

# SAT PREP

THE OFFICIAL STUDY GUIDE

STRATEGY

PRACTICE

REVIEW

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PRACTICE

TESTS



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# Acknowledgement

*This book was written to help students in succeeding in taking standardized Assessment Test (SAT). This book provides 9 practice tests, where questions are drawn from official tests or made to simulate the testing to better prepare students. To maximize the score improvement, we recommend taking the practice tests in testing settings. The College Planning Corp does not guarantee score improvement with the purchase of the book. This book is property of the College Planning Corp.*

### ***Planning Stages*** (High school freshmen and sophomores)

College applications are still a few years away, but we can help you prepare for and plan the best high school experience possible. We provide guidance in:

- Volunteering and extracurricular activities
- Finding and securing summer camp experiences
- leadership opportunities
- Foreign exchange programs
- Career and goal counseling and assessment based on abilities, interests, and personality
- Course selection toward interests

### ***Pre-application stage*** (High school juniors)

We also offer personalized services in:

- Gathering college information geared toward each individual student
- Prepare detailed information about specific colleges of interest, such as the best programs for possible majors

### ***Application stage*** (High school seniors)

College applications can be stressful and confusing. We are with you every step of the way to ensure you put your best foot forward in your application.

A sampling of our services:

- Career assessment based on abilities, interest, and personality
- Guidance and research assistance for narrowing career option
- Finding the best programs for your possible area of study, and gathering personalized, detailed information about those schools
- Guidance in filling out the Common application or school-specific applications and supplements
- Essay revision and development
- Resume creating and revision
- Prepare for college interviews

### ***Financial Aid and College Saving***

College Planning Co. offers guidance on saving for college financing, including comprehensive planning to reduce out of pocket expenses. We review all aspects of the family's financial situation and seek to reduce the EFC, the expected family contribution. Take advantage of our services in every step of the process:

- Opening 529 savings plans to jumpstart your college financial planning
- Complete financial analysis
- FAFSA and CSS profile preparations to avoid common mistakes families make that cause them to overpay for college
- International and undocumented student financial aid
- Maximization of need- and merit-based aid, scholarships, tax savings
- Evaluate and appeal financial aid awards
- Search for additional scholarships and eligibility

# Evidence-Based Reading and Writing

The Evidence-Based Reading and Writing section is composed of two tests that assess different but related skills and knowledge. The Reading Test gives you a chance to show how well you understand what you read. The Writing and Language Test asks you to revise and edit text.

This section has four distinctive features:

- **Emphasis on words in context:** Both tests measure your understanding of the meaning and use of words and phrases in the context of extended passages.
- **Emphasis on command of evidence:** Both tests require you to demonstrate your understanding of how writers make use of evidence to support and develop their claims and points.
- **Inclusion of informational graphics:** Both tests contain data presented in tables, graphs, charts, and the like, which you must interpret and integrate with information in a passage.
- **Variations in text complexity:** The passages on both tests range in difficulty from those found in grades 9–10 to those found in college-entry, credit-bearing postsecondary courses.

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## Reading Test Overview

The Reading Test gives you a chance to show how well you understand what you read.

- Total questions: 52 passage-based reading questions with multiple-choice responses
- Time allotted: 65 minutes
- Calculators may not be used or on your desk

## About the Passages

Reading passages range in length from about 500 to 750 words, and they are taken from a variety of fields, including U.S. and world literature, history/social studies, and science. Some passages are accompanied by tables, graphs, charts, and the like that you must interpret and sometimes synthesize with information and ideas presented in the associated passage. (Mathematical computation, however, is not required to answer these questions.) Some passages on similar subjects are paired, and these pairs are accompanied by questions that require you to make important connections between the passages as well as others that ask about each passage on its own.

## Tips for the Reading Test

- To answer each question, consider what is said directly in the passage(s) and use careful reasoning to draw supportable inferences and conclusions from the passage(s). The best answer to each question is derived from what is stated or implied in the passage(s) rather than from prior knowledge of the topics covered.
- Reading carefully is the key to finding the best answer. The information you need to answer each question is always in the passage(s). Don't be misled by an answer that looks correct but isn't supported by the actual text of the passage(s).
- The questions don't increase in difficulty from easy to hard. Instead, they are presented as logically as possible, with general questions about central ideas and themes, point of view, overall text structure, and the like coming early in the sequence. After that come more specific questions about details, words in context, evidence, and so on.
- Stay with a passage (or pair of passages) until you have answered as many questions as you can before you proceed to the next passage. Do not jump from passage to passage.
- The questions often include line numbers to help direct you to relevant part(s) of the passage(s). If one word or more is quoted exactly from the passage(s), generally the number(s) of the line(s) where that quotation can be found will appear in the question. You may have to look elsewhere in the passage(s), however, in order to find the best answer to the question.
- In your test booklet, mark any question you skip so that you can easily go back to it later if you have time.
- Remember that all questions are worth one point regardless of the type or difficulty. You are not penalized for guessing wrong, so it's to your advantage to answer each question as best you can.

## Sample Reading Materials

Following are samples of the kinds of Reading passages and questions that may appear on your test. For each set of sample materials:

- Read the passage(s) carefully.
- Decide on the best answer to each question.
- Read the explanation for the best answer to each question and for the answer you chose (if the two are different).

On the actual test, each passage will be followed by 10 or 11 questions. The directions provided on the next page match what you will see on the actual test.

# Reading Test Questions

## Directions

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-3 are based on the following passages.

Passage 1 is adapted from Susan Milius, "A Different Kind of Smart." ©2013 by Science News. Passage 2 is adapted from Bernd Heinrich, *Mind of the Raven: Investigations and Adventures with Wolf-Birds*. ©2007 by Bernd Heinrich.

#### Passage 1

In 1894, British psychologist C. Lloyd Morgan published what's called Morgan's canon, the principle that suggestions of humanlike mental processes behind an animal's behavior should be rejected if a simpler

5 explanation will do.

Still, people seem to maintain certain expectations, especially when it comes to birds and mammals.

"We somehow want to prove they are as 'smart' as people," zoologist Sara Shettleworth says. We want a bird that masters a vexing problem to be employing human-style insight.

New Caledonian crows face the high end of these expectations, as possibly the second-best toolmakers on the planet. Their tools are hooked sticks or strips made from spike-edged leaves, and they use them in the wild to wrinkle grubs out of crevices. Researcher Russell Gray first saw the process on a cold morning in a mountain forest in New Caledonia, an island chain east of Australia. Over the course of days, he and crow researcher Gavin Hunt had gotten wild crows used to finding meat tidbits in holes in a log. Once the birds were checking the log reliably, the researchers placed a spiky tropical pandanus plant beside the log and hid behind a blind.

25 A crow arrived. It hopped onto the pandanus plant, grabbed the spiked edge of one of the long straplike leaves and began a series of ripping motions. Instead of just tearing away one long strip, the bird ripped and nipped in a sequence to create a slanting stair-step edge on a leaf segment with a narrow point and a wide base. The process took only seconds. Then the bird dipped the narrow end of its leaf strip into a hole in the log, fished up the meat with the leaf-edge spikes, swallowed its prize and flew off.

35 "That was my 'oh wow' moment," Gray says. After the crow had vanished, he picked up the tool the bird had left behind. "I had a go, and I couldn't do it," he recalls. Fishing the meat out was tricky. It turned out

that Gray was moving the leaf shard too forcefully instead of gently stroking the spines against the treat.

40 The crow's deft physical manipulation was what inspired Gray and Auckland colleague Alex Taylor to test other wild crows to see if they employed the seemingly insightful string-pulling solutions that some ravens, kea parrots and other brainiac birds are known to employ. Three of four crows passed that test on the first try.

#### Passage 2

For one month after they left the nest, I led my four young ravens at least once and sometimes several times a day on thirty-minute walks. During these walks, I wrote down everything in their environment they pecked at. In the first sessions, I tried to be teacher. I touched specific objects—sticks, moss, rocks—and nothing that I touched remained untouched by them.

50 They came to investigate what I had investigated, leading me to assume that young birds are aided in learning to identify food from the parents' example. They also, however, contacted almost everything else that lay directly in their own paths. They soon became more independent by taking their own routes near mine. Even while walking along on their own, they pulled at leaves, grass stems, flowers, bark, pine needles, seeds, cones, clods of earth, and other objects they encountered. I wrote all this down, converting it to numbers. After they were thoroughly familiar with the background objects in these woods and started to ignore them, I seeded the path we would later walk together with objects they had never before encountered. Some of these were conspicuous food items: raspberries, dead meal worm beetles, and cooked corn kernels. Others were conspicuous and inedible: pebbles, glass chips, red winterberries. Still others were such highly cryptic foods as encased caddisfly larvae and moth cocoons. The results were dramatic.

75 The four young birds on our daily walks contacted all new objects preferentially. They picked them out at a rate of up to tens of thousands of times greater than background or previously contacted objects. The main initial criterion for pecking or picking anything up was its novelty. In subsequent trials, when the previously novel items were edible, they became preferred and the inedible objects became "background" items, just like the leaves, grass, and pebbles, even if they were highly conspicuous. These experiments showed that ravens' curiosity ensures exposure to all or almost all items in the environment.

85

1

Within Passage 1, the main purpose of the first two paragraphs (lines 1-11) is to

- A) offer historical background in order to question the uniqueness of two researchers' findings.
- B) offer interpretive context in order to frame the discussion of an experiment and its results.
- C) introduce a scientific principle in order to show how an experiment's outcomes validated that principle.
- D) present seemingly contradictory stances in order to show how they can be reconciled empirically.

<b>Estimated Difficulty:</b> Hard	<b>Key:</b> B
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**Choice B** is the best answer. Passage 1 opens with an explanation of Morgan's canon and continues with a discussion of people's expectations regarding animal intelligence. Taken together, the first two paragraphs indicate that despite cautions to the contrary, people still tend to look for humanlike levels of intelligence in many animals, including birds. These two paragraphs provide a framework in which to assess the work of Gray and Hunt, presented in the rest of the passage. The passage's characterization of the experiment Gray and Hunt conduct, in which they observe a crow's tool-making ability and to which Gray responds by trying and failing to mimic the bird's behavior ("I had a go, and I couldn't do it," line 37), suggests that Shettleworth, quoted in the second paragraph, is at least partially correct in her assessment that "we somehow want to prove [birds] are as 'smart' as people" (lines 8-9).

**Choice A** is incorrect because while the reference to Morgan's canon in the first paragraph offers a sort of historical background (given that the canon was published in 1894), the second paragraph describes people's continuing expectations regarding animal intelligence. Furthermore, the fact that Gray and Hunt may share with other people the tendency to look for humanlike intelligence in many animals does not by itself establish that the main purpose of the first two paragraphs is to question the uniqueness of Gray and Hunt's findings.

**Choice C** is incorrect because while the reference to Morgan's canon in the first paragraph does introduce a scientific principle, the discussion in the second paragraph of people's expectations regarding animal intelligence, as well as the passage's characterization of Gray and Hunt's experiment and how the researchers interpret the results, primarily suggest that people tend to violate the canon by attributing humanlike levels of intelligence to many animals.

**Choice D** is incorrect because although the first two paragraphs do present different perspectives, they are not seemingly or genuinely contradictory. The second paragraph, particularly the quotation from Shettleworth, serves mainly to qualify (not contradict) the position staked out in the first paragraph by suggesting that while Morgan's canon is probably a sound principle, people still tend to project humanlike levels of intelligence onto many animals. Moreover, the experiment depicted in the rest of the passage primarily bears out Shettleworth's claim that "we somehow want to prove [birds] are as 'smart' as people" (lines 8-9) and thus does not reconcile the perspectives found in the opening paragraphs.

2

According to the experiment described in Passage 2, whether the author's ravens continued to show interest in a formerly new object was dictated primarily by whether that object was

- A) edible.
- B) plentiful.
- C) conspicuous.
- D) natural.

<b>Estimated Difficulty:</b> Easy	<b>Key:</b> A
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**Choice A** is the best answer. The last paragraph of Passage 2 presents the results of an experiment in which the author scattered unfamiliar objects in the path of some ravens. According to the passage, the birds initially "contacted all new objects preferentially" but in "subsequent trials" only preferred those "previously novel items" that "were edible" (lines 75-81).

**Choice B** is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the inedible objects became 'background' items, just like the leaves, grass, and pebbles" (lines 80-83). In other words, plentiful items did not continue to interest the ravens unless the items were edible.

**Choice C** is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the inedible objects became 'background' items, just like the leaves, grass, and pebbles, even if they were highly conspicuous" (lines 80-84). In other words, conspicuous items did not continue to interest the ravens unless the items were edible.

**Choice D** is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the



inedible objects became 'background' items, just like the leaves, grass, and pebbles" (lines 80-83). In other words, natural items did not continue to interest the ravens unless the items were edible.

3

The crows in Passage 1 and the ravens in Passage 2 shared which trait?

- A) They modified their behavior in response to changes in their environment.
- B) They formed a strong bond with the humans who were observing them.
- C) They manufactured useful tools for finding and accessing food.
- D) They mimicked the actions they saw performed around them.

Estimated Difficulty: Medium

Key: A

**Choice A** is the best answer. Both bird species studied modified their behavior in response to changes in their environment. The researchers described in Passage 1 "had gotten wild crows used to finding meat tidbits in holes in a log" (lines 20-21). In other words, the researchers had repeatedly placed meat in the log — that is, changed the crows' environment — and the birds had responded by modifying their behavior, a point reinforced in line 22, which noted that the birds began "checking the log reliably." The ravens in Passage 2 act in analogous fashion, responding to the introduction of new objects in their environment by "pick[ing] them out at a rate of up to tens of thousands of times greater than background or previously contacted objects" (lines 76-78).

**Choice B** is incorrect because while there is some evidence that the ravens described in Passage 2 formed a bond with the author, going on walks with him and possibly viewing him as their "teacher," there is no evidence that a similar bond formed between the researchers described in Passage 1 and the crows they studied. Indeed, these researchers "hid behind a blind" (lines 23-24) in an effort to avoid contact with their subjects.

**Choice C** is incorrect because while crows' tool-making ability is the central focus of the experiment described in Passage 1, there is no evidence that the ravens in Passage 2 did anything similar. Passage 1 does mention that "some ravens" use "seemingly insightful string-pulling solutions" (lines 44-45), but nothing in Passage 2 suggests that the ravens in that particular study had or displayed tool-making abilities.

**Choice D** is incorrect because while there is some evidence that the ravens described in Passage 2 mimicked human behavior, going on walks with the author and possibly viewing him as their "teacher," there is no evidence that the crows in Passage 1 did any mimicking. Passage 1, in fact, suggests that the ability of the crow to produce the meat-fishing tool was innate rather than a skill it had acquired from either humans or other birds.

**Questions 4-6 are based on the following passage and supplementary material.**

This passage is adapted from Richard Florida, *The Great Reset*. ©2010 by Richard Florida.

In today's idea-driven economy, the cost of time is what really matters. With the constant pressure to innovate, it makes little sense to waste countless collective hours commuting. So, the most efficient and productive regions are those in which people are thinking and working—not sitting in traffic.

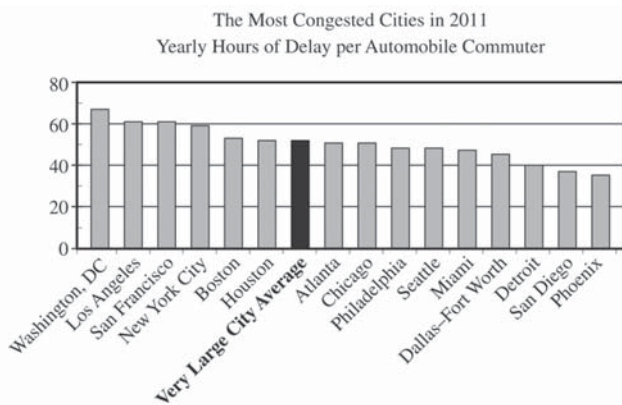
The auto-dependent transportation system has reached its limit in most major cities and megaregions. Commuting by car is among the least efficient of all our activities—not to mention among the least enjoyable, according to detailed research by the Nobel Prize-winning economist Daniel Kahneman and his colleagues. Though one might think that the economic crisis beginning in 2007 would have reduced traffic (high unemployment means fewer workers traveling to and from work), the opposite has been true. Average commutes have lengthened, and congestion has gotten worse, if anything. The average commute rose in 2008 to 25.5 minutes, "erasing years of decreases to stand at the level of 2000, as people had to leave home earlier in the morning to pick up friends for their ride to work or to catch a bus or subway train," according to the U.S. Census Bureau, which collects the figures. And those are average figures. Commutes are far longer in the big West Coast cities of Los Angeles and San Francisco and the East Coast cities of New York, Philadelphia, Baltimore, and Washington, D.C. In many of these cities, gridlock has become the norm, not just at rush hour but all day, every day.

The costs are astounding. In Los Angeles, congestion eats up more than 485 million working hours a year; that's seventy hours, or nearly two weeks, of full-time work per commuter. In D.C., the time cost of congestion is sixty-two hours per worker per year. In New York it's forty-four hours. Average it out, and the time cost across America's thirteen biggest city-regions is fifty-one hours per worker per year. Across the country, commuting wastes 4.2 billion hours of work time annually—nearly a full workweek for every commuter. The overall cost to the U.S. economy is nearly \$90 billion when lost productivity and wasted fuel are taken into account.

At the Martin Prosperity Institute, we calculate that every minute shaved off America's commuting time is worth \$19.5 billion in value added to the economy. The numbers add up fast: five minutes is worth \$97.7 billion; ten minutes, \$195 billion; fifteen minutes, \$292 billion.

It's ironic that so many people still believe the main remedy for traffic congestion is to build more roads and highways, which of course only makes the problem worse. New roads generate higher levels of "induced traffic," that is, new roads just invite drivers to drive more and lure people who take mass transit back to their cars. Eventually, we end up with more clogged roads rather than a long-term improvement in traffic flow.

The coming decades will likely see more intense clustering of jobs, innovation, and productivity in a smaller number of bigger cities and city-regions. Some regions could end up bloated beyond the capacity of their infrastructure, while others struggle, their promise stymied by inadequate human or other resources.



Adapted from Adam Werbach, "The American Commuter Spends 38 Hours a Year Stuck in Traffic." ©2013 by The Atlantic.

4

The passage most strongly suggests that researchers at the Martin Prosperity Institute share which assumption?

- A) Employees who work from home are more valuable to their employers than employees who commute.
- B) Employees whose commutes are shortened will use the time saved to do additional productive work for their employers.
- C) Employees can conduct business activities, such as composing memos or joining conference calls, while commuting.
- D) Employees who have lengthy commutes tend to make more money than employees who have shorter commutes.

Estimated Difficulty: Medium

Key: B

**Choice B** is the best answer because details in the third paragraph (lines 30-46) strongly suggest that researchers ("we") at the Martin Prosperity Institute assume that shorter commutes will lead to more productive time for workers. The author notes that "across the country, commuting wastes 4.2 billion hours of work time annually" and that "the overall cost to the U.S. economy is nearly \$90 billion when lost productivity and wasted fuel are taken into account" (lines 37-41). Given also that those at the institute "calculate that every minute shaved off America's commuting time is worth \$19.5 billion in value added to the economy" (lines 42-44), it can reasonably be concluded that some of that added value is from heightened worker productivity.

**Choice A** is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees who work from home are more valuable to their employers than employees who commute. Although the passage does criticize long commutes, it does not propose working from home as a solution.

**Choice C** is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees can conduct business activities, such as composing memos or joining conference calls, while commuting. The passage does discuss commuting in some detail, but it does not mention activities that commuters can or should be undertaking while commuting, and it generally portrays commuting time as lost or wasted time.

**Choice D** is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees who have lengthy commutes tend to make more money than employees who have shorter commutes. The passage does not draw any clear links between the amount of money employees make and the commutes they have.

5

As used in line 55, "intense" most nearly means

- A) emotional.
- B) concentrated.
- C) brilliant.
- D) determined.

Estimated Difficulty: Easy

Key: B

**Choice B** is the best answer because the context makes clear that the clustering of jobs, innovation, and productivity will be more concentrated in, or more densely packed into, "a smaller number of bigger cities and city-regions" (lines 56-57).



*Choice A* is incorrect because although “intense” sometimes means “emotional,” it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more emotional in “a smaller number of bigger cities and city-regions” (lines 56-57).

*Choice C* is incorrect because although “intense” sometimes means “brilliant,” it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more brilliant in “a smaller number of bigger cities and city-regions” (lines 56-57).

*Choice D* is incorrect because although “intense” sometimes means “determined,” it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more determined in “a smaller number of bigger cities and city-regions” (lines 56-57).

**6**

Which claim about traffic congestion is supported by the graph?

- A) New York City commuters spend less time annually delayed by traffic congestion than the average for very large cities.
- B) Los Angeles commuters are delayed more hours annually by traffic congestion than are commuters in Washington, D.C.
- C) Commuters in Washington, D.C., face greater delays annually due to traffic congestion than do commuters in New York City.
- D) Commuters in Detroit spend more time delayed annually by traffic congestion than do commuters in Houston, Atlanta, and Chicago.

<b>Estimated Difficulty:</b> Easy	<b>Key:</b> C
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**Choice C** is the best answer. Higher bars on the graph represent longer annual commute delays than do lower bars; moreover, the number of hours of annual commute delay generally decreases as one moves from left to right on the graph. The bar for Washington, D.C., is higher than and to the left of that for New York City, meaning that D.C. automobile commuters experience greater amounts of delay each year.

*Choice A* is incorrect because the graph’s bar for New York City is higher than and to the left of that for the average for very large cities, meaning that New York City automobile commuters experience greater, not lesser, amounts of delay each year.

*Choice B* is incorrect because the graph’s bar for Los Angeles is lower than and to the right of that

for Washington, D.C., meaning that Los Angeles automobile commuters experience lesser, not greater, amounts of delay each year.

*Choice D* is incorrect because the graph’s bar for Detroit is lower than and to the right of those for Houston, Atlanta, and Chicago, meaning that Detroit automobile commuters experience lesser, not greater, amounts of delay each year.

**Questions 7-9 are based on the following passage.**

This passage is adapted from a speech delivered by Congresswoman Barbara Jordan of Texas on July 25, 1974, as a member of the Judiciary Committee of the United States House of Representatives. In the passage, Jordan discusses how and when a United States president may be impeached, or charged with serious offenses, while in office. Jordan’s speech was delivered in the context of impeachment hearings against then president Richard M. Nixon.

Today, I am an inquisitor. An hyperbole would not be fictional and would not overstate the solemnness that I feel right now. My faith in the Constitution is whole; it is complete; it is total. And I am not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution.

Line 5

“Who can so properly be the inquisitors for the nation as the representatives of the nation themselves?” “The subjects of its jurisdiction are those offenses which proceed from the misconduct of public men.”\* And that’s what we’re talking about. In other words, [the jurisdiction comes] from the abuse or violation of some public trust.

10

It is wrong, I suggest, it is a misreading of the Constitution for any member here to assert that for a member to vote for an article of impeachment means that that member must be convinced that the President should be removed from office. The Constitution doesn’t say that. The powers relating to impeachment are an essential check in the hands of the body of the legislature against and upon the encroachments of the executive. The division between the two branches of the legislature, the House and the Senate, assigning to the one the right to accuse and to the other the right to judge—the framers of this Constitution were very astute. They did not make the accusers and the judges . . . the same person.

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We know the nature of impeachment. We’ve been talking about it a while now. It is chiefly designed for the President and his high ministers to somehow be called into account. It is designed to “bridle” the executive if he engages in excesses. “It is designed as a method of national inquest into the conduct of public men.”\* The framers confided in the Congress the power, if need be, to remove the President in order to strike a delicate balance between a President swollen with power and grown tyrannical, and preservation of the independence of the executive.

30

35

The nature of impeachment: a narrowly channeled exception to the separation of powers maxim. The Federal

Convention of 1787 said that. It limited impeachment to high crimes and misdemeanors, and discounted and opposed the term “maladministration.” “It is to be used only for great misdemeanors,” so it was said in the North Carolina ratification convention. And in the Virginia ratification convention: “We do not trust our liberty to a particular branch. We need one branch to check the other.”

... The North Carolina ratification convention: “No one need be afraid that officers who commit oppression will pass with immunity.” “Prosecutions of impeachments will seldom fail to agitate the passions of the whole community,” said Hamilton in the *Federalist Papers*, number 65. “We divide into parties more or less friendly or inimical to the accused.”\* I do not mean political parties in that sense.

The drawing of political lines goes to the motivation behind impeachment; but impeachment must proceed within the confines of the constitutional term “high crime[s] and misdemeanors.” Of the impeachment process, it was Woodrow Wilson who said that “Nothing short of the grossest offenses against the plain law of the land will suffice to give them speed and effectiveness. Indignation so great as to overgrow party interest may secure a conviction; but nothing else can.”

Common sense would be revolted if we engaged upon this process for petty reasons. Congress has a lot to do: appropriations, tax reform, health insurance, campaign finance reform, housing, environmental protection, energy sufficiency, mass transportation. Pettiness cannot be allowed to stand in the face of such overwhelming problems. So today we’re not being petty. We’re trying to be big, because the task we have before us is a big one.

\*Jordan quotes from *Federalist No. 65*, an essay by Alexander Hamilton, published in 1788, on the powers of the United States Senate, including the power to decide cases of impeachment against a president of the United States.

7

The stance Jordan takes in the passage is best described as that of

- A) an idealist setting forth principles.
- B) an advocate seeking a compromise position.
- C) an observer striving for neutrality.
- D) a scholar researching a historical controversy.

Estimated Difficulty: Hard

Key: A

**Choice A** is the best answer. Jordan helps establish her idealism by declaring that she is an “inquisitor” (line 1) and that her “faith in the Constitution is whole; it is complete; it is total” (lines 3-4). At numerous points in the passage, Jordan sets forth principles (e.g., “The powers

relating to impeachment are an essential check in the hands of the body of the legislature against and upon the encroachments of the executive,” in lines 18-20) and makes reference to important documents that do the same, including the U.S. Constitution and *Federalist No. 65*.

**Choice B** is incorrect because although Jordan is advocating a position, there is no evidence in the passage that she is seeking a compromise position. Indeed, she notes that she is “not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution” (lines 4-6), indicating that she is not seeking compromise.

**Choice C** is incorrect because Jordan is a participant (“an inquisitor,” line 1) in the proceedings, not a mere observer. Indeed, she notes that she is “not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution” (lines 4-6).

**Choice D** is incorrect because Jordan is identified as a congresswoman and an “inquisitor” (line 1), not a scholar, and because she is primarily discussing events happening at the moment, not researching an unidentified historical controversy. Although she refers to historical documents and individuals, her main emphasis is on the (then) present impeachment hearings.

8

In lines 49-54 (“Prosecutions . . . sense”), what is the most likely reason Jordan draws a distinction between two types of “parties”?

- A) To counter the suggestion that impeachment is or should be about partisan politics
- B) To disagree with Hamilton’s claim that impeachment proceedings excite passions
- C) To contend that Hamilton was too timid in his support for the concept of impeachment
- D) To argue that impeachment cases are decided more on the basis of politics than on justice

Estimated Difficulty: Medium

Key: A

**Choice A** is the best answer. Jordan is making a distinction between two types of “parties”: the informal associations to which Alexander Hamilton refers and formal, organized political parties such as the modern-day Republican and Democratic parties. Jordan anticipates that listeners to her speech might misinterpret her use of Hamilton’s quotation as suggesting that she thinks impeachment is essentially a tool of organized political parties to achieve partisan ends, with one party attacking and another defending the president. Throughout

the passage, and notably in the seventh paragraph (lines 55-63), Jordan makes clear that she thinks impeachment should be reserved only for the most serious of offenses — ones that should rankle people of any political affiliation.

*Choice B* is incorrect because Jordan offers no objection to Hamilton’s notion that impeachment proceedings excite passions. Indeed, she quotes Hamilton extensively in a way that indicates that she fundamentally agrees with his view on impeachment. Moreover, she acknowledges that her own speech is impassioned — that she feels a “solemnness” (line 2) and a willingness to indulge in “hyperbole” (line 1).

*Choice C* is incorrect because Jordan offers no objection to Hamilton’s level of support for the concept of impeachment. Indeed, she quotes Hamilton extensively in a way that indicates that she fundamentally agrees with his view on impeachment.

*Choice D* is incorrect because Jordan suggests that she and her fellow members of Congress are “trying to be big” (line 71), or high-minded, rather than decide the present case on the basis of politics. Indeed, throughout the last four paragraphs of the passage (lines 37-72), she elaborates on the principled, just basis on which impeachment should proceed. Moreover, throughout the passage, Jordan is focused on the present impeachment hearings, not on the justice or injustice of impeachments generally.

9

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 13-17 (“It . . . office”)
- B) Lines 20-24 (“The division . . . astute”)
- C) Lines 55-58 (“The drawing . . . misdemeanors”)
- D) Lines 65-68 (“Congress . . . transportation”)

**Estimated Difficulty:** Hard

**Key:** C

**Choice C** is the best answer because in lines 55-58, Jordan draws a contrast between political motivations and “high crime[s] and misdemeanors” as the basis for impeachment and argues that impeachment “must proceed within the confines” of the latter concept. These lines thus serve as the best evidence for the answer to the previous question.

*Choice A* is incorrect because lines 13-17 only address a misconception that Jordan contends some people have about what a vote for impeachment means. Therefore, these lines do not

serve as the best evidence for the answer to the previous question.

*Choice B* is incorrect because lines 20-24 only speak to a division of responsibility between the two houses of the U.S. Congress. Therefore, these lines do not serve as the best evidence for the answer to the previous question.

*Choice D* is incorrect because lines 65-68 serve mainly to indicate that the U.S. Congress has an extensive and important agenda. Therefore, these lines do not serve as the best evidence for the answer to the previous question.

## Writing and Language Test Overview

In the Writing and Language Test, you will be asked to make revision and editing decisions to improve multiparagraph passages.

- Total questions: 44 passage-based questions with multiple-choice responses
- Time allotted: 35 minutes
- Calculators may not be used or on your desk.

### About the Passages

Writing and Language passages range in length from about 400 to 450 words; they’re well-written pieces covering career-related topics as well as topics in history/social studies, the humanities, and science. As in the Reading Test, some passages in the Writing and Language Test are accompanied by tables, graphs, charts, and the like, which are intended to inform your decisions about how to revise and edit the passages. (Mathematical computation, again, is not required to answer these questions.)

### Tips for the Writing and Language Test

The Writing and Language Test comprises a series of passages — sometimes accompanied by one or more informational graphics (e.g., tables and graphs) — and associated multiple-choice questions. The questions ask you to revise and edit text to improve the development, organization, and expression of information and ideas and to correct errors in sentence structure, usage, and punctuation. All of the questions are passage based. Rote recall of language conventions is not tested.

- Each page of the Writing and Language Test is divided into two columns. Passages appear across multiple pages in the left-hand column, while associated questions appear in the right-hand column of each page. Questions direct your attention to particular parts of the passage, such

as a bit of underlined text or a paragraph, or ask you to consider the passage as a whole.

- Read each passage carefully. As you answer each question, decide on the best choice in light of the passage as a whole. Some questions can be answered just by looking at a particular sentence, but others require an understanding of the writer's overall purpose and approach. Remember that while most questions call attention to certain parts of the passage, finding the best answer may require looking back or further ahead in the passage. The information you need to answer each question is always in the passage.
- The most common format for the questions offers you three alternatives to an underlined portion of the passage along with the option of not changing the original language. For each of these questions, select the alternative that most effectively improves the development, organization, or use of language in the passage or that corrects an error in grammar, usage, or punctuation; or select "NO CHANGE" if you think the original version presented in the passage is the best option.
- Stay with a passage until you have answered as many questions as you can before you proceed to the next passage. Do not jump from passage to passage.

- In your test booklet, mark each question you skip so that you can easily go back to it later if you have time.
- Remember that all questions are worth one point regardless of the type or difficulty. You are not penalized for guessing wrong, so it's to your advantage to answer each question as best you can.

## Sample Writing and Language Materials

Following are samples of the kinds of Writing and Language passages and questions that may appear on your test. For each set of sample materials:

- Read the passage carefully.
- Decide on the best answer to each question.
- Read the explanation for the best answer to each question and for the answer you chose (if the two are different).

On the actual test, the passages and questions will be in side-by-side columns, with each passage (spread over multiple pages) in the left-hand column and associated questions in the right-hand column.

The directions provided here match what you will see on the actual test.

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# Writing and Language Test Questions

## Directions

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-5 are based on the following passage.

### Dong Kingman: Painter of Cities

A 1954 documentary about renowned watercolor painter Dong Kingman shows the artist sitting on a stool on Mott Street in New York City's Chinatown. A crowd of admiring spectators **1** watched as Kingman squeezes dollops of paint from several tubes into a tin watercolor **2** box, from just a few primary colors, Kingman creates dozens of beautiful hues as he layers the translucent paint onto the paper on his easel. Each stroke of the brush and dab of the sponge transforms thinly sketched outlines into buildings, shop signs, and streetlamps. The street scene Kingman begins composing in this short film is very much in keeping with the urban landscapes for which he is best known.

Kingman was keenly interested in landscape painting from an early age. His interest was so keen, in fact,



that he was named after it. In Hong Kong, where Kingman completed his schooling, teachers at that time customarily assigned students a formal “school name.” The young boy who had been Dong Moy Shu became Dong Kingman. The name Kingman was selected for its two **3** parts, “king” and “man”; Cantonese for “scenery” and “composition.” As Kingman developed as a painter, his works were often compared to paintings by Chinese landscape artists dating back to CE 960, a time when a strong tradition of landscape painting emerged in Chinese art. Kingman, however, departed from that tradition in a number of ways, most notably in that he chose to focus not on natural landscapes, such as mountains and rivers, but on cities.

His fine brushwork conveys detailed street-level activity: a peanut vendor pushing his cart on the sidewalk, a pigeon pecking for crumbs around a fire hydrant, an old man tending to a baby outside a doorway. His broader brush strokes and sponge-painted shapes create majestic city skylines, with skyscrapers towering in the background, bridges connecting neighborhoods on either side of a river, and **4** delicately painted creatures, such as a tiny, barely visible cat prowling in the bushes of a park. To art critics and fans alike, these city scenes represent the innovative spirit of twentieth-century urban Modernism.

During his career, Kingman exhibited his work internationally, garnering much acclaim. In 1936, a critic described one of Kingman’s solo exhibits as “twenty of the freshest, most satisfying watercolors that have been seen hereabouts in many a day.” **5**

**1**

- A) NO CHANGE
- B) had watched
- C) would watch
- D) watches

<b>Estimated Difficulty:</b> Easy	<b>Key:</b> D
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**Choice D** is the best answer because the simple present tense verb “watches” is consistent with the tense of the verbs in the rest of the sentence and paragraph.

**Choice A** is incorrect because “watched” creates an inappropriate shift to the past tense.

**Choice B** is incorrect because “had watched” creates an inappropriate shift to the past perfect tense.

**Choice C** is incorrect because “would watch” creates an inappropriate shift that suggests a habitual or hypothetical aspect when other verbs in the sentence and paragraph indicate that a specific, actual instance is being narrated.

**2**

- A) NO CHANGE
- B) box. From just a few primary colors,
- C) box from just a few primary colors,
- D) box, from just a few primary colors

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> B
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**Choice B** is the best answer because it provides punctuation that creates two grammatically complete and standard sentences.

**Choice A** is incorrect because it results in a comma splice as well as some confusion about what the prepositional phrase “from just a few primary colors” modifies.

**Choice C** is incorrect because it results in a run-on sentence as well as some confusion about what the prepositional phrase “from just a few primary colors” modifies.

**Choice D** is incorrect because it results in a comma splice.

**3**

- A) NO CHANGE
- B) parts: “king” and “man,”
- C) parts “king” and “man”;
- D) parts; “king” and “man”

<b>Estimated Difficulty:</b> Hard	<b>Key:</b> B
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**Choice B** is the best answer because the colon after “parts” effectively signals that what follows in the sentence further defines what the “two parts” of Kingman’s name are and because the comma after “man” properly indicates that “‘king’ and ‘man’” and “Cantonese for ‘scenery’ and ‘composition’” are nonrestrictive appositives.

*Choice A* is incorrect because the semicolon after “man” incorrectly joins an independent clause and a phrase. Moreover, the comma after “parts” is arguably a weak form of punctuation to be signaling the strong break in the sentence indicated here.

*Choice C* is incorrect because the semicolon after “man” incorrectly joins an independent clause and a phrase and because the absence of appropriate punctuation after “parts” fails to indicate that “two parts” and “‘king’ and ‘man’” are nonrestrictive appositives.

*Choice D* is incorrect because the semicolon after “parts” incorrectly joins an independent clause and two phrases and because the absence of appropriate punctuation after “man” fails to indicate that “‘king’ and ‘man’” and “Cantonese for ‘scenery’ and ‘composition’” are nonrestrictive appositives.

4

The writer wants to complete the sentence with a third example of a detail Kingman uses to create his majestic city skylines. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) exquisitely lettered street and storefront signs.
- C) other details that help define Kingman’s urban landscapes.
- D) enormous ships docking at busy urban ports.

**Estimated Difficulty:** Hard

**Key:** D

**Choice D** is the best answer because the phrase “enormous ships docking at busy urban ports” effectively continues the sentence’s series of details (“skyscrapers towering in the background” and “bridges connecting neighborhoods”) conveying the majesty of city skylines as depicted by Kingman.

*Choice A* is incorrect because the phrase “delicately painted creatures, such as a tiny, barely visible cat prowling in the bushes of a park” does not convey a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence’s series of details (“skyscrapers towering in the background” and “bridges connecting neighborhoods”).

*Choice B* is incorrect because the phrase “exquisitely lettered street and storefront signs” does not convey a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence’s series of details (“skyscrapers towering in the background” and “bridges connecting neighborhoods”).

*Choice C* is incorrect because the phrase “other details that help define Kingman’s urban landscapes” is too vague and general to constitute a third example that conveys a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence’s series of details (“skyscrapers towering in the background” and “bridges connecting neighborhoods”).

5

The writer wants to conclude the passage with a sentence that emphasizes an enduring legacy of Kingman’s work. Which choice would best accomplish this goal?

- A) Although Kingman’s work might not be as famous as that of some other watercolor painters, such as Georgia O’Keeffe and Edward Hopper, it is well regarded by many people.
- B) Since Kingman’s death in 2000, museums across the United States and in China have continued to ensure that his now-iconic landscapes remain available for the public to enjoy.
- C) The urban landscapes depicted in Kingman’s body of work are a testament to the aptness of the name chosen for Kingman when he was just a boy.
- D) Kingman’s work was but one example of a long-lasting tradition refreshed by an innovative artist with a new perspective.

**Estimated Difficulty:** Hard

**Key:** B

**Choice B** is the best answer because it concludes the passage with a sentence that emphasizes the enduring legacy of Kingman’s work by indicating that museums continue to make Kingman’s iconic paintings accessible to the public.

*Choice A* is incorrect because it concludes the passage with a sentence that acknowledges that the works of other painters are more famous than Kingman’s (which downplays, rather than emphasizes, the enduring legacy of Kingman’s work) and offers only a general assertion that Kingman’s work is “well regarded by many people.”

*Choice C* is incorrect because instead of referring to the enduring legacy of Kingman’s work, it concludes the passage with a sentence that recalls a detail the passage provides about Kingman’s early life.

*Choice D* is incorrect because it concludes the passage with a sentence that is too vague and general to emphasize effectively an enduring legacy of Kingman’s work. It is not clear what the idea of refreshing a long-lasting tradition is intended to mean or how (or even whether)

this represents an enduring legacy. Moreover, referring to Kingman's work as "but one example" downplays the significance of any potential legacy that might be suggested.

**Questions 6-10 are based on the following passage and supplementary material.**

### A Life in Traffic

A subway system is expanded to provide service to a growing suburb. A bike-sharing program is adopted to encourage nonmotorized transportation. Stoplight timing is coordinated to alleviate rush hour traffic jams in a congested downtown area. When any one of these changes **6** occur, it is likely the result of careful analysis conducted by transportation planners.

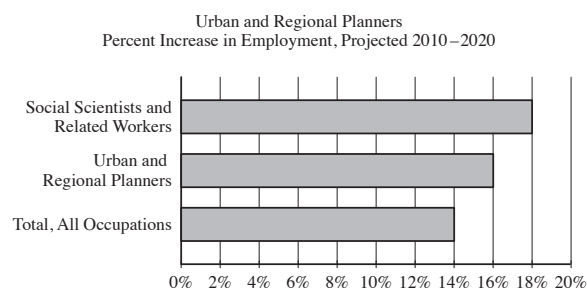
The work of transportation planners generally includes evaluating current transportation needs, assessing the effectiveness of existing facilities, and improving those facilities or designing new ones. Most transportation planners work in or near cities, **7** but some are employed in rural areas. Say, for example, a large factory is built on the outskirts of a small town. Traffic to and from that location would increase at the beginning and end of work shifts. The transportation planner's job might involve conducting a traffic count to determine the daily number of vehicles traveling on the road to the new factory. If analysis of the traffic count indicates that there is more traffic than the **8** current road as it is designed at this time can efficiently accommodate, the transportation planner might recommend widening the road to add another lane.

Transportation planners work closely with a number of community stakeholders, such as government officials and other interested organizations and individuals. For instance, representatives from the local public health department might provide input in designing a network of trails and sidewalks to encourage people to walk more. **9** According to the American Heart Association, walking provides numerous benefits related to health and well-being. Members of

the Chamber of Commerce might share suggestions about designing transportation and parking facilities to support local businesses.

People who pursue careers in transportation planning have a wide variety of educational backgrounds. A two-year degree in transportation technology may be sufficient for some entry-level jobs in the field. Most jobs, however, require at least a bachelor's degree; majors of transportation planners are **10** varied, including fields such as urban studies, civil engineering, geography, or transportation and logistics management. For many positions in the field, a master's degree is required.

Transportation planners perform critical work within the broader field of urban and regional planning. As of 2010, there were approximately 40,300 urban and regional planners employed in the United States. The United States Bureau of Labor Statistics forecasts steady job growth in this field, predicting that employment of urban and regional planners will increase 16 percent between 2010 and 2020. Population growth and concerns about environmental sustainability are expected to spur the need for transportation planning professionals.



Adapted from United States Bureau of Labor Statistics, Employment Projections program. "All occupations" includes all occupations in the United States economy.

6

- A) NO CHANGE
- B) occur, they are
- C) occurs, they are
- D) occurs, it is

<b>Estimated Difficulty:</b> Hard	<b>Key:</b> D
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**Choice D** is the best answer because it maintains agreement between the pronoun (“it”) and the antecedent (“any one”) and between the subject (“any one”) and the verb (“occurs”).

*Choice A* is incorrect because the plural verb “occur” does not agree with the singular subject “any one.”

*Choice B* is incorrect because the plural verb “occur” does not agree with the singular subject “any one” and because the plural pronoun “they” does not agree with the singular antecedent “any one.”

*Choice C* is incorrect because the plural pronoun “they” does not agree with the singular antecedent “any one.”

7

Which choice results in the most effective transition to the information that follows in the paragraph?

- A) NO CHANGE
- B) where job opportunities are more plentiful.
- C) and the majority are employed by government agencies.
- D) DELETE the underlined portion and end the sentence with a period.

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> A
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**Choice A** is the best answer because it effectively signals the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area and asked to consider the effects of a new factory built “on the outskirts of a small town.”

*Choice B* is incorrect because noting that job opportunities are more plentiful in cities does not effectively signal the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area.

*Choice C* is incorrect because noting that most transportation planners work for government agencies does not effectively signal the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area.

*Choice D* is incorrect because the proposed deletion would create a jarring shift from the statement “Most transportation planners work in or near cities” to the example of the work a transportation planner might perform if he or she were employed in a rural area.

8

- A) NO CHANGE
- B) current design of the road right now
- C) road as it is now currently designed
- D) current design of the road

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> D
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**Choice D** is the best answer because it offers a clear and concise wording without redundancy or wordiness.

*Choice A* is incorrect because “current” is redundant with “at this time” and because “as it is designed” is unnecessarily wordy.

*Choice B* is incorrect because “current” is redundant with “right now.”

*Choice C* is incorrect because “now” is redundant with “currently.”

9

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it provides supporting evidence about the benefits of walking.
- B) Kept, because it provides an additional example of a community stakeholder with whom transportation planners work.
- C) Deleted, because it blurs the paragraph’s focus on the community stakeholders with whom transportation planners work.
- D) Deleted, because it doesn’t provide specific examples of what the numerous benefits of walking are.

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> C
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**Choice C** is the best answer because it identifies the best reason the underlined sentence should not be kept. At this point in the passage and paragraph, a general statement about the benefits of walking only serves to interrupt the discussion of the community stakeholders with whom transportation planners work.

*Choice A* is incorrect because the underlined sentence should not be kept. Although the sentence theoretically provides supporting evidence about the benefits of walking, the passage has not made



a claim that needs to be supported in this way, and including such a statement only serves to interrupt the discussion of the community stakeholders with whom transportation planners work.

*Choice B* is incorrect because the underlined sentence should not be kept. Although the American Heart Association could theoretically be an example of “other interested organizations” that transportation planners work with, the sentence does not suggest this is the case. Instead, the association is merely the source for the general statement about the benefits of walking, a statement that only serves to interrupt the discussion of the actual community stakeholders with whom transportation planners work.

*Choice D* is incorrect because, although the underlined sentence should be deleted, it is not because the sentence lacks specific examples of the numerous benefits of walking. Adding such examples would only serve to blur the focus of the paragraph further with general factual information, as the paragraph’s main purpose is to

discuss the community stakeholders with whom transportation planners work.

10

- A) NO CHANGE
- B) varied, and including
- C) varied and which include
- D) varied, which include

**Estimated Difficulty:** Hard

**Key:** A

**Choice A** is the best answer because it effectively uses a comma and “including” to set off the list of varied fields in which transportation planners major.

*Choice B* is incorrect because “and including” results in an ungrammatical sentence.

*Choice C* is incorrect because “and which include” results in an ungrammatical sentence.

*Choice D* is incorrect because is it unclear from this construction to what exactly the relative pronoun “which” refers.

## Math

The Math questions test your ability to solve problems and use appropriate approaches and tools strategically. The test measures math skills across four areas:

- Heart of Algebra
- Problem Solving and Data Analysis
- Passport to Advanced Math
- Additional Topics in Math (covering relevant concepts learned in high school math, such as the Pythagorean theorem)

### Math Test Overview

The Math Test includes a portion that allows the use of a calculator and a portion that does **not**. Total of 58 questions (20 questions on the no calculator portion and 38 questions on the calculator portion):

- 45 standard multiple-choice questions
- 13 student-produced response questions
- Time allotted for Math – No Calculator: 25 minutes  
Time allotted for Math – Calculator: 55 minutes

Some questions are like those you may have seen in your math courses. The ability to reason logically in a variety of situations, including ones related to career, science, and social studies,

is tested throughout. You’ll also encounter at least three item sets that include more than one question about a given scenario.

### Tips for the Math Test

- Familiarize yourself with the directions ahead of time.
- The test does not require you to memorize formulas. Commonly used formulas are provided in the test booklet at the beginning of each math portion. Other formulas that are needed are provided in the questions themselves. It’s up to you to decide which formula is appropriate to a question.
- Read the problem carefully. Look for key words that tell you what the problem is asking. Ask yourself the following questions before you solve each problem: What is the question asking? What do I know?
- With some problems, it may be useful to draw a sketch or diagram of the given information.
- Use the test booklet for scratch work. You won’t receive credit for anything written in the booklet, but you’ll be able to check your work later.
- In the portion of the test that allows calculator use, you should be strategic when choosing to use your calculator. (See Calculator Tips.)

- Pace yourself so you have time to try answering every question and don't spend too much time on any individual problem.
- Eliminate choices. It's sometimes easier to find the wrong answers than the correct one. Remember that you won't lose points for incorrect answers, so plan to make your best guess if you don't know the answer.
- Check your answer to make sure it's a reasonable answer to the question asked. This is especially true for student-produced response questions, where no answer choices are given.
- All figures are drawn to scale unless otherwise indicated.

## Calculator Policy

You may not share calculators. You'll be dismissed and your scores will be canceled if you use your calculator to share information during the test or to remove test questions or answers from the test room.

### Acceptable Calculators

All questions on the Math Test – Calculator section can be solved without a calculator, but you may find using a calculator helpful on some questions. A scientific or graphing calculator is recommended for the Math Test – Calculator section.

Calculators permitted during testing are:

- Most graphing calculators (see a list at [sat.org/calculator](http://sat.org/calculator)).
- All scientific calculators that do not have prohibited features noted below.
- Four-function calculators (not recommended).

### Unacceptable Calculators

Do NOT bring these types of calculators to the test:

- Laptops or other computers, tablets, cell phones, or smartphones
- Models that can access the internet, have wireless, Bluetooth, cellular, audio/video recording and playing, camera, or any other smartphone-type feature
- Models that have typewriter-like keypad, pen-input, or stylus
- Models that use electrical outlets, make noise, or have a paper tape (unless approved to use as an accommodation)

In addition, the use of hardware peripherals such as a stylus with an approved calculator is not permitted. Some models with touch-screen capability are not permitted (e.g., Casio ClassPad). Check the list of acceptable calculators for models that are permitted.

## Calculator Tips

- Remember to bring your calculator on test day. Calculators will not be available at the test center. You should be familiar with how to use the calculator you bring to the test.
- Make sure your calculator is in good working order and that its batteries are fresh. If your calculator fails during testing and you have no backup, you will have to complete the test without it (or cancel your scores for the entire test).
- Don't buy an expensive, sophisticated calculator just to take the test. Although you can use them for the test, more sophisticated calculators are not required for any problem.
- Don't try to use a calculator on every question in the calculator portion. First, decide how you will solve the problem, and then decide whether to use the calculator. The calculator is meant to aid you in solving problems, not to get in the way.
- All questions in the calculator portion can be answered without a calculator, but for some questions, a calculator may be helpful. Look for algebra structures to solve problems first before reaching for your calculator.
- Take the calculator portion of the practice test with a calculator at hand. This will help you practice determining which types of questions you should use your calculator to answer.

## Sample Math Materials

Following are samples of the kinds of Math Test – No Calculator and Math Test – Calculator questions that may appear on your test. For these sample materials:

- Review the notes shown at the beginning of the section. They match what you will see at the beginning of both sections on the actual test.
- Decide on the correct answer to each multiple-choice question, then read the explanation for the correct answer to each question and for the answer you chose (if the two are different).
- Follow the directions for the student-produced response questions, shown on page 24. The directions match what you'll see on both portions of the actual test.

### Tips for Student-Produced Response Questions

- Know the rules for gridding mixed numbers and repeating decimals before taking the test.
- Check your work if your answer does not fit on the answer grid. If you obtain a negative value or a value greater than 9999, you have made an error.
- A zero cannot be gridded in the leftmost column of the answer grid.
- A fraction does not have to be reduced unless it will not fit on the answer grid.

# Math Test – No Calculator Questions

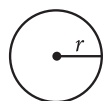
## Directions

For questions 1-5, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For question 6, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 6 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## Notes

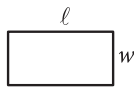
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## Reference

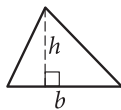


$$A = \pi r^2$$

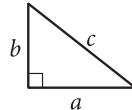
$$C = 2\pi r$$



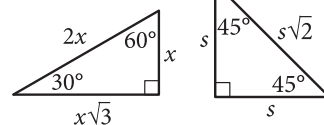
$$A = \ell w$$



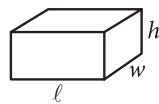
$$A = \frac{1}{2}bh$$



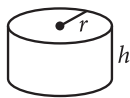
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



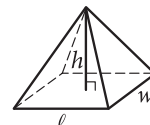
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

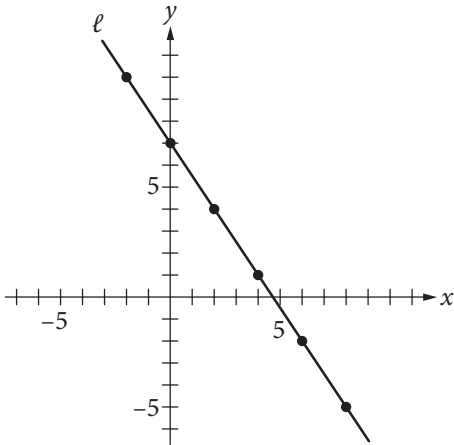
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

1

Line  $\ell$  is graphed in the  $xy$ -plane below.



If line  $\ell$  is translated up 5 units and right 7 units, then what is the slope of the new line?

- A)  $-\frac{2}{5}$
- B)  $-\frac{3}{2}$
- C)  $-\frac{8}{9}$
- D)  $-\frac{11}{14}$

**Estimated Difficulty:** Easy

**Key:** B

**Choice B** is correct. The slope of a line can be determined by finding the difference in the  $y$ -coordinates divided by the difference in the  $x$ -coordinates for any two points on the line.

Using the points indicated, the slope of line  $\ell$  is  $-\frac{3}{2}$ . Translating line  $\ell$  moves all the points on the line the same distance in the same direction, and the image will be a line parallel to  $\ell$ . Therefore, the slope of the image is also  $-\frac{3}{2}$ .

**Choice A** is incorrect. This value may result from a combination of errors. You may have erroneously determined the slope of the new line by adding 5 to the numerator and adding 7 to the denominator in the slope of line  $\ell$  and gotten the result  $\frac{(-3+5)}{(-2+7)}$ .

**Choice C** is incorrect. This value may result from a combination of errors. You may have erroneously determined the slope of the new line by subtracting 5 from the numerator and subtracting 7 from the denominator in the slope of line  $\ell$ .

**Choice D** is incorrect and may result from adding  $\frac{5}{7}$  to the slope of line  $\ell$ .

2

The mean number of students per classroom,  $y$ , at Central High School can be estimated using the equation  $y = 0.8636x + 27.227$ , where  $x$  represents the number of years since 2004 and  $x \leq 10$ . Which of the following statements is the best interpretation of the number 0.8636 in the context of this problem?

- A) The estimated mean number of students per classroom in 2004
- B) The estimated mean number of students per classroom in 2014
- C) The estimated yearly decrease in the mean number of students per classroom
- D) The estimated yearly increase in the mean number of students per classroom

**Estimated Difficulty:** Easy

**Key:** D

**Choice D** is correct. When an equation is written in the form  $y = mx + b$ , the coefficient of the  $x$ -term (in this case 0.8636) is the slope. The slope of this linear equation gives the amount that the mean number of students per classroom (represented by  $y$ ) changes per year (represented by  $x$ ).

**Choice A** is incorrect and may result from a misunderstanding of slope and  $y$ -intercept. The  $y$ -intercept of the equation represents the estimated mean number of students per classroom in 2004.

**Choice B** is incorrect and may result from a misunderstanding of the limitations of the model. You may have seen that  $x \leq 10$  and erroneously used this statement to determine that the model finds the mean number of students in 2014.

**Choice C** is incorrect and may result from a misunderstanding of slope. You may have recognized that slope models the rate of change but thought that a slope of less than 1 indicates a decreasing function.

3

The graph of  $y = (2x - 4)(x - 4)$  is a parabola in the  $xy$ -plane. In which of the following equivalent equations do the  $x$ - and  $y$ -coordinates of the vertex of the parabola appear as constants or coefficients?

- A)  $y = 2x^2 - 12x + 16$
- B)  $y = 2x(x - 6) + 16$
- C)  $y = 2(x - 3)^2 + (-2)$
- D)  $y = (x - 2)(2x - 8)$

**Estimated Difficulty:** Medium

**Key:** C

**Choice C** is correct. The equation  $y = (2x - 4)(x - 4)$  can be written in vertex form,  $y = a(x - h)^2 + k$ , to display the vertex,  $(h, k)$ , of the parabola. To put the equation in vertex form, first multiply:  $(2x - 4)(x - 4) = 2x^2 - 8x - 4x + 16$ . Then, add like terms,  $2x^2 - 8x - 4x + 16 = 2x^2 - 12x + 16$ . The next step is completing the square.

$$y = 2x^2 - 12x + 16$$

$$y = 2(x^2 - 6x) + 16$$

Isolate the  $x^2$  term by factoring

$$y = 2(x^2 - 6x + 9 - 9) + 16$$

Make a perfect square in the parentheses

$$y = 2(x^2 - 6x + 9) - 18 + 16$$

Move the extra term out of the parentheses

$$y = 2(x - 3)^2 - 18 + 16$$

Factor inside the parentheses

$$y = 2(x - 3)^2 - 2$$

Simplify the remaining terms

Therefore, the coordinates of the vertex,  $(3, -2)$ , are both revealed only in choice C. Since you are told that all of the equations are equivalent, simply knowing the form that displays the coordinates of the vertex will save all of these steps — this is known as “seeing structure in the expression or equation.”

**Choice A** is incorrect; it displays the  $y$ -value of the  $y$ -intercept of the graph  $(0, 16)$  as a constant.

**Choice B** is incorrect; it displays the  $y$ -value of the  $y$ -intercept of the graph  $(0, 16)$  as a constant.

**Choice D** is incorrect; it displays the  $x$ -value of one of the  $x$ -intercepts of the graph  $(2, 0)$  as a constant.

4

Which of the following is equal to  $(14 - 2i)(7 + 12i)$ ? (Note:  $i = \sqrt{-1}$ )

A) 74

B) 122

C)  $74 + 154i$

D)  $122 + 154i$

**Estimated Difficulty:** Medium

**Key:** D

**Choice D** is correct. Applying the distributive property to multiply the binomials yields the expression  $98 + 168i - 14i - 24i^2$ . The note in the question reminds you that  $i = \sqrt{-1}$ , therefore  $i^2 = -1$ . Substituting this value into the expression gives you  $98 + 168i - 14i - (-24)$ , and combining like terms results in  $122 + 154i$ .

**Choice A** is incorrect and may result from a combination of errors. You may not have correctly distributed when multiplying the binomials, multiplying only the first terms together and the second terms together. You may also have used the incorrect equality  $i^2 = 1$ .

**Choice B** is incorrect and may result from a combination of errors. You may not have correctly distributed when multiplying the binomials, multiplying only the first terms together and the second terms together.

**Choice C** is incorrect and results from misapplying the statement  $i = \sqrt{-1}$ .

5

Which of the following is equal to  $\sin\left(\frac{\pi}{5}\right)$ ?

A)  $-\cos\left(\frac{\pi}{5}\right)$

B)  $-\sin\left(\frac{\pi}{5}\right)$

C)  $\cos\left(\frac{3\pi}{10}\right)$

D)  $\sin\left(\frac{7\pi}{10}\right)$

**Estimated Difficulty:** Hard

**Key:** C

**Choice C** is correct. Sine and cosine are related

by the equation:  $\sin(x) = \cos\left(\frac{\pi}{2} - x\right)$ . Therefore,

$\sin\left(\frac{\pi}{5}\right) = \cos\left(\frac{\pi}{2} - \frac{\pi}{5}\right)$ , which reduces to  $\cos\left(\frac{\pi}{10}\right)$ .

**Choice A** is incorrect and may result from a misunderstanding about trigonometric relationships. You may have thought that cosine is the inverse function of sine and therefore reasoned that the negative of the cosine of an angle is equivalent to the sine of that angle.

**Choice B** is incorrect and may result from a misunderstanding of the unit circle and how it relates to trigonometric expressions. You may have thought that, on a coordinate grid, the negative sign only changes the orientation of the triangle formed, not the value of the trigonometric expression.

**Choice D** is incorrect. You may have confused the relationship between sine and cosine and erroneously added  $\frac{\pi}{2}$  to the given angle measure instead of subtracting the angle measure from  $\frac{\pi}{2}$ .

## Student-Produced Response Math Questions

For some questions in the Math Tests, you will be asked to solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$  (If 

3	1	/	2
•	•	•	•

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

6

$$x^2 + y^2 - 6x + 8y = 144$$

The equation of a circle in the  $xy$ -plane is shown above. What is the diameter of the circle?

Estimated Difficulty: Hard

Key: 26

Completing the square yields the equation  $(x - 3)^2 + (y + 4)^2 = 169$ , the standard form of an equation of the circle. Understanding this form results in the equation  $r^2 = 169$ , which when solved for  $r$  gives the value of the radius as 13. Diameter is twice the value of the radius; therefore, the diameter is 26.

Answer:  $\frac{7}{12}$

	7	/	1	2	
Write answer in boxes. →	•	•	•	•	
	0	0	0	0	
	1	1	•	1	
	2	2	2	•	
	3	3	3	3	
	4	4	4	4	
	5	5	5	5	
	6	6	6	6	
	•	7	7	7	
	8	8	8	8	
	9	9	9	9	

← Fraction line

Answer: 2.5

	2	.	5	
	•	•	•	•
	0	0	0	0
	1	1	1	1
	2	•	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	•
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3	
•	•	•	•	
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	•	
4	4	4	4	
5	5	5	5	
6	6	6	6	
7	7	7	7	
8	8	8	8	

	.	6	6	6	
•	•	•	•	•	
	0	0	0	0	
1	1	1	1	1	
2	2	2	2	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	•	•	•	6	
7	7	7	7	7	
8	8	8	8	8	

	.	6	6	7	
•	•	•	•	•	
	0	0	0	0	
1	1	1	1	1	
2	2	2	2	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	•	•	•	6	
7	7	7	7	•	
8	8	8	8	8	

Answer: 201 – either position is correct

	2	0	1	
•	•	•	•	
	0	•	0	
1	1	1	•	
2	•	2	2	
3	3	3	3	

	2	0	1	
•	•	•	•	
	•	0	0	
1	1	•	1	
2	2	2	2	
3	3	3	3	

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



# Math Test – Calculator Questions

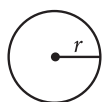
## Directions

**For questions 1-8**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 9-10**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 6 on page 24 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## Notes

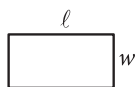
1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## Reference

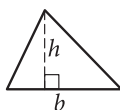


$$A = \pi r^2$$

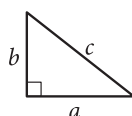
$$C = 2\pi r$$



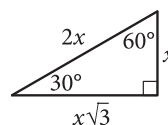
$$A = \ell w$$



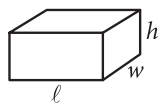
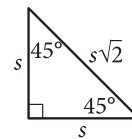
$$A = \frac{1}{2}bh$$



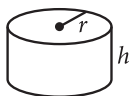
$$c^2 = a^2 + b^2$$



Special Right Triangles



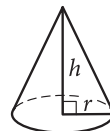
$$V = \ell wh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

**1**

The recommended daily calcium intake for a 20-year-old is 1,000 milligrams (mg). One cup of milk contains 299 mg of calcium and one cup of juice contains 261 mg of calcium. Which of the following inequalities represents the possible number of cups of milk,  $m$ , and cups of juice,  $j$ , a 20-year-old could drink in a day to meet or exceed the recommended daily calcium intake from these drinks alone?

- A)  $299m + 261j \geq 1,000$   
 B)  $299m + 261j > 1,000$   
 C)  $\frac{299}{m} + \frac{261}{j} \geq 1,000$   
 D)  $\frac{299}{m} + \frac{261}{j} > 1,000$

<b>Estimated Difficulty:</b> Easy	<b>Key:</b> A
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**Choice A** is correct. Multiplying the number of cups of milk by the amount of calcium each cup contains and multiplying the number of cups of juice by the amount of calcium each cup contains gives the total amount of calcium from each source. You must then find the sum of these two numbers to find the total amount of calcium. Because the question asks for the calcium from these two sources to meet or exceed the recommended daily intake, the sum of these two products must be greater than or equal to 1,000.

**Choice B** is incorrect and may result from a misunderstanding of the meaning of inequality symbols as they relate to real-life situations. This answer does not allow for the daily intake to meet the recommended daily amount.

**Choice C** is incorrect and may result from a misunderstanding of proportional relationships. Here the wrong operation is applied, with the total amount of calcium per cup divided by the number of cups of each type of drink. These values should be multiplied.

**Choice D** is incorrect and may result from a combination of mistakes. The inequality symbol used allows the option to exceed, but not to meet, the recommended daily value, and the wrong operation may have been applied when calculating the total amount of calcium intake from each drink.

**2**

A company's manager estimated that the cost  $C$ , in dollars, of producing  $n$  items is  $C = 7n + 350$ . The company sells each item for \$12. The company makes a profit when the total income from selling a quantity of items is greater than the total cost of producing that quantity of items. Which of the following inequalities gives all possible values of  $n$  for which the manager estimates that the company will make a profit?

- A)  $n < 70$   
 B)  $n < 84$   
 C)  $n > 70$   
 D)  $n > 84$

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> C
-------------------------------------	---------------

**Choice C** is correct. One way to find the correct answer is to create an inequality. The income from sales of  $n$  items is  $12n$ . For the company to profit,  $12n$  must be greater than the cost of producing  $n$  items; therefore, the inequality  $12n > 7n + 350$  can be used to model the scenario. Solving this inequality yields  $n > 70$ .

**Choice A** is incorrect and may result from a misunderstanding of the properties of inequalities. You may have found the number of items of the break-even point as 70 and used the incorrect notation to express the answer, or you may have incorrectly modeled the scenario when setting up an inequality to solve.

**Choice B** is incorrect and may result from a misunderstanding of how the cost equation models the scenario. If you use the cost of \$12 as the number of items  $n$  and evaluate the expression  $7n$ , you will find the value of 84. Misunderstanding how the inequality relates to the scenario might lead you to think  $n$  should be less than this value.

**Choice D** is incorrect and may result from a misunderstanding of how the cost equation models the scenario. If you use the cost of \$12 as the number of items  $n$  and evaluate the expression  $7n$ , you will find the value of 84. Misunderstanding how the inequality relates to the scenario might lead you to think  $n$  should be greater than this value.



At a primate reserve, the mean age of all the male primates is 15 years, and the mean age of all female primates is 19 years. Which of the following must be true about the mean age  $m$  of the combined group of male and female primates at the primate reserve?

- A)  $m = 17$
- B)  $m > 17$
- C)  $m < 17$
- D)  $15 < m < 19$

<b>Estimated Difficulty:</b> Medium	<b>Key:</b> D
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**Choice D** is correct. You must reason that because the mean of the males is lower than that of the females, the combined mean cannot be greater than or equal to that of the females, while also reasoning that because the mean of the females is greater than that of the males, the combined mean cannot be less than or equal to the mean of the males. Therefore, the combined mean must be between the two separate means.

*Choice A* is incorrect and results from finding the mean of the two means. This answer makes an unjustified assumption that there are an equal number of male and female primates.

*Choice B* is incorrect and results from finding the mean of the two means and misapplying an inequality to the scenario. This answer makes an unjustified assumption that there are more females than males.

*Choice C* is incorrect and results from finding the mean of the two means and misapplying an inequality to the scenario. This answer makes an unjustified assumption that there are more males than females.

A biology class at Central High School predicted that a local population of animals will double in size every 12 years. The population at the beginning of 2014 was estimated to be 50 animals. If  $P$  represents the population  $n$  years after 2014, then which of the following equations represents the class's model of the population over time?

- A)  $P = 12 + 50n$
- B)  $P = 50 + 12n$
- C)  $P = 50(2)^{12n}$
- D)  $P = 50(2)^{\frac{n}{12}}$

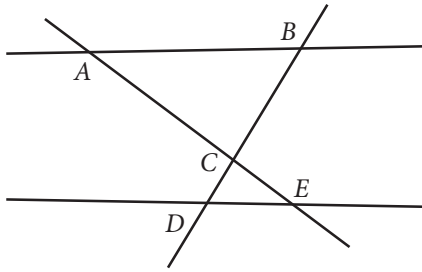
<b>Estimated Difficulty:</b> Medium	<b>Key:</b> D
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**Choice D** is correct. You must first recognize that a population that doubles in size over equal time periods is increasing at an exponential rate. In a doubling scenario, an exponential growth model can be written in the form  $y = a(2)^{\frac{n}{b}}$ , where  $a$  is the initial population (that is, the population when  $n = 0$ ) and  $b$  is the number of years it takes for the population to double in size. In this case, the initial population is 50, the number of animals at the beginning of 2014. Therefore,  $a = 50$ . The text explains that the population will double in size every 12 years. Therefore,  $b = 12$ .

*Choice A* is incorrect and may result from a misunderstanding of exponential equations or of the context. This linear model indicates that the initial population is 12 animals and the population is increasing by 50 animals each year. However, this is not the case.

*Choice B* is incorrect and may result from a misunderstanding of exponential equations or of the scenario. This linear model indicates that the initial population is 50 animals and the population is increasing by 12 animals each year. However, this is not the case.

*Choice C* is incorrect. This exponential model indicates that the initial population is 50 animals and is doubling. However, the exponent  $12n$  indicates that the population is doubling 12 times per year, not every 12 years. This is not the case.



Note: Figure not drawn to scale.

In the figure above,  $\triangle ABC \sim \triangle EDC$ . Which of the following must be true?

- A)  $\overline{AE} \parallel \overline{BD}$
- B)  $\overline{AE} \perp \overline{BD}$
- C)  $\overline{AB} \parallel \overline{DE}$
- D)  $\overline{AB} \perp \overline{DE}$

Estimated Difficulty: Medium

Key: C

**Choice C** is correct. Given that  $\triangle ABC$  is similar to  $\triangle EDC$ , you can determine that the corresponding  $\angle BAC$  is congruent to  $\angle CED$ . The converse of the alternate interior angle theorem tells us that  $\overline{AB} \parallel \overline{DE}$ . (You can also use the fact that  $\angle ABC$  and  $\angle CDE$  are congruent to make a similar argument.)

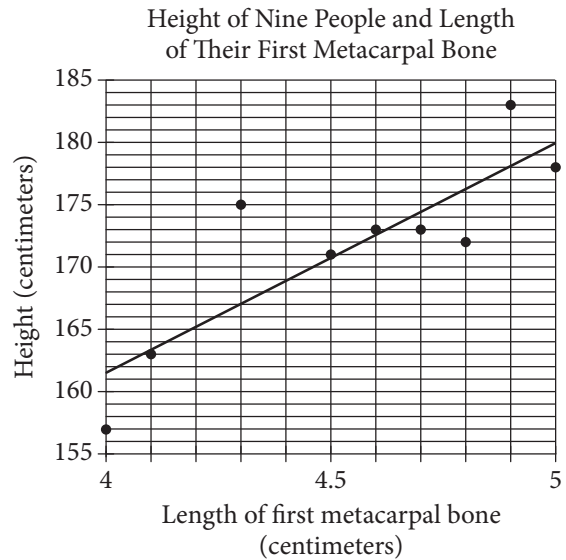
**Choice A** is incorrect and may result from multiple misconceptions. You may have misidentified the segments as perpendicular and used the wrong notation to express this statement.

**Choice B** is incorrect and may result from using only the diagram and not considering the given information. The line segments appear to be perpendicular, but need not be, given the information provided.

**Choice D** is incorrect and may result from misunderstanding either the notation or the vocabulary of parallel and perpendicular lines. You may have incorrectly identified parallel lines as perpendicular.

Questions 6-8 refer to the following information.

The first metacarpal bone is located in the hand. The scatterplot below shows the relationship between the length of the first metacarpal bone and height of 9 people. The line of best fit is also shown.



6

How many of the 9 people have an actual height that differs by more than 3 centimeters from the height predicted by the line of best fit?

- A) 2
- B) 4
- C) 6
- D) 9

Estimated Difficulty: Easy

Key: B

**Choice B** is correct. The people who have first metacarpal bones of length 4.0, 4.3, 4.8, and 4.9 centimeters have heights that differ by more than 3 centimeters from the height predicted by the line of best fit.

**Choice A** is incorrect. There are 2 people whose actual heights are more than 3 centimeters above the height predicted by the line of best fit. However, there are also 2 people whose actual heights are farther than 3 centimeters below the line of best fit.

**Choice C** is incorrect. There are 6 data points in which the absolute value between the actual height

and the height predicted by the line of best fit is greater than 1 centimeter.

*Choice D* is incorrect. The data on the graph represents 9 different people; however, the absolute value of the difference between actual height and predicted height is not greater than 3 for all of the people.

7

Which of the following is the best interpretation of the slope of the line of best fit in the context of this problem?

- A) The predicted height increase in centimeters for one centimeter increase in the first metacarpal bone
- B) The predicted first metacarpal bone increase in centimeters for every centimeter increase in height
- C) The predicted height in centimeters of a person with a first metacarpal bone length of 0 centimeters
- D) The predicted first metacarpal bone length in centimeters for a person with a height of 0 centimeters

**Estimated Difficulty:** Easy

**Key:** A

**Choice A** is correct. The slope is the change in the vertical distance divided by the change in the horizontal distance between any two points on a line. In this context, the change in the vertical distance is the change in the predicted height of a person, and the change in the horizontal distance is the change in the length of his or her first metacarpal bone. The unit rate, or slope, is the increase in predicted height for each increase of one centimeter of the first metacarpal bone.

*Choice B* is incorrect. If you selected this answer, you may have interpreted slope incorrectly as run over rise.

*Choice C* is incorrect. If you selected this answer, you may have mistaken slope for the  $y$ -intercept.

*Choice D* is incorrect. If you selected this answer, you may have mistaken slope for the  $x$ -intercept.

8

Based on the line of best fit, what is the predicted height for someone with a first metacarpal bone that has a length of 4.45 centimeters?

- A) 168 centimeters
- B) 169 centimeters
- C) 170 centimeters
- D) 171 centimeters

**Estimated Difficulty:** Easy

**Key:** C

**Choice C** is correct. First, notice that the scale of the  $x$ -axis is 0.1, and therefore the  $x$ -value of 4.45 is halfway between the unmarked value of 4.4 and the marked value of 4.5. Then find the  $y$ -value on the line of best fit that corresponds to an  $x$ -value of 4.45, which is 170.

*Choice A* is incorrect. If you mistakenly find the point on the line between the  $x$ -values of 4.3 and 4.4, you will likely find a predicted metacarpal bone length of 168 centimeters.

*Choice B* is incorrect. If you mistakenly find the point on the line that corresponds to an  $x$ -value of 4.4 centimeters, you will likely find a predicted height of approximately 169 centimeters.

*Choice D* is incorrect. If you mistakenly find the point on the line that corresponds to an  $x$ -value of 4.5 centimeters, you will likely find a predicted height of approximately 171 centimeters. You might also choose this option if you mistakenly use the data point that has an  $x$ -value closest to 4.45 centimeters.

## Student-Produced Response Math Questions

For questions 9 and 10, you are asked to solve the problem and enter your answer in the grid, as described on page 24 of this booklet.

### 9

The table below classifies 103 elements as metal, metalloid, or nonmetal and as solid, liquid, or gas at standard temperature and pressure.

	Solids	Liquids	Gases	Total
Metals	77	1	0	78
Metalloids	7	0	0	7
Nonmetals	6	1	11	18
Total	90	2	11	103

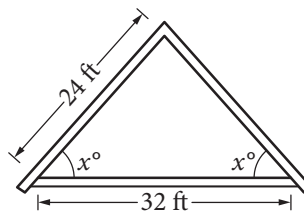
What fraction of all solids and liquids in the table are metalloids?

<b>Estimated Difficulty:</b> Easy	<b>Key:</b> $\frac{7}{92}$
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There are 7 metalloids that are solid or liquid, and there are 92 total solids and liquids. Therefore, the fraction of solids and liquids that are metalloids is  $\frac{7}{92}$ .

### 10

An architect drew the sketch below while designing a house roof. The dimensions shown are for the interior of the triangle.



Note: Figure not drawn to scale.

What is the value of  $\cos x$ ?

<b>Estimated Difficulty:</b> Hard	<b>Key:</b> $\frac{2}{3}$
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Because the triangle is isosceles, constructing a perpendicular from the top vertex to the opposite side will bisect the base and create two smaller right triangles. In a right triangle, the cosine of an acute angle is equal to the length of the side adjacent to the angle divided by the length of the hypotenuse.

This gives  $\cos x = \frac{16}{24}$ , which can be simplified to  $\cos x = \frac{2}{3}$ . Note that  $\frac{16}{24}$  cannot be entered into the answer grid, so this fraction must be reduced. Acceptable answers to grid are  $\frac{2}{3}$ ,  $\frac{4}{6}$ ,  $\frac{6}{9}$ ,  $\frac{8}{12}$ , .666, and .667.

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# The SAT Essay

The SAT Essay assesses reading, analysis, and writing skills. It's optional and given at the end of the SAT. Some postsecondary institutions require it for admission, so if you know where you want to apply before testing, be sure to check each institution's requirements before you choose the SAT with Essay or without during registration. (Note that you may be able to change from one option to the other on test day, but this isn't guaranteed.)

The SAT Essay presents you with a passage and asks you to explain how the passage's author builds an argument to persuade an audience. Essay passages examine ideas, debates, trends, and the like in the arts, the sciences, and civic, cultural, and political life that have wide interest, relevance, and accessibility. The passages tend not to be simple pro/con debates on issues but rather efforts to convey nuanced views on complex subjects.

Your response will analyze the passage for the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or other features that you believe contribute to the persuasiveness of the passage. Be sure to base your essay on the features of the passage that will help you respond to the prompt. If, for example, you feel that evidence use is not particularly important in a given passage, you don't have to write about it. Write instead about features that you believe help build the persuasive argument.

It's important to understand that your response should **not** focus on whether you agree or disagree with the claim made in the passage, but should instead focus on how the author builds an argument to persuade an audience.

While the source text (and a bit of the language in the prompt) will vary from test to test, you'll always be presented with a passage and asked to explain how its author builds an argument.

Essays are evaluated for demonstrated comprehension of the passage, quality of analysis, and quality of writing. See the SAT Essay Scoring Guide on pages 38 and 39 for more information.

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## The SAT Essay Overview

- Total questions: 1 prompt, with points to consider and directions
- 1 passage
- Time allotted: 50 minutes to read and analyze the passage and to develop a written response

The Essay asks you to demonstrate college and career readiness in **reading, writing, and analysis** by comprehending a high-quality source text, producing a cogent and clear written analysis of that text, and supporting that analysis with critical reasoning and evidence drawn from the source. The essay doesn't ask you to take a stand on the author's point of view but instead to analyze how the author builds a persuasive argument.

Your essay will receive three scores, each on a scale of 2 to 8:

**Reading:** Demonstrated comprehension of the passage, its main ideas, and its important details

**Analysis:** Demonstrated understanding of the analytical task, and effective analysis of the author's use of evidence, reasoning, and/or stylistic or persuasive elements (and/or features of your own choice)

**Writing:** Communication of information and ideas in a structured, cohesive manner, using precise language and a variety of sentence structures and showing a command of the conventions of Standard Written English

These scores are not combined with each other or with any other scores on the SAT. (They don't, for instance, affect the Evidence-Based Reading and Writing section score or the total test score.)

# Essay Prompt

## Directions

The essay gives you an opportunity to show how effectively you can read and comprehend a passage and write an essay analyzing the passage. In your essay, you should demonstrate that you have read the passage carefully, present a clear and logical analysis, and use language precisely.

Your essay must be written on the lines provided in your answer booklet; except for the Planning Page of the answer booklet, you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write or print so that what you are writing is legible to those readers.

You have 50 minutes to read the passage and write an essay in response to the prompt provided inside this booklet.

## Reminders:

- Do not write your essay in this prompt booklet. Only what you write on the lined pages of your answer booklet will be evaluated.
- An off-topic essay will not be evaluated.

The following sample illustrates the general format of the essay task in the context of a specific prompt, this one related to a passage adapted from an article by Paul Bogard about the value of natural darkness.

As you read the passage below, consider how Paul Bogard uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

**Adapted from Paul Bogard, “Let There Be Dark.” ©2012 by Los Angeles Times. Originally published December 21, 2012.**

- 1 At my family’s cabin on a Minnesota lake, I knew woods so dark that my hands disappeared before my eyes. I knew night skies in which meteors left smoky trails across sugary spreads of stars. But now, when 8 of 10 children born in the United States will never know a sky dark enough for the Milky Way, I worry we are rapidly losing night’s natural darkness before realizing its worth. This winter solstice, as we cheer the days’ gradual movement back toward light, let us also remember the irreplaceable value of darkness.
- 2 All life evolved to the steady rhythm of bright days and dark nights. Today, though, when we feel the closeness of nightfall, we reach quickly for a light switch. And too little darkness, meaning too much artificial light at night, spells trouble for all.
- 3 Already the World Health Organization classifies working the night shift as a probable human carcinogen, and the American Medical Association has voiced its unanimous support for “light pollution reduction efforts and glare reduction efforts at both the national and state levels.” Our bodies need darkness to produce the hormone melatonin, which keeps certain cancers from developing, and our bodies need darkness for sleep. Sleep disorders have been linked to diabetes, obesity, cardiovascular disease and depression, and recent research suggests one main cause of “short sleep” is “long light.” Whether we work at night or simply take our tablets, notebooks and smartphones to bed, there isn’t a place for this much artificial light in our lives.

- 4 The rest of the world depends on darkness as well, including nocturnal and crepuscular species of birds, insects, mammals, fish and reptiles. Some examples are well known—the 400 species of birds that migrate at night in North America, the sea turtles that come ashore to lay their eggs—and some are not, such as the bats that save American farmers billions in pest control and the moths that pollinate 80% of the world’s flora. Ecological light pollution is like the bulldozer of the night, wrecking habitat and disrupting ecosystems several billion years in the making. Simply put, without darkness, Earth’s ecology would collapse. . . .
- 5 In today’s crowded, louder, more fast-paced world, night’s darkness can provide solitude, quiet and stillness, qualities increasingly in short supply. Every religious tradition has considered darkness invaluable for a soulful life, and the chance to witness the universe has inspired artists, philosophers and everyday stargazers since time began. In a world awash with electric light . . . how would Van Gogh have given the world his “Starry Night”? Who knows what this vision of the night sky might inspire in each of us, in our children or grandchildren?
- 6 Yet all over the world, our nights are growing brighter. In the United States and Western Europe, the amount of light in the sky increases an average of about 6% every year. Computer images of the United States at night, based on NASA photographs, show that what was a very dark country as recently as the 1950s is now nearly covered with a blanket of light. Much of this light is wasted energy, which means wasted dollars. Those of us over 35 are perhaps among the last generation to have known truly dark nights. Even the northern lake where I was lucky to spend my summers has seen its darkness diminish.
- 7 It doesn’t have to be this way. Light pollution is readily within our ability to solve, using new lighting technologies and shielding existing lights. Already, many cities and towns across North America and Europe are changing to LED streetlights, which offer dramatic possibilities for controlling wasted light. Other communities are finding success with simply turning off portions of their public lighting after midnight. Even Paris, the famed “city of light,” which already turns off its monument lighting after 1 a.m., will this summer start to require its shops, offices and public buildings to turn off lights after 2 a.m. Though primarily designed to save energy, such reductions in light will also go far in addressing light pollution. But we will never truly address the problem of light pollution until we become aware of the irreplaceable value and beauty of the darkness we are losing.

Write an essay in which you explain how Paul Bogard builds an argument to persuade his audience that natural darkness should be preserved. In your essay, analyze how Bogard uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with Bogard’s claims, but rather explain how Bogard builds an argument to persuade his audience.



## Sample Essay Materials

The following student essays show you what kinds of attributes will be evaluated in the SAT Essay. Each essay is followed by an explanation of

why it received the assigned score on each of the three dimensions.

### SAMPLE 1

Bogard builds an argument to persuade his audience about what he is concerning about and feels it important to take care about. His essay talks about so much facts about sleeping how so little can effect us health wise examples like getting sleep disorders, diabetes, obesity, cardiovascular disease and depression. This facts helps people persuade the audience he also say that the world health organization classifies working night shift is bad. In his argument is not all about how it bad for the body he also claims and have proof that light cost are expensive and really costing people because they

have light all night long. He also claims light is messing with mother nature that animals need darkness to feed eat move around because there noctuaral creatures. He has details facts about human body, animals and about mother nature that he can use to support his idea of not using so much light at night and how we need darkness. With these features he can persuade the audience because people dont know why darkness can be good for us. He was all of facts and examples that he claim is efficting us and there world.

**This response scored a 2/1/1.**

**Reading—2:** This response demonstrates some comprehension of the source text, although the writer's understanding of Bogard's central idea isn't conveyed until the latter part of the essay, where the writer indicates that Bogard includes *details facts about human body, animals and about mother nature that he can use to support his idea of not using so much light at night and how we need darkness*. Prior to this, the writer has included details from the text, but without contextualizing these details within Bogard's broader argument, suggesting that the writer is relaying ideas from the text without much understanding of how they contribute to the whole. For example, the writer mentions the health problems cited in the text, that working the night shift is classified as bad, and that light costs are high, but doesn't explain how these points relate to Bogard's main claim that we must preserve natural darkness. On the whole, this essay displays only a partial understanding of the source text.

**Analysis—1:** In this essay, the writer has merely identified aspects of Bogard's use of evidence without explaining how the evidence contributes to the argument. The writer notes that Bogard's text *talks about so much facts about sleeping how so little can effect us health wise examples like getting sleep disorders, diabetes, obesity, cardiovascular disease and depression. This facts helps people persuade the audience*. Other than identifying these as persuasive facts, however, the writer does nothing to indicate an understanding of the analytical task. The writer again mentions persuasion before the conclusion of the essay

*(With these features he can persuade the audience because people dont know why darkness can be good for us)*, but once again, there is no explanation of how or why these features are persuasive. Thus, the essay offers inadequate analysis of Bogard's text.

**Writing—1:** This response demonstrates little cohesion and inadequate skill in the use and control of language. From the outset, problems with language control impede the writer's ability to establish a clear central claim (*Bogard builds an argument to persuade his audience about what he is concerning about and feels it important to take care about*). The response also lacks a recognizable introduction and conclusion, and sentences are strung together without a clear progression of ideas (for much of the response, the writer merely lists claims Bogard makes). The response also lacks variety in sentence structures, in part because of repetitive transitions. (For example, *he also claims* is used two sentences in a row in this brief response). Weak control of the conventions of standard written English, coupled with vague word choice, undermines the quality of writing. Overall, this response demonstrates inadequate writing skill.



## SAMPLE 2

Paul Bogard strongly believes that natural darkness should be preserved. In order to prove the need for natural darkness, Bogard divides his argument into three main topics, saying that natural darkness is beneficial to humans, essential to humans, and essential to ecosystems.

According to Bogard, natural darkness can be a positive help to humans. One of the ways it can accomplish this is by giving enjoyment to onlookers. To supplant this, Bogard gives a personal example of how he enjoyed seeing meteors dart across the night sky in Minnesota as a child. Also he states that natural darkness can be a source of solitude. Supporting this claim, Bogard states that darkness is invaluable to every religion. Additionally Bogard says that the night sky has inspired countless numbers of philosophers, artists, and stargazers for millennia. He then gives an appealing allusion by asking how Van Gogh could have painted “Starry Night” in the mist of electric light. One of Bogard’s primary arguments for natural darkness shows how it can benefit humans.

Bogard then gives a scientific case that shows why natural darkness is essential to humans. He states a find of the World Health Organization that declares the night shift can be detrimental to one’s health. He points to the necessity of darkness in producing melatonin, a hormone that helps prevent certain cancers from developing in the human body. Bogard then concludes his argument that darkness is essential to human well-being by analyzing sleep. He first makes

the obvious claim that darkness is essential for sleep. Then, he talks about the negative health effects of sleep disorders; these include “diabetes, obesity, cardiovascular disease and depression.” To associate this with his argument for natural darkness, Bogard states the findings of recent research, which say that “long light” is one of the primary causes of “short sleep.” Bogard uses scientific evidence to support his belief in the preservation of natural darkness.

Bogard’s third primary defense of natural darkness declares that it is essential to nature. He notes that there are a variety of nocturnal and crepuscular species of birds, fish, mammals, insects, and reptiles worldwide. He gives two specific, well-known examples of these species; these discussed the 400 species of North American birds that migrate at night and the sea turtles that lay their eggs on the shore at night. He also gives a couple of lesser-known examples, involving bats and moths that show the positive actions that some nocturnal animals perform. He then concludes his argument for nocturnal darkness necessary to nature with persuasion, saying that removing natural darkness would essentially destroy an ecology that took billions of years to develop. Here, Bogard uses scientific fact to prove that natural darkness is a key to nature and ecology. Paul Bogard supports the preservation of natural darkness. He uses an argument to support his position that has three primary points—benefit to humans, need for humans and need for nature.

### This response scored a 4/1/3.

**Reading—4:** This response demonstrates thorough comprehension of Bogard’s text and a clear understanding of the interrelation between the central idea and important details. The writer briefly summarizes Bogard’s central idea (*natural darkness should be preserved*) and aptly notes that Bogard’s argument encompasses three main points: *that natural darkness is beneficial to humans, essential to humans, and essential to ecosystems*. The writer provides various details from the text that support these points. In the first body paragraph, for example, the writer demonstrates comprehension of how Bogard’s *personal example of how he enjoyed seeing meteors dart across the night sky in Minnesota as a child* relates to his claim that natural darkness can *give enjoyment to onlookers*. The writer also sees the connection between darkness as a *source*

*of solitude* and it inspiring *countless numbers of philosophers, artists, and stargazers for millennia*. Providing these details highlights the writer’s understanding of Bogard’s claim that natural darkness *can benefit humans*. The writer continues to demonstrate how details in Bogard’s text relate to each other and to Bogard’s central idea in the subsequent discussion of how darkness is essential to humans’ health and to nature. Although little is directly quoted from the text, the writer’s thorough paraphrasing of multiple details taken from across the passage indicates that the writer comprehensively understands Bogard’s argument and is able to convey it in his own words.

**Analysis—1:** The response offers ineffective analysis of Bogard’s text and demonstrates little understanding of the analytical task. Although clearly comprehending the entirety of Bogard’s

argument, the writer does not communicate how Bogard builds his argument with evidence, reasoning, or stylistic or persuasive elements, nor does the writer communicate what effect Bogard's argumentation has on his audience. Instead of providing effective analysis, the writer only identifies argumentative elements in Bogard's text, such as the *appealing allusion* Bogard offers regarding Van Gogh's *Starry Night* or the *scientific evidence* Bogard uses to *support his belief in the preservation of natural darkness*. The writer instead consistently lapses into summary. Overall, the response demonstrates inadequate analysis.

**Writing—3:** This mostly cohesive response demonstrates effective use and control of language. The writer presents an effective introduction with a clear central claim that lays out the three points discussed in the response (*In order to prove the need for natural darkness, Bogard divides his argument into three main topics, saying that natural darkness is beneficial to humans, essential to humans, and essential to the ecosystem*). The response also includes a generally effective

conclusion that summarizes rather than advances the essay (*Paul Bogard supports the preservation of natural darkness. He uses an argument to support his position that has three primary points—benefit to humans, need for humans and need for nature*) although the conclusion is not marked off by a paragraph break. The response is organized clearly around the three points identified in the introduction, and each body paragraph stays on topic. The writer also demonstrates a clear progression of ideas both within paragraphs and throughout the essay. Sentence structure tends to be repetitive and simple, however. For example, at or near the end of each body paragraph, the writer restates the point that introduces that paragraph (*Bogard then gives a scientific case that shows why natural darkness is essential to humans. . . . Bogard uses scientific evidence to support his belief in the preservation of natural darkness*). Although the writing in this response is proficient, it does not demonstrate the sentence variety, precise word choice, or highly effective progression of ideas that is expected at the advanced level.

### SAMPLE 3

In response to our world's growing reliance on artificial light, writer Paul Bogard argues that natural darkness should be preserved in his article "Let There be dark". He effectively builds his argument by using a personal anecdote, allusions to art and history, and rhetorical questions.

Bogard starts his article off by recounting a personal story – a summer spent on a Minnesota lake where there was "woods so dark that [his] hands disappeared before [his] eyes." In telling this brief anecdote, Bogard challenges the audience to remember a time where they could fully amass themselves in natural darkness void of artificial light. By drawing in his readers with a personal encounter about night darkness, the author means to establish the potential for beauty, glamour, and awe-inspiring mystery that genuine darkness can possess. He builds his argument for the preservation of natural darkness by reminiscing for his readers a first-hand encounter that proves the "irreplaceable value of darkness."

This anecdote provides a baseline of sorts for readers to find credence with the author's claims. Bogard's argument is also furthered by his use of allusion to art – Van Gogh's "Starry Night" – and modern history – Paris' reputation as "The City of Light". By first referencing "Starry Night", a painting generally considered to be undoubtedly beautiful, Bogard establishes that the natural

magnificence of stars in a dark sky is definite. A world absent of excess artificial light could potentially hold the key to a grand, glorious night sky like Van Gogh's according to the writer. This urges the readers to weigh the disadvantages of our world consumed by unnatural, vapid lighting. Furthermore, Bogard's alludes to Paris as "the famed 'city of light'". He then goes on to state how Paris has taken steps to exercise more sustainable lighting practices. By doing this, Bogard creates a dichotomy between Paris' traditionally alluded-to name and the reality of what Paris is becoming – no longer "the city of light", but moreso "the city of light...before 2 AM". This furthers his line of argumentation because it shows how steps can be and are being taken to preserve natural darkness. It shows that even a city that is literally famous for being constantly lit can practically address light pollution in a manner that preserves the beauty of both the city itself and the universe as a whole.

Finally, Bogard makes subtle yet efficient use of rhetorical questioning to persuade his audience that natural darkness preservation is essential. He asks the readers to consider "what the vision of the night sky might inspire in each of us, in our children or grandchildren?" in a way that brutally plays to each of our emotions. By asking this question, Bogard draws out heartfelt ponderance from his readers about the affecting power of an

untainted night sky. This rhetorical question tugs at the readers' heartstrings; while the reader may have seen an unobscured night skyline before, the possibility that their child or grandchild will never get the chance sways them to see as Bogard sees. This strategy is definitively an appeal to pathos, forcing the audience to directly face an emotionally-charged inquiry that will surely spur some kind of response. By doing this, Bogard develops his argument, adding gutthral power

to the idea that the issue of maintaining natural darkness is relevant and multifaceted.

Writing as a reaction to his disappointment that artificial light has largely permeated the presence of natural darkness, Paul Bogard argues that we must preserve true, unaffected darkness. He builds this claim by making use of a personal anecdote, allusions, and rhetorical questioning.

**This response scored a 4/4/4.**

**Reading—4:** This response demonstrates thorough comprehension of the source text through skillful use of paraphrases and direct quotations. The writer briefly summarizes the central idea of Bogard's piece (*natural darkness should be preserved; we must preserve true, unaffected darkness*), and presents many details from the text, such as referring to the personal anecdote that opens the passage and citing Bogard's use of *Paris' reputation as "The City of Light."* There are few long direct quotations from the source text; instead, the response succinctly and accurately captures the entirety of Bogard's argument in the writer's own words, and the writer is able to articulate how details in the source text interrelate with Bogard's central claim. The response is also free of errors of fact or interpretation. Overall, the response demonstrates advanced reading comprehension.

**Analysis—4:** This response offers an insightful analysis of the source text and demonstrates a sophisticated understanding of the analytical task. In analyzing Bogard's use of *personal anecdote, allusions to art and history, and rhetorical questions*, the writer is able to explain carefully and thoroughly how Bogard builds his argument over the course of the passage. For example, the writer offers a possible reason for why Bogard chose to open his argument with a personal anecdote, and is also able to describe the overall effect of that choice on his audience (*In telling this brief anecdote, Bogard challenges the audience to remember a time where they could fully amass themselves in natural darkness void of artificial light. By drawing in his readers with a personal encounter . . . the author means to establish the potential for beauty, glamour, and awe-inspiring mystery that genuine darkness can possess. . . . This anecdote provides a baseline of sorts for readers to find credence with the author's claims*). The cogent chain of reasoning indicates an understanding of the overall effect of Bogard's personal narrative both in terms of its function in the passage and how it affects his audience. This type of insightful analysis is evident throughout the response and indicates advanced analytical skill.

**Writing—4:** The response is cohesive and demonstrates highly effective use and command of language. The response contains a precise central claim (*He effectively builds his argument by using personal anecdote, allusions to art and history, and rhetorical questions*), and the body paragraphs are tightly focused on those three elements of Bogard's text. There is a clear, deliberate progression of ideas within paragraphs and throughout the response. The writer's brief introduction and conclusion are skillfully written and encapsulate the main ideas of Bogard's piece as well as the overall structure of the writer's analysis. There is a consistent use of both precise word choice and well-chosen turns of phrase (*the natural magnificence of stars in a dark sky is definite, our world consumed by unnatural, vapid lighting, the affecting power of an untainted night sky*). Moreover, the response features a wide variety in sentence structure and many examples of sophisticated sentences (*By doing this, Bogard creates a dichotomy between Paris' traditionally alluded-to name and the reality of what Paris is becoming – no longer "the city of light", but more so "the city of light...before 2AM"*). The response demonstrates a strong command of the conventions of written English. Overall, the response exemplifies advanced writing proficiency.

## The SAT Essay Scoring Guide

Score	Reading	Analysis	Writing
4	<p><b>Advanced:</b> The response demonstrates thorough comprehension of the source text.</p> <p>The response shows an understanding of the text’s central idea(s) and of most important details and how they interrelate, demonstrating a comprehensive understanding of the text.</p> <p>The response is free of errors of fact or interpretation with regard to the text.</p> <p>The response makes skillful use of textual evidence (quotations, paraphrases, or both), demonstrating a complete understanding of the source text.</p>	<p><b>Advanced:</b> The response offers an insightful analysis of the source text and demonstrates a sophisticated understanding of the analytical task.</p> <p>The response offers a thorough, well-considered evaluation of the author’s use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student’s own choosing.</p> <p>The response contains relevant, sufficient, and strategically chosen support for claim(s) or point(s) made.</p> <p>The response focuses consistently on those features of the text that are most relevant to addressing the task.</p>	<p><b>Advanced:</b> The response is cohesive and demonstrates a highly effective use and command of language.</p> <p>The response includes a precise central claim.</p> <p>The response includes a skillful introduction and conclusion. The response demonstrates a deliberate and highly effective progression of ideas both within paragraphs and throughout the essay.</p> <p>The response has a wide variety in sentence structures. The response demonstrates a consistent use of precise word choice. The response maintains a formal style and objective tone.</p> <p>The response shows a strong command of the conventions of standard written English and is free or virtually free of errors.</p>
3	<p><b>Proficient:</b> The response demonstrates effective comprehension of the source text.</p> <p>The response shows an understanding of the text’s central idea(s) and important details.</p> <p>The response is free of substantive errors of fact and interpretation with regard to the text.</p> <p>The response makes appropriate use of textual evidence (quotations, paraphrases, or both), demonstrating an understanding of the source text.</p>	<p><b>Proficient:</b> The response offers an effective analysis of the source text and demonstrates an understanding of the analytical task.</p> <p>The response competently evaluates the author’s use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student’s own choosing.</p> <p>The response contains relevant and sufficient support for claim(s) or point(s) made.</p> <p>The response focuses primarily on those features of the text that are most relevant to addressing the task.</p>	<p><b>Proficient:</b> The response is mostly cohesive and demonstrates effective use and control of language.</p> <p>The response includes a central claim or implicit controlling idea.</p> <p>The response includes an effective introduction and conclusion.</p> <p>The response demonstrates a clear progression of ideas both within paragraphs and throughout the essay.</p> <p>The response has variety in sentence structures. The response demonstrates some precise word choice. The response maintains a formal style and objective tone.</p> <p>The response shows a good control of the conventions of standard written English and is free of significant errors that detract from the quality of writing.</p>

Score	Reading	Analysis	Writing
2	<p><b>Partial:</b> The response demonstrates some comprehension of the source text.</p> <p>The response shows an understanding of the text’s central idea(s) but not of important details.</p> <p>The response may contain errors of fact and/or interpretation with regard to the text.</p> <p>The response makes limited and/or haphazard use of textual evidence (quotations, paraphrases, or both), demonstrating some understanding of the source text.</p>	<p><b>Partial:</b> The response offers limited analysis of the source text and demonstrates only partial understanding of the analytical task.</p> <p>The response identifies and attempts to describe the author’s use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student’s own choosing, but merely asserts rather than explains their importance.</p> <p>Or one or more aspects of the response’s analysis are unwarranted based on the text.</p> <p>The response contains little or no support for claim(s) or point(s) made.</p> <p>The response may lack a clear focus on those features of the text that are most relevant to addressing the task.</p>	<p><b>Partial:</b> The response demonstrates little or no cohesion and limited skill in the use and control of language.</p> <p>The response may lack a clear central claim or controlling idea or may deviate from the claim or idea over the course of the response.</p> <p>The response may include an ineffective introduction and/or conclusion. The response may demonstrate some progression of ideas within paragraphs but not throughout the response.</p> <p>The response has limited variety in sentence structures; sentence structures may be repetitive.</p> <p>The response demonstrates general or vague word choice; word choice may be repetitive. The response may deviate noticeably from a formal style and objective tone.</p> <p>The response shows a limited control of the conventions of standard written English and contains errors that detract from the quality of writing and may impede understanding.</p>
1	<p><b>Inadequate:</b> The response demonstrates little or no comprehension of the source text.</p> <p>The response fails to show an understanding of the text’s central idea(s), and may include only details without reference to central idea(s).</p> <p>The response may contain numerous errors of fact and/or interpretation with regard to the text.</p> <p>The response makes little or no use of textual evidence (quotations, paraphrases, or both), demonstrating little or no understanding of the source text.</p>	<p><b>Inadequate:</b> The response offers little or no analysis or ineffective analysis of the source text and demonstrates little or no understanding of the analytic task.</p> <p>The response identifies without explanation some aspects of the author’s use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student’s choosing.</p> <p>Or numerous aspects of the response’s analysis are unwarranted based on the text.</p> <p>The response contains little or no support for claim(s) or point(s) made, or support is largely irrelevant.</p> <p>The response may not focus on features of the text that are relevant to addressing the task.</p> <p>Or the response offers no discernible analysis (e.g., is largely or exclusively summary).</p>	<p><b>Inadequate:</b> The response demonstrates little or no cohesion and inadequate skill in the use and control of language.</p> <p>The response may lack a clear central claim or controlling idea.</p> <p>The response lacks a recognizable introduction and conclusion. The response does not have a discernible progression of ideas.</p> <p>The response lacks variety in sentence structures; sentence structures may be repetitive. The response demonstrates general and vague word choice; word choice may be poor or inaccurate. The response may lack a formal style and objective tone.</p> <p>The response shows a weak control of the conventions of standard written English and may contain numerous errors that undermine the quality of writing.</p>

# Exam 1



**Section 1**

1	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	12	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	23	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	34	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	45	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
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**Section 2**

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6	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	15	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	24	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	33	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	42	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
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**Section 3 (No calculator)**

1	A	B	C	D	4	A	B	C	D	7	A	B	C	D	10	A	B	C	D	13	A	B	C	D
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3	A	B	C	D	6	A	B	C	D	9	A	B	C	D	12	A	B	C	D	15	A	B	C	D
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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	17	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	18	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	19	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	20	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>		
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0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section 4 (Calculator)**

1	A	B	C	D	7	A	B	C	D	13	A	B	C	D	19	A	B	C	D	25	A	B	C	D
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2	A	B	C	D	8	A	B	C	D	14	A	B	C	D	20	A	B	C	D	26	A	B	C	D
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3	A	B	C	D	9	A	B	C	D	15	A	B	C	D	21	A	B	C	D	27	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	A	B	C	D	10	A	B	C	D	16	A	B	C	D	22	A	B	C	D	28	A	B	C	D
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5	A	B	C	D	11	A	B	C	D	17	A	B	C	D	23	A	B	C	D	29	A	B	C	D
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**Section 4 (Continued)**

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**Section 5 (Optional)**

**Important:** Use a No. 2 pencil. Write inside the borders.

You may use the space below to plan your essay, but be sure to write your essay on the lined pages. Work on this page will not be scored.

**Use this space to plan your essay.**











# Section 1

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage or paired set of passages is accompanied by a number of questions. Read the passage or paired set of passages, then use what is said or implied in what you read and in any given graphics to choose the best answer to each question.

### Questions 1-10 are based on the following passage.

This passage is adapted from Edith Wharton, *The House of Mirth*, originally published in 1905.

Selden paused in surprise. In the afternoon rush of the Grand Central Station his eyes had been refreshed by the sight of Miss Lily Bart.

Line It was a Monday in early September, and he was  
5 returning to his work from a hurried dip into the country; but what was Miss Bart doing in town at that season? If she had appeared to be catching a train, he might have inferred that he had come on her in the act of transition between one and another of  
10 the country-houses which disputed her presence after the close of the Newport season; but her desultory air perplexed him. She stood apart from the crowd, letting it drift by her to the platform or the street, and wearing an air of irresolution which  
15 might, as he surmised, be the mask of a very definite purpose. It struck him at once that she was waiting for some one, but he hardly knew why the idea arrested him. There was nothing new about Lily Bart, yet he could never see her without a faint  
20 movement of interest: it was characteristic of her that she always roused speculation, that her simplest acts seemed the result of far-reaching intentions.

An impulse of curiosity made him turn out of his direct line to the door, and stroll past her. He knew

25 that if she did not wish to be seen she would contrive to elude him; and it amused him to think of putting her skill to the test.

“Mr. Selden—what good luck!”

30 She came forward smiling, eager almost, in her resolve to intercept him. One or two persons, in brushing past them, lingered to look; for Miss Bart was a figure to arrest even the suburban traveler rushing to his last train.

Selden had never seen her more radiant. Her  
35 vivid head, relieved against the dull tints of the crowd, made her more conspicuous than in a ball-room, and under her dark hat and veil she regained the girlish smoothness, the purity of tint, that she was beginning to lose after eleven years of late hours  
40 and indefatigable dancing. Was it really eleven years, Selden found himself wondering, and had she indeed reached the nine-and-twentieth birthday with which her rivals credited her?

45 “What luck!” she repeated. “How nice of you to come to my rescue!”

He responded joyfully that to do so was his mission in life, and asked what form the rescue was to take.

50 “Oh, almost any—even to sitting on a bench and talking to me. One sits out a cotillion—why not sit out a train? It isn’t a bit hotter here than in Mrs. Van Osburgh’s conservatory—and some of the women

CONTINUE 

are not a bit uglier.” She broke off, laughing, to explain that she had come up to town from Tuxedo, on her way to the Gus Trenors’ at Bellomont, and had missed the three-fifteen train to Rhinebeck. “And there isn’t another till half-past five.” She consulted the little jeweled watch among her laces. “Just two hours to wait. And I don’t know what to do with myself. My maid came up this morning to do some shopping for me, and was to go on to Bellomont at one o’clock, and my aunt’s house is closed, and I don’t know a soul in town.” She glanced plaintively about the station. “It is hotter than Mrs. Van Osburgh’s, after all. If you can spare the time, do take me somewhere for a breath of air.”

He declared himself entirely at her disposal: the adventure struck him as diverting. As a spectator, he had always enjoyed Lily Bart; and his course lay so far out of her orbit that it amused him to be drawn for a moment into the sudden intimacy which her proposal implied.

1

Which of the following provides the most reasonable summary of the passage?

- A) Two close friends meet to spend the day together.
- B) A traveler notices a woman acting suspiciously.
- C) Two acquaintances unexpectedly run into one another.
- D) A couple prepare to board a train for a romantic getaway.

2

Selden’s attitude towards Lily Bart is primarily one of

- A) attraction.
- B) fascination.
- C) disdain.
- D) pity.

3

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-3 (“In the ... Bart”)
- B) Lines 7-12 (“If she ... him”)
- C) Lines 18-22 (“There was ... intentions”)
- D) Lines 24-27 (“He knew ... test”)

4

Over the course of the passage, the main focus of the narrative shifts from the

- A) grim and suspicious attitude of one character to the gregarious behavior of another.
- B) meticulous plans laid by one character to the carefree adventures enjoyed by another.
- C) appreciation of abstract beauty to the enjoyment of living in the moment.
- D) private thoughts of one character about another to a friendly interaction between the two.

5

The passage suggests that Lily thinks it is good luck to run into Selden because

- A) she is in grave danger and thinks he can save her.
- B) she has been meaning to talk to him for a long time.
- C) she likes him better than the person she was planning to see.
- D) she has nothing to do until her train arrives.

6

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 16-18 (“It struck ... him”)
- B) Lines 46-48 (“He responded ... take”)
- C) Lines 59-60 (“And I ... myself”)
- D) Lines 65-67 (“It is ... air”)

7

The primary purpose of lines 6-12 (“but what ... him”) is to

- A) establish that Miss Bart does not live in town.
- B) suggest that Miss Bart owns many houses in Newport.
- C) imply that Selden thinks Miss Bart is untrustworthy.
- D) explain why Selden is surprised to see Miss Bart.

8

Selden walks towards Lily because

- A) he is curious about why she is at the station.
- B) he is hoping she will suggest they spend time together.
- C) he wants to see if she remembers him.
- D) he has missed her very much.

9

As used in line 32 the word “arrest” most nearly means

- A) apprehend.
- B) detain.
- C) impede.
- D) enthrall.

10

In the context of the passage, the author’s use of the phrase “eleven years of late hours and indefatigable dancing” (lines 39-40) is primarily meant to convey the idea that Lily

- A) is a professional dancer.
- B) prefers late parties to daytime activities.
- C) has never really been very punctual.
- D) has spent much of her youth in lively recreation.



**Questions 11-20 are based on the following passage.**

This passage is adapted from a speech given by President Lyndon B. Johnson at the University of Michigan on May 22, 1964, announcing his plan to establish several new governmental social service organizations.

Line  
5 For a century we labored to settle and to subdue a continent. For half a century we called upon unbounded invention and untiring industry to create an order of plenty for all of our people. The challenge of the next half century is whether we have the wisdom to use that wealth to enrich and elevate our national life, and to advance the quality of our American civilization.

10 Your imagination and your initiative and your indignation will determine whether we build a society where progress is the servant of our needs, or a society where old values and new visions are buried under unbridled growth. For in your time we have the opportunity to move not only toward the rich society and the powerful society, but upward to the Great Society. The Great Society rests on abundance and liberty for all. It demands an end to poverty and racial injustice, to which we are totally committed in our time. But that is just the beginning.

20 The Great Society is a place where every child can find knowledge to enrich his mind and to enlarge his talents. It is a place where leisure is a welcome chance to build and reflect, not a feared cause of boredom and restlessness. It is a place where the city of man serves not only the needs of the body and the demands of commerce but the desire for beauty and the hunger for community. It is a place where man can renew contact with nature. It is a place which honors creation for its own sake and for what it adds to the understanding of the race. It is a place where men are more concerned with the quality of their goals than the quantity of their goods.

35 But most of all, the Great Society is not a safe harbor, a resting place, a final objective, a finished work. It is a challenge constantly renewed, beckoning us toward a destiny where the meaning of

our lives matches the marvelous products of our labor. Within your lifetime powerful forces, already loosed, will take us toward a way of life beyond the realm of our experience, almost beyond the bounds of our imagination. For better or for worse, your generation has been appointed by history to deal with those problems and to lead America toward a new age. You have the chance never before afforded to any people in any age. You can help build a society where the demands of morality, and the needs of the spirit, can be realized in the life of the Nation.

50 So, will you join in the battle to give every citizen the full equality which God enjoins and the law requires, whatever his belief, or race, or the color of his skin? Will you join in the battle to give every citizen an escape from the crushing weight of poverty? Will you join in the battle to make it possible for all nations to live in enduring peace—as neighbors and not as mortal enemies? Will you join in the battle to build the Great Society, to prove that our material progress is only the foundation on which we will build a richer life of mind and spirit?

60 There are those timid souls that say this battle cannot be won, that we are condemned to a soulless wealth. I do not agree. We have the power to shape the civilization that we want. But we need your will and your labor and your hearts, if we are to build that kind of society. Those who came to this land sought to build more than just a new country. They sought a new world. So I have come here today to your campus to say that you can make their vision our reality. So let us from this moment begin our work so that in the future men will look back and say: It was then, after a long and weary way, that man turned the exploits of his genius to the full enrichment of his life.

11

Based on the passage, what is the best description of Johnson’s vision of the Great Society?

- A) A time when each American has an equal share of the nation’s wealth
- B) A nation in which citizens continuously seek to improve themselves and society
- C) A very exclusive club for the most powerful people in the country
- D) An organization dedicated to strengthening public infrastructure

12

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 4-8 (“The challenge ... civilization”)
- B) Lines 13-16 (“For in ... Society”)
- C) Lines 36-39 (“It is ... labor”)
- D) Lines 66-68 (“Those who ... world”)

13

What is the most likely reason Johnson refers to the founding of the United States?

- A) To link the Great Society to the original mission of the country
- B) To emphasize how morally superior current generations are to previous ones
- C) To decry how far Americans have fallen from their former greatness
- D) To provide information about the history of the country

14

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 9-13 (“Your imagination ... growth”)
- B) Lines 28-30 (“It is ... race”)
- C) Lines 42-45 (“For better ... age”)
- D) Lines 68-70 (“So I ... reality”)

15

Which of the following would Johnson probably see as a negative symptom of “unbridled growth” (line 13)?

- A) A business increases its profits by forcing its employees to work much longer hours.
- B) A railroad company expands its tracks across the country in a few months.
- C) A higher percentage of a city’s children are in school than have been previously.
- D) More people purchase at least ten books in a year than ever before.

16

How does Johnson characterize the relationship between the Great Society and “abundance and liberty for all” (line 17)?

- A) The Great Society will make abundance and liberty for all possible.
- B) Abundance and liberty for all are the ultimate goals of the Great Society.
- C) The Great Society and abundance and liberty for all are mutually exclusive.
- D) Abundance and liberty for all are the first requirements of the Great Society.

17

As used in line 19, “committed” most nearly means

- A) consigned.
- B) entrusted.
- C) assigned.
- D) dedicated.

18

Which best describes lines 20-33? (“The Great ... goods”)

- A) A list of ways in which the Great Society is already a reality
- B) A description of the hardships preventing Americans from realizing the Great Society
- C) An explanation of how Johnson came up with the vision for the Great Society
- D) A description of different aspects of Johnson’s vision for the Great Society

19

As used in line 40, “loosed” most nearly means

- A) unleashed.
- B) relaxed.
- C) extricated.
- D) slackened.

20

Johnson most likely repeats the phrase “will you” (lines 50-60) in order to

- A) demonstrate that his audience has many options before them.
- B) inspire his listeners to join him in achieving his goal.
- C) scold younger generations for neglecting his plans so far.
- D) repeat key information to ensure that listeners can understand what he is saying.

**Questions 21-31 are based on the following passage.**

This passage is adapted from Cindi May, “The Surprising Problem of Too Much Talent.” ©2014 by Scientific American.

Whether you’re the owner of the Dallas Cowboys or captain of the playground dodge ball team, the goal in picking players is the same: Get the top talent. Hearts have been broken, allegiances tested, and budgets busted as teams contend for the best athletes. The motivation for recruiting peak performers is obvious—exceptional players are the key to team success—and this belief is shared not only by coaches and sports fans, but also by corporations, investors, and even whole industries. Everyone wants a team of stars.

While there is no denying that exceptional players can put points on the board and enhance team success, new research by Roderick Swaab and colleagues suggests there is a limit to the benefit top talents bring to a team. Swaab and colleagues compared the amount of individual talent on teams with the teams’ success, and they found striking examples of more talent hurting the team.

The researchers looked at three sports: basketball, soccer, and baseball. In each sport, they calculated both the percentage of top talent on each team and the teams’ success over several years. For example, they identified top NBA talent using each player’s Estimated Wins Added (EWA), a statistic commonly employed to capture a player’s overall contribution to his team, along with selection for the All-Star tournament. Once the researchers determined who the elite players were, they calculated top-talent percentage at the team level by dividing the number of star players on the team by the total number of players on that team. Finally, team performance was measured by the team’s win-loss record over 10 years. For both basketball and soccer, they found that top talent did in fact predict team success, but only up to a point. Furthermore, there was not simply a point of diminishing returns with respect to top talent; there was in fact a cost.

Basketball and soccer teams with the greatest proportion of elite athletes performed worse than those with more moderate proportions of top level players.

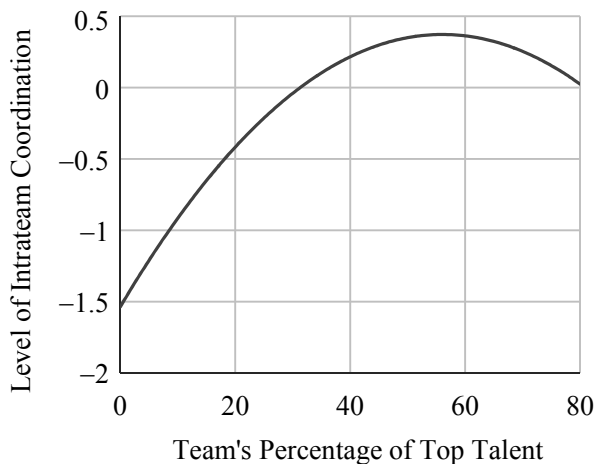
Why is too much talent a bad thing? Think teamwork. In many endeavors, success requires collaborative, cooperative work towards a goal that is beyond the capability of any one individual. When a team roster is flooded with individual talent, pursuit of personal star status may prevent the attainment of team goals. The basketball player chasing a point record, for example, may cost the team by taking risky shots instead of passing to a teammate who is open and ready to score.

Two related findings by Swaab and colleagues indicate that there is in fact tradeoff between top talent and teamwork. First, Swaab and colleagues found that the percentage of top talent on a team affects intrateam coordination. For the basketball study, teams with the highest levels of top performers had fewer assists and defensive rebounds, and lower field-goal percentages. These failures in strategic, collaborative play undermined the team’s effectiveness. The second revealing finding is that extreme levels of top talent did not have the same negative effect in baseball, which experts have argued involves much less interdependent play. In the baseball study, increasing numbers of stars on a team never hindered overall performance. Together these findings suggest that high levels of top talent will be harmful in arenas that require coordinated, strategic efforts, as the quest for the spotlight may trump the teamwork needed to get the job done.

The lessons here extend beyond the ball field to any group or endeavor that must balance competitive and collaborative efforts, including corporate teams, financial research groups, and brainstorming exercises. Indeed, the impact of too much talent is even evident in other animals: When hen colonies have too many dominant, high-producing chickens, conflict and hen mortality rise while egg production drops. So before breaking the bank to recruit

85 superstars, team owners and industry experts might want to consider whether the goal they are trying to achieve relies on individual talent alone, or a cooperative synergy from the team. If the latter, it would be wise to reign in the talent and focus on teamwork.

Coordination as a Function of Top Talent



21

Which of the following best describes the structure of the passage as a whole?

- A) A collection of anecdotes about sports
- B) A description of a study and its potential implications
- C) A set of pieces of advice for managers in sports and business
- D) A series of arguments in favor of changing recruitment methods

22

Based on information in the passage, it can be inferred that the researchers' results

- A) contradict most people's beliefs about team success.
- B) confirm the conventional wisdom of sports recruitment.
- C) provide information only about performance in a laboratory setting.
- D) can be used to explain team results in all sports, as well as some other settings.

23

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 12-16 ("While there ... team")
- B) Lines 39-42 ("Basketball and ... players")
- C) Lines 44-46 ("In many ... individual")
- D) Lines 66-68 ("In the ... performance")

24

Which of the following best summarizes the passage's interpretation of the researchers' findings?

- A) Teamwork is the most important quality for sports teams.
- B) Individual talent is the most important quality for sports teams.
- C) Individual talent matters, but teamwork can be a decisive factor in some sports.
- D) Although individual talent is more important, very strong teamwork can make up for weak talent.

25

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 6-10 (“The motivation ... industries”)
- B) Lines 34-36 (“For both ... point”)
- C) Lines 46-49 (“When a ... goals”)
- D) Lines 68-72 (“Together these ... done”)

26

The primary purpose of the first paragraph (lines 1-11) is to

- A) explain why a high level of talent is so important.
- B) explore possible reasons for the success of various teams.
- C) endorse a particular recruitment strategy for sports management.
- D) establish the conventional wisdom about talent and success.

27

As used in line 26, “employed” most nearly means

- A) occupied.
- B) used.
- C) appointed.
- D) hired.

28

As used in line 70, “coordinated” most nearly means

- A) negotiated.
- B) synchronized.
- C) communicated.
- D) light-footed.

29

The passage suggests that a study of the effect of top talent in baseball produced different results than the basketball study because

- A) top baseball players are better at cooperative play than top basketball players.
- B) there tend to be fewer elite athletes on baseball teams than on basketball teams.
- C) there are fewer team members on the court at once in basketball than are on the field at once in baseball.
- D) the sport of baseball requires less cooperative play than the sport of basketball.



30

Based on lines 81-87 (“So before ... teamwork”), in which of the following situations should decision makers “reign in the talent and focus on teamwork”?

- A) A professor deciding which student papers to select as examples for future classes
- B) A conductor auditioning singers for a choir to perform at a competition
- C) A gymnastics coach helping his team members with their solo routines
- D) A newspaper editor hiring journalists to cover local crime stories

31

Which of the following claims is best supported by information in the passage and graph?

- A) A basketball team with no top talent will generally perform slightly better than an all-star team.
- B) Basketball teams should aim to have top talent for about half of the team.
- C) A struggling basketball team should replace its best players instead of its worst ones.
- D) Around half of the players on an average basketball team tend to be considered top talent.

**Questions 32-41 are based on the following passage.**

This passage is adapted from David Noonan, “Meet the Two Scientists Who Implanted a False Memory Into a Mouse.”

©2014 by Smithsonian Magazine.

Steve Ramirez, a 24-year-old doctoral student at the time, placed the mouse in a small metal box with a black plastic floor. Instead of curiously sniffing around, though, the animal instantly froze in terror, recalling the experience of receiving a foot shock in that same box. It was a textbook fear response, and if anything, the mouse’s posture was more rigid than Ramirez had expected. Its memory of the trauma must have been quite vivid. Which was amazing, because the memory was bogus: The mouse had never received an electric shock in that box. Rather, it was reacting to a false memory that Ramirez and his MIT colleague Xu Liu had planted in its brain.

The observation culminated more than two years of a long-shot research effort and supported an extraordinary hypothesis: Not only was it possible to identify brain cells involved in the encoding of a single memory, but those specific cells could be manipulated to create a whole new “memory” of an event that never happened. What Ramirez and Liu have been able to see and control are the flickering clusters of neurons, known as engrams, where individual memories are stored. Joining forces in late 2010, the two men devised an elaborate new method for exploring living brains in action, a system that combines classic molecular biology and the emerging field of optogenetics, in which lasers are deployed to stimulate cells genetically engineered to be sensitive to light.

In the first study, published in *Nature* in March 2012, Ramirez and Liu identified, labeled and then reactivated a small cluster of cells encoding a mouse’s fear memory, in this case a memory of an environment where the mouse had received a foot shock. The feat provides strong evidence for the long-held theory that memories are encoded in engrams. Ramirez and Liu assembled a customized set of techniques to render mouse brain cells in their

target area, the dentate gyrus, sensitive to light.

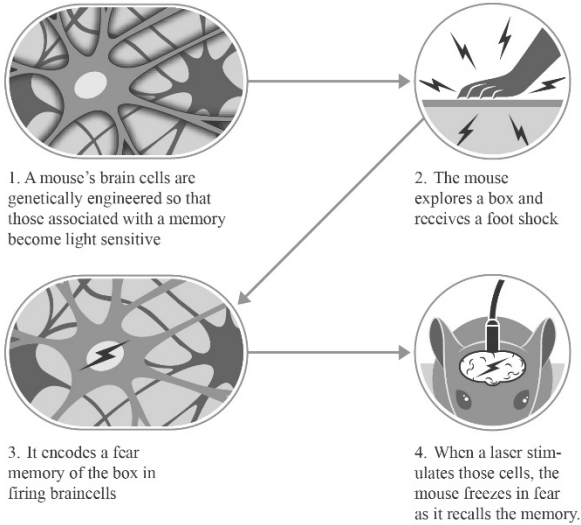
Working with a specialized breed of genetically engineered lab mice, the team injected the dentate gyrus with a biochemical cocktail that included a gene for a light-sensitive protein, channelrhodopsin-2. Dentate gyrus cells participating in memory formation would produce the protein, thus becoming light-sensitive themselves. The idea was that after the memory had been encoded, it could be reactivated by zapping those cells with a laser.

To do that, Ramirez and Liu surgically implanted thin filaments from the laser through the skulls of the mice and into the dentate gyrus. Reactivating the memory—and its associated fear response—was the only way to prove they had actually identified and labeled an engram. The researchers examined the brain tissues under a microscope to confirm the existence of the engrams; cells involved in a specific memory glowed green after treatment with chemicals that reacted with channelrhodopsin-2. When Ramirez and Liu looked at the treated neurons through the microscope, “it was like a starry night,” says Liu, “where you can see individual stars.” Though these active cells were just one part of a widely distributed foot shock engram, reactivating them was enough to trigger a fear response.

The next step was to manipulate a specific engram to create a false memory, an elegant experiment detailed in Ramirez and Liu’s second paper, published in *Science* in July 2013. They prepared the mouse, injecting the biochemical cocktail into the dentate gyrus. Next, they put the mouse in a box without shocking it. As the animal explored, a memory of this benign experience was encoded as an engram. The following day, the mouse was placed in a different box, where its memory of the first (safe) box was triggered by shooting the laser into the dentate gyrus. At that exact moment, the mouse received a foot shock. On the third day, the mouse was returned to the safe box—and immediately froze in fear. It had never received a foot shock there, but its false memory, created by the researchers in another box, caused

it to behave as if it had.

### Reactivating a Memory



32

The author's attitude towards Ramirez and Liu's innovation is best described as that of

- A) a zealous proponent.
- B) an interested observer.
- C) a wary critic.
- D) a skeptical colleague.

33

Based on the passage, what is the primary significance of the research described?

- A) It suggests new technologies might prevent memory loss.
- B) It proves that memories cannot be tampered with.
- C) It shows how specific interventions can alter memories.
- D) It clarifies the purpose of the dentate gyrus.

34

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 16-20 ("Not only ... happened")
- B) Lines 37-39 ("Ramirez and ... light")
- C) Lines 46-48 ("The idea ... laser")
- D) Lines 62-64 ("Though these ... response")

35

In relation to the other events described in the passage, when did the events described in the first paragraph most likely take place?

- A) Before the first study
- B) During the first study
- C) During the second study
- D) After the conclusion of the second study

36

Based on the passage, which choice best describes the relationship between neurons and memories?

- A) Multiple neurons may work together to store one memory.
- B) Each neuron stores exactly one memory.
- C) Neurons are involved in making memories but do not store them.
- D) Multiple memories are stored in each neuron.

37

As used in line 38, "render" most nearly means

- A) provide.
- B) make.
- C) depict.
- D) express.

38

The goal of Ramirez and Liu’s first study was to

- A) implant a false memory engram in a mouse.
- B) study the development of fear responses in mice.
- C) identify an engram storing a particular memory.
- D) discover whether they could make mice more sensitive to light.

39

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 30-35 (“In the ... shock”)
- B) Lines 44-46 (“Dentate gyrus ... themselves”)
- C) Lines 51-54 (“Reactivating the ... engram”)
- D) Lines 59-61 (“When Ramirez ... stars”)

40

As used in line 65, “manipulate” most nearly means

- A) handle.
- B) palpate.
- C) engineer.
- D) exploit.

41

Based on the passage and the graphic, the purpose of making certain cells light-sensitive is to

- A) allow the researchers to reactivate a memory with a laser.
- B) ensure that memories are encoded in engrams.
- C) prevent the mouse from recalling the memory in a new location.
- D) heighten the fear reaction in response to a foot shock.

**Questions 42-52 are based on the following passages.**

Passage 1 is adapted from Andrew Steele, "Your phone screen just won the Nobel Prize in physics." © Andrew Steele, 2014. Passage 2 is adapted from Sarah Zielinski, "The Potential Dark Side of Nobel-Winning LEDs: Pest Problems." © Smithsonian Magazine, 2014.

**Passage 1**

Blue LEDs are important for two reasons: First, the blue light has specific applications of its own and second, because it's a vital component of the white light which makes white LEDs, and therefore LED computer and phone screens, possible. Blue light has a short wavelength, which allows the pits on a Blu-ray disc to be smaller and closer together than on a DVD, which is read with red light. This means we can pack over five times as much data onto a disk the same size as a DVD.

Their biggest impact, however, is surely in giving us the ability to produce white LEDs. White light is actually a mixture of all the colors of the rainbow, as you can see if you split it up with a prism, or indeed if you catch a multicolored reflection in the surface of a Blu-ray disc, DVD or CD. However, the human eye has just three types of color receptor inside it: red, green and blue.

We can therefore make something which looks like white light using only these three colors. Combining red and green LEDs with blue ones allows us to create highly efficient white lighting, providing around 20 times as much light as an equivalent incandescent bulb. White LEDs are slowly making their way onto ceilings of homes, shops and factories around the world, but their real ubiquity today is as the back-light for computer and phone screens.

Unlock your phone or turn on a recent flat-screen monitor, and red, green and blue LEDs shining through a layer of liquid crystal allows you to browse the web and watch movies. The result is a technology which is all around us in the developed world, and making headway into the developing world too.

**Passage 2**

The Nobel Prize in Physics was recently awarded to three scientists who invented blue light-emitting diodes. The work was crucial for producing bright white LED lighting, which is more energy-efficient than traditional incandescent bulbs. But there's a possible downside to widespread use of LEDs: They could make light pollution worse. For decades streetlights have generally used yellow, high-pressure sodium vapor lamps, which light up by sending an arc of electricity through vaporized sodium metal. Now, white LEDs are quickly replacing the sodium lamps, but a study published in Ecological Applications shows why that might be an environmental problem.

"The main driver of the ecological impacts that result from a shift to white LED lighting will be the increase in emissions of short wavelength 'blue' light," says Stephen Pawson, an entomologist at the New Zealand research institute Scion. "The behavior of many animals is influenced by light in the blue portion of the spectrum. For example, insects have specific photoreceptors for blue light. Thus large-scale adoption of 'white' lighting is likely to increase the impacts of nighttime lighting on all species sensitive to 'blue' light."

In the study, Pawson and his Scion colleague Martin Bader looked at the effects of industrial white LEDs versus sodium lamps on insects. They set out the lamps in a field at night, placing sheets of a sticky material next to the lights to catch any insects that came near. On average, the white LEDs attracted 48 percent more flying invertebrates than the sodium lamps. The researchers hypothesized that certain white LEDs might be less attractive to invertebrates than others. Unfortunately, that wasn't the case.

If installed as currently designed, white LEDs could exacerbate pest problems, Pawson and Bader note in their study. Midge swarms, for instance, are already known to be more attracted to white lighting.

42

Passage 1 presents blue LEDs primarily as

- A) a fascinating demonstration of little-understood physical principles.
- B) a scientific curiosity of interest to select groups of people.
- C) a major technological breakthrough that has already proven important.
- D) a promising prototype that may become highly significant.

43

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 8-10 (“This means ... DVD”)
- B) Lines 12-16 (“White light ... CD”)
- C) Lines 21-24 (“Combining red ... bulb”)
- D) Lines 32-35 (“The result ... too”)

44

As used in line 3, “vital” most nearly means

- A) lively.
- B) vigorous.
- C) essential.
- D) compelling.

45

According to Passage 1, blue light is important for creating white LEDs because

- A) blue LEDs are cheaper to manufacture than white LEDs.
- B) blue is one of the colors for which human eyes have receptors.
- C) all colors must be present for humans to perceive white light.
- D) blue light is the easiest to produce artificially.

46

Passage 2 primarily focuses on

- A) different kinds of evidence that suggest white LEDs are harmful.
- B) what makes white LEDs different from sodium lights.
- C) the author’s opinion that we use too many white LEDs.
- D) a study demonstrating a specific effect of white LEDs.

47

The researchers in Passage 2 are primarily concerned that white LEDs will

- A) result in significant losses of native insects.
- B) disrupt the habitats of nocturnal animals.
- C) cause an increase in invertebrate populations.
- D) attract more pests than sodium lamps do.

48

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 42-46 (“For decades ... metal”)
- B) Lines 61-63 (“In the ... insects”)
- C) Lines 66-68 (“On average ... lamps”)
- D) Lines 74-75 (“Midge swarms ... lighting”)

49

As used in line 40, “traditional” most nearly means

- A) standard.
- B) time-honored.
- C) habitual.
- D) conservative.

50

Which of the following is the best example of one of the “impacts of nighttime lighting” mentioned in line 59?

- A) Insects can be caught in sheets of sticky material placed near lights.
- B) White LEDs are likely to emit more blue light than sodium lamps.
- C) Light sources often attract unwanted pests, such as midge swarms.
- D) Insects are drawn to things they have not seen before.

51

Which of the following best describes the relationship between the two passages?

- A) Passage 2 describes a new application of the technology explained in Passage 1.
- B) Passage 2 highlights a potential downside of the innovation described in Passage 1.
- C) Passage 2 details an experiment performed to test the tools discussed in Passage 1.
- D) Passage 2 criticizes the researchers profiled in Passage 1.

52

The authors of both passages would probably agree that

- A) the most significant use of blue LEDs is in making white LEDs.
- B) blue LEDs could be dangerous and should be used with caution.
- C) the primary harm blue LEDs might cause would be to humans.
- D) blue LEDs are too difficult to manufacture to be used widely.

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 2



# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage comes with a set of questions. Some questions will ask you to consider how the writer might revise the passage to improve the expression of ideas. Other questions will ask you to consider correcting potential errors in sentence structure, usage, or punctuation. There may be one or more graphics that you will need to consult as you revise and edit the passage.

Some questions will refer to a portion of the passage that has been underlined. Other questions will refer to a particular spot in a passage or ask that you consider the passage in full.

After you read the passage, select the answers to questions that most effectively improve the passage's writing quality or that adjust the passage to follow the conventions of standard written English. Many questions give you the option to select "NO CHANGE." Select that option in cases where you think the relevant part of the passage should remain as it currently is.

Questions 1-11 are based on the following passage.

### The Adaptive Arms Race

Every environment on Earth, from placid lakes to sun-scorched deserts, **1** is full of living beings engaged in life-and-death struggles. Predators constantly try to capture and eat prey, while **2** escaping predators is what prey tries to do. Over the course of many generations, predators tend to evolve to be better at spotting and catching their next meal, while prey animals evolve adaptations for evading and fighting off predators. Many prey animals have thus evolved fascinating defenses against being eaten.

1

- A) NO CHANGE
- B) has been full
- C) was full
- D) being full

2

- A) NO CHANGE
- B) escaping predators is prey's goal
- C) prey is trying to escape predators
- D) prey tries to escape predators

CONTINUE 

**3** The porcupine, for instance, is covered in barbed quills that can lodge painfully in the paws or skin of predators unwise enough to attack it. More intimidating still is the Texas horned lizard, which can fire a jet of foul-tasting blood from its eyes at a range of up to five feet. **4** That’s way too gross for most predators to handle. Predators faced with noxious or dangerous defenses like these often choose to seek out easier prey.

Other prey animals avoid being eaten by blending in with their environment or imitating inedible objects. Many insects use this strategy, including stick insects and leaf insects, which have body shapes and colors that resemble parts of plants. Their **5** mockery is so convincing that even people can have a hard time picking them out from surrounding vegetation. **6** Even so, such camouflage is very effective, since a prey animal that cannot be found cannot be eaten.

3

The writer would like to insert a sentence here to help establish the main topic of the following paragraph. Which choice most effectively conveys the main topic of this paragraph?

- A) Some prey animals have evolved defensive weapons to ward off predators.
- B) Evolution rarely results in the simplest solution to a problem, so many prey adaptations are quite elaborate.
- C) Although prey animals defend themselves when threatened, most animals prefer to avoid a fight whenever possible.
- D) For many prey animals, simply running away from predators is the best solution.

4

- A) NO CHANGE
- B) This disgusts and deters most predators.
- C) Most predators say, “no thanks!” to the horned lizard after that.
- D) This convinces most predators that the horned lizard is way too gross to eat.

5

- A) NO CHANGE
- B) duplication
- C) mimicry
- D) deceit

6

- A) NO CHANGE
- B) Nevertheless,
- C) Naturally,
- D) And then,

[1] Why, then, are some prey animals brightly colored instead? [2] Surely such animals would be spotted and **7** quickly devoured right away, leaving them unable to pass on their genes. [3] As it turns out, bright colors are usually part of another anti-predation strategy called *aposematism*. [4] The visually distinctive patterns on animals using aposematism warn predators that their potential prey tastes bad, is poisonous, or wields a dangerous defense. [5] These warning patterns are often quite beautiful. [6] For example, the striking orange and black coloration on the wings of monarch butterflies **8** indicate that their bodies are loaded with foul-tasting poison. [7] Any bird that tries to eat a monarch butterfly quickly learns to make its next meal out of a more drab insect. **9**

Aposematism works so well that some animals have even evolved to display such warnings despite actually being harmless, a strategy called *Batesian mimicry*. Batesian mimics include the drone fly, which bears the black and yellow colors of the honey bee but lacks **10** its ability to sting. Thanks to this trickery, predators that have experienced the pain of a real bee's sting will not risk running afoul of **11** it.

7

- A) NO CHANGE
- B) quickly eaten up immediately
- C) immediately
- D) devoured immediately

8

- A) NO CHANGE
- B) indicates
- C) will indicate
- D) indicated

9

Which of the following changes would most improve the focus of the passage?

- A) Move sentence 2 so that it follows sentence 3.
- B) Move sentence 5 so that it follows sentence 6.
- C) Delete sentence 5.
- D) Delete sentence 4.

10

- A) NO CHANGE
- B) it's
- C) their
- D) they're

11

- A) NO CHANGE
- B) them
- C) these
- D) the drone fly

Questions 12-22 are based on the following passage.

### Life and Legacy of Alexander III

When Alexander III inherited the throne of Macedon in the year 336 BC, he could hardly have come to power under better circumstances. He had the best education money could buy, having been tutored by the famed scholar Aristotle, and his power over all of Greece was already **12** secure. Thanks to decades of war and diplomacy overseen by his father, Philip II, Alexander was well-positioned to continue his father’s military expansion and earn the title “Alexander the Great.”

Alexander began his conquest by invading the mighty Persian Empire. Thanks to his brilliant strategy and **13** how experienced his troops were, he quickly defeated the armies of Persia and took control of what is now the Middle East and Iran. **14** This early success encouraged him. He decided to continue pushing east despite his army’s exhaustion. Threatening to mutiny, **15** he was eventually forced by his troops to turn back and end his campaign. Even so, by the time he turned thirty in 326 BC, Alexander was the ruler of the largest empire the world had yet **16** seen; it stretched from Egypt in the west all the way to India in the east.

**12**

- A) NO CHANGE
- B) secure: thanks
- C) secure; thanks
- D) secure, thanks

**13**

- A) NO CHANGE
- B) experienced troops
- C) how much experience his troops had
- D) his troops being very experienced

**14**

Which choice most effectively combines the two sentences at the underlined portion?

- A) While this early success encouraged him, he
- B) He, encouraged by his earlier success, then
- C) Encouraged by this early success, he
- D) Encouragement coming from this success, he

**15**

- A) NO CHANGE
- B) he eventually was forced by his troops
- C) his troops eventually forced him
- D) he and his troops were eventually forced

**16**

- A) NO CHANGE
- B) seen, it
- C) seen; it,
- D) seen it

Alexander had a grand vision for his new empire. He hoped to mix the cultures of Asia and Europe by transferring settlers among different regions of the empire. However, many Greek and Macedonian nobles disliked Alexander's adoption of **17** the customs that the Persians had; his decision to proclaim himself a god, as the Persian emperor had, was particularly unpopular. **18** Nevertheless, Alexander failed to unite his native Greek culture with the cultures of the peoples he had conquered.

[1] In 323 BC, Alexander died of a sudden illness.

[2] Many historians, ancient and modern, have suggested that he was poisoned by a political rival.

**19** [3] The reading of Alexander's will showed that his death had cut short many grandiose plans. [4] He had hoped to invade Arabia and even circumnavigate Africa. [5] His plans went unrealized as his empire quickly crumbled. [6] Without Alexander's leadership, his generals quickly turned to fighting among themselves to carve out their own kingdoms. **20**

17

- A) NO CHANGE
- B) Persia
- C) the customs of the Persians
- D) Persian customs

18

- A) NO CHANGE
- B) As a result,
- C) In addition,
- D) In spite of this,

19

Which choice, inserted here, most effectively adds support for the claim in sentence 2?

- A) Poisons may be derived from toxic plants or animal venom, but some minerals are also toxic.
- B) Macedonian nobles often poisoned their opponents to remove them from power.
- C) Alexander had taken many wounds in battle, leading to an overall decline in his health.
- D) Alexander's unhealthy diet and lifestyle had taken a toll on his body.

20

To make this paragraph most logical, sentence 4 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 6.

21 His conquests spread Greek culture across much of the Old World, influencing art as far away as India and establishing Greek as the language of international communication for centuries afterward. The Romans, who would later conquer much of Alexander's former territory, adopted Greek philosophy and made many 22 illusions to Greek literature in their own writings, ensuring that Greek culture would survive to influence Western thought for millennia.

21

Which choice, inserted here, most effectively conveys the main topic of this paragraph?

- A) As a result, Alexander's work was entirely undone soon after his death.
- B) Although his empire was short-lived, Alexander's conquest had an enormous impact on history.
- C) Despite his early successes as a conqueror, Alexander had failed to achieve his objectives as a ruler.
- D) Alexander was remembered long after his death as a fair and just ruler.

22

- A) NO CHANGE
- B) elusions
- C) elisions
- D) allusions

Questions 23-33 are based on the following passage.

### The Pressing Need for Clinical Psychologists

Clinical psychologists study, diagnose, and treat mental illnesses. Their work is vital given the high rates of mental illness among adolescents and adults. More psychologists are needed to contribute to research on the causes of and treatments for mental illness and give therapy to patients.

Mental illness is quite common in the United States. In 2012, the National Institutes of Mental Health estimated that almost 20% of adults in the US were diagnosed with a mental illness. Anxiety disorders, which involve excessive **23** stressing out about stuff, were the most common. Other relatively common illnesses were attention-deficit hyperactivity disorder (ADHD), which involves difficulties focusing, and major depression, which saps the mood and energy of its sufferers.

23

- A) NO CHANGE
- B) worry and stress
- C) worrying all the time
- D) difficulty taking it easy



[1] Adolescents between the ages of 13 and 18 are particularly vulnerable to these disorders; NIMH estimates indicate that **24** about 25% of them likely suffer from at least one anxiety disorder. [2] That figure is just below 10% for ADHD and depression. [3] Another disorder that has drawn the attention of psychologists and the general public is autism spectrum disorder (ASD). [4] People with ASD often show symptoms from a very early age; **25** his or her symptoms can include difficulties with motor coordination and delayed literacy acquisition. [5] ASD is becoming increasingly common; **26** 1 in 150 children born in 2000 had ASD, while by 2010 the rate had increased to 1 in 68. **27**

Surveillance Year	Birth Year	Number of Sites Reporting	Prevalence per 1,000 Children	This is about 1 in X children
2000	1992	6	6.7	1 in 150
2002	1994	14	6.6	1 in 150
2004	1996	8	8.0	1 in 125
2006	1998	11	9.0	1 in 110
2008	2000	14	11.3	1 in 88
2010	2002	11	14.7	1 in 68

24

- A) NO CHANGE
- B) about 25% of them likely suffer from at least one anxiety disorder as well
- C) about 25% of adolescents likely suffer from at least one anxiety disorder and teens as well
- D) about 25% of adolescent and teenage youth likely suffer from at least one anxiety disorder

25

- A) NO CHANGE
- B) their
- C) one's
- D) his

26

Which choice completes the sentence with accurate data based on the table?

- A) NO CHANGE
- B) 1 in 150 children born in 1992 had ASD, while by 2002 the rate had increased to 1 in 68.
- C) 6.7% of children born in 2000 had ASD, while by 2010 the rate had increased to 14.7%.
- D) 6.7% of children born in 1992 had ASD, while by 2002 the rate had increased to 14.7%.

27

To make this paragraph most logical, sentence 2 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 4.
- D) after sentence 5.

If more students became **28** a psychologist, they could perform research to address many questions relating to mental illness. For instance, many researchers are currently unsure if mental illness is truly becoming more common or if clinical psychologists are simply more likely to spot it than in the past. Broad studies of the population are needed to address the issue. **29** Without a doubt, the root causes and biological underpinnings of many disorders are not known. More studies of the **30** gene's and brain's of people with mental illness are needed to develop fuller understandings of these disorders.

28

- A) NO CHANGE
- B) psychologists
- C) psychologist
- D) the psychologist

29

- A) NO CHANGE
- B) However,
- C) Conversely,
- D) Consequently,

30

- A) NO CHANGE
- B) gene's and brains
- C) genes and brain's
- D) genes and brains

**31** Some mental illnesses can be treated with medications, such as antidepressants for depression and stimulants for ADHD, but there are patients for whom **32** it does not work perfectly. Therapy is a vital part of recovery for these people. Even for patients who respond well to medication, regular therapy can also help them develop coping skills and avoid relapse. The availability of psychologists who can meet with patients to deliver therapies **33** are vital to addressing the serious public health challenge of mental illness.

**31**

The writer would like to insert a sentence here to help establish the main idea of the paragraph. Which choice most effectively conveys the main topic of this paragraph?

- A) Though the causes of mental illnesses are not well understood, psychologists have found that many are at least partially heritable.
- B) The Internet has helped people with mental illnesses form communities to support one another.
- C) More psychologists are also needed to provide treatment for mental illnesses.
- D) Unfortunately, mental illness is sometimes stigmatized in American society.

**32**

- A) NO CHANGE
- B) they do
- C) which does
- D) they does

**33**

- A) NO CHANGE
- B) can be
- C) is
- D) was

Questions 34-44 are based on the following passage.

### Several French Existentialists

In the years following World War II, France responded to its liberation from Nazi occupation with a remarkable flourishing of culture and intellectualism. One of the foremost movements to emerge during this time was the philosophical school of existentialism. Authors and thinkers **34** affiliated to this movement produced a formidable yet accessible body of literature that is still read by many today.

34

- A) NO CHANGE
- B) affiliated in
- C) affiliated by
- D) affiliated with

CONTINUE 

One of the pioneers of existentialism was the author Jean-Paul Sartre, whose book *Existentialism is a Humanism* **35** concluded the philosophical principles of the movement. Sartre argued that human beings as individuals must define the meaning and purpose of their **36** own lives, by developing their own values and acting in accordance with them. His worldview thus emphasized the importance of individual responsibility **37** and also freedom of choice as well. Sartre's literary works explored these ideas, often by focusing on the thoughts and actions of irresponsible and immoral characters. **38**

35

- A) NO CHANGE
- B) contrived
- C) expounded
- D) insinuated

36

- A) NO CHANGE
- B) own lives by developing
- C) own lives. By developing
- D) own lives: by developing

37

- A) NO CHANGE
- B) and also freedom of choice
- C) and freedom of choice
- D) and freedom of choice as well

38

Which choice, inserted here, most effectively provides support for the claim in the preceding sentence?

- A) For example, his short story *The Wall* depicts a captured soldier who refuses to give up his comrade's location.
- B) In fact, despite being offered the Nobel Prize in 1964, he actually declined it.
- C) For instance, his play *No Exit* portrays three people condemned to Hell and forced to reflect on their misdeeds.
- D) For example, the main character of his novel *Nausea* becomes consumed by anxiety and disgust with life.

39 Though he did not consider himself an existentialist, author Albert Camus also addressed existentialist themes in his writings. Camus often wrote about characters struggling to find meaning in a seemingly meaningless and absurd world. In one of his best-known works, *The Stranger*, the protagonist Meursault drifts apathetically through his life and, after being sentenced to death for murder, tries to come to terms with the apparent indifference of the universe itself. Camus' masterpiece, *The Plague*, depicts a group of citizens in the Algerian city of Oran as it is devastated by an outbreak of disease. 40 Camus was actually a *pied-noir*, a child of French colonists born and raised in Algeria. This setting allows Camus to explore the existentialist themes of 41 moral responsibility and the search for meaning in suffering and the importance of social ties.

39

- A) NO CHANGE
- B) He did not consider himself an existentialist, though author Albert Camus
- C) Author Albert Camus did not consider himself an existentialist. He
- D) Not considering himself an existentialist, author Albert Camus

40

The writer is considering deleting the underlined sentence. Should it be kept or deleted?

- A) Kept, because it provides an interesting piece of information about the subject.
- B) Kept, because the sentence contributes to the logical progression of the passage.
- C) Deleted, because the information is not relevant and diminishes the focus of the paragraph.
- D) Deleted, because the information in the sentence contradicts information provided earlier in the passage.

41

- A) NO CHANGE
- B) moral responsibility, and the search for meaning in suffering and the importance of social ties
- C) moral responsibility, the search for meaning in suffering, and the importance of social ties
- D) moral responsibility and the search for meaning in suffering, and the importance of social ties

Author **42** Simone de Beauvoir who maintained a lifelong romantic relationship with Sartre, united existentialist ideas with feminist convictions to write about the unique challenges that women faced in the mid-20<sup>th</sup> century. Her treatise *The Second Sex* examined how social roles and expectations **43** constrain women’s choices, shape their identities, and deny them the opportunity to find their own sources of meaning. In her novel *Les Belles Images*, her character Laurence struggles with feelings of dissatisfaction and constraint despite her seemingly ideal married life. Many critics praised de Beauvoir’s frank depictions of women and felt that her female characters were more realistic and **44** relatable than Sartre. It is hardly surprising that de Beauvoir’s works, like those of the other existentialists, are widely read to this day.

42

- A) NO CHANGE
- B) Simone de Beauvoir that maintained
- C) Simone de Beauvoir—who maintained
- D) Simone de Beauvoir, who maintained

43

- A) NO CHANGE
- B) bind
- C) contain
- D) oblige

44

- A) NO CHANGE
- B) relatable than was Sartre
- C) relatable than Sartre’s
- D) relatable than did Sartre

## STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 3





# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

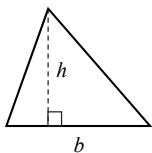
## DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

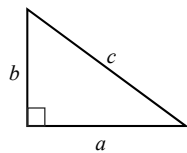
## NOTES

1. You **may not** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

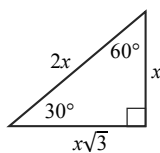
## REFERENCE



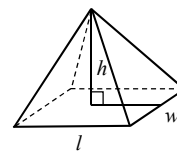
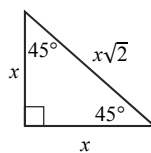
$$A = \frac{1}{2}bh$$



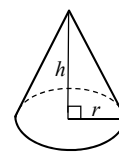
$$a^2 + b^2 = c^2$$



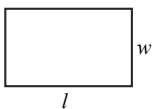
Special Triangles



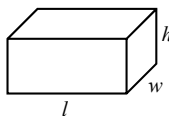
$$V = \frac{1}{3}lwh$$



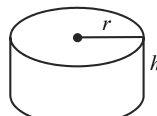
$$V = \frac{1}{3}\pi r^2 h$$



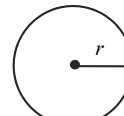
$$A = lw$$



$$V = lwh$$

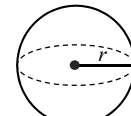


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE



1

$$x + 6 + 2x = 5x$$

What is the value of  $x$  in the above equation?

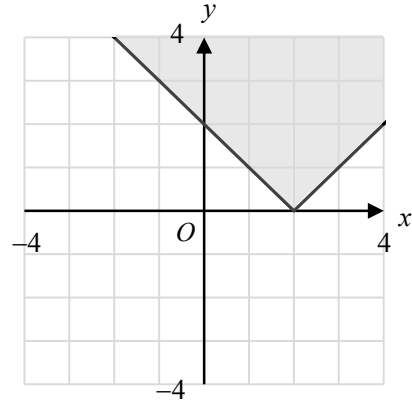
- A) 2
- B) 3
- C) 4
- D) 5

2

If  $a^2 + 3a + 1 = c$  and  $-4a + 5 = d$ , which of the following is equal to  $c + d$ ?

- A)  $a^2 + a + 6$
- B)  $a^2 - a + 6$
- C)  $a^2 + 7a - 4$
- D) 6

3



Which inequality is represented by the graph above?

- A)  $y \geq |x - 2|$
- B)  $y \geq |x + 2|$
- C)  $y \leq |x - 2|$
- D)  $y \leq |x + 2|$

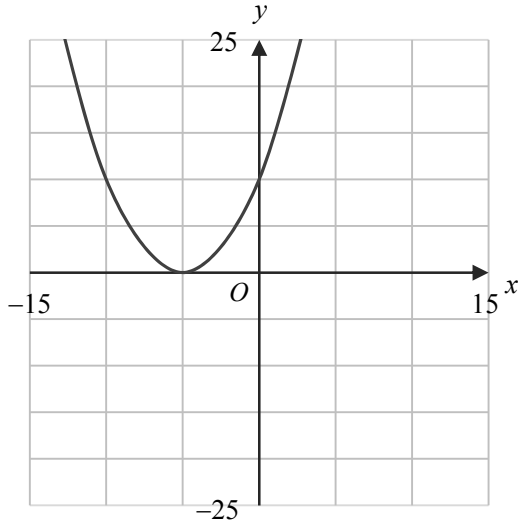
4

Sophie and Jazmin have the same amount of money to invest in the stock market. If Sophie lends \$15,000 to Jazmin, Jazmin has twice as much money as Sophie. How much money did Jazmin have originally?

- A) \$10,000
- B) \$30,000
- C) \$45,000
- D) \$60,000



5



Which function best represents the parabola above?

- A)  $y = \frac{2}{5}(x - 5)^2$
- B)  $y = \frac{2}{5}(x + 5)^2$
- C)  $y = \frac{2}{5}x + 5$
- D)  $y = \frac{2}{5}x - 5$

6

Luca pays \$1195 per month for rent plus 10 cents per kilowatt hour (kWh) used for electricity. If Luca used  $x$  kWh in one month, which expression best represents the amount of money in dollars Luca needs to pay for his apartment?

- A)  $1195 + 0.1x$
- B)  $(1195 + 0.1)x$
- C)  $1195 + 10x$
- D)  $(1195 + 1)x$

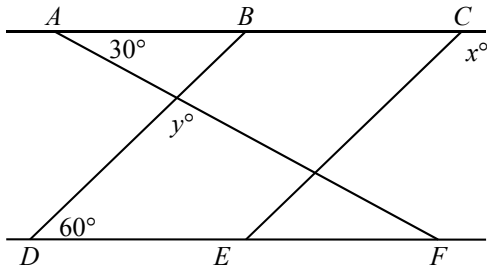
7

Which of the following equations has the same slope as  $2y + 6x = 5$ ?

- A)  $x + 3y = 1$
- B)  $3x = -y + 5$
- C)  $y - 3x = 4$
- D)  $6y = 2x - 1$



8



Note: figure is not drawn to scale.

In the figure above,  $\overline{AC} \parallel \overline{DF}$  and  $\overline{BD} \parallel \overline{CE}$ . What is the value of  $x - y$ ?

- A) 30
- B) 60
- C) 90
- D) 12

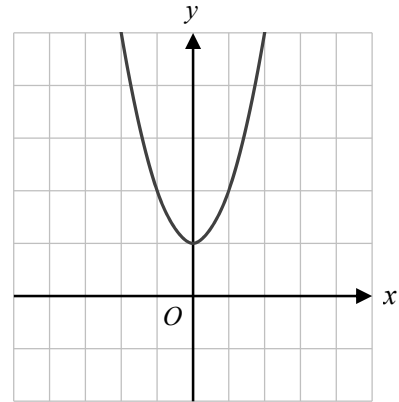
9

$$8x + y = 36 = 2y + 4x$$

In the above equation, what is the value of  $x + y$ ?

- A) 3
- B) 10
- C) 12
- D) 15

10



The graph above is a parabola whose equation is  $y = ax^2 + b$ . If  $y = -ax^2 + b$  were drawn on the same graph, how many  $x$ -intercepts would the resulting graph have?

- A) 0
- B) 1
- C) 2
- D) Need more information

11

$$\frac{(x^2 - 1)(x - 1)}{x + 1}$$

Which of the following is equivalent to the expression above?

- A)  $x^2 - 1$
- B)  $(x - 1)^2$
- C)  $(x + 1)^2$
- D)  $x^2 + 1$



12

Grace kicks a soccer ball into the air, where the height of the ball follows the function  $h(t) = 8t - t^2$ . After how many seconds does the ball return to the ground?

- A) 0
- B) 4
- C) 6
- D) 8

13

What is the solution for  $x$  in the quadratic equation  $y = x^2 - 4x + 6$ ?

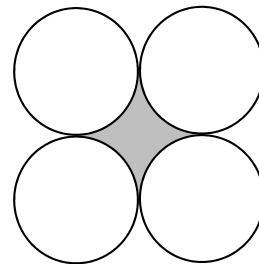
- A)  $x = 2 \pm \sqrt{2}$
- B)  $x = -2 \pm \sqrt{2}$
- C)  $x = 2 \pm 2\sqrt{2}$
- D) No real solution

14

The square of a negative number is decreased by 14. The resulting number is 5 times the original number. What is the reciprocal of the original number?

- A)  $-\frac{1}{2}$
- B)  $-\frac{1}{4}$
- C)  $-\frac{1}{5}$
- D)  $-\frac{1}{7}$

15



A landscape architect is creating four identical circular gardens so that each circular garden is touching two other gardens, as shown in the figure above. If each circular garden has an area of  $\pi$ , what is the area of the shaded region between the gardens?

- A)  $64 - \pi$
- B)  $4 - \pi$
- C)  $\pi$
- D)  $2 + \pi$


**DIRECTIONS**

Questions **16-20** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

- You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
- Fill in only one circle in a column.
- You can start your answer in any column as long as you can fit in the whole answer.
- For questions 16-20, no answers will be negative numbers.
- Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
- If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
- If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 /   1   1   1	8   .   4	3   /   7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

.   4   2   2	.   3   2   6	.   1   2   5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



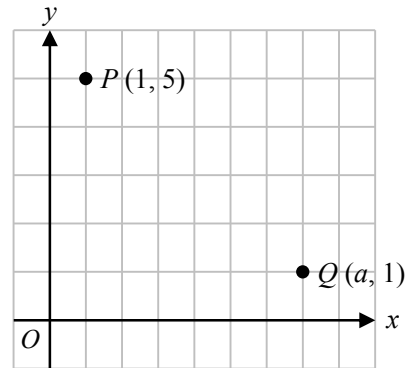
16

What is the value of  $(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$ ?

17

If  $|3x - 1| \leq 2x$ , where  $x > 0$ , what is a possible value of  $x$ ?

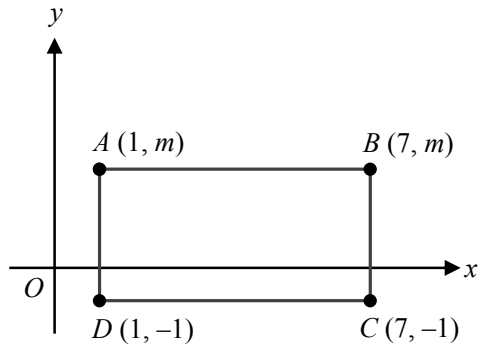
18



The slope of  $PQ$  is  $-\frac{2}{3}$ . What is the value of  $a$ ?



19



The rectangle  $ABCD$  is placed on top of a coordinate grid as shown in the figure above. If the area of the rectangle is 24, what is the value of  $m$ ?

20

If  $x + \frac{9}{x} = -6$ , what is the value of  $x^2 + \frac{81}{x^2}$ ?

# STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.



## Section 4



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

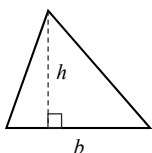
## DIRECTIONS

Questions **1-30** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **31-38** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 31. You may use your test booklet for scratch work.

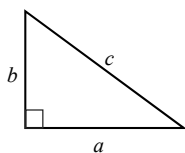
## NOTES

1. You **may** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

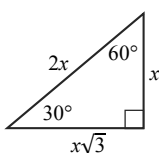
## REFERENCE



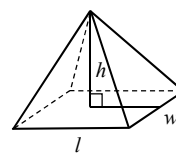
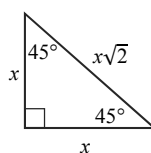
$$A = \frac{1}{2}bh$$



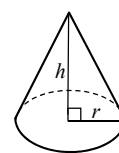
$$a^2 + b^2 = c^2$$



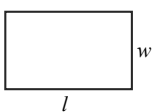
Special Triangles



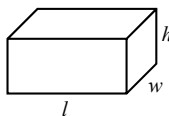
$$V = \frac{1}{3}lwh$$



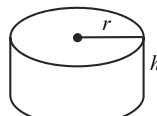
$$V = \frac{1}{3}\pi r^2 h$$



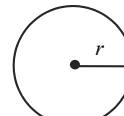
$$A = lw$$



$$V = lwh$$

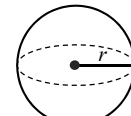


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE



1

If  $a + 4 = 12$ , what is  $4a$ ?

- A) 8
- B) 32
- C) 48
- D) 64

3

If  $f(x) = 2x$  and  $g(x) = 5x + 1$ , what is  $g(f(c))$ ?

- A)  $2c$
- B)  $10c + 1$
- C)  $10c + 2$
- D)  $20c + 2$

2

Package	Price
1-hr session	\$100
2-hr session	\$190
Five 1-hr sessions	\$450
Five 2-hr sessions	\$850

The table above shows various packages offered by a tutoring company. How much cheaper is it, in dollars per hour, to buy a 2-hr session than a 1-hr session?

- A) 5
- B) 10
- C) 20
- D) 90

4

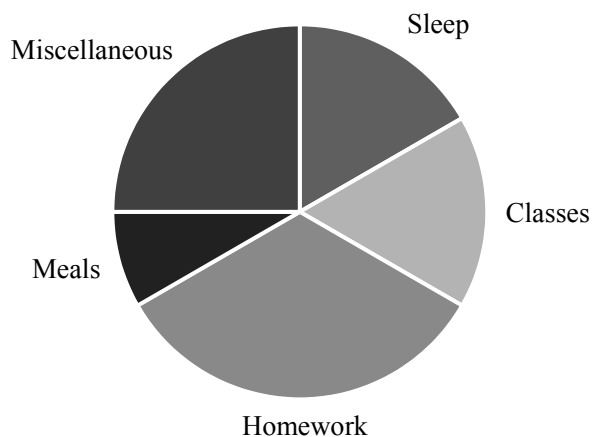
$U$  is 75% of  $T$ . If  $V$  is 5% of  $U$ , what percentage of  $T$  is  $V$ ?

- A) 1%
- B) 3.75%
- C) 10%
- D) 75%



5

Activities over 24 Hours



The pie chart above shows how a student spends his time in a 24-hour period. According to this chart, what fraction of his day does he spend sleeping and going to classes?

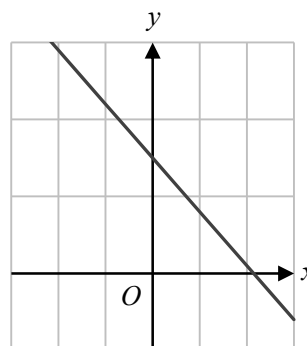
- A)  $\frac{1}{4}$   
 B)  $\frac{1}{3}$   
 C)  $\frac{1}{2}$   
 D)  $\frac{2}{3}$

6

If  $f(x) = 2x + 2$  is a linear function, which of the following is true for  $4f(x)$ ?

- A) The slope is four times steeper than  $f(x)$ .  
 B) The slope is four times less steep than  $f(x)$ .  
 C) All values of  $x$  are four times greater than  $f(x)$  for the same values of  $y$ .  
 D) The slope changes, but the  $y$ -intercept remains the same as  $f(x)$ .

7



What is a possible equation for the linear function above?

- A)  $y = -\frac{10}{7x} - 3$   
 B)  $y = -\frac{10}{7x} + 3$   
 C)  $y = \frac{10}{7x} - 3$   
 D)  $y = \frac{10}{7x} + 3$



8

An object measures 3 cm by 9 cm by 4 cm and weighs 54 grams. If another object made from the same material measures 6 cm by 2 cm by 3 cm, what would be the weight of the second object in terms of the first object?

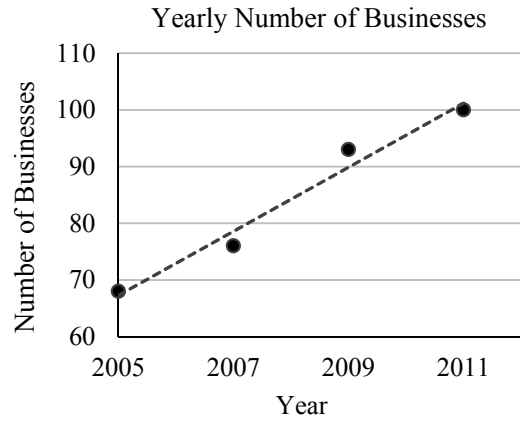
- A) 3 times heavier
- B) 2 times heavier
- C) The same weight
- D) 3 times lighter

9

A set of five integers includes 30, 45, 75, 75, and 100. When a sixth integer is added, the mean of the integers does not change. Which of the following is the sixth integer?

- A) 45
- B) 50
- C) 65
- D) 75

10



City planners in Beaufort, South Carolina want to estimate the number of businesses in 2015 from data collected from 2005 to 2011. The number of businesses in the city during this period is graphed above. Using the line of best fit, what is the best estimate for the number of businesses in Beaufort operating in 2015?

- A) 120
- B) 125
- C) 130
- D) 140

11

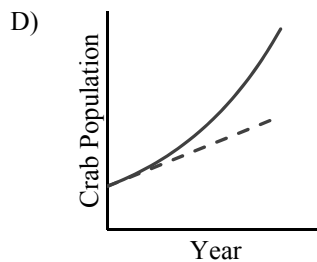
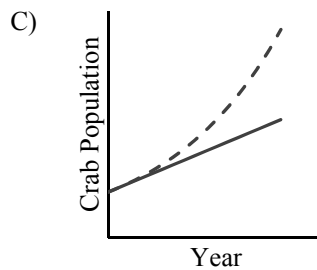
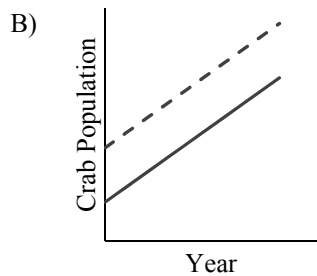
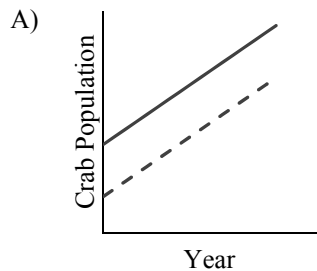
If  $x = a + 2b$ ,  $y = 2a - b$  and  $z = -2b$ , what is  $x - y + 2z$ ?

- A)  $-a - b$
- B)  $a - b$
- C)  $-a + b$
- D)  $-a - 3b$



12

Dungess crab and Horseshoe crab populations are observed and compared by marine researchers. Researchers notice that the Dungess population increases by 10% each year, and the Horseshoe population increases by 100 each year. If the Dungess crab population is represented by the solid line, and the Horseshoe crab population is represented by the dotted line, which of the following graphs best represents Dungess crab and Horseshoe crab populations?



13

Isabella and Tom drive from the same location at 9:46 AM. Isabella drives north with a constant speed of 65 km/h, and Tom drives south with a constant speed of 77 km/h. At what time will Isabella and Tom be 639 km apart?

- A) 1:16 PM
- B) 2:16 PM
- C) 3:30 PM
- D) 4:30 PM

14

If  $L + 11 = A$  and  $L + A = 93$ , what is product of  $L$  and  $A$ ?

- A) 1230
- B) 2132
- C) 2150
- D) 3276



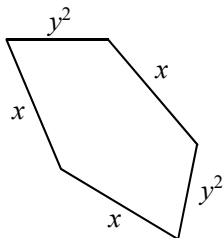
15

$x$	0	1	2	3
$f(x)$	-3	-4	-7	-12

The table above gives values of the quadratic function  $f$  for selected values of  $x$ . Which of the following expressions defines  $f(x)$ ?

- A)  $-x^2 - 3$
- B)  $x^2 - 3$
- C)  $2x^2 - 3$
- D)  $x^2 - 2x - 3$

16



Note: figure is not drawn to scale.

The perimeter of the figure above is 333. If  $x = 15$ , what is the value of  $y$ ?

- A) 12
- B) 30
- C) 144
- D) 159

17

$p$	$N(p)$
0	1250
1	2500
2	5000
3	10000
4	20000

A number,  $N(p)$ , increases according to a defined period,  $p$ , as shown in the chart above. What equation best represents the relationship between the number and the period?

- A)  $N(p) = 1250 \times (2)^p$
- B)  $N(p) = 1250 + 2p$
- C)  $N(p) = 1250 + 2p^2$
- D)  $N(p) = 1250p^2$

18

A company wants to create a solution of pure ethanol and distilled water. The density of ethanol is  $0.789 \text{ g/cm}^3$  and the density of the water is  $1 \text{ g/cm}^3$ . If the company combines  $8 \text{ cm}^3$  of ethanol with  $4 \text{ cm}^3$  of water, what is the resulting density of the solution, to the nearest one thousandth of a gram? (Density is mass divided by volume.)

- A)  $0.789 \text{ g/cm}^3$
- B)  $0.842 \text{ g/cm}^3$
- C)  $0.859 \text{ g/cm}^3$
- D)  $0.895 \text{ g/cm}^3$



19

If  $\frac{x+1}{x+5} = \frac{1}{x-1}$ , what are the values of  $x$ ?

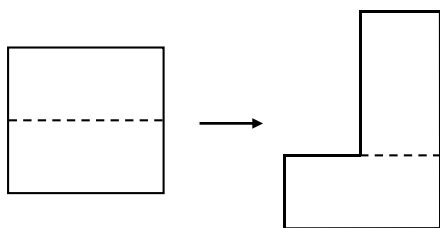
- A) 1 and  $-5$
- B) 2 and  $-3$
- C) 3 and  $-2$
- D)  $-1$  and 2

21

If  $(3^x)(9^y) = 2187$ , what is the value of  $x + 2y$ ?

- A) 5
- B) 6
- C) 7
- D) 8

20



A square with an area of  $A$  is cut in half, and arranged as in the diagram above. What is the perimeter of the resulting figure, in terms of  $A$ ?

- A)  $\frac{5}{2}A$
- B)  $4A^2$
- C)  $4\sqrt{A}$
- D)  $5\sqrt{A}$

22

Number
72
90
87
84
$x$

Four known numbers and one unknown number are shown in the table above. If the median number of the five numbers is 85, which of the following statements is NOT true?

- A) The value for  $x$  is equal to the median of the five numbers.
- B) The mean of the five numbers is greater than the median.
- C) The value for  $x$  is greater than the mean of the five numbers.
- D) In order to calculate the median, the numbers must be arranged in order.





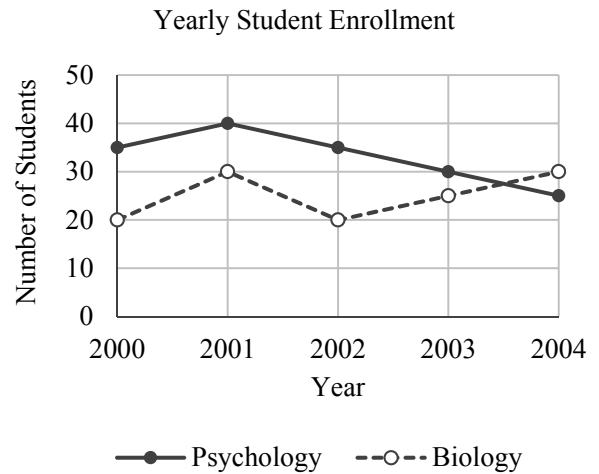
23

A group of 11 people are travelling together. Two people are from France, seven are from England, and two are from China. Unfortunately, their travel agent only booked 9 tickets, and two people have to leave the group. The group decides to pick two people at random by drawing lots. If the first person chosen is from England, what is the percent probability that the second person will also be from England?

- A) 30
- B) 40
- C) 50
- D) 60

**Questions 24, 25 and 26 refer to the following information.**

The graph below shows student enrollment for a psychology class and biology class in the years 2000-2004.



24

What is the total number of students who enrolled in psychology class during the period from 2000 to 2002?

- A) 110
- B) 130
- C) 140
- D) 170



25

Which of the following statements is NOT true for the period from 2000-2004?

- A) The median is equal to the mean for the number of students enrolled in biology.
- B) Both the median and the mean number of students is greater in psychology than in biology.
- C) There are approximately 32% more students enrolled in psychology than in biology on average.
- D) The mean is greater than the median for the number of students enrolled in psychology.

26

Which of the following statements is supported by the graph?

- A) In 2001, there were twice as many students in the biology class than the psychology class.
- B) During the years 2001-2004, enrollment in the psychology class on average decreased by 5 students per year.
- C) During the years 2002-2004, enrollment in the biology class on average increased by 10 students per year.
- D) In 2003, there were more students in the biology class than in the psychology class.

27

If  $x \leq 9$  and  $x \geq 1$ , which of the following statements are true?

- I.  $-1 \leq x \leq 9$
  - II.  $1 \leq x \leq 9$
  - III.  $|x - 5| \leq 4$
- A) I only
  - B) II and III
  - C) I and II
  - D) I, II and III

28

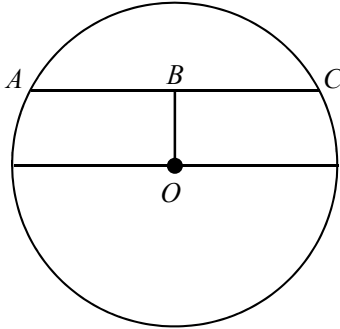
Expression	Value
$A + B$	2.50
$A + C$	2.62
$B + C$	2.12

The table above displays the values of different expressions. What is the value of  $A + B + C$ ?

- A) 3.42
- B) 3.62
- C) 4.62
- D) 7.24



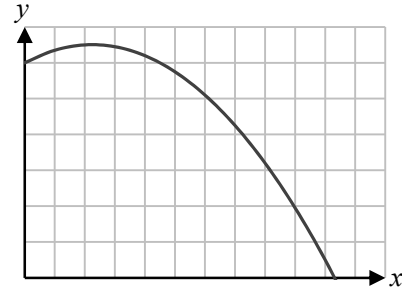
29



The figure above shows a circle with center  $O$  and a diameter of 10. If the chord  $\overline{AC}$  is equal to 8, what is the value of  $\overline{BO}$ ?

- A) 1
- B) 2
- C) 3
- D) 4

30



A class of physics students at Seaton high school tests how long it will take a ball to reach a height of ten meters when thrown off the top of a very tall building. Their result is graphed above. The class calculates that the ball follows the function  $h(t) = -2t^2 + 10t + 100$ , where  $h$  is the function of the height of the ball in meters, and  $t$  is the time in seconds. How long does it take, in seconds, for the ball to reach the ground?

- A) 10
- B) 11
- C) 12
- D) 13


**DIRECTIONS**

Questions **31-38** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

8. You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
9. Fill in only one circle in a column.
10. You can start your answer in any column as long as you can fit in the whole answer.
11. For questions 31-38, no answers will be negative numbers.
12. **Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
13. If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
14. If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 /   1   1	8 .   4	3 /   7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

.   4   2   2	.   3   2   6	.   1   2   5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



31

What is the difference between  $2x + 7$  and  $2x - 1$ ?

32

$$3(x - 4) - 2(8 - x) = 4(x + 1)$$

What is the value of  $x$  in the equation above?

33

Four times  $b$  is equal to ten. If  $b$  is reduced by 20 percent, what is the value of three times  $b$ ?

34

$$\sqrt{2x + 10} = x + 5$$

What is the product of the solutions for  $x$  in the equation above?

35

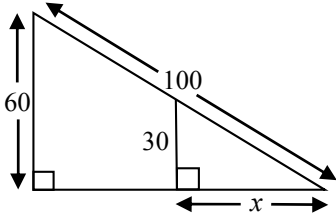
Career Preference	Number of Students
Healthcare	
Education	
Finance	
Retail	
Unsure	

= 2 students

The chart above shows career preferences for students in a class. If two different students are randomly chosen, what is the probability they both want to enter finance?



36



What is the value of  $x$  in the figure above?

38

The animal supplies company offers the student a deal that will reduce the cost of maintaining each cage by half. Taking this opportunity, the student decides to conduct a multi-day experiment. If she wants to test 102 mice and has a budget of 225 dollars for cage maintenance, what is the maximum number of days she can conduct her experiment? (Round your answer to the nearest day.)

---

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**Questions 37 and 38 refer to the following information.**

A student is conducting a series of experiments to study the effects of a drug on mouse behavior. For the duration of the experiments, she keeps the mice in cages. One cage can house up to five mice. Each cage costs a flat rate of \$1.25 per day to maintain.

37

For her first experiment, the student has six cages of mice at maximum capacity. If there are twice as many female mice as male mice, how many male mice does she have?

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Chapter 3

# Answers and Scoring

# ANSWERS

## PART 1

### SECTION 1

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 14. D | 27. B | 40. C |
| 2. B  | 15. A | 28. B | 41. A |
| 3. C  | 16. D | 29. D | 42. C |
| 4. D  | 17. D | 30. B | 43. D |
| 5. D  | 18. D | 31. B | 44. C |
| 6. C  | 19. A | 32. B | 45. B |
| 7. D  | 20. B | 33. C | 46. D |
| 8. A  | 21. B | 34. A | 47. D |
| 9. D  | 22. A | 35. C | 48. C |
| 10. D | 23. A | 36. A | 49. A |
| 11. B | 24. C | 37. B | 50. C |
| 12. C | 25. D | 38. C | 51. B |
| 13. A | 26. D | 39. A | 52. A |

### SECTION 2

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. A  | 12. D | 23. B | 34. D |
| 2. D  | 13. B | 24. A | 35. C |
| 3. A  | 14. C | 25. B | 36. B |
| 4. B  | 15. C | 26. B | 37. C |
| 5. C  | 16. A | 27. A | 38. C |
| 6. C  | 17. D | 28. B | 39. A |
| 7. D  | 18. B | 29. B | 40. C |
| 8. B  | 19. B | 30. D | 41. C |
| 9. C  | 20. A | 31. C | 42. D |
| 10. A | 21. B | 32. B | 43. A |
| 11. D | 22. D | 33. C | 44. C |



### SECTION 3

- |      |       |       |                                 |
|------|-------|-------|---------------------------------|
| 1. B | 6. A  | 11. B | 16. 1                           |
| 2. B | 7. B  | 12. D | 17. $\frac{1}{5} \leq x \leq 1$ |
| 3. A | 8. A  | 13. D | 18. 7                           |
| 4. C | 9. D  | 14. A | 19. 3                           |
| 5. B | 10. C | 15. B | 20. 18                          |

### SECTION 4

- |       |       |       |                    |
|-------|-------|-------|--------------------|
| 1. B  | 11. A | 21. C | 31. 8              |
| 2. A  | 12. D | 22. B | 32. 32             |
| 3. B  | 13. B | 23. D | 33. 6              |
| 4. B  | 14. B | 24. A | 34. 15             |
| 5. B  | 15. A | 25. D | 35. $\frac{1}{29}$ |
| 6. A  | 16. A | 26. B | 36. 40             |
| 7. B  | 17. A | 27. B | 37. 10             |
| 8. D  | 18. C | 28. B | 38. 17             |
| 9. C  | 19. C | 29. C |                    |
| 10. A | 20. D | 30. A |                    |

## CROSS-TEST SCORES AND SUBSCORES

You will receive **cross-test scores** for Analysis in Science and Analysis in History/Social Studies. The scores are based on your performance on questions in their respective subject domains across all sections of the exam. These scores will be reported on a scale of 10-40.

You will also receive **subscores** based on your performance on certain question types within each test section. Subscores will be reported on a scale of 1-15. There will be seven subscores, for the following areas:

- **Words in Context:** this subscore will be based on your performance on questions related to determining the meanings of words in the context of a passage in the Reading and Writing and Language tests.
- **Command of Evidence:** this subscore will be based on your performance on questions that ask you to identify the best evidence in the Reading and Writing and Language tests.
- **Expression of Ideas:** this subscore will be based on your performance on questions that ask you to identify clear, stylistically appropriate choices in Writing passages.
- **Standard English Conventions:** this subscore will be based on your performance on questions that ask you to identify and correct errors of grammar, punctuation, usage, and syntax in Writing passages.
- **Heart of Algebra:** this subscore will be based on your performance on Math questions testing key concepts in Algebra.
- **Problem Solving and Data Analysis:** this subscore will be based on your performance on Math questions testing your ability to analyze sets of data, the meanings of units and quantities, and the properties of different objects and operations.
- **Passport to Advanced Math:** this subscore will be based on your performance on Math questions that test the skills you'll build on as you continue to learn more advanced math including rewriting expressions, solving quadratic equations, working with polynomials and radicals, and solving systems of equations.

# SCORING YOUR TEST

## PART 3

To score your tests, first use the answer key to mark each of your responses right or wrong. Then, calculate your **raw score** for each section by counting up the number of correct responses. Use the tables below to help you calculate your scores:

Raw Score	
Section	# of Questions Correct
1. Reading	_____
2. Writing and Language	_____
3. Math: No-Calculator	_____
4. Math: Calculator	_____
<b>Raw Score for Reading (Section 1):</b> _____	
<b>Raw Score for Writing and Language (Section 2):</b> _____	
<b>Raw Score for Math (Section 3 + 4):</b> _____	

## SCALED SCORES

Once you have found your raw score for each section, convert it into an approximate **scaled test score** using the following chart. To find a scaled test score for each section, find the row in the Raw Score column which corresponds to your raw score for that section, then check the column for the section you are scoring in the same row. For example, if you had a raw score of 48 for Reading, then your scaled Reading test score would be 39. Keep in mind that these scaled scores are estimates only. Your actual SAT score will be scaled against the scores of all other high school students taking the test on your test date.

Raw Score	Math Scaled Score	Reading Scaled Score	Writing Scaled Score	Raw Score	Math Scaled Score	Reading Scaled Score	Writing Scaled Score
58	40			28	23	26	25
57	40			27	22	25	24
56	40			26	22	25	24
55	39			25	21	24	23
54	38			24	21	24	23
53	37			23	20	23	22
52	36	40		22	20	22	21
51	35	40		21	19	22	21
50	34	40		20	19	21	20
49	34	39		19	18	20	20
48	33	39		18	18	20	19
47	33	38		17	17	19	19
46	32	37		16	16	19	18
45	32	36		15	15	18	18
44	31	35	40	14	14	17	17
43	30	34	39	13	13	16	16
42	30	34	38	12	12	16	15
41	29	33	37	11	11	14	14
40	29	33	35	10	10	13	13
39	28	32	34	9	10	12	12
38	28	31	33	8	10	11	11
37	27	31	32	7	10	10	10
36	27	30	31	6	10	10	10
35	26	30	30	5	10	10	10
34	26	29	29	4	10	10	10
33	25	29	28	3	10	10	10
32	25	28	27	2	10	10	10
31	24	28	27	1	10	10	10
30	24	27	26	0	10	10	10
29	23	26	26				

Use the table below to record your scaled scores:

<b>Scaled Scores</b>	
Scaled Score for Reading (Out of 40): _____	
Scaled Score for Writing and Language (Out of 40): _____	
Scaled Score for Math (Out of 40): _____	

## ESSAY SCORE

Estimate your essay score by assigning your essay a score out of 1-4 in each scoring area listed below. Have a trusted reader check your work.

Scoring Area	Essay Score	
	Reader 1 Score (1-4)	Reader 2 Score (1-4)
Reading	_____	_____
Analysis	_____	_____
Writing	_____	_____

## AREA SCORE CONVERSION

You can look up your area score out of 800 below. To find your overall score, combine your area score for Reading + Writing with your area score for Math to get your total score out of 1600.

### READING + WRITING

Scaled Score	Area Score	Scaled Score	Area Score	Scaled Score	Area Score
80	760-800	59	550-630	39	350-430
79	750-800	58	540-620	38	340-420
78	740-800	57	530-610	37	330-410
77	730-800	56	520-600	36	320-400
76	720-800	55	510-590	35	310-390
75	710-790	54	500-580	34	300-380
74	700-780	53	490-570	33	290-370
73	690-770	52	480-560	32	280-360
72	680-760	51	470-550	31	270-350
71	670-750	50	460-540	30	260-340
70	660-740	49	450-530	29	250-330
69	650-730	48	440-520	28	240-320
68	640-720	47	430-510	27	230-310
67	630-710	46	420-500	26	220-300
66	620-700	45	410-490	25	210-290
65	610-690	44	400-480	24	200-280
64	600-680	43	390-470	23	200-270
63	590-670	42	380-460	22	200-260
62	580-660	41	370-450	21	200-250
61	570-650	40	360-440	20	200-240
60	560-640				

**MATH**

Total Points	Area Score	Total Points	Area Score
40	760-800	24	440-520
39	740-800	23	420-500
38	720-800	22	400-480
37	700-780	21	380-460
36	680-760	20	360-440
35	660-740	19	340-420
34	640-720	18	320-400
33	620-700	17	300-380
32	600-680	16	280-360
31	580-660	15	260-340
30	560-640	14	240-320
29	540-620	13	220-300
28	520-600	12	200-280
27	500-580	11	200-260
26	480-560	10	200-240
25	460-540		

Use the table below to record your area scores and to calculate your overall score:

<b>Reading + Writing Area Score</b>		<b>Math Area Score</b>		<b>Overall Score (400-1600)</b>
_____	+	_____	=	_____

**Section 1**

1	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	12	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	23	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	34	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	45	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
2	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	13	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	24	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	35	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	46	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
3	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	14	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	25	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	36	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	47	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
4	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	15	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	26	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	37	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	48	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
5	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	16	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	27	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	38	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	49	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
6	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	17	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	28	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	39	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	50	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	18	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	29	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	40	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	51	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
8	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	19	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	30	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	41	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	52	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
9	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	20	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	31	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	42	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		
10	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	21	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	32	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	43	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		
11	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	22	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	33	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	44	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		

**Section 2**

1	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	10	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	19	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	28	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	37	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
2	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	11	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	20	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	29	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	38	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
3	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	12	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	21	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	30	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	39	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
4	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	13	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	22	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	31	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	40	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
5	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	14	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	23	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	32	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	41	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
6	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	15	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	24	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	33	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	42	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	16	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	25	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	34	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	43	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
8	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	17	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	26	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	35	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	44	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
9	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	18	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	27	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	36	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		



**Section 3 (No calculator)**

1	A	B	C	D	4	A	B	C	D	7	A	B	C	D	10	A	B	C	D	13	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	A	B	C	D	5	A	B	C	D	8	A	B	C	D	11	A	B	C	D	14	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	A	B	C	D	6	A	B	C	D	9	A	B	C	D	12	A	B	C	D	15	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	17	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	18	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	19	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	20	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>			/	<input type="radio"/>	<input type="radio"/>		
.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section 4 (Calculator)**

1	A	B	C	D	7	A	B	C	D	13	A	B	C	D	19	A	B	C	D	25	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	A	B	C	D	8	A	B	C	D	14	A	B	C	D	20	A	B	C	D	26	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	A	B	C	D	9	A	B	C	D	15	A	B	C	D	21	A	B	C	D	27	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	A	B	C	D	10	A	B	C	D	16	A	B	C	D	22	A	B	C	D	28	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	A	B	C	D	11	A	B	C	D	17	A	B	C	D	23	A	B	C	D	29	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	A	B	C	D	12	A	B	C	D	18	A	B	C	D	24	A	B	C	D	30	A	B	C	D
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section 4 (Continued)**

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

31		32		33		34		35	
	<input type="text"/>		<input type="text"/>		<input type="text"/>		<input type="text"/>		<input type="text"/>
/	<input type="radio"/>	/	<input type="radio"/>	/	<input type="radio"/>	/	<input type="radio"/>	/	<input type="radio"/>
.	<input type="radio"/>	.	<input type="radio"/>	.	<input type="radio"/>	.	<input type="radio"/>	.	<input type="radio"/>
0	<input type="radio"/>	0	<input type="radio"/>	0	<input type="radio"/>	0	<input type="radio"/>	0	<input type="radio"/>
1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>
2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>
3	<input type="radio"/>	3	<input type="radio"/>	3	<input type="radio"/>	3	<input type="radio"/>	3	<input type="radio"/>
4	<input type="radio"/>	4	<input type="radio"/>	4	<input type="radio"/>	4	<input type="radio"/>	4	<input type="radio"/>
5	<input type="radio"/>	5	<input type="radio"/>	5	<input type="radio"/>	5	<input type="radio"/>	5	<input type="radio"/>
6	<input type="radio"/>	6	<input type="radio"/>	6	<input type="radio"/>	6	<input type="radio"/>	6	<input type="radio"/>
7	<input type="radio"/>	7	<input type="radio"/>	7	<input type="radio"/>	7	<input type="radio"/>	7	<input type="radio"/>
8	<input type="radio"/>	8	<input type="radio"/>	8	<input type="radio"/>	8	<input type="radio"/>	8	<input type="radio"/>
9	<input type="radio"/>	9	<input type="radio"/>	9	<input type="radio"/>	9	<input type="radio"/>	9	<input type="radio"/>

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

36		37		38	
	<input type="text"/>		<input type="text"/>		<input type="text"/>
/	<input type="radio"/>	/	<input type="radio"/>	/	<input type="radio"/>
.	<input type="radio"/>	.	<input type="radio"/>	.	<input type="radio"/>
0	<input type="radio"/>	0	<input type="radio"/>	0	<input type="radio"/>
1	<input type="radio"/>	1	<input type="radio"/>	1	<input type="radio"/>
2	<input type="radio"/>	2	<input type="radio"/>	2	<input type="radio"/>
3	<input type="radio"/>	3	<input type="radio"/>	3	<input type="radio"/>
4	<input type="radio"/>	4	<input type="radio"/>	4	<input type="radio"/>
5	<input type="radio"/>	5	<input type="radio"/>	5	<input type="radio"/>
6	<input type="radio"/>	6	<input type="radio"/>	6	<input type="radio"/>
7	<input type="radio"/>	7	<input type="radio"/>	7	<input type="radio"/>
8	<input type="radio"/>	8	<input type="radio"/>	8	<input type="radio"/>
9	<input type="radio"/>	9	<input type="radio"/>	9	<input type="radio"/>

**Section 5 (Optional)**

**Important:** Use a No. 2 pencil. Write inside the borders.

You may use the space below to plan your essay, but be sure to write your essay on the lined pages. Work on this page will not be scored.

**Use this space to plan your essay.**









# Section 1



# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage or paired set of passages is accompanied by a number of questions. Read the passage or paired set of passages, then use what is said or implied in what you read and in any given graphics to choose the best answer to each question.

### Questions 1-11 are based on the following passage.

This passage is adapted from Atul Grover, “Should Hospital Residency Programs Be Expanded to Increase the Number of Doctors?” © 2013 Dow Jones & Company.

Thanks to baby boomers, the population over 65 will have doubled between 2000 and 2030. And when the Affordable Care Act takes full effect, up to  
 Line 32 million new patients will seek access to medical  
 5 care, many of whom will need treatment for ailments that have gone undiagnosed for years, such as cancer, diabetes, arthritis and heart disease. This surge in demand means the U.S. will have a shortfall of at least 90,000 doctors by the end of the decade,  
 10 according to the Association of American Medical Colleges Center for Workforce Studies. Many parts of the country have too few doctors already.

A small, vocal minority of researchers suggest we don’t need more doctors. That minority clearly is  
 15 having an impact: many clinicians and policy makers say there is 20% to 30% “waste” in our health-care system. Elliott Fisher, a Dartmouth professor, says those numbers are backed up by Dartmouth research.

20 The Dartmouth studies base their conclusions about waste on comparisons of health-care spending in different geographic areas. But other studies have shown that differences in the health status of patients in the different regions explain the majority of  
 25 variations in spending. In other words, urban areas, with their high concentrations of poor people, tend to have a higher disease burden and thus higher medical needs. Sicker patients, along with high labor costs, explain the higher levels of spending found in these urban areas—not too many doctors.

30 There is no question that delivery of care needs to be better organized, and that some current reforms are likely to improve patient outcomes. That’s true, for example, with experiments in team-based care.  
 35 However, these improvements in patient care have not translated to any reduction in the need for physician time.

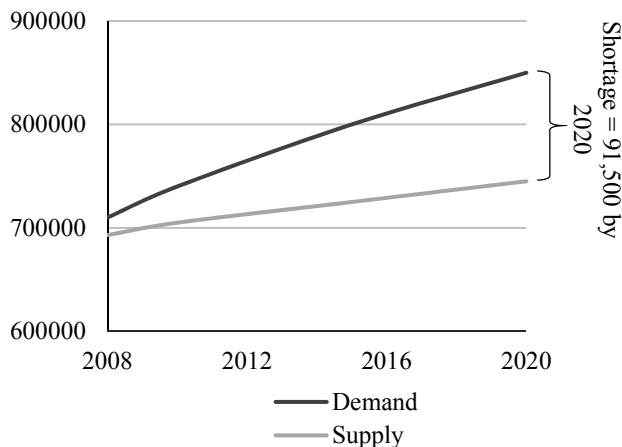
40 Another new experiment—accountable-care organizations, which allow groups of providers to share any savings gained by keeping their patients healthy—also hasn’t been shown to reduce the number of physicians needed. Indeed, there is a lot of wishful thinking associated with ACOs, just as there was with HMOs<sup>1</sup> in the 1990s—that everyone

<sup>1</sup> Health maintenance organizations

45 would be cared for in a way that would cost less and would prevent people from ever getting sick. Unfortunately, that didn't turn out to be the reality.

Primary care and prevention will increase the need for doctors. An 8-year-old girl with acute  
50 leukemia today has an 80% chance of survival. If she survives, in the years that follow, she is likely to get a vaccine to avoid cervical cancer, take cholesterol-lowering drugs and undergo multiple screenings for breast cancer. She may still develop  
55 heart disease or cancer. And as she and millions of other people continue to age, their risk for other conditions like Alzheimer's will increase dramatically. But she, like everyone else, deserves first-rate care every step of the way. We need more  
60 doctors, not fewer.

Projected Supply and Demand, Physicians, 2008-2020



1

Which of the following provides the best summary of the passage's main idea?

- A) The US health care system is about to suffer a significant collapse, and hundreds of hospitals will have to be shut down.
- B) There is too much wasteful spending in the current health care system, which additional doctors cannot correct.
- C) The US needs to prepare for increasing health care demands by training more doctors.
- D) Accountable-care organizations (ACOs) will improve the current health care system and reduce unnecessary care.

2

The author argues that the US will experience a shortfall of doctors because

- A) a large portion of doctors are choosing to retire early.
- B) new legislation and an aging population will increase the demand for healthcare.
- C) many doctors waste too much of their time on non-essential treatments rather than more important ailments.
- D) many medical programs have closed and fewer doctors are being trained.

3

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 7-11 ("This surge ... Studies")
- B) Lines 14-17 ("That minority ... system")
- C) Lines 25-28 ("In other ... needs")
- D) Lines 50-55 ("If she ... cancer")

4

The passage most strongly suggests that

- A) primary care and prevention, while important, will not solve the issue of a doctor shortage.
- B) preventing diseases via primary care will help reduce costs for healthcare by reducing early death.
- C) relocating doctors from urban to rural areas will reduce US medical costs.
- D) the first step in resolving the doctor shortage is conducting more extensive research on its causes.

5

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 22-25 (“But other ... spending”)
- B) Lines 28-30 (“Sicker patients ... doctors”)
- C) Lines 35-37 (“However these ... time”)
- D) Lines 48-49 (“Primary care ... doctors”)

6

As used in line 13, “vocal” most nearly means

- A) blunt.
- B) outspoken.
- C) out loud.
- D) forthright.

7

The passage suggests that the 20%-30% “waste” mentioned in lines 14-19 is

- A) likely to result in a reduction in the demand for physician time.
- B) a significant expense, but still less expensive than the cost of training enough new doctors.
- C) mostly explained by differences in patient health, rather than wasteful spending.
- D) best explained by the fact that affluent patients tend to spend more on healthcare.

8

The primary purpose of the fifth paragraph (lines 38-47) is to

- A) discuss another potential option to mitigate the coming shortage of physicians.
- B) offer a historical account of physicians’ various organizations.
- C) provide evidence that the government is coming up with clever options to address problems in healthcare.
- D) support the author’s claim that new experiments in patient care will not solve the coming doctor shortage.

9

As used in line 49, “acute” most nearly means

- A) critical.
- B) keen.
- C) severe.
- D) sharp.

10

Which of the following best expresses the main point of the final paragraph (lines 48-60)?

- A) Even though patients may live longer, primary and preventative care still offer savings.
- B) We must provide the highest quality of care possible, in order to reduce costs.
- C) The shortage of physicians is best explained by an excessive amount of primary care.
- D) Although we have a responsibility to provide high-quality care, we should not expect for that to decrease medical costs.

11

Which of the following claims is best supported by the graph?

- A) There will be more doctors in 2020 than at any time since 2008, and a greater shortage of doctors.
- B) The doctor shortage will continue to grow until there are 91,500 fewer doctors in 2020 than there were in 2008.
- C) By 2015, around 850,000 patients will need a doctor, but only about 750,000 will receive any form of treatment.
- D) An increase in the supply of doctors over time will cause an even greater increase in the demand.

**Questions 12-22 are based on the following passages.**

The following passages are adapted from Chensheng Lu and Janet H. Silverstein, "Would Americans Be Better Off Eating an Organic Diet?" © 2014 by Dow Jones & Company.

**Passage 1**

Is there definitive scientific proof that an organic diet is healthier? Not yet. Robust scientific studies comparing food grown organically and food grown conventionally don't exist, thanks to a lack of  
 Line 5 funding for this kind of research in humans.

But let's be clear: some convincing scientific work does exist to suggest that an organic diet has its benefits. What's more, it only makes sense that food free of pesticides and chemicals is safer and  
 10 better for us than food containing those substances, even at trace levels. This was illustrated in a study published in the journal *Environmental Health Perspectives* in 2006. That study, which I led, showed that within five days of substituting mostly  
 15 organic produce in children's diets for conventional produce, pesticides disappeared from the children's urine.

Many say the pesticides found in our food are nothing to fear because the levels fall well below  
 20 federal safety guidelines and thus aren't dangerous. Similarly, they say the bovine growth hormone used to increase cows' milk yield is perfectly safe. But federal guidelines don't take into account what effect repeated exposure to low levels of chemicals  
 25 might have on humans over time. And many pesticides were eventually banned or restricted by the federal government after years of use when they were discovered to be harmful to the environment or human health.

Organic skeptics like to cite a meta-analysis study published in the *Annals of Internal Medicine* last year that suggested organic foods are neither healthier nor more nutritious than their conventional counterparts. Left out of that analysis, however,  
 35 were recent field studies showing that organic

CONTINUE 

produce, such as strawberries, leafy vegetables, and wheat, not only tastes better but contains much higher levels of phenolic acids than conventional produce. Phenolic acids are secondary plant metabolites that can be absorbed easily through the walls of the intestinal tract, and can act as potent antioxidants that prevent cellular damage, and therefore offer some protection against oxidative stress, inflammation, and cancer. Knowing that we could reduce our exposure to pesticides and increase our exposure to antioxidants by eating organic food, it makes great common sense to consume more of it.

### Passage 2

There is no definitive evidence that organic food is more nutritious or healthier than conventional food, but there is proof that eating more fruits and vegetables and less processed food is.

Therefore, our focus as a society should be to eat as much fresh food and whole grains as possible—regardless of whether it is organically grown or not.

It is difficult to compare the nutritional value of organic versus conventional food because the soil, climate, timing of harvest, and storage conditions all affect the composition of produce. Still, published studies have found no significant differences in nutritional quality between organic and nonorganic produce or milk. Similarly, there is no evidence that giving bovine growth hormone (BGH) to cows changes the composition of milk or affects human health. BGH is inactive in humans and degrades in the acidic environment of the stomach.

As for pesticide exposure, the U.S. in 1996 established maximum permissible levels for pesticide residues in food to ensure food safety. Many studies have shown that pesticide levels in conventional produce fall well below those guidelines. While it's true that organic fruits and vegetables in general contain fewer traces of these chemicals, we can't draw conclusions about what that means for health as there haven't been any long-term studies comparing the relationship between exposure to pesticides from organic versus

nonorganic foods and adverse health outcomes. It may seem like “common sense” to reduce exposure to these chemicals, but there are currently no good evidence-based studies to answer the question.

We would like to think that organic food is grown locally, put in a wheelbarrow and brought directly to our homes. However, much of it comes from countries where regulations might not be as tightly enforced as in the U.S., and labeling of the foods might be misleading. And just because food is labeled organic doesn't mean it is completely free of pesticides. Contamination can occur from soil and ground water containing previously used chemicals, or during transport, processing and storage.

Organochlorine insecticides were recently found in organically grown root crops and tomatoes even though these pesticides haven't been used for 20 years.

Given what we know, the best diet advice we can give families is to eat a wide variety of produce and whole grains. Whether they want to buy organic is up to them.

### 12

The author's main purpose in Passage 1 appears to be to

- A) discuss the implications of new research into the health effects of organic foods.
- B) persuade readers that eating organic food has potential health benefits.
- C) critique research which claims to show that there are no health benefits from eating organic food.
- D) argue that more funding is required to perform better research about organic food.

13

The first passage most strongly suggests that

- A) study results conflict on some points, but agree that it is healthiest to eat an all-organic diet.
- B) organic diets have unique health benefits, despite some incomplete studies that claim the contrary.
- C) all studies conducted on humans show that organic diets are essential to health.
- D) studies are inconclusive regarding the benefits of an organic diet, except when it comes to the diets of children.

14

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 2-5 (“Robust scientific ... humans”)
- B) Lines 13-17 (“That study ... urine”)
- C) Lines 25-29 (“And many ... health”)
- D) Lines 34-39 (“Left out ... produce”)

15

The attitude of the author of Passage 2 towards health claims about organic foods would best be described as

- A) derisive.
- B) skeptical.
- C) enthusiastic.
- D) quizzical.

16

As used in line 48, “definitive” most nearly means

- A) conclusive.
- B) consummate.
- C) accepted.
- D) specific.

17

As used in line 77, “adverse” most nearly means

- A) harmful.
- B) antagonistic.
- C) unlucky.
- D) contrary.

18

The author’s purpose in lines 81-83 (“We would ... homes”) is most likely to

- A) provide a detailed description of the process that most people believe is implied by organic labeling.
- B) characterize the organic food industry as inefficient and unsophisticated.
- C) caricature misconceptions about organic food to help create a stark contrast with reality.
- D) offer a vision for how organic agriculture could operate if the author’s recommendations are adopted.

19

Passage 1 differs from Passage 2 in that

- A) Passage 1 argues that only organic foods should be eaten, while Passage 2 argues that only non-organic foods should be.
- B) Passage 1 argues that people should consume more organic foods, while Passage 2 states that it is more important to focus on eating a less processed diet.
- C) Passage 1 argues that organic foods are important for health, while Passage 2 argues they are harmful.
- D) Passage 1 argues that organic foods are overemphasized in the media, while Passage 2 argues they are not emphasized enough.

20

The authors of both passages would most likely agree with which of the following statements?

- A) It is reasonable to conclude that long-term exposure to even low levels of pesticides has a negative effect on human health.
- B) Scientific studies on organic foods cannot be trusted, as they often conflict with one another.
- C) Food labels are highly variable and all but useless, and it is better to select foods based on their freshness.
- D) There is enough information available about the health impacts of various foods to enable informed decisions about diet.

21

Based on the two passages, which best describes the relationship between organic food and health risks?

- A) Organic foods offer nutritional benefits which more than offset their health risks.
- B) Organic foods clearly protect against a variety of known health risks.
- C) Organic foods have a reputation for being healthy, but actually increase certain risks.
- D) Organic foods may reduce exposure to possible but unconfirmed health risks.

22

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 52-54 (“Therefore, our ... not”)
- B) Lines 71-77 (“While it’s ... outcomes”)
- C) Lines 81-83 (“We would ... homes”)
- D) Lines 91-94 (“Organochlorine insecticides ... years”)

**Questions 23-32 are based on the following passage.**

This passage is adapted from Lynne Peeples “Moths Use Sonar-Jamming Defense to Fend Off Hunting Bats.” © 2009 by Scientific American.

An insect with paper-thin wings may carry much the same defense technology as some of the military’s heavy-duty warships. The finding that a species of tiger moth can jam the sonar of echolocating bats to avoid being eaten seems to be the “first conclusive evidence of sonar jamming in nature,” says Aaron Corcoran, a biology PhD student at Wake Forest University and the lead author of the paper reporting the discovery. “It demonstrates a new level of escalation in the bat-moth evolutionary arms race.”

Before Corcoran’s study, scientists were puzzled by why certain species of tiger moths made sound. Some speculated that the moths use it to startle bats. A few pointed to its potential interference with their echolocation. General consensus, however, fell with a third hypothesis: clicks function to warn a predator not to eat the clicking prey because it is toxic, or at least pretending to be.

To test these hypotheses, Corcoran and his team pitted the tiger moth *Bertholdia trigona* against the big brown bat *Eptesicus fuscus*, a battle frequently fought after sundown from Central America to Colorado. High-speed infrared cameras and an ultrasonic microphone recorded the action over nine consecutive nights. The process of elimination began. If moth clicks served to startle, previous studies suggested the bats should become tolerant of the sound within two or three days. “But that’s not what we found,” says Corcoran, explaining the lack of success bats had in capturing their clicking prey even through the last nights of the study.

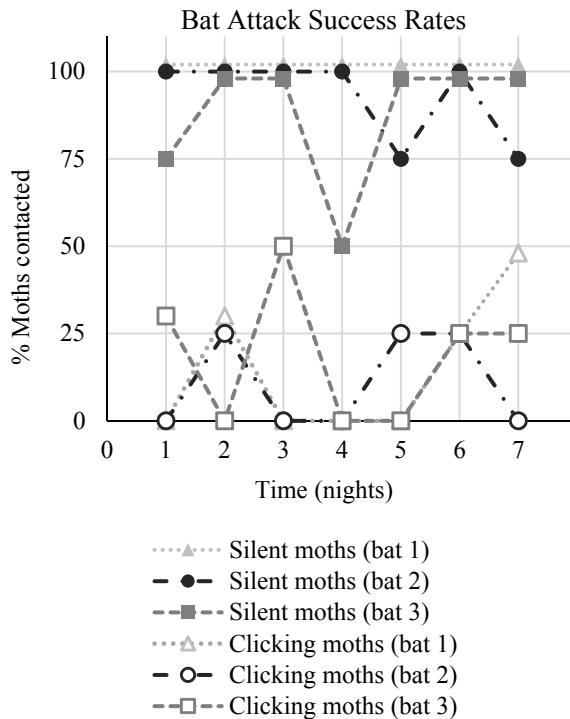
How about the toxic warning theory? If this were the case, according to Corcoran, bats would not find the moths palatable or, if they were indeed tasty, they would quickly learn they’d been tricked. Either way, bats should start to ignore the moth’s unique ultrasonic clicks. Also, bats partook readily when

offered *B. trigona* that lacked the ability to click, and they kept coming back for more. This attraction also held true for clicking *B. trigona*: the predators persisted after their prey despite only reaching them about 20 percent of the time. Bats actually launched four times as many successful attacks against a control group of silent moths. These findings are “only consistent with the jamming hypothesis,” Corcoran notes. “But the most distinctive evidence was in the echolocation sequences of the bats.”

Normally, a bat attack starts with relatively intermittent sounds. They then increase in frequency—up to 200 cries per second—as the bat gets closer to the moth “so it knows where the moth is at that critical moment,” Corcoran explains. But his research showed that just as bats were increasing their click frequency, moths “turn on sound production full blast,” clicking at a rate of up to 4,500 times a second. This furious clicking by the moths reversed the bats’ pattern—the frequency of bat sonar decreased, rather than increased, as it approached its prey, suggesting that it lost its target.

The biological mechanism behind the moth’s defense strategy is still unclear to researchers. “Most likely, moth clicks are disrupting the bat’s neural processing of when echoes return,” Corcoran says. Bats judge how far away a moth is based on the time delay between making the cry and its audible return. This “blurring” of the bat’s vision, he explains, “may be just enough to keep the moth safe.”





23

The passage is primarily concerned with

- A) the ways *Eptesicus fuscus* bats capture moths.
- B) the discovery that tiger moths can jam bats' sonar.
- C) how the tiger moths' clicking defense works.
- D) why tiger moths developed defenses against bats.

24

The author describes alternate hypotheses of the moths' clicking defense in order to

- A) support her claim that researchers need more evidence before they can draw any conclusions.
- B) show how the researchers' experiment disproved all but one of these hypotheses.
- C) signal to the reader that the researchers' data shows only one side of the debate.
- D) explain the multiple reasons that this defense is effective for the moths.

25

According to Aaron Corcoran's research, which of the following represents the tiger moths' most effective defensive countermeasure?

- A) Poisonous bodies
- B) Defensive maneuvering
- C) Clicking ultrasonically
- D) Hearing ability

26

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-9 ("The finding ... discovery")
- B) Lines 16-19 ("General consensus ... be")
- C) Lines 27-29 ("If moth ... days")
- D) Lines 43-45 ("Bats actually ... moths")

27

According to the passage, the bats would not attack some tiger moths because

- A) they lost “sight” of the moths via sonar when pursuing them.
- B) they realized the moths were toxic after a few nights.
- C) they preferred to focus their attention on easier prey.
- D) the moths’ ultrasonic clicks startled them, frightening them away.

28

Which choice provides the best evidence for the answer to the previous question?

- A) Line 14 (“Some speculated ... bats”)
- B) Lines 33-36 (“If this ... tricked”)
- C) Lines 57-60 (“This furious ... target”)
- D) Lines 65-66 (“Bats judge ... return”)

29

As used in line 38, “partook readily” most nearly means

- A) consumed without difficulty.
- B) ate without hesitation.
- C) shared happily.
- D) participated promptly.

30

As used in line 50, “intermittent” most nearly means

- A) random.
- B) sporadic.
- C) alternating.
- D) scattered.

31

The passage discusses all of the following EXCEPT

- A) the moths’ effectiveness in warding off attacks from their predators.
- B) whether these particular species would encounter one another in nature.
- C) the lessons that can be learned by engineers from the moth’s natural sonar jamming.
- D) the bats’ responses to moths that lacked the ability to click.

32

Information from the graph best supports which of the following statements?

- A) Bats were more effective at hunting silent moths at the end of the study than they were at the start.
- B) Bats devoured half as many clicking moths as they did silent moths.
- C) Bats became increasingly effective at hunting clicking moths with each subsequent night.
- D) Silent moths were consistently more likely to be captured than clicking moths.

**Questions 33-42 are based on the following passage.**

The following passage is adapted from the story “The Godchildren,” by Tessa Hadley, first published in *The New Yorker* in 2009.

The three heirs, in three separate taxis, converged on 33 Everdene Walk on a fine afternoon in late May. They were in their early fifties, and had not met since they were sixteen or seventeen. Amanda, who had been officious even as a teenager, had organized the meeting by e-mail, via the solicitors: “If we’re all going to the house, why don’t we go at the same time? Wouldn’t it be fun to meet up?”

Now each was regretting having agreed to this. Chris, who was a lecturer at a new university, was certain that he had spotted Amanda at the station, ahead of him in the queue for taxis; he had been too embarrassed to make himself known to her, even though they could have shared the fare. She surely hadn’t had all that red hair thirty-five years ago, and she hadn’t seemed so tall then, or so loosely put together: the woman in the queue wasn’t large, exactly, but physically complicated, with a bright-colored striped wrap tossed over one shoulder which made him think of beachwear. Perhaps she lived in a hot country. He’d recognized her only when she threw her unguarded, emphatic glance at everyone behind her in the queue—boldly but blindly. Quailing, Chris was suddenly his anguished seventeen-year-old self again, stripped of his disguise as someone experienced and distinguished.

His memories of Mandy, young, were dim but had an ominous intensity. He wished he hadn’t come. He knew already that he wouldn’t want anything, anyway, from the horrible old house. At least he wouldn’t be alone with Amanda; although when he tried to recover his memories of Susan, the other godchild, he couldn’t find anything at all, only a neatly labeled vacancy.

The three taxis bore them, just a few minutes apart, out of the city center, then, swooping decorously downhill between traffic lights, through a species of suburb that seemed more remote from

their present lives than anywhere they ever went on holiday.

By the time these three had come, as children, to visit their godmother here, their more fashionable parents had already decided that the suburbs were dreary: places to joke about, not to aspire to. Their parents were doing up, in those days, spindly dilapidated eighteenth-century houses, bought cheap, in the city center. Susan’s mother still lived in one of these, now worth a great deal, and Susan had spent the previous night in her childhood bed. In her taxi, she was hardly thinking of the meeting ahead—except to wish that she weren’t going to it. She was obsessing over jagged old irritations, roused by a conversation with her mother that morning.

Chris’s and Susan’s taxis pulled up outside 33 Everdene Walk at the same moment; Amanda had got there before them, and the front door stood open to what seemed, to their foreboding, a seething blackness, in contrast to the glare outside. Who knew what state the house would be in? Susan was quicker, paying her taxi off; Chris was always afraid that he would tip too little or too much. She looked away while he probed in his change purse, then they politely pretended to recognize each other. He tried to dig back in his mind to their old acquaintance: how hadn’t he seen that the invisible, unremembered Susan might grow into this slim, long-faced, long-legged dark woman, somewhat ravaged but contained and elegant?

Meanwhile, Amanda, watching from a window she had just opened upstairs, saw thirty-five years of change heaped in one awful moment on both their heads. They looked broken-down to her, appalling. On her way to the house, she had bullied her resisting taxi-driver into two consecutive U-turns between the lime trees: visited by a premonition of just this disappointment, and then recovering, repressing her dread, willing herself to hope. Amanda remembered the old days more vividly than either of the others, cherished the idea of their shared past—strangely, because at the time she had seemed the one most ready to trample it underfoot,

on her way to better things. Now she revolted at Chris’s untidy gray-white locks, windswept without wind, around his bald patch: why did men  
85 yield so readily to their disintegration? At least Susan had the decency to keep her hair brown and well cut. Chris was stooping and bobbing at Susan, smiling lopsidedly, self-deprecatory.

90 She whistled from the window, piercing the Walk’s tranquility.

“Come on up!” she shouted. “Prepare for the Chamber of Horrors!”

33

Amanda, Susan, and Chris are meeting up because

- A) their father died and they need to discuss his will.
- B) they wanted to have a reunion after thirty-five years, since they had once been great friends.
- C) they are going to an open house that is in a desirable neighborhood.
- D) their godmother passed away and they need to sort through her belongings.

34

Based on the information in the passage, Chris’s memories of the other two godchildren

- A) perfectly matched his impressions of them later on.
- B) were colored negatively by his subsequent interactions with them.
- C) were almost non-existent, as he had forgotten all about them over the years.
- D) seemed inadequate and incomplete when confronted with the women in-person.

35

In the passage, Amanda, Chris, and Susan all experience the greatest sense of foreboding about

- A) seeing one another again after all these years.
- B) entering the dilapidated, potentially unsafe house.
- C) confronting the memories of their dead godparent.
- D) whether they’ll receive the fair portion of their inheritance.

36

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-4 (“They were ... seventeen”)
- B) Line 9 (“Now each ... this”)
- C) Lines 29-30 (“He knew ... house”)
- D) Lines 91-92 (“Prepare for ... Horrors”)

37

The passage hints that Chris

- A) has an unresolved history with Amanda.
- B) used to be in love with Susan.
- C) is a reformed rebel.
- D) was always their godparent’s favorite.

38

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 21-24 (“He’d recognized ... blindly”)
- B) Lines 27-28 (“His memories ... intensity”)
- C) Lines 63-68 (“He tried ... elegant”)
- D) Lines 82-85 (“Now she ... disintegration”)

39

As used in line 5, “officious” most nearly means

- A) presumptuous.
- B) busy.
- C) pushy.
- D) informal.

40

The rhetorical effect of the phrase “a neatly labeled vacancy” (line 34) is to suggest that

- A) Chris had intentionally suppressed painful memories about Susan.
- B) Chris often had difficulties in recalling his childhood.
- C) Chris had no strong memories of one of his fellow godchildren.
- D) Susan had been so dull in her youth that few people remembered her.

41

As used in line 52, “roused” most nearly means

- A) provoked.
- B) stimulated.
- C) excited.
- D) galvanized.

42

How does Amanda’s assessment of her two old acquaintances compare with Chris’s assessment?

- A) Chris was delighted to see the other two, while Amanda was annoyed.
- B) Chris was surprised at the changes in his acquaintances, while Amanda was disappointed in them.
- C) Chris thought the two women looked overdressed, while Amanda thought the others should have put more effort into their appearance.
- D) Chris thought the other two looked old, while Amanda thought they looked surprisingly good for their age.

**Questions 43-52 are based on the following passage.**

This passage is adapted from a speech given by President Richard Nixon when he resigned his office on August 9, 1974. His decision followed the revelation that five men connected to the Nixon administration were caught breaking into the headquarters of the opposing political party. At the time of Nixon’s resignation, proceedings had already begun in Congress to impeach him and seemed likely to succeed.

Line Good evening. This is the 37th time I have  
spoken to you from this office, where so many  
decisions have been made that shaped the history of  
this Nation. Each time I have done so to discuss with  
5 you some matter that I believe affected the national  
interest. Throughout the long and difficult period of  
Watergate, I have felt it was my duty to persevere—  
to make every possible effort to complete the term of  
office to which you elected me. In the past few days,  
10 however, it has become evident to me that I no  
longer have a strong enough political base in the  
Congress to justify continuing that effort. As long as  
there was such a base, I felt strongly that it was  
necessary to see the constitutional process through to  
15 its conclusion; that to do otherwise would be  
unfaithful to the spirit of that deliberately difficult  
process, and a dangerously destabilizing precedent  
for the future. But with the disappearance of that  
base, I now believe that the constitutional purpose  
20 has been served. And there is no longer a need for  
the process to be prolonged.

I would have preferred to carry through to the  
finish, whatever the personal agony it would have  
involved, and my family unanimously urged me to  
25 do so. But the interests of the nation must always  
come before any personal considerations. From the  
discussions I have had with Congressional and other  
leaders I have concluded that because of the  
Watergate matter I might not have the support of the  
30 Congress that I would consider necessary to back the  
very difficult decisions and carry out the duties of  
this office in the way the interests of the nation will  
require.

I have never been a quitter. To leave office  
35 before my term is completed is abhorrent to every  
instinct in my body. But as President, I must put the  
interests of America first. America needs a full-time  
President and a full-time Congress, particularly at  
this time with problems we face at home and abroad.  
40 To continue to fight through the months ahead for  
my personal vindication would almost totally absorb  
the time and attention of both the President and the  
Congress in a period when our entire focus should  
be on the great issues of peace abroad and prosperity  
45 without inflation at home. Therefore, I shall resign  
the Presidency effective at noon tomorrow. Vice  
President Ford will be sworn in as President at that  
hour in this office.

By taking this action, I hope that I will have  
50 hastened the start of that process of healing which is  
so desperately needed in America. I regret deeply  
any injuries that may have been done in the course  
of the events that led to this decision. I would say  
only that if some of my Judgments were wrong, and  
55 some were wrong, they were made in what I  
believed at the time to be the best interest of the  
Nation.

As I recall the high hopes for America with  
which we began this second term, I feel a great  
60 sadness that I will not be here in this office working  
on your behalf to achieve those hopes in the next  
two and a half years. But in turning over direction of  
the Government to Vice President Ford, I know, as I  
told the nation when I nominated him for that office  
65 ten months ago, that the leadership of America  
would be in good hands.

So let us all now join together in affirming that  
common commitment and in helping our new  
President succeed for the benefit of all Americans. I  
70 shall leave this office with regret at not completing  
my term but with gratitude for the privilege of  
serving as your President for the past five and a half  
years. These years have been a momentous time in  
the history of our nation and the world. They have  
75 been a time of achievement in which we can all be  
proud, achievements that represent the shared efforts

of the administration, the Congress and the people. But the challenges ahead are equally great. And they, too, will require the support and  
80 the efforts of the Congress and the people, working in cooperation with the new Administration.

May God’s grace be with you in all the days ahead.

43

Nixon’s primary purpose in delivering this speech was most likely to

- A) ask the American public for their forgiveness for his mistakes.
- B) announce his resignation and offer an explanation to the public.
- C) condemn the press for trying him in the court of public opinion before all the facts were available.
- D) express his full confidence in Vice President Ford.

44

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 6-9 (“Throughout the ... me”)
- B) Lines 36-37 (“But as ... first”)
- C) Lines 40-45 (“To continue ... home”)
- D) Lines 46-48 (“Vice President ... office”)

45

Nixon’s tone in the passage can best be described as

- A) regretful.
- B) hopeful.
- C) livid.
- D) uncertain.

46

Which of the following is NOT a reason Nixon gives for resigning the presidency?

- A) He no longer feels he has enough congressional support.
- B) He can’t fulfill his obligations as President while also fighting for his personal vindication in the Watergate scandal.
- C) Vice President Ford stated he was ready to take on the duties of the presidency.
- D) The United States faces great challenges in the coming years and requires a cooperative government to face them.

47

The passage implies that Nixon

- A) wanted to continue in his office, but felt obligated to resign.
- B) was in fact relieved to step aside.
- C) resigned in order to spend more time with his family.
- D) was blackmailed into resigning by Congress.

48

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-4 (“This is ... Nation”)
- B) Lines 25-26 (“But the ... considerations”)
- C) Lines 62-66 (“But in ... hands”)
- D) Lines 69-73 (“I shall ... years”)

49

Nixon’s use of the phrase “dangerously destabilizing precedent for the future” (lines 17-18) is primarily meant to refer to

- A) forcing congress to initiate impeachment proceedings.
- B) permitting the president’s party to get away with crimes.
- C) resigning too easily while he still had political support.
- D) finishing out his term in the face of serious accusations.

50

Which of the following is an issue that Nixon states Americans must address in the coming years?

- A) A potential economic collapse
- B) An overly powerful Congress
- C) A trial of those involved in Watergate
- D) A struggle for peace

51

As used in line 35, “abhorrent” most nearly means

- A) pitiful.
- B) shocking.
- C) disgusting.
- D) repugnant.

52

As used in line 67, “affirming” most nearly means

- A) stating.
- B) defending.
- C) upholding.
- D) swearing.

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**



## Section 2

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage comes with a set of questions. Some questions will ask you to consider how the writer might revise the passage to improve the expression of ideas. Other questions will ask you to consider correcting potential errors in sentence structure, usage, or punctuation. There may be one or more graphics that you will need to consult as you revise and edit the passage.

Some questions will refer to a portion of the passage that has been underlined. Other questions will refer to a particular spot in a passage or ask that you consider the passage in full.

After you read the passage, select the answers to questions that most effectively improve the passage's writing quality or that adjust the passage to follow the conventions of standard written English. Many questions give you the option to select "NO CHANGE." Select that option in cases where you think the relevant part of the passage should remain as it currently is.

Questions 1-11 are based on the following passage.

### A Marine Biologist's Day in Maine

Lucy is up by eight in the morning. **1** By nine, she's out the door. She'll be on the beach by nine thirty, but Lucy isn't headed out to tan; Lucy is a marine biologist. She got her PhD last year, and she's now doing post-doctorate research on the coast of Maine.

1

- A) NO CHANGE
- B) Lucy goes out the door after that.
- C) Then she just walks out the door.
- D) It's 9:00 o'clock when she leaves.

CONTINUE 

[1] She meets the other researchers out by the tide pools. [2] They're focused this month on the effects of an **2** intrusive green crab population that has been harming the balance of the coastal ecosystem. [3] This loss of clams affects other species as well as the economy: the Maine clam industry typically makes \$17 million annually, and the lost profits will affect fishermen, distributors, and consumers. [4] **3** The crabs eat soft-shell clams and as a result the clam population is plummeting, and clams are invertebrates. [5] Today, the research team will gather samples of both crabs and clams. **4**

2

- A) NO CHANGE
- B) encroaching
- C) invasive
- D) infringing

3

Which choice best improves or maintains the focus of the paragraph?

- A) NO CHANGE
- B) The crabs eat soft-shell clams and as a result the clam population is plummeting.
- C) The crabs eat soft-shell clams, and clams are invertebrates.
- D) Soft-shell clams are invertebrates, and their population is plummeting as they are eaten by crabs.

4

To make this paragraph most logical, sentence 3 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 4.
- D) after sentence 5.

Arriving at the work **5** cite, Lucy feels a misty spray on her arms as breakers crash on the rocks. The air is chilly; it's early June but it still feels more like spring than summer. Lucy hears another researcher say, "I love everything about this job except having freezing fingers first thing in the morning." Plunging her hands into a tide pool, she can't help but disagree.

**6** The cold is a welcome shock to the system, instantly making Lucy feel more alert and invigorated.

**5**

- A) NO CHANGE
- B) sight
- C) sleight
- D) site

**6**

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it helps to maintain a clear chronology of events in the story.
- B) Kept, because it helps to explain why Lucy disagrees with the other researcher.
- C) Deleted, because Lucy's opinions about cold water are not statements of fact.
- D) Deleted, because it doesn't provide relevant information about the qualifications necessary to become a marine biologist.

They spend the morning collecting specimens. Crabs scuttle around, and clams lie still in their respective buckets. The day gets warmer, and Lucy works up a sweat. Compared to sitting at a desk, **7** the animals are lively. By noon, Lucy and her colleagues are gathering up their specimens and equipment to head indoors. **8**

Lucy spends the afternoon entering and analyzing data on a computer, tagging crabs in preparation for an experiment the following day, and monitoring the results of an ongoing experiment that focuses on the birthrate of phytoplankton, which are the primary component of the soft-shell clam's diet. **9** After dinner and a phone call, the phone call being from her sister, she puts in some hours on a research paper. Tomorrow will again start with a trip to the field station, as they continue to examine the changing ecosystem's challenges.

7

- A) NO CHANGE
- B) working with the animals is a lively activity.
- C) the biologists are livelier.
- D) the animal is lively.

8

The writer wants to insert another sentence here to wrap up the events of this paragraph, and provide an effective transition to the next. Which of the following choices best accomplishes these goals?

- A) Lucy is sad to leave the shore, because working on the shore is her favorite part of the day.
- B) After depositing their specimens in holding tanks, they have a quick break for lunch and then get to work in the lab.
- C) They work quickly, because it's almost time for lunch and everyone has worked up an appetite collecting specimens.
- D) The equipment will be stored for later use, and the specimens will be placed in holding tanks.

9

- A) NO CHANGE
- B) After dinner, and also after a phone call from her sister, she works on putting in some hours on a research paper.
- C) After dinner and a phone call from her sister, she works on a research paper.
- D) After eating dinner and then speaking on the phone with her sister, she then works on doing some work for a research paper.

**10** When we hear about problems in the ocean, it's easy for us to think that we don't affect us. However, changes in ocean populations affect populations on land, as well as the economy. **11** Nobody are at the forefront of addressing these oceanic environmental concerns like marine biologists.

**10**

- A) NO CHANGE
- B) When we hear about problems in the ocean, it's easy for them to think that they don't affect them.
- C) When we hear about problems in the ocean, it's easy for us to think that they don't affect us.
- D) When you hear about problems in the ocean, it's easy for us to think that they don't affect us.

**11**

- A) NO CHANGE
- B) Nobody at the forefront
- C) Somebody are at the forefront
- D) Nobody is at the forefront

Questions 12-22 are based on the following passage.

**Comets, Briefly Brightening our Skies**

**12** Blazing through the sky for short periods of time before disappearing into the galaxy, humans have long been fascinated by comets. Comets are balls of dust and ice, comprised of leftover materials that did not become planets during the formation of our solar system.

**12**

- A) NO CHANGE
- B) Before disappearing into the galaxy, humans have long been fascinated by comets, blazing through the sky for brief periods of time.
- C) Comets, blazing through the sky for brief periods of time before disappearing into the galaxy, have long fascinated humans.
- D) For brief periods of time, humans have long been fascinated by comets, blazing through the sky before disappearing into the galaxy.

Comets travel around the sun in a highly elliptical orbit. When far from the sun, a comet consists of only its nucleus, which is a few kilometers wide. As the nucleus gets closer to the sun (about as close as Jupiter), some of its ice sublimates, or turns directly into gas without melting into liquid first. The coma, a cloud of gas created by the process of sublimation, is very large compared to the initial size of the nucleus. **13** Solar winds disrupt **14** rock particles dust, and gas, creating distinct tails of particles streaming out from the coma.

**13**

The writer wants to insert a sentence here which will provide additional support for the preceding sentence. Which choice best accomplishes this goal?

- A) On the surface of Mars, frozen CO<sub>2</sub> sublimates in warmer months.
- B) Comas vary in size, depending on the initial size of the nucleus and environmental factors.
- C) The coma can reach up to 10,000 kilometers in diameter, which is close to the size of the planet Earth.
- D) At least one comet's tail was longer than 320 million kilometers.

**14**

- A) NO CHANGE
- B) rock particles, dust, and gas,
- C) rock particles dust and gas
- D) rock particles, dust, and, gas



These tails can exceed 150 million kilometers in **15** length are visible from Earth. **16** Because tails are caused by solar winds, they are always moving away from the sun. Thus, surprisingly, if a comet is moving away from the sun then it is following **17** it's tail. Comets that are sublimating and have a tail are among the fastest objects in our solar system, reaching speeds up to 160,000 kilometers per hour.

**15**

- A) NO CHANGE
- B) length, are
- C) length and are
- D) length, further are

**16**

Which choice most clearly explains why comet tails move away from the sun?

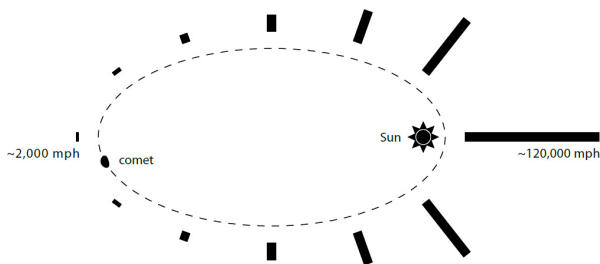
- A) NO CHANGE
- B) Tails, because of their cause, solar winds, are always moving away from the sun.
- C) They are being caused by solar winds, and tails are always moving away from the sun.
- D) Tails are always moving away from the sun, being caused by solar winds.

**17**

- A) NO CHANGE
- B) it
- C) its'
- D) its

The sun is near the center of Earth's orbit.

However, a comet travels differently: the sun is at one of the far sides of its elliptical orbit. As the comet approaches the sun its velocity **18** increases, and as it moves farther away from the sun its velocity increases. Some comets **19** do an orbit around the sun in a few years, while others take thousands of years to do so.



18

Which choice completes the sentence with accurate information based on the graphic?

- A) NO CHANGE
- B) increases as the length of its tail increases, which decreases as it moves away from the sun.
- C) increases, and as it moves farther away from the sun its velocity decreases.
- D) decreases, and as it moves closer to the sun the length of its tail decreases.

19

- A) NO CHANGE
- B) make an orbit of
- C) orbit
- D) complete a whole entire orbit around

Although it is a rare occurrence, sometimes

**20** comets collide with another celestial body. A popular theory is that a comet first brought water to Earth. The last known collision on Earth was 65 million years ago, when a comet or an asteroid hit the Earth just south of the Yucatan peninsula, creating a massive crater. The impact caused a global dust cloud to rise which blocked the sun and cooled the entire planet.

**21** When Halley’s Comet last neared the Earth in 1986, scientists determined that it is made up of carbon, hydrogen, oxygen, and nitrogen in proportions similar to those of the human body. As distant and as different as comets may seem from us as they trail across the sky, we are **22** composed of the same elements.

20

- A) NO CHANGE
- B) comets collides with another celestial body.
- C) a comet collides with other celestial bodies.
- D) comets collide with other celestial bodies.

21

The writer is considering dividing the underlined sentence into two sentences. Should the underlined sentence be divided into two sentences?

- A) Yes, because it is a run-on sentence.
- B) Yes, because the sentence mixes unrelated pieces of information without explanation.
- C) No, because the conjunction “and” effectively links the various ideas expressed in the sentence.
- D) No, because the several pieces of information in the sentence serve to express a single complete thought.

22

- A) NO CHANGE
- B) constituted with
- C) arranged among
- D) produced through

Questions 23-33 are based on the following passage.

**Hamilton’s Essential Contributions to the United States’ Economy**

23 Of all the Founding Fathers, Alexander Hamilton’s contributions to the establishment of the United States’ economy were unparalleled. A trusted advisor of George Washington during the Revolutionary War, Hamilton spent a lot of time thinking about what kind of government the new country needed. He studied European economies and governments, and maintained that strong federal power was necessary for the nation’s survival. 24 You may not know that when delegates convened in 1787 to create a Constitution for the new country, Hamilton was active at the Convention and instrumental in the Constitution’s ratification. He convinced states to approve it through speeches and the influential Federalist Papers which he co-authored.

23

- A) NO CHANGE
- B) Even among those of all of the Founding Fathers, Alexander Hamilton’s contributions to the establishment of the United States’ economy
- C) Alexander Hamilton’s were the greatest, the contributions of all of the Founding Fathers
- D) Alexander Hamilton, more than any other contributions to the establishment of the United States’ economy,

24

- A) NO CHANGE
- B) I have heard that when delegates convened
- C) When delegates convened
- D) Posterity remembers that when delegates convened

[1] **25** President Washington decided on the choice of Hamilton as the first Secretary of the Treasury. [2] Washington and his cabinet had no example to follow: they set the **26** preceding for how the executive branch of the government would operate. [3] Thus, Hamilton was largely responsible for establishing the United States' early economic policies. [4] Thomas Jefferson was influential as Secretary of State as well. [5] Without sound economic policies, the country might not have survived. **27**

**25**

- A) NO CHANGE
- B) President Washington made the choice to have Hamilton be the first Secretary
- C) President Washington chose Hamilton to be the first Secretary
- D) President Washington made his choice and decided on Hamilton as first Secretary

**26**

- A) NO CHANGE
- B) precedent
- C) proceeding
- D) president

**27**

Which sentence should be removed in order to improve the focus of this paragraph?

- A) Sentence 1
- B) Sentence 2
- C) Sentence 3
- D) Sentence 4

**28** Hamilton knew the United States needed to have strong businesses and industries, which could not form without a strong national economy. The country was still deep in debt from the war and needed additional revenue to initiate national projects. Although taxes were **29** unpopular—a major cause of the Revolutionary War was American resentment toward British taxes, Hamilton argued for their necessity. Without capital, how could the government accomplish anything?

28

- A) NO CHANGE
- B) Hamilton knew; the United States
- C) Hamilton knew, the United States
- D) Hamilton, knew the United States,

29

- A) NO CHANGE
- B) unpopular, a major cause of the Revolutionary War was American resentment toward British taxes; Hamilton
- C) unpopular, a major cause of the Revolutionary War was American resentment toward British taxes—Hamilton
- D) unpopular—a major cause of the Revolutionary War was American resentment toward British taxes—Hamilton

**30** Hamilton’s “Report on Credit” stated that the government needed to repay its war bonds, take on the war debts of the states, and place a tax on imported goods. Many **31** members of Congress thought covering states’ war debts expanded the central government’s power too much, but Hamilton pointed out the difficulties of each state doing so independently. Virginia was strongly opposed to Hamilton’s proposal, so Hamilton met secretly with Virginia Congressman James Madison. They agreed that Virginia would support the measure if the nation’s new capital would be just outside Virginia, rather than in New York. With Virginia’s support, the measures of the “Report on Credit” passed.

Another of Hamilton’s ideas that met **32** obstacles was a national bank. Again, many states thought a federal bank would place too much power in the hands of the central **33** government and so for the sake of efficiency, and to establish credit for the federal government, the nation needed a centralized bank. In 1790, the idea was approved.

**30**

Which choice most effectively establishes the main topic of the paragraph?

- A) Virginians and New Yorkers wanted the nation’s capital to be in their respective states.
- B) On January 14, 1790, Hamilton presented Congress with a plan of action for jumpstarting the economy.
- C) President Washington relied on Hamilton.
- D) Hamilton threw himself into his work, becoming increasingly obsessive as he developed his plans.

**31**

- A) NO CHANGE
- B) members’ of Congress thought covering states war debts
- C) members of Congress thought covering state’s war debts
- D) members of Congress thought covering states war debts

**32**

- A) NO CHANGE
- B) resistance
- C) problems
- D) hardships

**33**

- A) NO CHANGE
- B) government. However,
- C) government and however,
- D) government. Thus,

Questions 34-44 are based on the following passage.

**Artistic Game Changer: Marcel Duchamp**

The twentieth century saw a major expansion of the definition of “art.” Though visual art developed and flourished in practically every culture worldwide for millennia before the twentieth century, most schools of art had emphasized formal elements and aesthetics. The modern art movement, which began in the second half of the nineteenth century, had already **34** lengthened the scope of what the public accepted as art. Rather than aiming to represent their subjects directly, modern artists experimented with color and form to produce striking visual effects. By challenging the public’s expectations for visual art, they laid the groundwork for the conceptual **35** art movement. Conceptual artists shifted the focus even further, from visual effects to ideas. They rejected the notion that a piece of art must be beautiful, or that it should demonstrate artistic skill—proclaiming, **36** rather, that as long as it expresses, an artistic concept, it should be considered art. Marcel Duchamp was a pioneer of the Conceptual art movement.

34

- A) NO CHANGE
- B) expanded
- C) built
- D) deepened

35

- A) NO CHANGE
- B) art movement—Conceptual artists
- C) art movement, conceptual artists
- D) art movement: and conceptual artists

36

- A) NO CHANGE
- B) rather: that as long as it expresses, an artistic concept, it should
- C) rather, that as long as it expresses an artistic concept it should
- D) rather that as long as it expresses an artistic concept it should



[1] Duchamp was born in France in 1887, **37** and by young adulthood it is true that he had spent time creating art in both France and the United States. [2] Many critics claimed that the piece was not legitimate, but he maintained that it was the provocative, innovative nature of his act that made it art. [3] Disenchanted with the commercial art world, he refused to engage in practices generally seen as necessary for financial success and recognition: developing an identifiable aesthetic, frequently showing his work publicly, **38** or creating pieces similar to each other for the sake of profit, and in 1955 he became a U.S. citizen. [4] He developed the notion of a “Readymade,” a pre-existing object that an artist finds, chooses, and claims as art, **39** modifying the object only by signing it. [5] Famously, Duchamp’s 1917 submission to an art exhibition, Fountain, consisted of a urinal that he rotated ninety degrees and signed with a pseudonym. **40**

**37**

- A) NO CHANGE
- B) and had spent time creating, by young adulthood, art
- C) and created art, which by young adulthood he had spent time creating
- D) and by young adulthood had spent time creating art

**38**

Which of the following choices most improves the focus of the passage?

- A) or creating profits and becoming a citizen.
- B) and in 1955 he became a U.S. citizen.
- C) or creating pieces similar to each other for the sake of profit.
- D) or creating pieces similar to each other for the sake of profit, and he became a U.S. citizen.

**39**

- A) NO CHANGE
- B) modifying the object only by signing it by the artist.
- C) modifying the object, the piece of art, only by signing it.
- D) modifying the object only by applying his or her, the artist’s, signature.

**40**

To make the paragraph most logical, sentence 2 should be placed

- A) where it is now
- B) before sentence 1
- C) before sentence 5
- D) after sentence 5

In an interview in 1955, Duchamp **41** says, “You should wait for fifty . . . or a hundred years for your true public. That is the only public that interests me.” **42** Because he did not receive critical acclaim for much of his career, over fifty years later Duchamp is seen as one of the most influential artists of the twentieth century. Duchamp’s influence can be seen in the work of later conceptual artists: Andy Warhol, with his pop art images and prints of everyday objects; Jackson Pollock, with his canvases covered in splattered paint; Sol LeWitt, **43** who made cubic steel “structures.” Thus, Duchamp achieved the respect of the public he cared **44** about! Duchamp and the conceptual art movement permanently changed ideas about art’s definition, its scope, and its possibilities.

41

- A) NO CHANGE
- B) was saying
- C) is saying
- D) said

42

- A) NO CHANGE
- B) Considering that
- C) Although
- D) However

43

- A) NO CHANGE
- B) with his
- C) in making
- D) by making

44

- A) NO CHANGE
- B) about. Duchamp
- C) about—Duchamp
- D) about? Duchamp

## STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 3



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

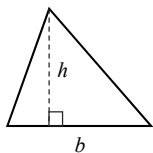
## DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

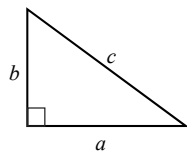
## NOTES

1. You **may not** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

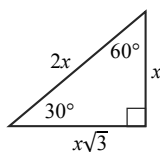
## REFERENCE



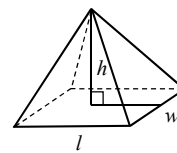
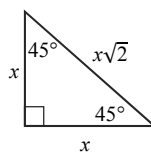
$$A = \frac{1}{2}bh$$



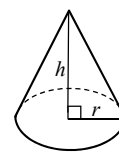
$$a^2 + b^2 = c^2$$



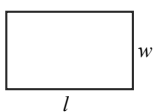
Special Triangles



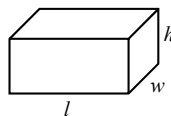
$$V = \frac{1}{3}lwh$$



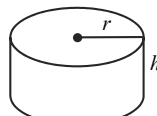
$$V = \frac{1}{3}\pi r^2 h$$



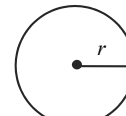
$$A = lw$$



$$V = lwh$$

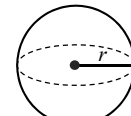


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE



1

If  $42 = 3(x - 4)$ , what is the value of  $x$ ?

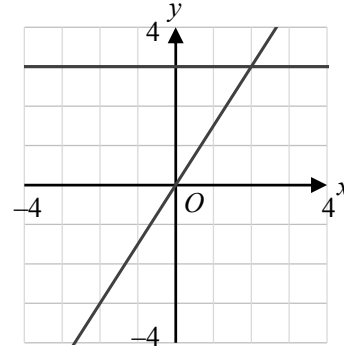
- A) 4
- B) 10
- C) 18
- D) 20

2

For what value of  $k$  does  $x^2 + kx + 9 = (x + 3)^2$ ?

- A) 0
- B) 3
- C) 6
- D) 9

3



If  $(x, y)$  is the solution to the system of equations graphed above, what is the value of  $x$  in terms of  $y$ ?

- A)  $y$
- B)  $\frac{2}{3}y$
- C)  $\frac{1}{3}y$
- D)  $-\frac{1}{3}y$

4

A barrel of crude oil is extracted from shale at a cost of \$51, and then transported to and from the refinery at a cost of \$6 each direction. Oil is processed three times at the refinery plant, at a cost of \$9 each time. What is the profit, in dollars per barrel, if one barrel is sold for \$93? (Profit is equal to revenue minus expenses.)

- A) 1
- B) 2
- C) 3
- D) 4



5

If  $c - 1 = 3$ , what is the value of  $c^2 - 1$ ?

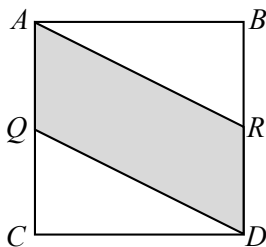
- A) 3
- B) 8
- C) 10
- D) 15

7

If  $2(3a - b) = 4b$  and  $b = 6$ , what is the value of  $a$ ?

- A) 6
- B) -6
- C) 2
- D) 5

6



The square above has an area of 100. If  $Q$  is the midpoint of  $\overline{AC}$  and  $R$  is the midpoint of  $\overline{BD}$ , what is the area of the shaded area?

- A) 40
- B) 50
- C) 60
- D) 75

8

$$\frac{2x}{x-1} - \frac{3x}{x+1}$$

Which of the following expressions is equivalent to the expression above?

- A)  $-\frac{x}{x^2-1}$
- B)  $\frac{5x-x^2}{x^2-1}$
- C)  $-\frac{x}{x-1}$
- D)  $-\frac{6x}{x^2-1}$



9

Joel is  $a$  years older than Luca. In  $b$  years, Joel will be twice as old as Luca. What is Joel's present age, in terms of  $a$  and  $b$ ?

- A)  $-2(a - b)$
- B)  $-2a - b$
- C)  $2a - b$
- D)  $a - b$

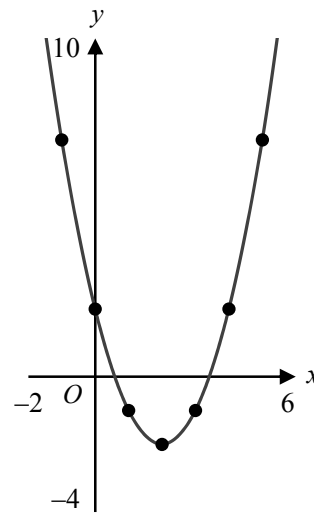
10

$$|x - 3| \leq 5$$

Which of the following inequalities is equivalent to the absolute value inequality above?

- A)  $-2 \leq x \leq 8$
- B)  $-8 \leq x \leq 2$
- C)  $x \leq -2$  or  $x \geq 8$
- D)  $x \leq -8$  or  $x \geq 2$

11



The figure above shows the graph of a quadratic function  $f$  with a minimum point at  $(2, -2)$ . If  $f(5) = n$ , what is a possible value for  $n$ ?

- A)  $f(-2)$
- B)  $f(-1)$
- C)  $f(0)$
- D)  $f(1)$



12

$$\frac{16^x}{4^a + 4^a + 4^a + 4^a} = \frac{1}{4}$$

Which equation best represents the value of  $x$  in terms of  $a$ ?

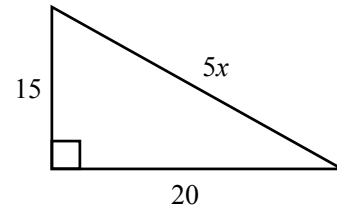
- A)  $\frac{a}{4} = x$
- B)  $\frac{a}{2} = x$
- C)  $a = x$
- D)  $2a = x$

13

The sum of  $a$  and  $b$  is 132. If  $a$  is the square of  $b$  and the product of  $a$  and  $b$  is negative, what is  $a$ ?

- A) -12
- B) 11
- C) 121
- D) 144

14



What is the value of  $x$  in the triangle above?

- A) 5
- B) 10
- C) 25
- D) 31

15

$$y = 5x^2 - 3x - 1$$

$$y + 6 = 7x$$

In the system of equations above, what is the value of  $y$  in terms of  $x$ ?

- A)  $-x$
- B)  $x$
- C)  $2x$
- D)  $3x$




**DIRECTIONS**

Questions **16-20** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

- You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
- Fill in only one circle in a column.
- You can start your answer in any column as long as you can fit in the whole answer.
- For questions 16-20, no answers will be negative numbers.
- Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
- If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
- If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 /   1   1	8   .   4	3   /   7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

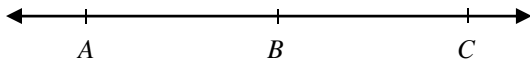
.   4   2   2	.   3   2   6	.   1   2   5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



16

A stone is dropped from a height of 9 meters above the ground. If the height function can be modelled by the equation  $h(t) = a - t^2$ , where  $t$  is time in seconds and  $h$  is height in meters, how many seconds does it take for the stone to hit the ground?

17



$A$ ,  $B$  and  $C$  lie on a line, as shown above. The length of  $\overline{AB}$  is  $x - 4$  and the length of  $\overline{AC}$  is  $x + 6$ . What is the length of  $\overline{BC}$ ?

18

If  $f(x) = 8x + 1$  and  $g(x) = 3x - 1$ , what is the value of  $\frac{f(2)}{g(f(0))}$ ?

19

$$\frac{d}{y} = \frac{12}{d}$$

$$y^2 = 6y - 9$$

If  $d$  is positive, what is the value of  $d$  in the series of equations above?



20

The imaginary number  $i$  is defined such that  $i^2 = -1$ . What is the value of  $(1 - i\sqrt{5})(1 + i\sqrt{5})$ ?

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 4



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

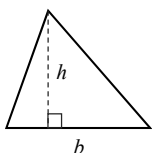
## DIRECTIONS

Questions **1-30** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **31-38** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 31. You may use your test booklet for scratch work.

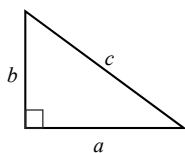
## NOTES

1. You **may** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

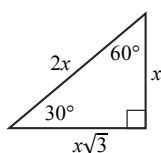
## REFERENCE



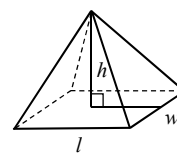
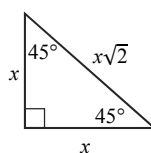
$$A = \frac{1}{2}bh$$



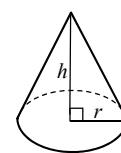
$$a^2 + b^2 = c^2$$



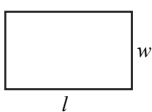
Special Triangles



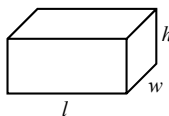
$$V = \frac{1}{3}lwh$$



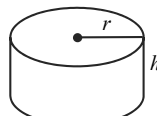
$$V = \frac{1}{3}\pi r^2 h$$



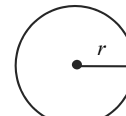
$$A = lw$$



$$V = lwh$$

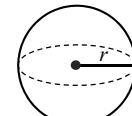


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE



1

If  $y = x - 2$ , and  $x = 2y + 4$ , what is the value of  $x$ ?

- A) 1
- B) 0
- C) -2
- D) -6

2

$x$	0	2	4	6
$f(x)$	3	4	5	6

Which of the following expressions defines  $f(x)$  in the table above?

- A)  $f(x) = x + 3$
- B)  $f(x) = \frac{1}{2}x + 3$
- C)  $f(x) = x$
- D)  $f(x) = 2x$

3

If a farmer in Kansas purchases 8 pigs for every 1.5 acres of land and has 6 acres of land set aside for pigs, how many pigs will she purchase?

- A) 20
- B) 32
- C) 40
- D) 48

4

$$\frac{x-1}{3} = \frac{2x-6}{4}$$

What is the value of  $x$  that satisfies the equation above?

- A) 5
- B) 7
- C) 8
- D) 16

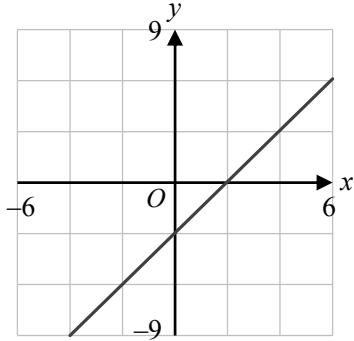
5

If  $8x + 4 = 48$ , what is  $2x + 1$ ?

- A) 9
- B) 10
- C) 11
- D) 12



6



What is the slope of the function in the graph above?

- A) 2
- B)  $\frac{3}{2}$
- C)  $\frac{2}{3}$
- D)  $\frac{1}{2}$

7

The population of an invasive species of moth doubles every 5 years. If the initial population is 300, what will be the population after 15 years?

- A) 900
- B) 1200
- C) 2000
- D) 2400

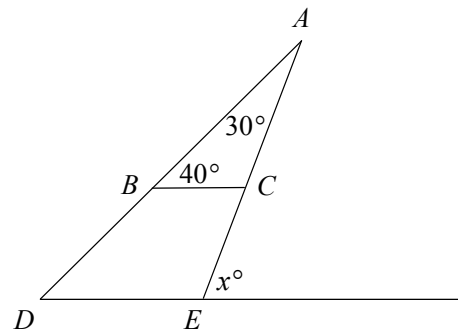
8

John fills his bag with five cent candies,  $v$ , and ten cent candies,  $t$ . If he has a total of 54 candies and his candies are worth \$3.10, which of the following is true?

- I.  $\$0.05v + \$0.10t = \$3.10$
- II.  $54 = v + t$
- III.  $\$0.05 \times (54 - v) + \$0.10v = \$3.10$

- A) I only
- B) I and II only
- C) I, II, and III
- D) None of the above

9



In the figure above, if  $\overline{BC} \parallel \overline{DE}$ , what is the value of  $x$ ?

- A) 30
- B) 40
- C) 70
- D) 110



10

Ali buys 10 burgers and 7 chocolate milkshakes for \$50.95. If the price of a chocolate milkshake is \$0.25 cheaper than the price of a burger, what is the price of a chocolate milkshake?

- A) \$2.85
- B) \$3.10
- C) \$4.05
- D) \$5.09

11

The acute angles of a right triangle have a ratio of 12 to 3. What is the difference between the two angle measures?

- A) 42 degrees
- B) 54 degrees
- C) 64 degrees
- D) 72 degrees

12

A number is a palindrome if it is the same written backwards and forwards (6336 is an example of a palindrome). What number divides into every 4 digit palindrome?

- A) 2
- B) 3
- C) 7
- D) 11

13

Day	Number of books
Monday	$x$
Tuesday	$2x$
Wednesday	$0.5x$
Thursday	$x$
Friday	$3.5x$

The above table outlines how many books Anthony reads per day in terms of  $x$ . What is the average daily number of books that Anthony reads, in terms of  $x$ ?

- A)  $\frac{5x}{8}$
- B)  $x$
- C)  $\frac{8x}{5}$
- D)  $8x$

14

$$x^2 - 1 < x^3$$

For which of the following values is the above inequality true?

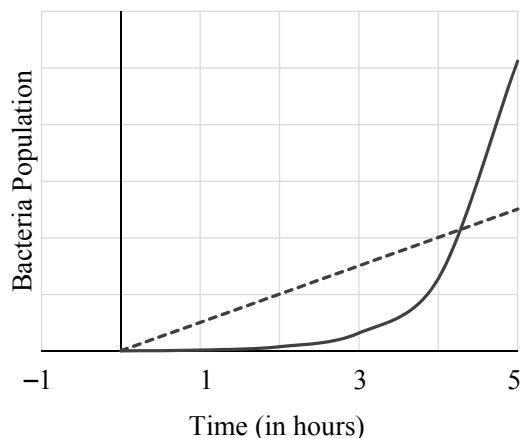
- A)  $x = -3$
- B)  $x = -2$
- C)  $x = -1$
- D)  $x = 0$





15

## Growth of Bacteria Populations



Bacteria  $A$  is represented by the solid line and Bacteria  $B$  is represented by the dotted line in the graph shown above. Which of the following statements is TRUE?

- A) Bacteria  $A$  is growing at a linear rate.
- B) Bacteria  $B$  is growing at an exponential rate.
- C) Neither Bacteria  $A$  nor Bacteria  $B$  is growing at a linear rate.
- D) Bacteria  $B$  is growing linearly, but Bacteria  $A$  is growing exponentially.

16

Which of the following values of  $x$  results in the largest value of  $y$  in the equation  $y = -(x - 2)^2 + 4$ ?

- A)  $-2$
- B)  $0$
- C)  $2$
- D)  $4$

17

$$x = 12$$

$$3x = 4y^2$$

In the system of equations above, if  $y > 0$ , what is the value of  $x^2y$ ?

- A) 36
- B) 108
- C) 432
- D) 1296

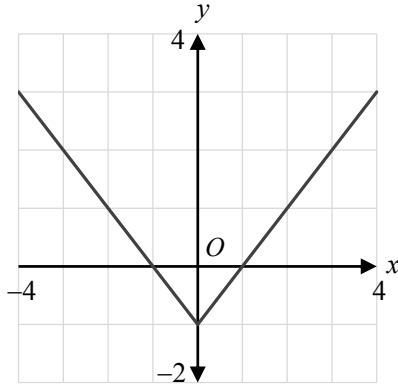
18

The product of two positive consecutive even numbers is 168. What is the smaller of the two numbers?

- A) 24
- B) 21
- C) 14
- D) 12



19



The function  $f(x)$  is graphed above. If  $g(x) = f(x) - 1$ , which of the following statements is true?

- A)  $g(x)$  is greater than or equal to zero.
- B)  $g(x)$  is greater than or equal to negative one.
- C)  $g(x)$  is greater than or equal to negative two.
- D)  $g(x)$  is greater than negative one, but smaller than five.

20

Three different integers are randomly selected from a group of five unique integers consisting of 1 through 5. What is the probability that these numbers are 1, 2, and 3?

- A) One in five
- B) One in ten
- C) One in twenty
- D) One in sixty

21

The ratio of  $d:c$  is 3:1. If the sum of  $d$  and  $c$  is  $s$ , what is the value for  $d$ , in terms of  $s$ ?

- A)  $\frac{4}{3}s$
- B)  $\frac{3}{4}s$
- C)  $s - 3$
- D)  $s - 4$



**Questions 22 and 23 refer to the following information.**

A survey on coffee consumption was conducted among a random sample of students at a university. A total of 200 students were surveyed. The table below displays a summary of the results.

Cups of Coffee (Per Day)				
Student Year	0	1	2 or more	Total
Freshman	25	9	16	50
Sophomore	5	19	26	50
Junior	10	6	50	66
Senior	0	2	32	34
Total	40	36	124	200

22

Based on the information in the table, who would be least likely to drink any cups of coffee during the day?

- A) a freshman
- B) a sophomore
- C) a junior
- D) a senior

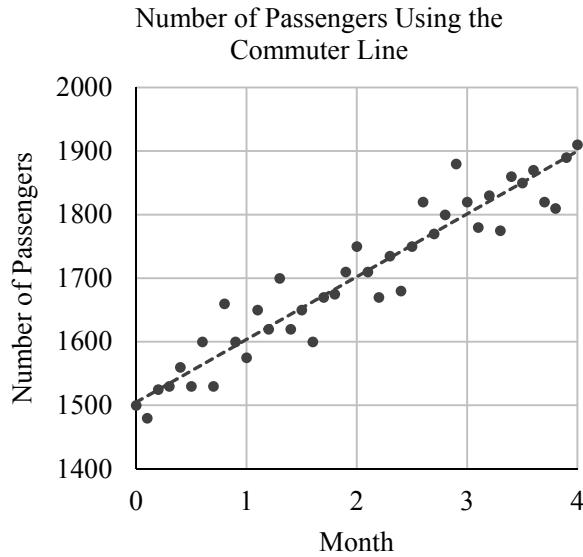
23

Which of the following statements about the students surveyed is not supported by the table above?

- A) A higher percentage of juniors than sophomores drink 2 or more cups of coffee per day.
- B) A higher percentage of juniors than seniors drink 2 or more cups of coffee per day.
- C) 20% of all students surveyed do not drink coffee.
- D) 50% of the freshmen do not drink coffee.



24



The graph above shows the number of passengers on a train line over 4 months. If  $m$  is the number of months, which of the following functions best represents the graph's line of best fit?

- A)  $f(m) = 200 + 1500m$
- B)  $f(m) = 150 + 100m$
- C)  $f(m) = 1500 + 100m$
- D)  $f(m) = 150m + 1500$

25

Produce at the Farmer's Market	
Fruit	Price
Apples	3 for 2 dollars
Peaches	1 for 1 dollar
Oranges	4 for 3 dollars

The chart above shows the prices for fruit at a farmer's market. Claire spends 4 dollars on apples, 2 dollars on peaches, and 3 dollars on oranges and puts all of her fruits in a brown bag. If she randomly selects a fruit from her bag, what is the probability she grabs an apple?

- A)  $\frac{1}{4}$
- B)  $\frac{1}{3}$
- C)  $\frac{1}{2}$
- D)  $\frac{2}{3}$

26

$j$  is equal to 925 and  $k$  is equal to 5,550. A number,  $n$ , is added to  $j$ , such that the ratio of  $j + n$  to  $k$  is 1:3. What is the ratio of  $n$  to  $j + n$ , expressed as a percentage of  $j + n$ ?

- A) 30%
- B) 40%
- C) 50%
- D) 60%



27

When Amelia goes cliff diving in Bali, her height above the water can be modelled by the function  $f(t) = -2t^2 + 4t + 30$ , where  $t$  represents time in seconds. How long, in seconds, does it take for Amelia to hit the water?

- A) 3
- B) 4
- C) 5
- D) 6

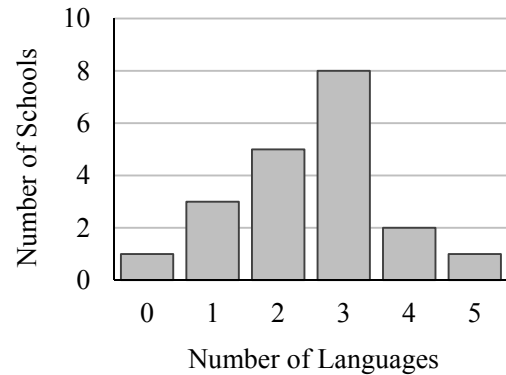
28

The average of 5 positive numbers is 85. If the highest of these numbers is 100, which of the following statements cannot be true?

- A) The lowest score is 20.
- B) The highest range possible is 75.
- C) The median is greater than 25.
- D) The mode is 85.

29

Number of Foreign Languages Offered in a High School Curriculum



20 high schools were surveyed on the number of languages offered in their curriculum. The results are shown in the chart above. How many schools offer fewer languages than average across the 20 schools?

- A) 9
- B) 10
- C) 11
- D) 17

30

A city wants to replace 10% of its bus fleet with hydrogen-powered buses. Each hydrogen-powered bus costs \$200,000. If there are 180 buses in the city, how much money, in dollars, will it cost for the city to meet its goal?

- A) 1,800,000
- B) 2,000,000
- C) 3,600,000
- D) 4,000,000


**DIRECTIONS**

Questions **31-38** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

- You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
- Fill in only one circle in a column.
- You can start your answer in any column as long as you can fit in the whole answer.
- For questions 31-38, no answers will be negative numbers.
- Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
- If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
- If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 /   1   1	8   .   4	3   /   7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

.   4   2   2	.   3   2   6	.   1   2   5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



31

If  $2x$  is equal to the sum of 11, 12, and 13, what is the value of  $x$ ?

32

$$-15(2 + n) = -16(n - 7)$$

What is the value of  $n$  in the equation above?

33

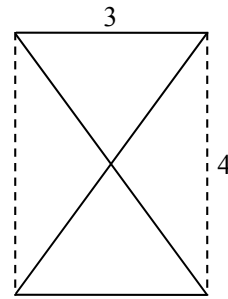
If  $x$  is 60% of  $y$ , and  $y$  is 30% of  $z$ ,  $x$  is what percent of  $z$ ?

34

$$8^{3x-1} = \frac{1}{4^{3x-21}}$$

What is the value of  $x$  in the equation above?

35



A rectangle has side lengths 3 and 4 as shown in the figure above. What is the total length of the solid lines?



36

What is the radius of the circle with the equation  $x^2 + y^2 - 7 = 9$ ?

37

How much faster, in seconds, did Susan run each mile in Week 3 compared to Week 4?

---

**Questions 37 and 38 refer to the following information.**

Susan is training for a marathon. To track her progress, she has been keeping a record of her recent practice runs. The table below summarizes her training progress.

Time For Practice Runs		
Week	Distance (in miles)	Time (in minutes)
1	10	100
2	12	108
3	8	68
4	10	87
5	12	105

38

Susan would like to run 26 miles in 3 hours and 54 minutes. Currently, she can run 26 miles at a pace of 11 minutes/mile. If she plans on improving her pace by 15 seconds/mile every week, how many weeks will it take Susan to reach her goal?

---

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**



# Answers and Scoring

# ANSWERS

## PART 1

### SECTION 1

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 14. D | 27. A | 40. C |
| 2. B  | 15. B | 28. C | 41. A |
| 3. A  | 16. A | 29. B | 42. B |
| 4. A  | 17. A | 30. B | 43. B |
| 5. D  | 18. C | 31. C | 44. B |
| 6. B  | 19. B | 32. D | 45. A |
| 7. C  | 20. D | 33. D | 46. C |
| 8. D  | 21. D | 34. D | 47. A |
| 9. C  | 22. B | 35. A | 48. B |
| 10. D | 23. B | 36. B | 49. C |
| 11. A | 24. B | 37. A | 50. D |
| 12. B | 25. C | 38. B | 51. D |
| 13. B | 26. A | 39. C | 52. C |

### SECTION 2

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. A  | 12. C | 23. B | 34. B |
| 2. C  | 13. C | 24. C | 35. A |
| 3. B  | 14. B | 25. C | 36. C |
| 4. C  | 15. C | 26. B | 37. D |
| 5. D  | 16. A | 27. D | 38. C |
| 6. B  | 17. D | 28. A | 39. A |
| 7. B  | 18. C | 29. D | 40. D |
| 8. B  | 19. C | 30. B | 41. D |
| 9. C  | 20. D | 31. A | 42. C |
| 10. C | 21. D | 32. B | 43. B |
| 11. D | 22. A | 33. B | 44. B |

### SECTION 3

- |      |       |       |            |
|------|-------|-------|------------|
| 1. C | 6. B  | 11. B | 16. 3      |
| 2. C | 7. A  | 12. B | 17. 10     |
| 3. B | 8. B  | 13. D | 18. $17/2$ |
| 4. C | 9. C  | 14. A | 19. 6      |
| 5. D | 10. A | 15. B | 20. 6      |

### SECTION 4

- |       |       |       |         |
|-------|-------|-------|---------|
| 1. B  | 11. B | 21. B | 31. 18  |
| 2. B  | 12. D | 22. A | 32. 142 |
| 3. B  | 13. C | 23. B | 33. 18  |
| 4. B  | 14. D | 24. C | 34. 3   |
| 5. D  | 15. D | 25. C | 35. 16  |
| 6. B  | 16. C | 26. C | 36. 4   |
| 7. D  | 17. C | 27. C | 37. 12  |
| 8. B  | 18. D | 28. A | 38. 8   |
| 9. C  | 19. C | 29. A |         |
| 10. A | 20. B | 30. C |         |

# THE SCORING SYSTEM

## PART 2

The new SAT will have three test scores on a scale from 10 to 40. There will be one test score for each test: the Reading Test, the Writing and Language Test, and the Math Test. The Reading Test score and the Writing and Language Test score will be added together and converted to a single area score in Evidence-Based Reading and Writing; there will also be an area score in Math based on the Math Test Score.

The area scores will be on a scale from 200 to 800. Added together, they will form the composite score for the whole test, on a scale from 400 to 1600. The Essay will be scored separately and will not affect your scores in other areas.

SAT Scoring	
Test Scores (10 to 40)	<ul style="list-style-type: none"><li>• Reading Test</li><li>• Writing and Language Test</li><li>• Math Test</li></ul>
Area Scores (200 to 800)	<ul style="list-style-type: none"><li>• Evidence-Based Reading and Writing</li><li>• Math</li></ul>
Composite Score (400 to 1600)	<ul style="list-style-type: none"><li>• Math (Area Score) + Evidence-Based Reading and Writing (Area Score)</li></ul>
Essay Scores (1 to 4)	<ul style="list-style-type: none"><li>• Reading</li><li>• Analysis</li><li>• Writing</li></ul>

The College Board will also be reporting new types of scores. **Cross-test scores** for **Analysis in Science** and **Analysis in History/Social Studies** will be based on performance on specific questions across different tests relating to specific types of content. For example, your cross-test score in Analysis in Science will be based on your performance on questions relating to science passages on the Reading Test as well as questions using scientific data on the Math Test. These scores will be on a scale from 10 to 40.

There will also be seven **subscores** based on particular question types within each test section. Subscores will be reported on a scale from 1 to 15. Four will be related to particular questions in the Reading and Writing and Language Test: Words in Context, Command of Evidence, Expression of Ideas, and Standard English Conventions. The other three relate to specific types of questions on the Math Test: Heart of Algebra, Problem Solving and Data Analysis, and Passport to Advanced Math.

## CROSS-TEST SCORES AND SUBSCORES

You will receive **cross-test scores** for Analysis in Science and Analysis in History/Social Studies. The scores are based on your performance on questions in their respective subject domains across all sections of the exam. These scores will be reported on a scale of 10-40.

You will also receive **subscores** based on your performance on certain question types within each test section. Subscores will be reported on a scale of 1-15. There will be seven subscores, for the following areas:

- **Words in Context:** this subscore will be based on your performance on questions related to determining the meanings of words in the context of a passage in the Reading and Writing and Language tests.
- **Command of Evidence:** this subscore will be based on your performance on questions that ask you to identify the best evidence in the Reading and Writing and Language tests.
- **Expression of Ideas:** this subscore will be based on your performance on questions that ask you to identify clear, stylistically appropriate choices in Writing passages.
- **Standard English Conventions:** this subscore will be based on your performance on questions that ask you to identify and correct errors of grammar, punctuation, usage, and syntax in Writing passages.
- **Heart of Algebra:** this subscore will be based on your performance on Math questions testing key concepts in Algebra.
- **Problem Solving and Data Analysis:** this subscore will be based on your performance on Math questions testing your ability to analyze sets of data, the meanings of units and quantities, and the properties of different objects and operations.
- **Passport to Advanced Math:** this subscore will be based on your performance on Math questions that test the skills you'll build on as you continue to learn more advanced math including rewriting expressions, solving quadratic equations, working with polynomials and radicals, and solving systems of equations.

# SCORING YOUR TEST

## PART 3

To score your tests, first use the answer key to mark each of your responses right or wrong. Then, calculate your **raw score** for each section by counting up the number of correct responses. Use the tables below to help you calculate your scores:

Raw Score	
Section	# of Questions Correct
1. Reading	_____
2. Writing and Language	_____
3. Math: No-Calculator	_____
4. Math: Calculator	_____
<b>Raw Score for Reading (Section 1):</b> _____	
<b>Raw Score for Writing and Language (Section 2):</b> _____	
<b>Raw Score for Math (Section 3 + 4):</b> _____	

## SCALED SCORES

Once you have found your raw score for each section, convert it into an approximate **scaled test score** using the following chart. To find a scaled test score for each section, find the row in the Raw Score column which corresponds to your raw score for that section, then check the column for the section you are scoring in the same row. For example, if you had a raw score of 48 for Reading, then your scaled Reading test score would be 39. Keep in mind that these scaled scores are estimates only. Your actual SAT score will be scaled against the scores of all other high school students taking the test on your test date.

Raw Score	Math Scaled Score	Reading Scaled Score	Writing Scaled Score	Raw Score	Math Scaled Score	Reading Scaled Score	Writing Scaled Score
58	40			28	23	26	25
57	40			27	22	25	24
56	40			26	22	25	24
55	39			25	21	24	23
54	38			24	21	24	23
53	37			23	20	23	22
52	36	40		22	20	22	21
51	35	40		21	19	22	21
50	34	40		20	19	21	20
49	34	39		19	18	20	20
48	33	39		18	18	20	19
47	33	38		17	17	19	19
46	32	37		16	16	19	18
45	32	36		15	15	18	18
44	31	35	40	14	14	17	17
43	30	34	39	13	13	16	16
42	30	34	38	12	12	16	15
41	29	33	37	11	11	14	14
40	29	33	35	10	10	13	13
39	28	32	34	9	10	12	12
38	28	31	33	8	10	11	11
37	27	31	32	7	10	10	10
36	27	30	31	6	10	10	10
35	26	30	30	5	10	10	10
34	26	29	29	4	10	10	10
33	25	29	28	3	10	10	10
32	25	28	27	2	10	10	10
31	24	28	27	1	10	10	10
30	24	27	26	0	10	10	10
29	23	26	26				

Use the table below to record your scaled scores:

<b>Scaled Scores</b>	
Scaled Score for Reading (Out of 40): _____	
Scaled Score for Writing and Language (Out of 40): _____	
Scaled Score for Math (Out of 40): _____	

## ESSAY SCORE

Estimate your essay score by assigning your essay a score out of 1-4 in each scoring area listed below. Have a trusted reader check your work.

Scoring Area	Essay Score	
	Reader 1 Score (1-4)	Reader 2 Score (1-4)
Reading	_____	_____
Analysis	_____	_____
Writing	_____	_____



## AREA SCORE CONVERSION

You can look up your area score out of 800 below. To find your overall score, combine your area score for Reading + Writing with your area score for Math to get your total score out of 1600.

### READING + WRITING

Scaled Score	Area Score	Scaled Score	Area Score	Scaled Score	Area Score
80	760-800	59	550-630	39	350-430
79	750-800	58	540-620	38	340-420
78	740-800	57	530-610	37	330-410
77	730-800	56	520-600	36	320-400
76	720-800	55	510-590	35	310-390
75	710-790	54	500-580	34	300-380
74	700-780	53	490-570	33	290-370
73	690-770	52	480-560	32	280-360
72	680-760	51	470-550	31	270-350
71	670-750	50	460-540	30	260-340
70	660-740	49	450-530	29	250-330
69	650-730	48	440-520	28	240-320
68	640-720	47	430-510	27	230-310
67	630-710	46	420-500	26	220-300
66	620-700	45	410-490	25	210-290
65	610-690	44	400-480	24	200-280
64	600-680	43	390-470	23	200-270
63	590-670	42	380-460	22	200-260
62	580-660	41	370-450	21	200-250
61	570-650	40	360-440	20	200-240
60	560-640				

**MATH**

Total Points	Area Score	Total Points	Area Score
40	760-800	24	440-520
39	740-800	23	420-500
38	720-800	22	400-480
37	700-780	21	380-460
36	680-760	20	360-440
35	660-740	19	340-420
34	640-720	18	320-400
33	620-700	17	300-380
32	600-680	16	280-360
31	580-660	15	260-340
30	560-640	14	240-320
29	540-620	13	220-300
28	520-600	12	200-280
27	500-580	11	200-260
26	480-560	10	200-240
25	460-540		

Use the table below to record your area scores and to calculate your overall score:

<b>Reading + Writing Area Score</b>		<b>Math Area Score</b>		<b>Overall Score (400-1600)</b>
_____	+	_____	=	_____

# Exam 3

**Section 1**

1	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	12	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	23	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	34	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	45	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
2	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	13	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	24	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	35	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	46	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
3	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	14	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	25	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	36	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	47	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
4	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	15	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	26	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	37	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	48	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
5	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	16	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	27	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	38	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	49	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
6	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	17	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	28	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	39	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	50	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	18	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	29	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	40	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	51	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
8	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	19	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	30	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	41	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	52	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
9	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	20	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	31	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	42	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		
10	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	21	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	32	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	43	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		
11	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	22	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	33	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	44	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		

**Section 2**

1	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	10	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	19	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	28	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	37	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
2	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	11	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	20	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	29	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	38	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
3	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	12	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	21	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	30	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	39	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
4	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	13	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	22	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	31	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	40	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
5	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	14	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	23	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	32	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	41	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
6	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	15	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	24	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	33	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	42	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	16	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	25	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	34	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	43	A B C D <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
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**Section 3 (No-Calculator)**

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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**Section 4 (Calculator)**

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**Section 4 (Continued)**

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**Section 5 (Optional)**

**Important:** Use a No. 2 pencil. Write inside the borders.

You may use the space below to plan your essay, but be sure to write your essay on the lined pages. Work on this page will not be scored.

**Use this space to plan your essay.**





Lined writing area consisting of 25 horizontal lines.

Continue on the next page.



Multiple horizontal lines for writing or drawing.

**STOP.**

## Section 1

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage or paired set of passages is accompanied by a number of questions. Read the passage or paired set of passages, then use what is said or implied in what you read and in any given graphics to choose the best answer to each question.

### Questions 1-10 are based on the following passage.

The following is adapted from E.M. Forster's *A Room With a View*, originally published in 1908.

A few days after the engagement was announced Mrs. Honeychurch made Lucy and her Fiancé come to a little garden-party in the neighborhood, for naturally she wanted to show people that her daughter was marrying a presentable man.

Cecil was more than presentable; he looked distinguished, and it was very pleasant to see his slim figure keeping step with Lucy, and his long, fair face responding when Lucy spoke to him. People congratulated Mrs. Honeychurch, which is, I believe, a social blunder, but it pleased her, and she introduced Cecil rather indiscriminately to some stuffy dowagers.

At tea a misfortune took place: a cup of coffee was upset over Lucy's figured silk, and though Lucy feigned indifference, her mother feigned nothing of the sort but dragged her indoors to have the frock treated by a sympathetic maid. They were gone some time, and Cecil was left with the dowagers.

When they returned he was not as pleasant as he had been.

"Do you go to much of this sort of thing?" he asked when they were driving home.

"Oh, now and then," said Lucy, who had rather enjoyed herself.

"Is it typical of country society?"

"I suppose so. Mother, would it be?"

"Plenty of society," said Mrs. Honeychurch, who was trying to remember the hang of one of the dresses.

Seeing that her thoughts were elsewhere, Cecil bent towards Lucy and said:

"To me it seemed perfectly appalling, disastrous, portentous."

"I am so sorry that you were stranded."

"Not that, but the congratulations. It is so disgusting, the way an engagement is regarded as public property—a kind of waste place where every outsider may shoot his vulgar sentiment. All those old women smirking!"

"One has to go through it, I suppose. They won't notice us so much next time."

"But my point is that their whole attitude is wrong. An engagement—horrid word in the first place—is a private matter, and should be treated as such."

Yet the smirking old women, however wrong individually, were racially correct. The spirit of the generations had smiled through them, rejoicing in

CONTINUE

the engagement of Cecil and Lucy because it promised the continuance of life on earth. To Cecil and Lucy it promised something quite different—personal love. Hence Cecil’s irritation and Lucy’s belief that his irritation was just.

55 “How tiresome!” she said. “Couldn’t you have escaped to tennis?”

“I don’t play tennis—at least, not in public.

The neighborhood is deprived of the romance of me being athletic. Such romance as I have is that  
60 of the Inglese Italianato.”

“Inglese Italianato?”

“E un diavolo incarnato! You know the proverb?”

She did not. Nor did it seem applicable to a  
65 young man who had spent a quiet winter in Rome with his mother. But Cecil, since his engagement, had taken to affect a cosmopolitan naughtiness which he was far from possessing.

“Well,” said he, “I cannot help it if they do  
70 disapprove of me. There are certain irremovable barriers between myself and them, and I must accept them.”

“We all have our limitations, I suppose,” said wise Lucy.

75 “Sometimes they are forced on us, though,” said Cecil, who saw from her remark that she did not quite understand his position.

“How?”

80 “It makes a difference doesn’t it, whether we fully fence ourselves in, or whether we are fenced out by the barriers of others?”

She thought a moment, and agreed that it did make a difference.

85 “Difference?” cried Mrs. Honeychurch, suddenly alert. “I don’t see any difference. Fences are fences, especially when they are in the same place.”

“We were speaking of motives,” said Cecil, on whom the interruption jarred.

90 “My dear Cecil, look here.” She spread out her knees and perched her card-case on her lap. “This is me. That’s Windy Corner. The rest of the

pattern is the other people. Motives are all very well, but the fence comes here.”

95 “We weren’t talking of real fences,” said Lucy, laughing.

“Oh, I see, dear—poetry.”

1

It can reasonably be inferred from the passage that Mrs. Honeychurch is

- A) particularly fond of Cecil.
- B) an expert seamstress with a knack for dress-making.
- C) concerned with presenting a respectable image to society.
- D) disinterested in attending the engagement party.

2

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-5 (“A few ... man”)
- B) Lines 9-13 (“People ... dowagers”)
- C) Lines 18-19 (“They were ... dowagers”)
- D) Lines 28-30 (“Plenty of ... dresses”)

3

As used in line 39, “sentiment” most nearly means

- A) nostalgia.
- B) emotion.
- C) opinion.
- D) tenderness.

4

Which situation is most similar to the one described in lines 6-13?

- A) A distinguished war hero returning to his hometown
- B) A leader making concessions to his subjects
- C) A prized show dog being paraded before judges
- D) A criminal facing judgment in a court of law

5

The passage most strongly suggests that Cecil found the engagement party “disastrous” (line 33) because

- A) he judged the other guests at the party to be uninteresting.
- B) he was angered by the intrusion into his relationship with Lucy.
- C) he prefers playing tennis to other forms of social interaction.
- D) he would rather communicate in Italian than in English.

6

As used in line 67, “affect” most nearly means

- A) cause.
- B) feign.
- C) influence.
- D) impress.

7

Lucy’s response to Cecil in line 78 primarily serves to

- A) show Lucy’s worldly sophistication.
- B) express Lucy’s resignation to the narrowness of country society.
- C) demonstrate Lucy’s growing resentment of the differences between Cecil’s outlook and hers.
- D) indicate Lucy’s assent to Cecil’s opinions.

8

Cecil brings up fences (lines 79-81) in order to

- A) highlight his feeling that he is different from others in the community.
- B) express his frustration at being excluded from polite society.
- C) demand greater respect for his desire for privacy and seclusion.
- D) reveal an epiphany about the separations among human beings.

9

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 44-46 (“An engagement ... such”)
- B) Lines 58-59 (“The neighborhood ... athletic”)
- C) Lines 70-72 (“There are ... them”)
- D) Lines 93-94 (“Motives are ... here”)

10

The comic effect of the final part of the passage (lines 90-97) comes from

- A) Lucy's enjoyment of the spirited exchange between Cecil and Mrs. Honeychurch.
- B) Cecil's growing irritation with Mrs. Honeychurch and Lucy's opinions.
- C) Lucy's teasing Cecil by pretending not to understand his point.
- D) Mrs. Honeychurch's obliviousness and inattention to the conversation.

**Questions 11-21 are based on the following passage.**

Human beings are in the process of dramatically reshaping the Earth's ecosystems. As far back as the 19th century, some scientists have noted that the current era is defined mainly by the impact of human activity. Now, there is an emerging consensus among Earth scientists that we have indeed entered a new period of geological time, the *Anthropocene epoch*.

Scientists who study the history of the Earth usually divide geological time according to major changes to the biology and climate of the Earth. For instance, the ancient *Cambrian period*, some 500 million years ago, is distinguished by a sudden explosion in the diversity of life, including the emergence of the ancestors of many modern species. More recently, the *Pleistocene epoch*, which ended about ten thousand years ago, is notable for the glaciers that swept over much of the Earth. The new Anthropocene epoch would be distinguished from all earlier times in Earth's history by the dramatic impacts of human activity on the Earth.

Though Earth scientists debate exactly when the Anthropocene began, there is a clear consensus that human changes to the environment are real and extreme. For one, many life forms have become, and are becoming, extinct as a result of human activity. For this reason, some paleontologists argue that the human impacts of the Anthropocene began at the end of the last Ice Age, around ten thousand years ago. The fossil record indicates that around that time, many large animals, like woolly mammoths and giant sloths, went extinct shortly after humans arrived in their ranges. Their sudden disappearance suggests that habitat destruction and overhunting by humans may have contributed to their demise. Indeed, many large animals, like elephants and gorillas, are endangered for those same reasons today.

The pace of human-caused extinctions has only increased in the past several hundred years. The growth and spread of human populations, caused by


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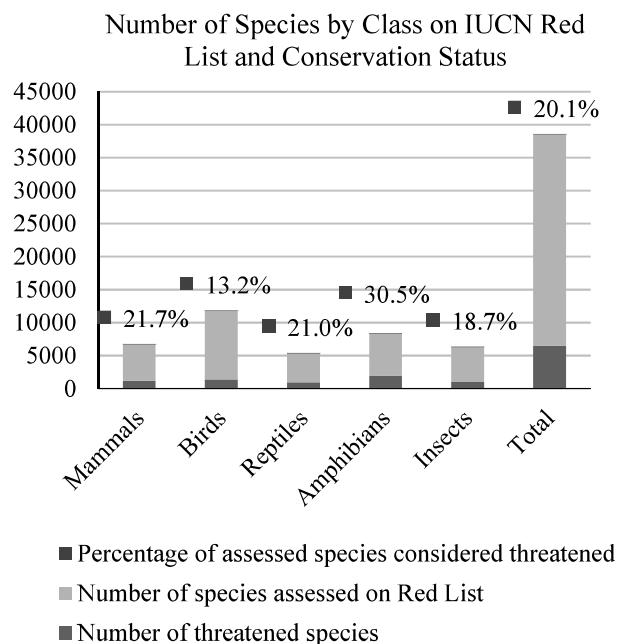


advances in seafaring technology and agriculture, has led to overexploitation of fragile ecosystems, introduction of invasive species, and pollution, causing many extinctions. Scientists have estimated the rate of extinction by studying the fossil record, monitoring existing species, and using statistical models to estimate the number of undiscovered species that have been lost. Estimates vary, but most scientists believe that diverse species are going extinct at hundreds or thousands of times the natural rate. The International Union for the Conservation of Nature, for instance, has found that, of species surveyed on its “Red List,” about a fifth of all mammals and reptiles and nearly a third of amphibians are in danger of extinction. This ongoing, rapid loss of species has been described as a mass extinction, as severe as the event that wiped out the dinosaurs 65 million years ago. To some ecologists, this steep decline in biodiversity suggests that the Anthropocene epoch began in the 17th and 18th centuries, when the rate of extinction shot up dramatically.

Human activity is also altering the climate as a whole. Since the Industrial Revolution of the 18th and 19th centuries, humans have significantly altered the atmosphere by mining and burning fossil fuels such as coal, oil, and natural gas. Some byproducts of the use of these fuels, like carbon dioxide, are greenhouse gases that trap solar energy on Earth. To assess the impact of these greenhouse gases on the Earth, scientists have had to investigate the history of the Earth’s climate. Ice cores, samples of ice layers that have trapped atmospheric chemicals over time, have supplied scientists with millennia of year-by-year information about greenhouse gas concentrations and atmospheric temperature. Evidence from ice cores clearly show that the Industrial Revolution brought about a sudden jump in carbon dioxide in the atmosphere, along with an increase in temperatures. A scientific consensus exists that this ongoing rise in temperatures has resulted in warming of the oceans, rising sea levels, and more frequent extreme weather

events. Thus, some climatologists propose that the Anthropocene’s onset occurred with the Industrial Revolution and its effects on Earth’s atmosphere.

Whenever the Anthropocene is judged to have begun, its impact is undeniable. Human activity has changed the face of the planet; the global ecosystem has been and is being reshaped, the composition of the atmosphere has been altered, and even weather patterns are changing in response to human activity. The consequences of these changes will affect life on Earth for millions of years to come, leaving a mark of human activity that may well outlive humanity itself.



11

The main purpose of the passage is to

- A) respond to controversial claims made by rival scientists.
- B) argue for potential solutions to the problems posed by climate change.
- C) describe human impacts on the Earth's environment.
- D) account for recent changes in global biodiversity.

12

The author's tone is best described as that of

- A) a dejected defeatist.
- B) a concerned observer.
- C) a jaded skeptic.
- D) an uncertain specialist.

13

The second paragraph primarily serves to

- A) explain how scientists divide geological time.
- B) provide a broad description of the Earth's history.
- C) describe the origins of the majority of the Earth's biodiversity.
- D) compare the current geological epoch to the Cambrian period.

14

As used in line 14, "explosion" most nearly means

- A) shattering.
- B) catastrophe.
- C) growth.
- D) outburst.

15

The main rhetorical effect of lines 56-59 ("This ongoing ... ago") is to

- A) suggest that the dinosaurs did not become extinct due to natural causes.
- B) make clear the extreme nature of the current extinction event.
- C) imply that humans themselves are now in danger of extinction.
- D) emphasize humanity's connections to earlier forms of life on earth.

16

Based on the passage, which choice best describes the relationship between carbon dioxide and ice cores?

- A) Carbon dioxide destroys ice cores, leading to a loss of a source of information.
- B) Ice cores remove carbon dioxide from the atmosphere, reducing its effects on the climate.
- C) Carbon dioxide is extracted from ice cores and used to fuel industrial processes.
- D) Ice cores can be studied to track changes in atmospheric carbon dioxide levels.

17

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 68-71 (“Some byproducts ... Earth”)
- B) Lines 73-78 (“Ice cores ... temperature”)
- C) Lines 85-87 (“Thus, some ... atmosphere”)
- D) Lines 94-97 (“The consequences ... itself”)

18

As used in line 96, “mark” most nearly means

- A) grade.
- B) symbol.
- C) target.
- D) trace.

19

The passage most strongly suggests that

- A) some life forms are going extinct before being discovered by humans.
- B) all extinctions currently taking place result from human activity.
- C) modern extinctions are destroying the biodiversity generated in the Cambrian period.
- D) the recent increase in the extinction rate occurred as a result of human-caused climate change.

20

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 11-15 (“For instance ... species”)
- B) Lines 30-33 (“The fossil ... ranges”)
- C) Lines 45-49 (“Scientists ... lost”)
- D) Lines 89-93 (“Human ... activity”)

21

Based on information from the passage and the graphic, which of the following statements can reasonably be inferred?

- A) Birds are less susceptible to human-driven extinction than other animals because they can fly to new habitats.
- B) About 20% of all assessed species are currently threatened with extinction.
- C) Mammals are the animals most sensitive to human impacts on the environment.
- D) About 18% of known insect species have recently gone extinct.

**Questions 22-31 are based on the following passage.**

The following is adapted from “Television and the Public Interest,” a speech delivered by Newton N. Minow to TV executives in 1961. Minow was the chairman of the Federal Communications Commission, which regulates television and other forms of communication in the United States.

Certainly, I hope you will agree that ratings should have little influence where children are concerned. The best estimates indicate that during the hours of 5 to 6 P.M. sixty per cent of your audience is composed of children under twelve. And most young children today, believe it or not, spend as much time watching television as they do in the schoolroom.

I repeat—let that sink in, ladies and gentlemen—most young children today spend as much time watching television as they do in the schoolroom. It used to be said that there were three great influences on a child: home, school, and church. Today, there is a fourth great influence, and you ladies and gentlemen in this room control it.

If parents, teachers, and ministers conducted their responsibilities by following the ratings, children would have a steady diet of ice cream, school holidays, and no Sunday school. What about your responsibilities? Is there no room on television to teach, to inform, to uplift, to stretch, to enlarge the capacities of our children? Is there no room for programs deepening their understanding of children in other lands? Is there no room for a children’s news show explaining something to them about the world at their level of understanding? Is there no room for reading the great literature of the past, for teaching them the great traditions of freedom? There are some fine children’s shows, but they are drowned out in the massive doses of cartoons, violence, and more violence. Must these be your trademarks? Search your consciences and see if you cannot offer more to your young beneficiaries whose future you guide so many hours each and every day.

Now what about adult programming and ratings? You know, newspaper publishers take popularity

ratings too. And the answers are pretty clear: it is almost always the comics, followed by advice to the lovelorn columns. But, ladies and gentlemen, the news is still on the front page of all newspapers; the editorials are not replaced by more comics; and the newspapers have not become one long collection of advice to the lovelorn. Yet newspapers do not even need a license from the government to be in business; they do not use public property. But in television, where your responsibilities as public trustees are so plain, the moment that the ratings indicate that westerns are popular there are new imitations of westerns on the air faster than the old coaxial cable could take us from Hollywood to New York. Broadcasting cannot continue to live by the numbers. Ratings ought to be the slave of the broadcaster, not his master, and you and I both know that the rating services themselves would agree.

Let me make clear that what I am talking about is balance. I believe that the public interest is made up of many interests. There are many people in this great country and you must serve all of us. You will get no argument from me if you say that, given a choice between a western and a symphony, more people will watch the western. I like westerns too, but a steady diet for the whole country is obviously not in the public interest. We all know that people would more often prefer to be entertained than stimulated or informed. But your obligations are not satisfied if you look only to popularity as a test of what to broadcast. You are not only in show business; you are free to communicate ideas as well as relaxation.

And as Governor Collins said to you yesterday when he encouraged you to editorialize—as you know the FCC has now encouraged editorializing for years—we want you to do this; we want you to editorialize, take positions. We only ask that you do it in a fair and a responsible manner. Those stations that have editorialized have demonstrated to you that the FCC will always encourage a fair and responsible clash of opinion.

22

The main purpose of the passage is to

- A) compare and contrast various television show genres.
- B) call for higher standards in television programming.
- C) denounce television as a harmful pastime for children.
- D) note that other forms of media are as important as television.

23

The author primarily seeks to convince his audience of his point by

- A) suggesting that television could be incorporated into school curricula.
- B) mentioning the profits to be gained from drawing child audiences.
- C) raising fears that television networks could lose in competition with newspapers.
- D) making appeals to morality and a sense of civic obligation.

24

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 5-8 (“And most ... schoolroom”)
- B) Lines 32-34 (“Search your ... day”)
- C) Lines 43-45 (“Yet newspapers ... property”)
- D) Lines 63-65 (“We all ... informed”)

25

The author mentions the potential consequences of “following the ratings” (lines 16-19) in order to

- A) note that children do not necessarily know what is best for them.
- B) imply that parents and teachers are sometimes overly restrictive.
- C) suggest that television should educate children about healthy diets.
- D) lament the laxness of parents and teachers during his era.

26

As used in line 18, “steady” most nearly means

- A) calm.
- B) firm.
- C) consistent.
- D) rooted.

27

In the fourth paragraph (lines 35-54), the author states that, unlike television networks, newspapers

- A) can be easily transported and enjoyed anywhere.
- B) pander to their audiences in order to stay in business.
- C) require a license from the government to operate.
- D) emphasize information over entertainment.

28

The author suggests that television networks can improve their content by

- A) making an effort to develop and air more westerns.
- B) consulting the operators of the rating services.
- C) creating programming that informs and encourages national discourse.
- D) airing shows that encourage adults rather than children to tune in.

29

Which choice provides the best evidence for the answer to the previous question?

- A) Line 35 (“Now what ... ratings”)
- B) Lines 52-54 (“Ratings ought ... agree”)
- C) Lines 58-61 (“You will ... western”)
- D) Lines 70-74 (“And as ... positions”)

30

As used in line 66, “satisfied” most nearly means

- A) convinced.
- B) fulfilled.
- C) sated.
- D) dispelled.

31

Which of the following situations is most analogous to the situation presented in lines 28-31 (“There are...violence”)?

- A) An enjoyable piece of music cannot be heard due to loud construction work nearby.
- B) A few healthy items at a buffet are surrounded by unhealthy, but tasty, options.
- C) An elected representative suppresses the viewpoints of her ideological opponent.
- D) A small number of protestors disrupt a large event taking place on a campus.

Questions 32-42 are based on the following passages.

Passage 1

The origins of life on Earth are shrouded in mystery. Scientists agree that life arose almost 4 billion years ago from non-living chemicals, a process called *abiogenesis*. However, many competing hypotheses exist to explain how this might have happened. Because Earth is the only planet in the universe known to harbor life, studying the unique chemical environment of early Earth can allow us to develop a deeper understanding of the causes of abiogenesis.

During the earliest phase of Earth's existence, the *Hadean eon*, conditions on the newly formed planet were very different from those found today. The young Earth was intensely hot, with highly active volcanoes and frequent meteorite impacts. Unlike today's atmosphere, which is predominantly made of nitrogen and oxygen, the Hadean atmosphere is thought to have consisted mainly of carbon dioxide, hydrogen, water vapor, and volcanic gases. Thanks to the intense pressure of this thick atmosphere, liquid water oceans probably existed despite the boiling temperatures on Earth's surface.

Although these conditions would be totally inhospitable to modern life, this unique environment could have produced many of the building blocks of life. Scientists have discovered this by replicating the conditions of the Hadean eon in laboratories. The earliest and most famous of these experiments, conducted by Stanley Miller in the 1950s, involved passing electricity through the particular mixture of gases in the early Earth's atmosphere. Miller found that electricity, such as that delivered by lightning strikes, could have triggered chemical reactions in the Hadean atmosphere, producing amino acids, the building blocks of proteins, as well as the nitrogenous bases and sugars that make up nucleic acids such as DNA and RNA. More recent experiments using ultraviolet light, a major component of sunlight, have found that it too could have caused organic compounds to form on Earth

during the Hadean eon.

This has led to speculation on the part of many scientists that these molecules, once synthesized in the early Earth's oceans, could have become organized into self-replicating structures that developed into life as we know it. Nucleic acids, for instance, can both carry genetic information and catalyze chemical reactions; simple nucleic acids thus could have replicated themselves and even created proteins from amino acids, like modern life forms do. Indeed, many scientists now believe that today's life descends from an "RNA world" that formed in this way.

Passage 2

It turns out that the conditions for life to arise may actually be quite common throughout the universe. At the very least, the building blocks of life as we know it—amino acids, simple sugars, and other organic compounds—seem to show up wherever we point our telescopes.

For instance, organic molecules form quite readily in the clouds of dust and gas that hang between and around stars. A number of studies have found that certain organic molecules, called PAHs, may be present in nebulae and star systems all over the universe. These molecules, made up of rings of carbon and hydrogen, have structures that might allow them to help RNA strands self-assemble in the oceans of planets; NASA scientists estimate that these molecules contain as much as 20% of the universe's carbon and may have formed shortly after the universe began.

Scientists have also found organic molecules closer to home, within our own galaxy and Solar System. In the massive nursery of new star systems at the heart of the Milky Way, a simple form of sugar has been detected. The formation of this sugar is a key step in the creation of the more complex sugars in nucleic acids. This suggests that the raw materials for nucleic acids, and perhaps other key components of life, might be commonly incorporated into forming star systems. This

certainly seems to have happened around our Sun. A number of Solar System bodies, such as the Murchison meteorite, have crashed to Earth  
 85 bearing nitrogenous bases and amino acids that were formed in space, and comets currently orbiting our Sun have been found to carry amino acids as well. If the early Earth was seeded with organic molecules, either during its formation or  
 90 by meteorite and comet impacts, it is plausible that this could have paved the way for abiogenesis to take place soon thereafter.

Taken together, this evidence suggests that the building blocks of life appear throughout the  
 95 Milky Way galaxy and elsewhere in the universe. Earth's status as the cradle of life may not be so special after all.

32

The main purpose of Passage 1 is to

- A) argue that Earth is the only planet in the universe that could support life.
- B) explain how the conditions of the early Earth could have given rise to life.
- C) describe a period of Earth's history that was very different from the modern day.
- D) propose a method for creating artificial life in a laboratory.

33

As used in line 30, "particular" most nearly means

- A) fastidious.
- B) individual.
- C) detailed.
- D) specific.

34

The purpose of lines 37-41 ("More recent ... eon") is primarily to

- A) refute the idea that lightning strikes were responsible for creating organic compounds.
- B) emphasize the importance of the Sun to the origins of life.
- C) suggest an alternative energy source for the formation of organic compounds.
- D) propose that organic compounds may have originated in outer space.

35

Passage 1 suggests that many scientists believe that modern life descends from an "RNA world" (line 52) because

- A) RNA can perform some of the functions needed to sustain a living organism.
- B) RNA organisms would have been uniquely suited to the conditions of the Hadean eon.
- C) RNA molecules were produced in Stanley Miller's experiments.
- D) RNA is more stable than other nucleic acids.



36

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 15-19 (“Unlike today’s ... gases”)
- B) Lines 23-26 (“Although these ... life”)
- C) Lines 31-37 (“Miller found ... RNA”)
- D) Lines 48-51 (“Nucleic acids ... do”)

37

It can reasonably be inferred from Passage 2 that

- A) living organisms must have come to Earth from elsewhere in the universe.
- B) the environment of the early Earth would have destroyed organic compounds.
- C) our Solar System is unique in containing organic compounds.
- D) abiogenesis could have taken place when the universe was fairly young.

38

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 56-59 (“At the ... telescopes”)
- B) Lines 65-71 (“These molecules ... began”)
- C) Lines 81-82 (“This certainly ... Sun”)
- D) Lines 93-95 (“Taken together ... universe”)

39

As used in line 61, “readily” most nearly means

- A) preparedly.
- B) easily.
- C) willingly.
- D) freely.

40

Based on Passage 2, which choice best describes the relationship between PAHs and RNA?

- A) PAHs can be combined to form RNA molecules in the presence of water.
- B) PAHs can provide support for the synthesis of RNA molecules.
- C) PAHs are a necessary precursor for the synthesis of RNA molecules.
- D) PAHs make possible the synthesis of RNA molecules even in nebulae in deep space.

41

With which of the following claims would the authors of Passages 1 and 2 most likely both agree?

- A) Life arose on Earth from non-living organic compounds.
- B) Earth’s environment is uniquely conducive to the formation of organic compounds.
- C) Earth is certainly not the only planet on which life exists.
- D) Life on Earth could only have begun with an RNA world.

42

How would the author of Passage 2 most likely respond to the claim made in lines 6-10 (“Because Earth ... abiogenesis”) of Passage 1?

- A) Life probably developed in a nebula elsewhere before arriving on Earth.
- B) Scientists do not know exactly what the early Earth’s atmosphere was like.
- C) The chemical precursors of life can form in a wide variety of environments.
- D) Modern organisms would not have been able to survive on the Hadean Earth.

**Questions 43-52 are based on the following passage.**

In general, democracies organize and carry out their elections in one of two ways. In first-past-the-post (FPTP) elections, voters choose individual candidates for office, and the candidate with the most votes wins. Elections in this kind of system are also called “winner-take-all.” In a democracy with proportional representation (PR), parties, not individuals, win seats in a legislature according to the percent of votes they receive in an election. Parties then form coalitions with each other to gain control of the government. Which system a country uses can greatly affect its politics; each has its merits and disadvantages.

These two types of election tend to foster very different styles of political debate. First-past-the-post elections tend to lead to more moderate political discussions at the national level. In elections for the presidency of the United States, for example, candidates need support from every part of the country. They cannot alienate large groups by expressing extreme views, so they must be moderate in order to have broad appeal. This moderation has its downsides, however. For one, uncommon opinions tend to be left out of public discussion. This can result in an elected government that may not fully represent citizens’ views. Extreme parties are also reduced to the role of spoilers in national elections: unable to win, but able to hurt larger parties with similar, but more moderate, viewpoints. During the US election for president in 1992, a far-right candidate, Ross Perot, drew votes from the sitting president, the center-right George H.W. Bush. This may have allowed the center-left candidate, Bill Clinton, to win the presidency.

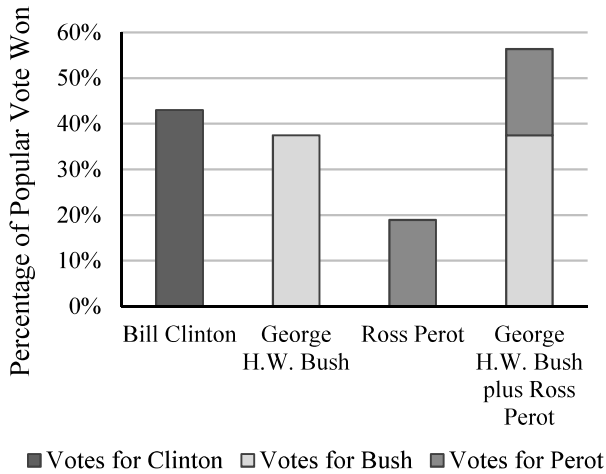
Proportional representation, for better or worse, allows more extreme viewpoints to be represented at the national level. This can be a good thing, allowing minority groups and small, single-issue parties to have a voice in government. However, these small parties can cause problems when they join ruling coalitions. They can force the government to focus

on niche agendas by threatening to leave the coalition if ignored. In some cases, radical parties that actively oppose or threaten democracy, like fascist or communist parties, can gain seats in PR elections. This occurred most famously in Germany’s Weimar Republic in the 1930s, when democratic elections gave the Nazi Party the opportunity to take power.

Each electoral system also results in different levels of voter participation. First-past-the-post systems generally result in lower overall voter participation. This could be because the rules of FPTP elections discourage voters who support candidates or parties who are not likely to win. Because votes for a losing candidate count for nothing in an FPTP election, votes for opposition parties are effectively wasted. In elections for US Senate seats and the US presidency, for instance, many states are consistently won by candidates from one party. Opposition voters in these states have little reason to show up at the polls. However, some political scientists argue that because voters vote for specific candidates in FPTP elections, those elected officials are more personally accountable to the citizens that voted for them. This sense of accountability could lead to more citizen engagement between elections.

Proportional representation, on the whole, encourages higher levels of participation. Because voters will be represented even if they are in the minority, there are far fewer wasted votes in PR elections. Perhaps for this reason, voter turnout is much higher, on average, in countries that use a PR system. On the other hand, voters in PR elections generally vote for parties rather than individuals. Because the parties appoint legislators to their seats, politicians may feel more accountable to their parties than to voters. This can lead officials to focus on within-party politics rather than the wishes of the people.

1992 US Election Outcomes



43

The passage primarily focuses on which of the following aspects of democracy?

- A) The advantages of democracy over other forms of governance
- B) The historical development of democratic ideals
- C) The potential failings of democratic systems
- D) The electoral systems used in democratic nations

44

As used in line 20, “alienate” most nearly means

- A) isolate.
- B) divert.
- C) reject.
- D) offend.

45

Based on the passage, which choice best describes the relationship between proportional representation elections and political extremism?

- A) Proportional representation elections suppress extremism by making politicians accountable to the people.
- B) Proportional representation elections allow extremists to have a voice in government.
- C) Proportional representation elections permit extremist politicians to siphon votes from mainstream parties.
- D) Proportional representation elections do not impact extremist participation in politics.

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 6-9 (“In a democracy ... election”)
- B) Lines 26-29 (“Extreme ... viewpoints”)
- C) Lines 35-37 (“Proportional ... level”)
- D) Lines 75-76 (“On the other ... individuals”)

47

The author most likely mentioned the 1992 US presidential election in lines 30-34 in order to

- A) lament the defeat of the author’s preferred candidate in an election.
- B) demonstrate the impact that spoilers can have on elections.
- C) show how unlikely extreme candidates are to win seats in first-past-the-post systems.
- D) question the conventional wisdom regarding US presidential elections

48

As used in line 68, “engagement” most nearly means

- A) betrothal.
- B) appointment.
- C) involvement.
- D) conflict.

49

The author argues that first-past-the-post elections tend to have lower voter turnout than proportional representation elections because

- A) votes for the loser in an first-past-the-post election do not affect the makeup of the government.
- B) politicians in first-past-the-post systems do not entirely share their constituents’ ideologies.
- C) politicians in proportional representation systems are directly accountable to their constituents.
- D) small parties in first-past-the-post systems can destabilize coalitions with more frequent elections.

50

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 25-26 (“This can ... views”)
- B) Lines 39-43 (“However ... ignored”)
- C) Lines 53-58 (“This could ... wasted”)
- D) Lines 62-68 (“However ... elections”)

51

Which situation is most similar to the one described in lines 77-81 (“Because the ... people”)?

- A) A city councilman fielding a barrage of questions from citizens at a town hall meeting
- B) A CEO who answers to her company’s board of directors, not its shareholders
- C) A scientist submitting a research paper for review by his colleagues
- D) A company which looks at consumer trends to make decisions about future products

52

It can reasonably be inferred from the passage and graphic that

- A) A candidate can win the US presidency without earning a majority of votes.
- B) Ross Perot would have won the 1992 election had George HW Bush not been a candidate.
- C) Spoilers are typically the deciding factor in US presidential elections.
- D) Bill Clinton’s performance in the 1992 election was solely due to Ross Perot’s candidacy.

## STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 2

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Every passage comes with a set of questions. Some questions will ask you to consider how the writer might revise the passage to improve the expression of ideas. Other questions will ask you to consider correcting potential errors in sentence structure, usage, or punctuation. There may be one or more graphics that you will need to consult as you revise and edit the passage.

Some questions will refer to a portion of the passage that has been underlined. Other questions will refer to a particular spot in a passage or ask that you consider the passage in full.

After you read the passage, select the answers to questions that most effectively improve the passage's writing quality or that adjust the passage to follow the conventions of standard written English. Many questions give you the option to select "NO CHANGE." Select that option in cases where you think the relevant part of the passage should remain as it currently is.

Questions 1-11 are based on the following passage.

### Disputes in Ancient Greek Philosophy

People often speak of “the philosophy of Ancient Greeks” or “what the Greeks believed,” as though they had a single shared opinion. **1** However, ancient Greek philosophers held a great diversity of opinions, founding many schools of thought that have shaped the development of culture in the West and beyond.

1

- A) NO CHANGE
- B) Meanwhile, ancient
- C) Ancient
- D) Consequently, ancient

CONTINUE 

2 The thinker Epicurus developed this system of philosophy in the 4th century BCE. Epicurus and his followers challenged 3 humdrum beliefs of the time by claiming that all events happened by chance without any intervention from the gods. This stance was highly controversial in Greece’s polytheistic society. Epicurus also stated that people could achieve happiness by seeking pleasure and avoiding pain, which led many to perceive him as a hedonist. As a result, the word “epicurean” is used to this day to describe someone who enjoys luxury and self-indulgence, especially in the realm of fine dining.

2

Which choice most effectively conveys the main topic of this paragraph?

- A) One of the foremost of these philosophical movements was Epicureanism.
- B) Of course, philosophers in other parts of the world also developed many great insights.
- C) These schools often argued with one another, each claiming to have the best doctrine.
- D) Many of these philosophers held positions that Greek society considered unpopular and controversial.

3

- A) NO CHANGE
- B) routine
- C) mundane
- D) conventional

The most famous rivals of the Epicureans were the Stoics. The Stoic school of thought was founded in the 4th century **4** BCE, and its most well-known follower, the Roman emperor Marcus Aurelius, lived and wrote much later, in the 2nd century CE. The Stoics, unlike the Epicureans, believed that a **5** divine will they called the logos influenced all events. Thus, the Stoics thought that people could not control their fates, and so should cultivate self-control and composure, even in the face of hardship. Because of these teachings, the word “stoic” has now come to mean “calm,” “steady,” and even “emotionless.”

4

- A) NO CHANGE
- B) BCE, so its
- C) BCE, however its
- D) BCE, but its

5

- A) NO CHANGE
- B) divine will, they called
- C) divine will: they called
- D) divine will—they called



[1] The Cynics, another group of philosophers with roots in 4th century BCE Greece, held views similar to **6** the Stoics, but more extreme. [2] For instance, the best-known Cynic, Diogenes of Sinope, lived in a large jar in the marketplace of Athens, ate only onions, and mocked **7** famous people that everyone looked up to. [3] The Cynics claimed that desires for wealth and power clouded the mind. [4] Only if one gave up these pursuits, they said, could **8** you live a virtuous life. [5] The Cynics thus chose to live without possessions or status and rejected social norms. [6] The Cynics' distrust of societal institutions and authority has today led to the word "cynical" being used to describe people who doubt the motivations of others and criticize society. **9**

6

- A) NO CHANGE
- B) those Stoics
- C) Stoicism
- D) those of the Stoics

7

Which of the following choices is most consistent with the style of the passage as a whole?

- A) NO CHANGE
- B) famous people that were highly respected
- C) respected public figures
- D) respectful people of fame

8

- A) NO CHANGE
- B) one live
- C) they live
- D) he or she live

9

For the sake of the cohesion of this paragraph, sentence 2 should be placed

- A) where it is now.
- B) after sentence 3.
- C) before sentence 5.
- D) after sentence 5.

These Greek philosophies have had a profound influence on culture worldwide. Alexander the Great's conquest carried these ideas across the Middle East and Asia, bringing them into contact with many other cultures. In the Middle East, **10** aesthetic ideals from Cynicism influenced early Christians, leading some to give up their possessions to live in poverty in the desert. **11** Thus, though these Greek schools of thought were suppressed by later Roman authorities, their influence has continued to this day.

**10**

- A) NO CHANGE
- B) eclectic
- C) ascetic
- D) analytic

**11**

Which of the following, inserted here, would be the most relevant addition to the paragraph?

- A) In the Judeo-Christian tradition, the desert has long been associated with religious experience.
- B) In India and Central Asia, Stoicism and Buddhism may have exchanged ideas about the importance of self-control and tranquility.
- C) Indeed, Christianity quickly spread beyond the Middle East, arriving in Greece and what is now Turkey in the 1<sup>st</sup> century CE.
- D) Still, most people today would probably not say they are cynical.

Questions 12-22 are based on the following passage.

### Genetically Modified Crops and the Future of Agriculture

For millennia, humans have altered the genes of the plants we eat. For as long as agriculture has existed, we have used selective breeding to raise crops with the traits we want, crossing wild plants with each other to create the domesticated varieties we eat today. In the past several decades, however, the use of genetic engineering techniques to create genetically modified (GM) crops has promised **12** essentially new benefits to agriculture while also raising concerns and spurring controversy.

Since the 1980s, scientists have developed and applied several new methods to create GM crops. Typically, scientists modify plants by creating a ring of DNA called a plasmid, which holds the desired **13** genes, then they insert this plasmid into plant cells. In some cases, scientists use bacteria that naturally infect plants with plasmids to deliver **14** there own lab-created plasmids. Alternatively, scientists might use a “gene gun,” a device that shoots microscopic gold particles coated with genetic material directly into target cells. These methods are able to reliably create plants that contain genes of scientists’ choice, turning conventional crops into **15** a genetically modified organism.

**12**

- A) NO CHANGE
- B) radically
- C) progressively
- D) unconventionally

**13**

- A) NO CHANGE
- B) genes. Whereupon, they insert
- C) genes, which are then to be inserted
- D) genes, and inserting

**14**

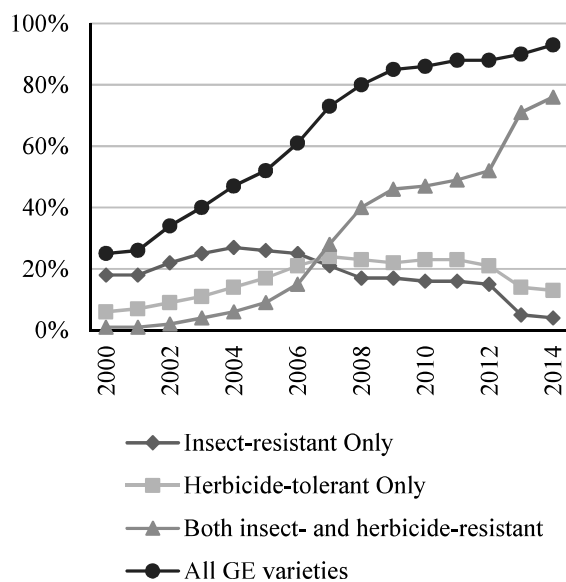
- A) NO CHANGE
- B) they’re
- C) their
- D) they

**15**

- A) NO CHANGE
- B) genetic modifications
- C) genetically modified organisms
- D) a genetic organism

**16** One of the foremost applications of this technology is the creation of plants that are resistant to **17** certain pests, diseases, and herbicides. Because such plants save farmers money by allowing them to use less pesticide, these GM crops have recently become very popular in the United States. The US Department of Agriculture estimates that **18** 93% of corn planted in 2014 was both insect- and herbicide-resistant, up from 25% in 2000.

Genetically Engineered (GE) Corn Varieties as a Percentage of All Corn Planted in the United States



16

Which choice most effectively conveys the main topic of this paragraph?

- A) There are a number of advantages to creating and planting GM crops.
- B) Farmers all over the world have enthusiastically embraced the use of GM crops.
- C) Most governments around the world have imposed regulations and controls on the use of this technology within their borders.
- D) As a result, scientists have much more control over the traits of GM crops than they would over conventionally bred varieties.

17

- A) NO CHANGE
- B) certain pests, and diseases, and herbicides
- C) certain pests; diseases; and herbicides
- D) certain: pests, diseases, and herbicides

18

Which of the following choices completes the sentence with accurate information from the graphic?

- A) NO CHANGE
- B) 76% of corn planted in 2014 was both insect- and herbicide-resistant, up from 1% in 2000
- C) 13% of corn planted in 2014 was both insect- and herbicide-resistant, up from 6% in 2000
- D) 18% of corn planted in 2014 was both insect- and herbicide-resistant, up from 4% in 2000

Crops can also be genetically modified to enhance their nutritional value, which is especially beneficial for people in the developing world. **19** Some scientists are also experimenting with producing GM crops with above-average yields in order to meet the needs of Earth’s rapidly growing population.

**19**

Which of the following, inserted here, would be the most relevant addition to the paragraph?

- A) Very few people in the developed world suffer from diseases of nutritional deficiency, however.
- B) New varieties of corn and rice have been developed to resist drought and heat, which will make them useful in dry countries near the Equator in Africa.
- C) “Golden rice” has been engineered so that its grains contain vitamin A, a necessary nutrient that many people in Africa and South Asia lack in their diets.
- D) Many farmers in the developing world are subsistence farmers, who grow only enough food for themselves and their families.

[1] Despite these potential benefits, GM crops have been criticized and viewed with suspicion by many. [2] Even though there is a clear scientific consensus that food derived from GM crops is safe for human consumption, much of the general public fears that [20] they might pose unknown health risks. [3] Some conservation groups are also concerned about the effects that GM crops could have on the environment. [4] For instance, GM crops could outcompete wild plants, give rise to toxin-resistant pests, or [21] disrupting an ecosystem's food chain by damaging insect populations. [5] Clearly, the use of GM crops must be carefully studied and regulated to ensure that the benefits are not outweighed by these risks. [22]

20

- A) NO CHANGE
- B) it
- C) one
- D) he or she

21

- A) NO CHANGE
- B) disruptive to
- C) disruptor of
- D) disrupt

22

To make this paragraph most logical, sentence 4 should be placed

- A) where it is now.
- B) after sentence 1.
- C) before sentence 3.
- D) after sentence 5.

Questions 23-33 are based on the following passage.

### Science in the Medieval Islamic World

The history of science as it is taught to most Western students **23** are tragically incomplete. In many schools, teachers promote the myth that little scientific progress occurred between the fall of the Roman Empire and the Renaissance in Europe. It is true that medieval European scholars made few discoveries in the **24** natural sciences. It must be noted that scholars in the Islamic world developed and revolutionized many fields during the Middle Ages. Their discoveries laid the groundwork for future breakthroughs and made Europe's later Scientific Revolution possible.

In mathematics, Muslim thinkers produced many insights. The Persian mathematician **25** al-Khwarizmi who worked in the 9th century CE developed new methods for solving linear and quadratic equations. His work was so influential that his name gave rise to the word algorithm, a term used in modern mathematics and computer science to refer to a step-by-step method of **26** calculation, and the term algebra, from the Arabic al-jabr, also comes from al-Khwarizmi's work. He also popularized the Hindu-Arabic numerals that have become the most common way of writing numbers around the world today.

23

- A) NO CHANGE
- B) being
- C) is
- D) am

24

- A) NO CHANGE
- B) natural sciences, yet it must be noted
- C) natural sciences, even if it's noted
- D) natural sciences, while noting

25

- A) NO CHANGE
- B) al-Khwarizmi, who worked in the 9th century CE developed
- C) al-Khwarizmi who worked in the 9th century CE, developed
- D) al-Khwarizmi, who worked in the 9th century CE, developed

26

- A) NO CHANGE
- B) calculation. The term
- C) calculation, not to mention the term
- D) calculation, the term

[1] Muslim scientists also made important advances in the theory and practice of medicine. [2] For instance, the Persian doctor al-Razi revolutionized how doctors diagnosed disease. [3] In the 9th century CE, he wrote the first accurate descriptions of smallpox and measles. [4] He also challenged mistaken ancient ideas about the causes of disease. [5] A vaccine for smallpox wasn't developed until several centuries later, however. [6] Perhaps most impressively, al-Razi conducted one of history's earliest clinical trials to study **27** how effective the practice of bloodletting was as a cure for disease. **28**

27

- A) NO CHANGE
- B) the effectiveness of using bloodletting
- C) the effectiveness of bloodletting
- D) blood effects

28

Which of the following changes would most improve the focus of the passage?

- A) Move sentence 3 so that it follows sentence 4.
- B) Move sentence 5 so that it follows sentence 3.
- C) Delete sentence 5.
- D) Delete sentence 6.



**29** Throughout the medieval era, the dominant view among astronomers was the geocentric Ptolemaic model. In this view, Earth was the center of the Solar System, and the planets, Sun, and stars orbited around it. Astronomers working at the Maragha observatory in Persia, noting inconsistencies between **30** this models predictions and actual observations, developed new equations in the 13th century CE to resolve the conflict. They only updated the Ptolemaic theory, and did not discover that the Solar System is actually heliocentric, with the Earth and other planets orbiting the Sun. However, their mathematical innovations inspired Nicolaus Copernicus, several centuries later, to propose a heliocentric model that would revolutionize astronomy. **31**

29

Which choice most effectively conveys the main topic of the paragraph?

- A) On occasion, medieval Muslim scientists, like their later European counterparts, were opposed in their work by religious authorities.
- B) Muslim scientists were not afraid to challenge widely accepted scientific ideas in the areas of mathematics, medicine, or astronomy.
- C) The achievements of Muslim scientists were remarkable in light of their limited access to advanced equipment.
- D) Furthermore, Muslim astronomers made accurate observations and predictions which would fuel later discovery.

30

- A) NO CHANGE
- B) this model's
- C) this models'
- D) the model

31

Which of the following sentences, inserted here, most effectively supports the claim made in the previous sentence?

- A) It is not yet known how Copernicus found astronomy texts from the Muslim world.
- B) Copernicus faced many obstacles from Christian religious authorities after he proposed his heliocentric theory.
- C) Copernicus's equations describing planetary motion are clearly based on the work of al-Tusi, a Maragha astronomer.
- D) Copernicus was almost certainly not able to read Persian or Arabic writings himself.

In all, thinkers in the Islamic world made enormous contributions to the development of science. Had they not preserved ancient knowledge and **32** elaborated on it with their own findings, scientific and technological development might be centuries behind where it is today. **33** Even so, the accomplishments of medieval Muslim scientists should be better known around the world; more effort should be made to inform students about these pioneers of science.

32

- A) NO CHANGE
- B) elaborated with
- C) elaborated for
- D) elaborated to

33

- A) NO CHANGE
- B) For most people,
- C) Afterward,
- D) For this reason,

Questions 34-44 are based on the following passage.

### The Growing Roles of Dietitians and Nutritionists

Dietitians are experts in nutrition who help people plan healthy diets. Using their wide range of knowledge and skills, these professionals ensure that their clients and patients eat nutritious foods and **34** living lifestyles that will help them be fit and healthy.

**35** Clinical dietitians might, for example, work with patients with medical conditions that involve dietary restrictions, such as **36** the disorder known as celiac disease. These patients **37** need instruction in how best to eat a nutritious and complete diet while avoiding foods that could make them sick. Other clinical dietitians might specialize in working with elderly patients, teaching them to eat foods that build strong bones and promote all-around good health.

**34**

- A) NO CHANGE
- B) live
- C) to live
- D) lived

**35**

Which choice most effectively conveys the main topic of this paragraph?

- A) Dietitians work to improve the diets of their clients in many different contexts.
- B) Some dietitians, known as clinical dietitians, work primarily in hospitals and other health care facilities to improve the health of patients.
- C) Although they are not doctors themselves, dietitians sometimes collaborate with nurses and doctors to assist in providing medical care.
- D) Dietitians are concerned first and foremost with using their expertise to improve the health of the clients they work with.

**36**

- A) NO CHANGE
- B) the disorder of celiac disease
- C) celiac disease
- D) celiac

**37**

- A) NO CHANGE
- B) will need
- C) have needed
- D) would need

CONTINUE 

Other dietitians work mainly outside of health care settings. Community dietitians work to encourage public health outside of health care settings. They may educate schoolchildren on good nutrition, or teach classes for adults living in **38** communities, with poor access to healthy groceries and fresh food. Sports dietitians collaborate with clients to help them eat right to achieve their fitness and athletic goals. Research dietitians are employed by universities to study the effects of nutrients and diets on the body. Teaching classes on dietetics to university students, **39** new dietitians are also trained by them.

Students must gain substantial skills and education in order to become dietitians. The profession requires a bachelor's degree in a related field, such as biology, anatomy, or nutrition. **40** Regardless, many dietitians go on to earn master's degrees in a specific subfield. This education helps them **41** learn a lot of stuff about biology and chemistry so that they can understand the human body and the effects that various nutrients can have on overall health. Dietitians must also **42** compliment this knowledge with good communication skills, since many interact one-on-one with patients or even speak publicly to large groups.

38

- A) NO CHANGE
- B) communities; with poor access
- C) communities with poor access
- D) communities. With poor access

39

- A) NO CHANGE
- B) they also train new dietitians
- C) training for new dietitians is also provided by them
- D) their new dietitians are also trained

40

- A) NO CHANGE
- B) In addition,
- C) For example,
- D) Certainly,

41

Which of the following choices is most consistent with the style of the passage as a whole?

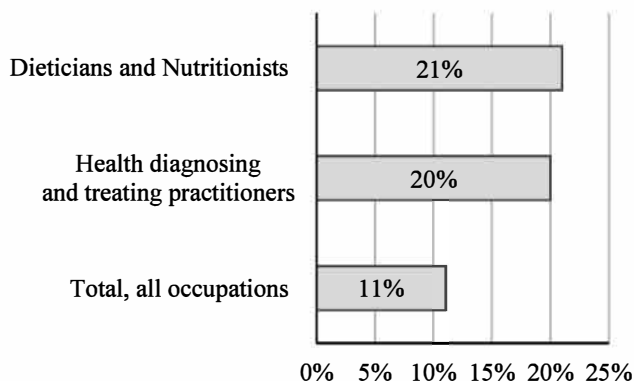
- A) NO CHANGE
- B) get really knowledgeable about
- C) develop a strong knowledge of
- D) read up on

42

- A) NO CHANGE
- B) complement
- C) condescend
- D) complicate

[1] There will most likely be a great deal of demand for dietitians in the coming years. [2] As the “baby boomer” generation of the United States ages, dietitians will play an important role in ensuring the health of the growing number of elderly Americans. [3] In addition, as the US works to address its obesity epidemic, dietitians will be vital to treating and preventing obesity by helping Americans develop healthier diets. [4] By promoting good nutrition, dietitians can help their patients avoid some of the health problems associated with aging. [5] For these and other reasons, the US Bureau of Labor Statistics predicts **43** a 20% increase in the number of dietitians and nutritionists by 2022. **44**

Dietitians and Nutritionists  
Percent change in employment, projected  
2012-22



43

- A) NO CHANGE
- B) an 11% increase in the number of dietitians and nutritionists
- C) that 21% of all workers will be dietitians or nutritionists
- D) a 21% increase in the number of dietitians and nutritionists

44

For the sake of the cohesion of this paragraph, sentence 4 should be placed

- A) where it is now.
- B) before sentence 2.
- C) after sentence 2.
- D) after sentence 5.

## STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 3



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

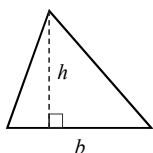
## DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

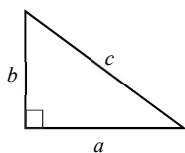
## NOTES

1. You **may not** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

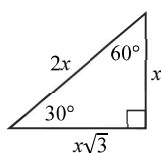
## REFERENCE



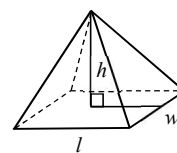
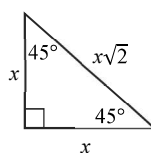
$$A = \frac{1}{2}bh$$



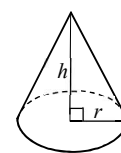
$$a^2 + b^2 = c^2$$



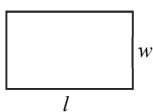
Special Triangles



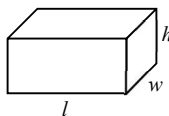
$$V = \frac{1}{3}lwh$$



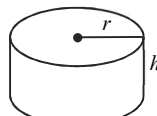
$$V = \frac{1}{3}\pi r^2 h$$



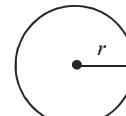
$$A = lw$$



$$V = lwh$$

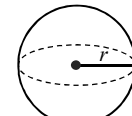


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE



1

If  $p = 5.5$ , what is the value of  $|p| - |1 - p|$ ?

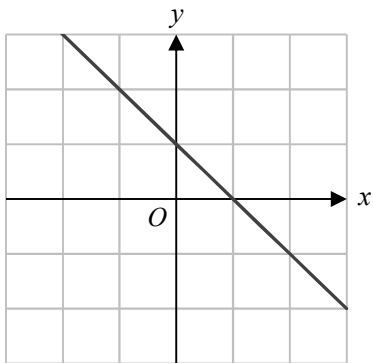
- A) 1.5
- B) 1
- C) 5.5
- D) 9.5

3

If  $(3x + 2)(5x + 1) = ax^2 + bx + 2$ , what is the value of  $a - b$ ?

- A) 2
- B) 8
- C) 22
- D) 28

2



Which of the following equations best describes the function in the figure above?

- A)  $y = x + 2$
- B)  $y = x - 2$
- C)  $y = -x + 2$
- D)  $y = -x - 2$

4

Leo is manufacturing 1 meter rulers. If the ruler differs from the expected length by more than 1 mm, he needs to throw it away. If  $x$  is the length of the ruler in meters, what absolute value inequality represents the rulers that Leo does NOT throw away?

- A)  $|x - 1| \leq 0.01$
- B)  $|x - 1| \leq 0.001$
- C)  $|x - 1| \geq 0.01$
- D)  $|x - 1| \geq 0.001$





5

If  $x^2 = 0.1$ , what is the value of  $x^{-4}$ ?

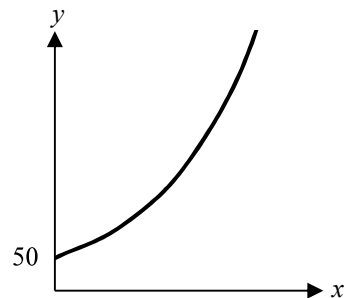
- A) 1
- B) 10
- C) 100
- D) 1000

6

If  $4n(n + 8) = 36$ , what is the product of the two solutions to this equation?

- A) -12
- B) -9
- C) 0
- D) 9

7



Every year, the population of Dwarf lop rabbits doubles in a certain country, as shown in the graph above. If there were 50 Dwarf lop rabbits last year, how many Dwarf lop rabbits will there be 4 years from now?

- A) 200
- B) 250
- C) 800
- D) 1600

8

Which of the following represents the solution set to the inequality  $2x + 1 \geq 9$ ?

- A)
- B)
- C)
- D)

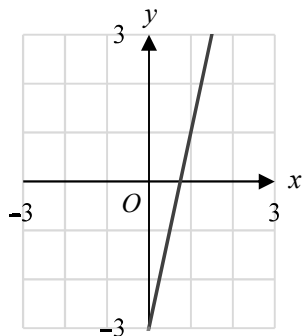


9

$f(x) = 2x - 1$ , and  $g(x)$  is a linear function that is perpendicular to  $f(x)$ . If  $(0, 4)$  is a point of  $g(x)$ , at what point do  $f(x)$  and  $g(x)$  intersect?

- A)  $(0, -1)$
- B)  $(1, 1)$
- C)  $(2, 3)$
- D)  $(3, 2)$

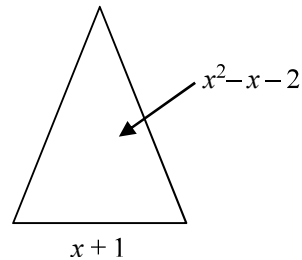
10



The graph shown above represents  $f(x) = 4x - 3$ . If  $f(a + 4) = 5$ , what is the value of  $a$ ?

- A)  $-2$
- B)  $-1$
- C)  $1$
- D)  $4$

11



The triangle above has an area of  $x^2 - x - 2$  and a base of  $x + 1$ . What is the height of the triangle?

- A)  $\frac{1}{2}(x - 2)$
- B)  $x - 2$
- C)  $2(x - 2)$
- D)  $(x - 2)(x + 1)^2$

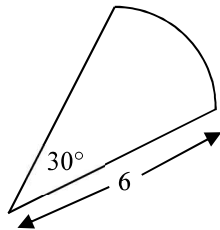
12

Which of the following is equal to  $6x^2 - 11x - 7$ ?

- A)  $(6x - 1)(x + 7)$
- B)  $(6x + 1)(x - 7)$
- C)  $(2x - 1)(3x + 7)$
- D)  $(2x + 1)(3x - 7)$



13



Note: figure is not drawn to scale.

What is the arc length of the figure above?

- A) 180
- B) 90
- C)  $\pi$
- D)  $2\pi$

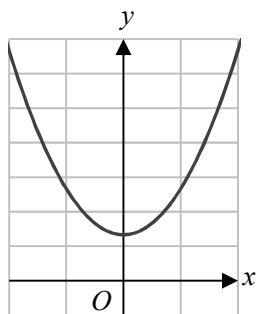
15

Which of the following expressions is equivalent

to  $\frac{15x^2 - 27x - 6}{x - 2}$  ?

- A)  $(5x + 1)$
- B)  $3(5x + 1)$
- C)  $15x^2 - 28x - 4$
- D)  $15x - 35$

14



Which of the following equations could represent an expression for the function in the figure above?

- A)  $f(x) = x^2 + 4$
- B)  $f(x) = x^2 - 4$
- C)  $f(x) = (x - 4)^2$
- D)  $f(x) = (x + 4)^2$

CONTINUE


**DIRECTIONS**

Questions **16-20** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

- You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
- Fill in only one circle in a column.
- You can start your answer in any column as long as you can fit in the whole answer.
- For questions 16-20, no answers will be negative numbers.
- Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
- If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
- If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 /   1   1	8   .   4	3   /   7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

.   4   2   2	.   3   2   6	.   1   2   5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



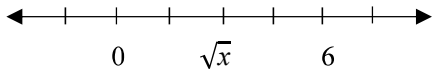
16

What is a value of  $y$  that satisfies the inequality  $|y - 5| \leq 1$ ?

18

A psychological research study at a local university pays participants \$15 if they are students and \$10 if they are non-students. If the research study pays 10 participants a total cost of \$120, how many of the participants were students?

17



What is the value of  $x$  in the number line above?

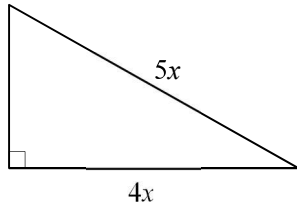
19

$$\frac{n^2 + 1}{-2n + 8} = -13$$

What is a value of  $n$  that satisfies the equation above?



20



If the perimeter of the above triangle is 72, what is the value of  $x$ ?

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

## Section 4



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

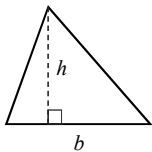
## DIRECTIONS

Questions **1-30** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **31-38** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 31. You may use your test booklet for scratch work.

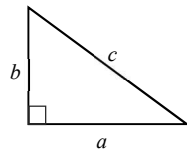
## NOTES

1. You **may** use a calculator.
2. Variables and expressions represent real numbers unless stated otherwise.
3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function  $f$  is defined as the set of all real numbers  $x$  for which  $f(x)$  is also a real number, unless stated otherwise.

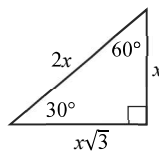
## REFERENCE



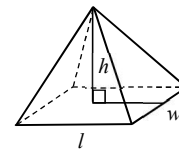
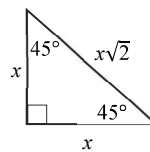
$$A = \frac{1}{2}bh$$



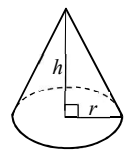
$$a^2 + b^2 = c^2$$



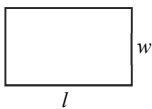
Special Triangles



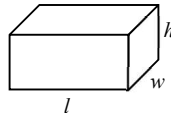
$$V = \frac{1}{3}lwh$$



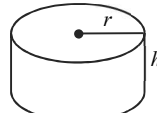
$$V = \frac{1}{3}\pi r^2 h$$



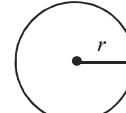
$$A = lw$$



$$V = lwh$$

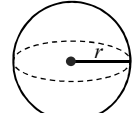


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



$$V = \frac{4}{3}\pi r^3$$

There are  $360^\circ$  in a circle.

The sum of the angles in a triangle is  $180^\circ$ .

The number of radians of arc in a circle is  $2\pi$ .

CONTINUE





1

If  $f(x) = 2x + 1$  and  $g(x) = 4x - 4$ , what is  $f(0) \times g(0)$ ?

- A)  $-5$
- B)  $-4$
- C)  $4$
- D)  $8$

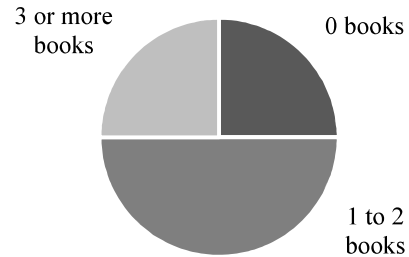
2

If  $y:z$  is equal to  $1:3$ , and  $z:a$  is equal to  $2:3$ , what ratio is equal to  $y:a$ ?

- A)  $2:9$
- B)  $1:3$
- C)  $1:2$
- D)  $2:3$

3

Books Read Per Month



A group of people are surveyed about the number of books they read each month, and the results are graphed above. If the sample accurately represents the 420,000 people in the city of Omaha, how many people in Omaha can we expect to read 3 or more books per month?

- A) 84,000
- B) 105,000
- C) 189,000
- D) 218,000

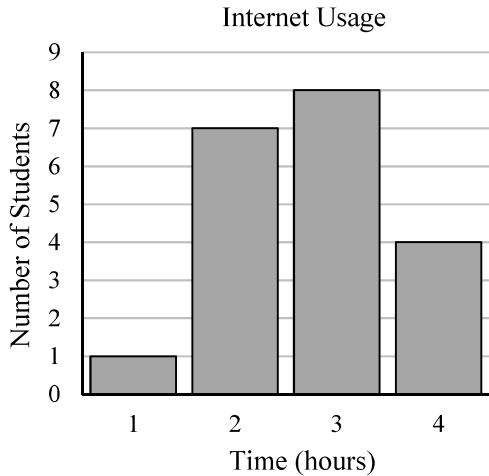
4

A printer can print at a rate of 5 pages per minute. How many hours will it take to print 300 pages?

- A) 0.5
- B) 1
- C) 1.5
- D) 3



5



Administrators at Washington High School have noticed that students are downloading and watching movies while in class. They want to determine whether it is only a few kids who are using the internet for long periods of time at school. The above graph is the result of an anonymous student survey, representing the number of hours spent on the internet per day by students at Washington High School. Which of the following statements is INCORRECT?

- A) The mode of this data set is 3 hours.
- B) The range of this data set is 3 hours.
- C) 60% of the students surveyed use the internet 3 or 4 hours per day.
- D) The median is smaller than the mean for this set of data.

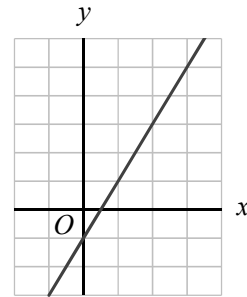
6

$$\sqrt{x+1} = 6$$

Which of the following is a value of  $x$  for the equation above?

- A) 6
- B) 34
- C) 35
- D) 36

7



Which of the following equations could represent the linear equation above?

- A)  $y = -2x - 1$
- B)  $y = -2x + 1$
- C)  $y = 2x - 1$
- D)  $y = 2x + 1$



8

If  $f(x)$  is a linear function that passes through the points  $(4, 3)$  and  $(-4, -9)$ , what is the  $y$ -intercept of  $f(x)$ ?

- A)  $(0, 2)$
- B)  $(2, 0)$
- C)  $(0, -3)$
- D)  $(-3, 0)$

9

Which of the following equations represents the function  $f(x) = 2x - 1$  shifted 2 units to the left on the  $xy$ -plane?

- A)  $g(x) = 2x - 5$
- B)  $g - 3x = 2x$
- C)  $g(x) = 2x + 1$
- D)  $g(x) = 2x + 3$

10

What is the average of  $2x + 4$ ,  $5x - 1$ , and  $-x + 3$ ?

- A)  $x + 2$
- B)  $x - 2$
- C)  $2x + 2$
- D)  $2x - 2$

11

University Students' Sleep Habits		
Hours of Sleep	University A	University B
Average	6	8
Median	4	7
Mode	5	7
Standard Deviation	3	1

A random sample of students in two different universities were surveyed for their sleep habits. The results are shown in the table above. Which of the following statements is supported by the information in this table?

- A) The hours of sleep per night varies more among students at University A than students at University B.
- B) More students attend University B than University A.
- C) More than half of the students at University B get 7 hours of sleep per night.
- D) Half of the students at University A get 6 hours of sleep per night.

12

Logan bought 36 pieces of bubble gum, which was 40% of the store's stock. How much bubble gum is remaining in the store?

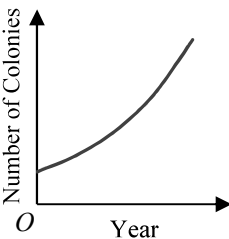
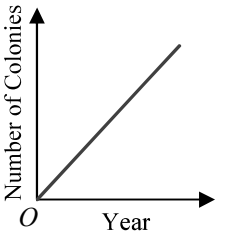
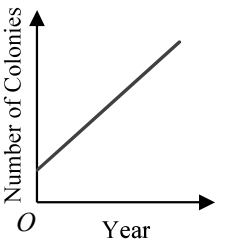
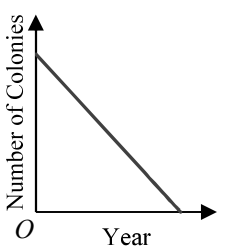
- A) 54
- B) 72
- C) 80
- D) 90



13

Year	Number of Colonies
1992	41,402
1993	43,783
1994	46,164
1995	48,545

The table above shows the number of fire ant colonies found in Greenville from 1992 to 1995. Which of the following graphs best represents the number of fire ant colonies in Greenville?

- A) 
- B) 
- C) 
- D) 

14

For the inequality  $2x + y > 15$ , when  $x = 3$ , which of the following CANNOT be a possible value of  $y$ ?

- A) 9  
 B) 10  
 C) 11  
 D) 12

15

The sum of the digits in a two digit number is 8. If 18 is subtracted from this number, the numbers' digits are reversed. Which of the following could be the original number?

- A) 32  
 B) 53  
 C) 62  
 D) 71

16

If  $x^2 + ax + b = (x - 9)(x + 9)$ , what is the value of  $ab$ ?

- A) -81  
 B) 0  
 C) 81  
 D) 1458



17

$$\frac{2}{x} + \frac{3}{y} + \frac{5}{xy} = \frac{A}{xy}$$

What is the expression for  $A$ ?

- A)  $2x + 3y + 5xy$
- B)  $2y + 3x + 5$
- C)  $2x + 2y + 5$
- D)  $10xy$

18

A company polls a group of 1,067 people randomly selected to represent New York City. The company determines that 10% of the sample group does not like cheese, while the remaining 90% does like cheese. The poll is true with a 3% margin of error 19 times out of 20. If there are 8.5 million people in New York City, what is the best estimate for the number who do not like cheese?

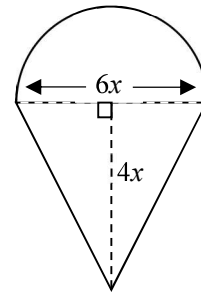
- A) 850,000 people
- B) Between 425,000 and 1,275,000 people
- C) Between 595,000 and 1,105,000 people
- D) Between 722,500 and 977,500 people

19

$f(2) = 3$  and  $f(-6) = -13$ . If  $f(x)$  is a linear function, what is the  $y$ -intercept of  $f(x)$ ?

- A)  $-1$
- B)  $0$
- C)  $1$
- D)  $2$

20



What is the perimeter of the figure outlined by the solid line, in terms of  $x$ ?

- A)  $5x + 3\pi x$
- B)  $5x + 6\pi x$
- C)  $10x + 3\pi x$
- D)  $10x + 6\pi x$



21

If  $5^{x+4} = 25^{x+3}$ , what is the value of  $x$ ?

- A)  $-2$
- B)  $-1$
- C)  $0$
- D)  $1$

22

Sam can run 4 miles in 48 minutes. If Ahn can run twice as fast as Sam, how many minutes does it take Ahn to run 6 miles?

- A) 24
- B) 30
- C) 36
- D) 48

23

Drink Sales for July		
Drink Flavor	16 oz.	24 oz.
Vanilla	1525	3200
Mocha	$m$	175
Espresso	$s$	4500
Total	3000	7875

A beverage company offers three different flavors of energy drinks. Each flavor is also offered in two different sizes. The table above shows the number of cans sold in each category during the month of July. If 16 oz. cans represented 20% of the total Espresso cans sold, how many 16 oz. cans of Mocha,  $m$ , did the company sell?

- A) 1125
- B) 575
- C) 465
- D) 350

24

If  $(x + 2)^2 = 4$ , what is a solution for  $x$ ?

- A)  $-4$
- B)  $-2$
- C)  $2$
- D)  $8$



**Questions 25 and 26 refer to the following information.**

Scientists study a group of large dogs, allocating each of them 1600 calories per day.  $\frac{1}{2}$  of these calories come from carbohydrates, and  $\frac{1}{4}$  of these calories come from fats.

25

How many more carbohydrate calories than fat calories is each dog allocated per day?

- A) 150
- B) 250
- C) 400
- D) 800

26

When the dogs are active, the scientists increase the dogs' daily caloric intake by 25%. Of these calories, 1,000 are from carbohydrates. What percentage of the remaining calories come from other, non-carbohydrate sources?

- A) 25
- B) 50
- C) 60
- D) 75

27

$$5x + 3y = 3c$$

$$2y = c - 4x$$

If  $x + y = 6$ , what is the value of  $c$  for the system of equations above?

- A) 2
- B) 3
- C) 4
- D) 5

28

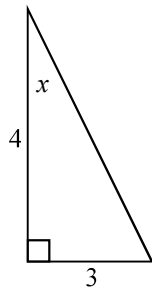
Hours of Exercise Per Week		
	Number of Students	
Hours Per Week	Class A	Class B
0	0	3
1	4	0
2	2	5
3	4	1

The table above shows the number of hours spent exercising per week by students in Class A and Class B. Which statement best describes the relationship of the median and mean of the hours of weekly exercise between the two classes?

- A) Class A has a higher median than Class B and Class B has a higher mean than Class A.
- B) Class B has a higher median than Class A and Class B has a higher mean than Class A.
- C) Class A and B have the same median, and Class B has a lower mean than Class A.
- D) Class A and B have the same median, and Class A has a lower mean than Class B.



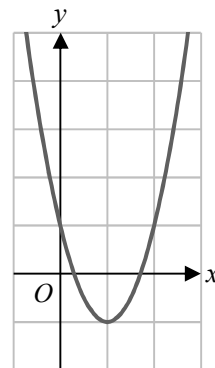
29



In the figure above, what is the value of  $\sin(x)$ ?

- A)  $\frac{3}{5}$
- B)  $\frac{3}{4}$
- C)  $\frac{4}{5}$
- D)  $\frac{5}{3}$

30



The function  $f(x) = ax^2 + bx + c$  is graphed above. Which of the following must be positive?

- A)  $ab$
- B)  $b - a$
- C)  $-c$
- D)  $ac$




**DIRECTIONS**

Questions **31-38** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. When completing grid-in questions:

- You are required to bubble in the circles for your answers. It is recommended, but not required, that you also write your answer in the boxes above the columns of circles. Points will be awarded based only on whether the circles are filled in correctly.
- Fill in only one circle in a column.
- You can start your answer in any column as long as you can fit in the whole answer.
- For questions 31-38, no answers will be negative numbers.
- Mixed numbers**, such as  $4\frac{2}{5}$ , must be gridded as decimals or improper fractions, such as 4.4 or as  $\frac{22}{5}$ . "42/5" will be read as "forty-two over five," not as "four and two-fifths."
- If your answer is a **decimal** with more digits than will fit on the grid, you may round it or cut it off, but you must fill the entire grid.
- If there are **multiple correct solutions** to a problem, all of them will be considered correct. Enter only **one** on the grid.

5 / 1 1 1	8 . 4	3 / 7
/ ● ○	/ ○ ○	/ ○ ●
. ○ ○ ○ ○	. ○ ○ ● ○	. ○ ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ● ●	1 ○ ○ ○ ○	1 ○ ○ ○ ○
2 ○ ○ ○ ○	2 ○ ○ ○ ○	2 ○ ○ ○ ○
3 ○ ○ ○ ○	3 ○ ○ ○ ○	3 ○ ● ○ ○
4 ○ ○ ○ ○	4 ○ ○ ○ ●	4 ○ ○ ○ ○
5 ● ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ○
6 ○ ○ ○ ○	6 ○ ○ ○ ○	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ●
8 ○ ○ ○ ○	8 ○ ● ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○

. 4 2 2	. 3 2 6	. 1 2 5
/ ○ ○	/ ○ ○	/ ○ ○
. ● ○ ○ ○	. ● ○ ○ ○	. ● ○ ○ ○
0 ○ ○ ○ ○	0 ○ ○ ○ ○	0 ○ ○ ○ ○
1 ○ ○ ○ ○	1 ○ ○ ○ ○	1 ○ ● ○ ○
2 ○ ○ ● ●	2 ○ ○ ● ○	2 ○ ○ ● ○
3 ○ ○ ○ ○	3 ○ ● ○ ○	3 ○ ○ ○ ○
4 ○ ● ○ ○	4 ○ ○ ○ ○	4 ○ ○ ○ ○
5 ○ ○ ○ ○	5 ○ ○ ○ ○	5 ○ ○ ○ ●
6 ○ ○ ○ ○	6 ○ ○ ○ ●	6 ○ ○ ○ ○
7 ○ ○ ○ ○	7 ○ ○ ○ ○	7 ○ ○ ○ ○
8 ○ ○ ○ ○	8 ○ ○ ○ ○	8 ○ ○ ○ ○
9 ○ ○ ○ ○	9 ○ ○ ○ ○	9 ○ ○ ○ ○



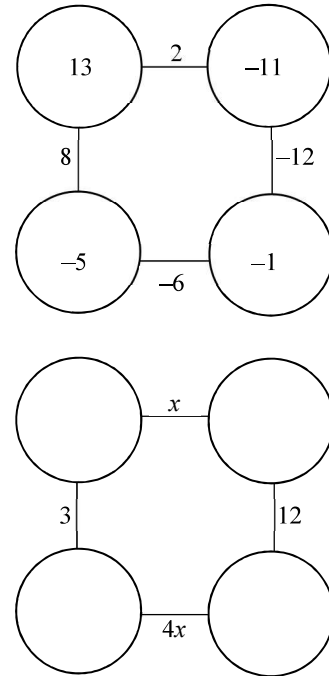
31

Linda works 6 hours a day on Monday and Wednesday, 8 hours a day on Thursday and Friday, and 5 hours on Sunday. If she is paid \$495 at the end of the week, what is Linda's hourly wage?

32

If the ratio of  $A$  to  $B$  is 2:3 and the ratio of  $A$  to  $C$  is 5:6, what is  $\frac{B}{C}$ ?

33



The figure above is an example of a completed bubble square. The numbers next to the line connecting the two adjacent circles is the sum of the numbers inside each of the two circles. What is the value of  $x$ ?



34

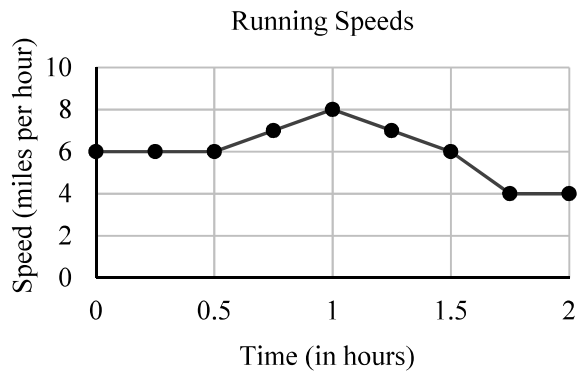
$$\frac{5}{x^2 + 6x + 8} = \frac{A}{x + 2} + \frac{B}{x + 4}$$

In the above equation, what is the value of  $A + B$  if  $A$  is equal to 2.5?

36

If a sector of a circle with an angle of  $60^\circ$  has an area of  $24\pi$ , what is the radius of the circle?

35

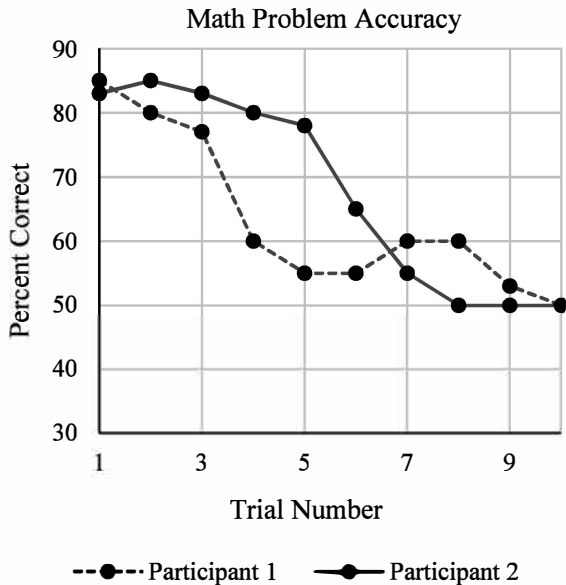


The graph above shows Rebecca's running speeds during a 2 hour run. What is the total distance, in miles, that Rebecca ran during the first hour of her run?



**Questions 37 and 38 refer to the following information.**

In a psychology experiment, participants are asked to solve simple math problems presented on a computer screen. The data is analyzed by calculating what percentage of the questions that the participant answers correctly during one trial. The trials are presented back to back with no breaks in between. The results are shown below.



37

The duration of the experiment is 50 minutes and consists of 10 trials each lasting 5 minutes. If a new math problem is presented every 6 seconds, how many math problems are presented during one trial?

38

Trials 6 through 8 focus on spatial reasoning problems in math. The lab wants to determine whether the average accuracy is greater for Participant 1 or for Participant 2 during these trials. The percent of math problems correct for both participants during trials 6 through 8 is always divisible by 5. What is the difference between the average number of problems correct for Participant 1 and Participant 2 during trials 6 through 8? (Round your answer to the nearest integer.)

# STOP

**If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.**

# Answers

# Answers

## Part 1

### Section 1

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 14. C | 27. D | 40. B |
| 2. A  | 15. B | 28. C | 41. A |
| 3. C  | 16. D | 29. D | 42. C |
| 4. C  | 17. B | 30. B | 43. D |
| 5. B  | 18. D | 31. B | 44. D |
| 6. B  | 19. A | 32. B | 45. B |
| 7. D  | 20. C | 33. D | 46. C |
| 8. A  | 21. B | 34. C | 47. B |
| 9. C  | 22. B | 35. A | 48. C |
| 10. D | 23. D | 36. D | 49. A |
| 11. C | 24. B | 37. D | 50. C |
| 12. B | 25. A | 38. B | 51. B |
| 13. A | 26. C | 39. B | 52. A |

### Section 2

- |       |       |       |       |
|-------|-------|-------|-------|
| 1. C  | 12. B | 23. C | 34. B |
| 2. A  | 13. D | 24. B | 35. B |
| 3. D  | 14. C | 25. D | 36. C |
| 4. D  | 15. C | 26. B | 37. A |
| 5. A  | 16. A | 27. C | 38. C |
| 6. D  | 17. A | 28. C | 39. B |
| 7. C  | 18. B | 29. D | 40. B |
| 8. B  | 19. C | 30. B | 41. C |
| 9. D  | 20. B | 31. C | 42. B |
| 10. C | 21. D | 32. A | 43. D |
| 11. B | 22. A | 33. D | 44. C |

### Section 3

- |      |       |       |                       |
|------|-------|-------|-----------------------|
| 1. B | 6. B  | 11. C | 16. $4 \leq y \leq 6$ |
| 2. C | 7. D  | 12. D | 17. 9                 |
| 3. A | 8. A  | 13. C | 18. 4                 |
| 4. B | 9. C  | 14. A | 19. 5 or 21           |
| 5. C | 10. A | 15. B | 20. 6                 |

### Section 4

- |       |       |       |                   |
|-------|-------|-------|-------------------|
| 1. B  | 11. A | 21. A | 31. 15            |
| 2. A  | 12. A | 22. C | 32. $\frac{5}{4}$ |
| 3. B  | 13. C | 23. D | 33. 3             |
| 4. B  | 14. A | 24. A | 34. 0             |
| 5. D  | 15. B | 25. C | 35. 6.5           |
| 6. C  | 16. B | 26. B | 36. 12            |
| 7. C  | 17. B | 27. B | 37. 50            |
| 8. C  | 18. C | 28. C | 38. 1             |
| 9. D  | 19. A | 29. A |                   |
| 10. C | 20. C | 30. D |                   |

# Exam 4



# SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○	27	A B C D	○ ○ ○ ○	40	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○	28	A B C D	○ ○ ○ ○	41	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	16	A B C D	○ ○ ○ ○	29	A B C D	○ ○ ○ ○	42	A B C D	○ ○ ○ ○
4	A B C D	○ ○ ○ ○	17	A B C D	○ ○ ○ ○	30	A B C D	○ ○ ○ ○	43	A B C D	○ ○ ○ ○
5	A B C D	○ ○ ○ ○	18	A B C D	○ ○ ○ ○	31	A B C D	○ ○ ○ ○	44	A B C D	○ ○ ○ ○
6	A B C D	○ ○ ○ ○	19	A B C D	○ ○ ○ ○	32	A B C D	○ ○ ○ ○	45	A B C D	○ ○ ○ ○
7	A B C D	○ ○ ○ ○	20	A B C D	○ ○ ○ ○	33	A B C D	○ ○ ○ ○	46	A B C D	○ ○ ○ ○
8	A B C D	○ ○ ○ ○	21	A B C D	○ ○ ○ ○	34	A B C D	○ ○ ○ ○	47	A B C D	○ ○ ○ ○
9	A B C D	○ ○ ○ ○	22	A B C D	○ ○ ○ ○	35	A B C D	○ ○ ○ ○	48	A B C D	○ ○ ○ ○
10	A B C D	○ ○ ○ ○	23	A B C D	○ ○ ○ ○	36	A B C D	○ ○ ○ ○	49	A B C D	○ ○ ○ ○
11	A B C D	○ ○ ○ ○	24	A B C D	○ ○ ○ ○	37	A B C D	○ ○ ○ ○	50	A B C D	○ ○ ○ ○
12	A B C D	○ ○ ○ ○	25	A B C D	○ ○ ○ ○	38	A B C D	○ ○ ○ ○	51	A B C D	○ ○ ○ ○
13	A B C D	○ ○ ○ ○	26	A B C D	○ ○ ○ ○	39	A B C D	○ ○ ○ ○	52	A B C D	○ ○ ○ ○



**SAT PRACTICE ANSWER SHEET**

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 2**

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS** ○ ⊗ ⊖ ⊕ ⊗ ⊕ ⊖ ⊗ ⊕ ⊖

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 3**

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	/ ○ ○	17	□ □ □ □	/ ○ ○	18	□ □ □ □	/ ○ ○	19	□ □ □ □	/ ○ ○	20	□ □ □ □	/ ○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	

**NO CALCULATOR ALLOWED**



**SAT PRACTICE ANSWER SHEET**

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 4**

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS** ○ ⊗ ⊖ ⊕ ⊗ ⊕ ⊖ ⊗ ⊕ ⊖

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	/ ○ ○	17	□ □ □ □	/ ○ ○	18	□ □ □ □	/ ○ ○	19	□ □ □ □	/ ○ ○	20	□ □ □ □	/ ○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	

**NO CALCULATOR ALLOWED**



## SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF  
INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED



**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**


It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 4 (Continued)**

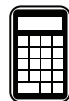
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<b>31</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>32</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>33</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>34</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>35</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○
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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<b>36</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>37</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>38</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○
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**CALCULATOR  
ALLOWED**



# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is from Lydia Minatoya, *The Strangeness of Beauty*. ©1999 by Lydia Minatoya. The setting is Japan in 1920. Chie and her daughter Naomi are members of the House of Fuji, a noble family.

Akira came directly, breaking all tradition. Was that it? Had he followed form—had he asked his mother to speak to his father to approach a

Line go-between—would Chie have been more receptive?

5 He came on a winter's eve. He pounded on the door while a cold rain beat on the shuttered veranda, so at first Chie thought him only the wind. The maid knew better. Chie heard her soft scuttling footsteps, the creak of the door. Then the maid brought a  
10 calling card to the drawing room, for Chie.

Chie was reluctant to go to her guest; perhaps she was feeling too cozy. She and Naomi were reading at a low table set atop a charcoal brazier. A thick quilt spread over the sides of the table so their legs were  
15 tucked inside with the heat.

“Who is it at this hour, in this weather?” Chie questioned as she picked the name card off the maid's lacquer tray.

“Shinoda, Akira. Kobe Dental College,” she read.

20 Naomi recognized the name. Chie heard a soft intake of air.

“I think you should go,” said Naomi.

Akira was waiting in the entry. He was in his early twenties, slim and serious, wearing the black  
25 military-style uniform of a student. As he bowed—his hands hanging straight down, a black cap in one, a yellow oil-paper umbrella in the other—Chie glanced beyond him. In the glistening surface of the courtyard's rain-drenched paving  
30 stones, she saw his reflection like a dark double.

“Madame,” said Akira, “forgive my disruption, but I come with a matter of urgency.”

His voice was soft, refined. He straightened and stole a deferential peek at her face.

35 In the dim light his eyes shone with sincerity. Chie felt herself starting to like him.

“Come inside, get out of this nasty night. Surely your business can wait for a moment or two.”

40 “I don't want to trouble you. Normally I would approach you more properly but I've received word of a position. I've an opportunity to go to America, as dentist for Seattle's Japanese community.”

“Congratulations,” Chie said with amusement.

45 “That is an opportunity, I'm sure. But how am I involved?”

Even noting Naomi's breathless reaction to the name card, Chie had no idea. Akira's message, delivered like a formal speech, filled her with maternal amusement. You know how children speak  
50 so earnestly, so hurriedly, so endearingly about things that have no importance in an adult's mind? That's how she viewed him, as a child.



It was how she viewed Naomi. Even though Naomi was eighteen and training endlessly in the arts  
55 needed to make a good marriage, Chie had made no effort to find her a husband.

Akira blushed.

“Depending on your response, I may stay in Japan. I’ve come to ask for Naomi’s hand.”

60 Suddenly Chie felt the dampness of the night.

“Does Naomi know anything of your . . . ambitions?”

“We have an understanding. Please don’t judge my candidacy by the unseemliness of this proposal. I  
65 ask directly because the use of a go-between takes much time. Either method comes down to the same thing: a matter of parental approval. If you give your consent, I become Naomi’s yoshi.\* We’ll live in the House of Fuji. Without your consent, I must go to  
70 America, to secure a new home for my bride.”

Eager to make his point, he’d been looking her full in the face. Abruptly, his voice turned gentle. “I see I’ve startled you. My humble apologies. I’ll take no more of your evening. My address is on my card. If  
75 you don’t wish to contact me, I’ll reapproach you in two weeks’ time. Until then, good night.”

He bowed and left. Taking her ease, with effortless grace, like a cat making off with a fish.

80 “Mother?” Chie heard Naomi’s low voice and turned from the door. “He has asked you?”

The sight of Naomi’s clear eyes, her dark brows gave Chie strength. Maybe his hopes were preposterous.

85 “Where did you meet such a fellow? Imagine! He thinks he can marry the Fuji heir and take her to America all in the snap of his fingers!”

Chie waited for Naomi’s ripe laughter.

Naomi was silent. She stood a full half minute looking straight into Chie’s eyes. Finally, she spoke.

90 “I met him at my literary meeting.”

Naomi turned to go back into the house, then stopped.

“Mother.”

“Yes?”

95 “I mean to have him.”

\* a man who marries a woman of higher status and takes her family’s name

1

Which choice best describes what happens in the passage?

- A) One character argues with another character who intrudes on her home.
- B) One character receives a surprising request from another character.
- C) One character reminisces about choices she has made over the years.
- D) One character criticizes another character for pursuing an unexpected course of action.

2

Which choice best describes the developmental pattern of the passage?

- A) A careful analysis of a traditional practice
- B) A detailed depiction of a meaningful encounter
- C) A definitive response to a series of questions
- D) A cheerful recounting of an amusing anecdote

3

As used in line 1 and line 65, “directly” most nearly means

- A) frankly.
- B) confidently.
- C) without mediation.
- D) with precision.

4

Which reaction does Akira most fear from Chie?

- A) She will consider his proposal inappropriate.
- B) She will mistake his earnestness for immaturity.
- C) She will consider his unscheduled visit an imposition.
- D) She will underestimate the sincerity of his emotions.

5

Which choice provides the best evidence for the answer to the previous question?

- A) Line 33 (“His voice . . . refined”)
- B) Lines 49-51 (“You . . . mind”)
- C) Lines 63-64 (“Please . . . proposal”)
- D) Lines 71-72 (“Eager . . . face”)

6

In the passage, Akira addresses Chie with

- A) affection but not genuine love.
- B) objectivity but not complete impartiality.
- C) amusement but not mocking disparagement.
- D) respect but not utter deference.

7

The main purpose of the first paragraph is to

- A) describe a culture.
- B) criticize a tradition.
- C) question a suggestion.
- D) analyze a reaction.

8

As used in line 2, “form” most nearly means

- A) appearance.
- B) custom.
- C) structure.
- D) nature.

9

Why does Akira say his meeting with Chie is “a matter of urgency” (line 32)?

- A) He fears that his own parents will disapprove of Naomi.
- B) He worries that Naomi will reject him and marry someone else.
- C) He has been offered an attractive job in another country.
- D) He knows that Chie is unaware of his feelings for Naomi.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Line 39 (“I don’t . . . you”)
- B) Lines 39-42 (“Normally . . . community”)
- C) Lines 58-59 (“Depending . . . Japan”)
- D) Lines 72-73 (“I see . . . you”)

**Questions 11-21 are based on the following passage and supplementary material.**

This passage is adapted from Francis J. Flynn and Gabrielle S. Adams, "Money Can't Buy Love: Asymmetric Beliefs about Gift Price and Feelings of Appreciation." ©2008 by Elsevier Inc.

Every day, millions of shoppers hit the stores in full force—both online and on foot—searching frantically for the perfect gift. Last year, Americans spent over \$30 billion at retail stores in the month of December alone. Aside from purchasing holiday gifts, most people regularly buy presents for other occasions throughout the year, including weddings, birthdays, anniversaries, graduations, and baby showers. This frequent experience of gift-giving can engender ambivalent feelings in gift-givers. Many relish the opportunity to buy presents because gift-giving offers a powerful means to build stronger bonds with one's closest peers. At the same time, many dread the thought of buying gifts; they worry that their purchases will disappoint rather than delight the intended recipients.

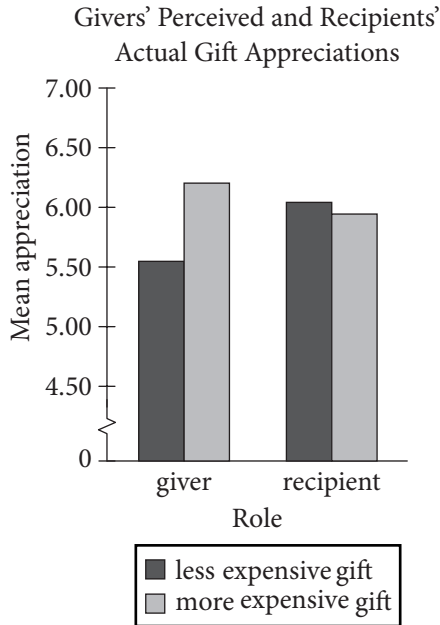
Anthropologists describe gift-giving as a positive social process, serving various political, religious, and psychological functions. Economists, however, offer a less favorable view. According to Waldfogel (1993), gift-giving represents an objective waste of resources. People buy gifts that recipients would not choose to buy on their own, or at least not spend as much money to purchase (a phenomenon referred to as "the deadweight loss of Christmas"). To wit, givers are likely to spend \$100 to purchase a gift that receivers would spend only \$80 to buy themselves. This "deadweight loss" suggests that gift-givers are not very good at predicting what gifts others will appreciate. That in itself is not surprising to social psychologists. Research has found that people often struggle to take account of others' perspectives—their insights are subject to egocentrism, social projection, and multiple attribution errors.

What is surprising is that gift-givers have considerable experience acting as both gift-givers and gift-recipients, but nevertheless tend to overspend each time they set out to purchase a meaningful gift. In the present research, we propose a unique psychological explanation for this overspending problem—i.e., that gift-givers equate how much they

spend with how much recipients will appreciate the gift (the more expensive the gift, the stronger a gift-recipient's feelings of appreciation). Although a link between gift price and feelings of appreciation might seem intuitive to gift-givers, such an assumption may be unfounded. Indeed, we propose that gift-recipients will be less inclined to base their feelings of appreciation on the magnitude of a gift than givers assume.

Why do gift-givers assume that gift price is closely linked to gift-recipients' feelings of appreciation? Perhaps givers believe that bigger (i.e., more expensive) gifts convey stronger signals of thoughtfulness and consideration. According to Camerer (1988) and others, gift-giving represents a symbolic ritual, whereby gift-givers attempt to signal their positive attitudes toward the intended recipient and their willingness to invest resources in a future relationship. In this sense, gift-givers may be motivated to spend more money on a gift in order to send a "stronger signal" to their intended recipient. As for gift-recipients, they may not construe smaller and larger gifts as representing smaller and larger signals of thoughtfulness and consideration.

The notion of gift-givers and gift-recipients being unable to account for the other party's perspective seems puzzling because people slip in and out of these roles every day, and, in some cases, multiple times in the course of the same day. Yet, despite the extensive experience that people have as both givers and receivers, they often struggle to transfer information gained from one role (e.g., as a giver) and apply it in another, complementary role (e.g., as a receiver). In theoretical terms, people fail to utilize information about their own preferences and experiences in order to produce more efficient outcomes in their exchange relations. In practical terms, people spend hundreds of dollars each year on gifts, but somehow never learn to calibrate their gift expenditures according to personal insight.



11

- The authors most likely use the examples in lines 1-9 of the passage (“Every . . . showers”) to highlight the
- regularity with which people shop for gifts.
  - recent increase in the amount of money spent on gifts.
  - anxiety gift shopping causes for consumers.
  - number of special occasions involving gift-giving.

12

- In line 10, the word “ambivalent” most nearly means
- unrealistic.
  - conflicted.
  - apprehensive.
  - supportive.

13

- The authors indicate that people value gift-giving because they feel it
- functions as a form of self-expression.
  - is an inexpensive way to show appreciation.
  - requires the gift-recipient to reciprocate.
  - can serve to strengthen a relationship.

14

- Which choice provides the best evidence for the answer to the previous question?
- Lines 10-13 (“Many . . . peers”)
  - Lines 22-23 (“People . . . own”)
  - Lines 31-32 (“Research . . . perspectives”)
  - Lines 44-47 (“Although . . . unfounded”)

15

- The “social psychologists” mentioned in paragraph 2 (lines 17-34) would likely describe the “deadweight loss” phenomenon as
- predictable.
  - questionable.
  - disturbing.
  - unprecedented.

16

- The passage indicates that the assumption made by gift-givers in lines 41-44 may be
- insincere.
  - unreasonable.
  - incorrect.
  - substantiated.

17

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 53-55 (“Perhaps . . . consideration”)
- B) Lines 55-60 (“According . . . relationship”)
- C) Lines 63-65 (“As . . . consideration”)
- D) Lines 75-78 (“In . . . relations”)

18

As it is used in line 54, “convey” most nearly means

- A) transport.
- B) counteract.
- C) exchange.
- D) communicate.

19

The authors refer to work by Camerer and others (line 56) in order to

- A) offer an explanation.
- B) introduce an argument.
- C) question a motive.
- D) support a conclusion.

20

The graph following the passage offers evidence that gift-givers base their predictions of how much a gift will be appreciated on

- A) the appreciation level of the gift-recipients.
- B) the monetary value of the gift.
- C) their own desires for the gifts they purchase.
- D) their relationship with the gift-recipients.

21

The authors would likely attribute the differences in gift-giver and recipient mean appreciation as represented in the graph to

- A) an inability to shift perspective.
- B) an increasingly materialistic culture.
- C) a growing opposition to gift-giving.
- D) a misunderstanding of intentions.

**Questions 22-31 are based on the following passage and supplementary material.**

This passage is adapted from J. D. Watson and F. H. C. Crick, "Genetical Implications of the Structure of Deoxyribonucleic Acid." ©1953 by Nature Publishing Group. Watson and Crick deduced the structure of DNA using evidence from Rosalind Franklin and R. G. Gosling's X-ray crystallography diagrams of DNA and from Erwin Chargaff's data on the base composition of DNA.

The chemical formula of deoxyribonucleic acid (DNA) is now well established. The molecule is a very long chain, the backbone of which consists of a regular alternation of sugar and phosphate groups.

To each sugar is attached a nitrogenous base, which can be of four different types. Two of the possible bases—adenine and guanine—are purines, and the other two—thymine and cytosine—are pyrimidines. So far as is known, the sequence of bases along the chain is irregular. The monomer unit, consisting of phosphate, sugar and base, is known as a nucleotide.

The first feature of our structure which is of biological interest is that it consists not of one chain, but of two. These two chains are both coiled around a common fiber axis. It has often been assumed that since there was only one chain in the chemical formula there would only be one in the structural unit. However, the density, taken with the X-ray evidence, suggests very strongly that there are two.

The other biologically important feature is the manner in which the two chains are held together. This is done by hydrogen bonds between the bases. The bases are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other. The important point is that only certain pairs of bases will fit into the structure.

One member of a pair must be a purine and the other a pyrimidine in order to bridge between the two chains. If a pair consisted of two purines, for example, there would not be room for it.

We believe that the bases will be present almost entirely in their most probable forms. If this is true, the conditions for forming hydrogen bonds are more restrictive, and the only pairs of bases possible are: adenine with thymine, and guanine with cytosine. Adenine, for example, can occur on either chain; but when it does, its partner on the other chain must always be thymine.

The phosphate-sugar backbone of our model is completely regular, but any sequence of the pairs of bases can fit into the structure. It follows that in a

long molecule many different permutations are possible, and it therefore seems likely that the precise sequence of bases is the code which carries the  
45 genetical information. If the actual order of the bases on one of the pair of chains were given, one could write down the exact order of the bases on the other one, because of the specific pairing. Thus one chain is, as it were, the complement of the other, and it is  
50 this feature which suggests how the deoxyribonucleic acid molecule might duplicate itself.

The table shows, for various organisms, the percentage of each of the four types of nitrogenous bases in that organism's DNA.

Base Composition of DNA				
Organism	Percentage of base in organism's DNA			
	adenine (%)	guanine (%)	cytosine (%)	thymine (%)
Maize	26.8	22.8	23.2	27.2
Octopus	33.2	17.6	17.6	31.6
Chicken	28.0	22.0	21.6	28.4
Rat	28.6	21.4	20.5	28.4
Human	29.3	20.7	20.0	30.0
Grasshopper	29.3	20.5	20.7	29.3
Sea urchin	32.8	17.7	17.3	32.1
Wheat	27.3	22.7	22.8	27.1
Yeast	31.3	18.7	17.1	32.9
<i>E. coli</i>	24.7	26.0	25.7	23.6

Adapted from Manju Bansal, "DNA Structure: Revisiting the Watson-Crick Double Helix." ©2003 by Current Science Association, Bangalore.

22

The authors use the word “backbone” in lines 3 and 39 to indicate that

- A) only very long chains of DNA can be taken from an organism with a spinal column.
- B) the main structure of a chain in a DNA molecule is composed of repeating units.
- C) a chain in a DNA molecule consists entirely of phosphate groups or of sugars.
- D) nitrogenous bases form the main structural unit of DNA.

23

A student claims that nitrogenous bases pair randomly with one another. Which of the following statements in the passage contradicts the student’s claim?

- A) Lines 5-6 (“To each . . . types”)
- B) Lines 9-10 (“So far . . . irregular”)
- C) Lines 23-25 (“The bases . . . other”)
- D) Lines 27-29 (“One member . . . chains”)

24

In the second paragraph (lines 12-19), what do the authors claim to be a feature of biological interest?

- A) The chemical formula of DNA
- B) The common fiber axis
- C) The X-ray evidence
- D) DNA consisting of two chains

25

The authors’ main purpose of including the information about X-ray evidence and density is to

- A) establish that DNA is the molecule that carries the genetic information.
- B) present an alternate hypothesis about the composition of a nucleotide.
- C) provide support for the authors’ claim about the number of chains in a molecule of DNA.
- D) confirm the relationship between the density of DNA and the known chemical formula of DNA.

26

Based on the passage, the authors’ statement “If a pair consisted of two purines, for example, there would not be room for it” (lines 29-30) implies that a pair

- A) of purines would be larger than the space between a sugar and a phosphate group.
- B) of purines would be larger than a pair consisting of a purine and a pyrimidine.
- C) of pyrimidines would be larger than a pair of purines.
- D) consisting of a purine and a pyrimidine would be larger than a pair of pyrimidines.

27

The authors’ use of the words “exact,” “specific,” and “complement” in lines 47-49 in the final paragraph functions mainly to

- A) confirm that the nucleotide sequences are known for most molecules of DNA.
- B) counter the claim that the sequences of bases along a chain can occur in any order.
- C) support the claim that the phosphate-sugar backbone of the authors’ model is completely regular.
- D) emphasize how one chain of DNA may serve as a template to be copied during DNA replication.



28

Based on the table and passage, which choice gives the correct percentages of the purines in yeast DNA?

- A) 17.1% and 18.7%
- B) 17.1% and 32.9%
- C) 18.7% and 31.3%
- D) 31.3% and 32.9%

29

Do the data in the table support the authors' proposed pairing of bases in DNA?

- A) Yes, because for each given organism, the percentage of adenine is closest to the percentage of thymine, and the percentage of guanine is closest to the percentage of cytosine.
- B) Yes, because for each given organism, the percentage of adenine is closest to the percentage of guanine, and the percentage of cytosine is closest to the percentage of thymine.
- C) No, because for each given organism, the percentage of adenine is closest to the percentage of thymine, and the percentage of guanine is closest to the percentage of cytosine.
- D) No, because for each given organism, the percentage of adenine is closest to the percentage of guanine, and the percentage of cytosine is closest to the percentage of thymine.

30

According to the table, which of the following pairs of base percentages in sea urchin DNA provides evidence in support of the answer to the previous question?

- A) 17.3% and 17.7%
- B) 17.3% and 32.1%
- C) 17.3% and 32.8%
- D) 17.7% and 32.8%

31

Based on the table, is the percentage of adenine in each organism's DNA the same or does it vary, and which statement made by the authors is most consistent with that data?

- A) The same; "Two of . . . pyrimidines" (lines 6-8)
- B) The same; "The important . . . structure" (lines 25-26)
- C) It varies; "Adenine . . . thymine" (lines 36-38)
- D) It varies; "It follows . . . information" (lines 41-45)



**Questions 32-41 are based on the following passage.**

This passage is adapted from Virginia Woolf, *Three Guineas*. ©1938 by Harcourt, Inc. Here, Woolf considers the situation of women in English society.

Close at hand is a bridge over the River Thames, an admirable vantage ground for us to make a survey. The river flows beneath; barges pass, laden with timber, bursting with corn; there on one side are the domes and spires of the city; on the other, Westminster and the Houses of Parliament. It is a place to stand on by the hour, dreaming. But not now. Now we are pressed for time. Now we are here to consider facts; now we must fix our eyes upon the procession—the procession of the sons of educated men.

There they go, our brothers who have been educated at public schools and universities, mounting those steps, passing in and out of those doors, ascending those pulpits, preaching, teaching, administering justice, practising medicine, transacting business, making money. It is a solemn sight always—a procession, like a caravanserai crossing a desert. . . . But now, for the past twenty years or so, it is no longer a sight merely, a photograph, or fresco scrawled upon the walls of time, at which we can look with merely an esthetic appreciation. For there, trapesing along at the tail end of the procession, we go ourselves. And that makes a difference. We who have looked so long at the pageant in books, or from a curtained window watched educated men leaving the house at about nine-thirty to go to an office, returning to the house at about six-thirty from an office, need look passively no longer. We too can leave the house, can mount those steps, pass in and out of those doors, . . . make money, administer justice. . . . We who now agitate these humble pens may in another century or two speak from a pulpit. Nobody will dare contradict us then; we shall be the mouthpieces of the divine spirit—a solemn thought, is it not? Who can say whether, as time goes on, we may not dress in military uniform, with gold lace on our breasts, swords at our sides, and something like the old family coal-scuttle on our heads, save that that venerable object was never decorated with plumes of white horsehair. You laugh—indeed the shadow of the private house still makes those dresses look a little queer. We have worn private clothes so long. . . . But we have not come here to laugh, or to

talk of fashions—men’s and women’s. We are here, on the bridge, to ask ourselves certain questions. And they are very important questions; and we have very little time in which to answer them. The questions that we have to ask and to answer about that procession during this moment of transition are so important that they may well change the lives of all men and women for ever. For we have to ask ourselves, here and now, do we wish to join that procession, or don’t we? On what terms shall we join that procession? Above all, where is it leading us, the procession of educated men? The moment is short; it may last five years; ten years, or perhaps only a matter of a few months longer. . . . But, you will object, you have no time to think; you have your battles to fight, your rent to pay, your bazaars to organize. That excuse shall not serve you, Madam. As you know from your own experience, and there are facts that prove it, the daughters of educated men have always done their thinking from hand to mouth; not under green lamps at study tables in the cloisters of secluded colleges. They have thought while they stirred the pot, while they rocked the cradle. It was thus that they won us the right to our brand-new sixpence. It falls to us now to go on thinking; how are we to spend that sixpence? Think we must. Let us think in offices; in omnibuses; while we are standing in the crowd watching Coronations and Lord Mayor’s Shows; let us think . . . in the gallery of the House of Commons; in the Law Courts; let us think at baptisms and marriages and funerals. Let us never cease from thinking—what is this “civilization” in which we find ourselves? What are these ceremonies and why should we take part in them? What are these professions and why should we make money out of them? Where in short is it leading us, the procession of the sons of educated men?

32

The main purpose of the passage is to

- A) emphasize the value of a tradition.
- B) stress the urgency of an issue.
- C) highlight the severity of social divisions.
- D) question the feasibility of an undertaking.

33

The central claim of the passage is that

- A) educated women face a decision about how to engage with existing institutions.
- B) women can have positions of influence in English society only if they give up some of their traditional roles.
- C) the male monopoly on power in English society has had grave and continuing effects.
- D) the entry of educated women into positions of power traditionally held by men will transform those positions.

34

Woolf uses the word “we” throughout the passage mainly to

- A) reflect the growing friendliness among a group of people.
- B) advance the need for candor among a group of people.
- C) establish a sense of solidarity among a group of people.
- D) reinforce the need for respect among a group of people.

35

According to the passage, Woolf chooses the setting of the bridge because it

- A) is conducive to a mood of fanciful reflection.
- B) provides a good view of the procession of the sons of educated men.
- C) is within sight of historic episodes to which she alludes.
- D) is symbolic of the legacy of past and present sons of educated men.

36

Woolf indicates that the procession she describes in the passage

- A) has come to have more practical influence in recent years.
- B) has become a celebrated feature of English public life.
- C) includes all of the richest and most powerful men in England.
- D) has become less exclusionary in its membership in recent years.

37

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 12-17 (“There . . . money”)
- B) Lines 17-19 (“It . . . desert”)
- C) Lines 23-24 (“For . . . ourselves”)
- D) Lines 30-34 (“We . . . pulpit”)

38

Woolf characterizes the questions in lines 53-57 (“For we . . . men”) as both

- A) controversial and threatening.
- B) weighty and unanswerable.
- C) momentous and pressing.
- D) provocative and mysterious.

39

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 46-47 (“We . . . questions”)
- B) Lines 48-49 (“And . . . them”)
- C) Line 57 (“The moment . . . short”)
- D) Line 62 (“That . . . Madam”)

40

Which choice most closely captures the meaning of the figurative “sixpence” referred to in lines 70 and 71?

- A) Tolerance
- B) Knowledge
- C) Opportunity
- D) Perspective

41

The range of places and occasions listed in lines 72-76 (“Let us . . . funerals”) mainly serves to emphasize how

- A) novel the challenge faced by women is.
- B) pervasive the need for critical reflection is.
- C) complex the political and social issues of the day are.
- D) enjoyable the career possibilities for women are.

**Questions 42-52 are based on the following passages.**

Passage 1 is adapted from Michael Slezak, “Space Mining: the Next Gold Rush?” ©2013 by New Scientist. Passage 2 is from the editors of *New Scientist*, “Taming the Final Frontier.” ©2013 by New Scientist.

**Passage 1**

Follow the money and you will end up in space. That’s the message from a first-of-its-kind forum on mining beyond Earth.

Line Convened in Sydney by the Australian Centre for  
5 Space Engineering Research, the event brought together mining companies, robotics experts, lunar scientists, and government agencies that are all working to make space mining a reality.

The forum comes hot on the heels of the  
10 2012 unveiling of two private asteroid-mining firms. Planetary Resources of Washington says it will launch its first prospecting telescopes in two years, while Deep Space Industries of Virginia hopes to be harvesting metals from asteroids by 2020. Another  
15 commercial venture that sprung up in 2012, Golden Spike of Colorado, will be offering trips to the moon, including to potential lunar miners.

Within a few decades, these firms may be meeting earthly demands for precious metals, such as  
20 platinum and gold, and the rare earth elements vital for personal electronics, such as yttrium and lanthanum. But like the gold rush pioneers who transformed the western United States, the first space miners won’t just enrich themselves. They also hope  
25 to build an off-planet economy free of any bonds with Earth, in which the materials extracted and processed from the moon and asteroids are delivered for space-based projects.

In this scenario, water mined from other  
30 worlds could become the most desired commodity. “In the desert, what’s worth more: a kilogram of gold or a kilogram of water?” asks Kris Zacny of HoneyBee Robotics in New York. “Gold is useless. Water will let you live.”

35 Water ice from the moon’s poles could be sent to astronauts on the International Space Station for drinking or as a radiation shield. Splitting water into oxygen and hydrogen makes spacecraft fuel, so ice-rich asteroids could become interplanetary  
40 refuelling stations.

Companies are eyeing the iron, silicon, and aluminium in lunar soil and asteroids, which could be used in 3D printers to make spare parts or machinery. Others want to turn space dirt into  
45 concrete for landing pads, shelters, and roads.

**Passage 2**

The motivation for deep-space travel is shifting from discovery to economics. The past year has seen a flurry of proposals aimed at bringing celestial riches down to Earth. No doubt this will make a few  
50 billionaires even wealthier, but we all stand to gain: the mineral bounty and spin-off technologies could enrich us all.

But before the miners start firing up their rockets, we should pause for thought. At first glance, space  
55 mining seems to sidestep most environmental concerns: there is (probably!) no life on asteroids, and thus no habitats to trash. But its consequences—both here on Earth and in space—merit careful consideration.

60 Part of this is about principles. Some will argue that space’s “magnificent desolation” is not ours to despoil, just as they argue that our own planet’s poles should remain pristine. Others will suggest that glutting ourselves on space’s riches is not an  
65 acceptable alternative to developing more sustainable ways of earthly life.

History suggests that those will be hard lines to hold, and it may be difficult to persuade the public that such barren environments are worth preserving.  
70 After all, they exist in vast abundance, and even fewer people will experience them than have walked through Antarctica’s icy landscapes.

There’s also the emerging off-world economy to consider. The resources that are valuable in orbit and  
75 beyond may be very different to those we prize on Earth. Questions of their stewardship have barely been broached—and the relevant legal and regulatory framework is fragmentary, to put it mildly.

Space miners, like their earthly counterparts, are  
80 often reluctant to engage with such questions. One speaker at last week’s space-mining forum in Sydney, Australia, concluded with a plea that regulation should be avoided. But miners have much to gain from a broad agreement on the for-profit  
85 exploitation of space. Without consensus, claims will be disputed, investments risky, and the gains made insecure. It is in all of our long-term interests to seek one out.

42

In lines 9-17, the author of Passage 1 mentions several companies primarily to

- A) note the technological advances that make space mining possible.
- B) provide evidence of the growing interest in space mining.
- C) emphasize the large profits to be made from space mining.
- D) highlight the diverse ways to carry out space mining operations.

43

The author of Passage 1 indicates that space mining could have which positive effect?

- A) It could yield materials important to Earth's economy.
- B) It could raise the value of some precious metals on Earth.
- C) It could create unanticipated technological innovations.
- D) It could change scientists' understanding of space resources.

44

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 18-22 (“Within . . . lanthanum”)
- B) Lines 24-28 (“They . . . projects”)
- C) Lines 29-30 (“In this . . . commodity”)
- D) Lines 41-44 (“Companies . . . machinery”)

45

As used in line 19, “demands” most nearly means

- A) offers.
- B) claims.
- C) inquiries.
- D) desires.

46

What function does the discussion of water in lines 35-40 serve in Passage 1?

- A) It continues an extended comparison that begins in the previous paragraph.
- B) It provides an unexpected answer to a question raised in the previous paragraph.
- C) It offers hypothetical examples supporting a claim made in the previous paragraph.
- D) It examines possible outcomes of a proposal put forth in the previous paragraph.

47

The central claim of Passage 2 is that space mining has positive potential but

- A) it will end up encouraging humanity's reckless treatment of the environment.
- B) its effects should be thoughtfully considered before it becomes a reality.
- C) such potential may not include replenishing key resources that are disappearing on Earth.
- D) experts disagree about the commercial viability of the discoveries it could yield.

48

As used in line 68, “hold” most nearly means

- A) maintain.
- B) grip.
- C) restrain.
- D) withstand.

49

Which statement best describes the relationship between the passages?

- A) Passage 2 refutes the central claim advanced in Passage 1.
- B) Passage 2 illustrates the phenomenon described in more general terms in Passage 1.
- C) Passage 2 argues against the practicality of the proposals put forth in Passage 1.
- D) Passage 2 expresses reservations about developments discussed in Passage 1.

50

The author of Passage 2 would most likely respond to the discussion of the future of space mining in lines 18-28, Passage 1, by claiming that such a future

- A) is inconsistent with the sustainable use of space resources.
- B) will be difficult to bring about in the absence of regulations.
- C) cannot be attained without technologies that do not yet exist.
- D) seems certain to affect Earth's economy in a negative way.

51

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 60-63 (“Some . . . pristine”)
- B) Lines 74-76 (“The resources . . . Earth”)
- C) Lines 81-83 (“One . . . avoided”)
- D) Lines 85-87 (“Without . . . insecure”)

52

Which point about the resources that will be highly valued in space is implicit in Passage 1 and explicit in Passage 2?

- A) They may be different resources from those that are valuable on Earth.
- B) They will be valuable only if they can be harvested cheaply.
- C) They are likely to be primarily precious metals and rare earth elements.
- D) They may increase in value as those same resources become rare on Earth.

**STOP**

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**

**No Test Material On This Page**

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Whey to Go

Greek yogurt—a strained form of cultured yogurt—has grown enormously in popularity in the United States since it was first introduced in the country in the late 1980s.

From 2011 to 2012 alone, sales of Greek yogurt in the US increased by 50 percent. The resulting increase in Greek yogurt production has forced those involved in the business to address the detrimental effects that the yogurt-making process may be having on the environment. Fortunately, farmers and others in the



Greek yogurt business have found many methods of controlling and eliminating most environmental threats. Given these solutions as well as the many health benefits of the food, the advantages of Greek yogurt **1** outdo the potential drawbacks of its production.

[1] The main environmental problem caused by the production of Greek yogurt is the creation of acid whey as a by-product. [2] Because it requires up to four times more milk to make than conventional yogurt does, Greek yogurt produces larger amounts of acid whey, which is difficult to dispose of. [3] To address the problem of disposal, farmers have found a number of uses for acid whey. [4] They can add it to livestock feed as a protein **2** supplement, and people can make their own Greek-style yogurt at home by straining regular yogurt. [5] If it is improperly introduced into the environment, acid-whey runoff **3** can pollute waterways, depleting the oxygen content of streams and rivers as it decomposes. [6] Yogurt manufacturers, food **4** scientists; and government officials are also working together to develop additional solutions for reusing whey. **5**

1

- A) NO CHANGE
- B) defeat
- C) outperform
- D) outweigh

2

Which choice provides the most relevant detail?

- A) NO CHANGE
- B) supplement and convert it into gas to use as fuel in electricity production.
- C) supplement, while sweet whey is more desirable as a food additive for humans.
- D) supplement, which provides an important element of their diet.

3

- A) NO CHANGE
- B) can pollute waterway's,
- C) could have polluted waterways,
- D) has polluted waterway's,

4

- A) NO CHANGE
- B) scientists: and
- C) scientists, and
- D) scientists, and,

5

To make this paragraph most logical, sentence 5 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

6 Though these conservation methods can be costly and time-consuming, they are well worth the effort. Nutritionists consider Greek yogurt to be a healthy food: it is an excellent source of calcium and protein, serves 7 to be a digestive aid, and 8 it contains few calories in its unsweetened low- and non-fat forms. Greek yogurt is slightly lower in sugar and carbohydrates than conventional yogurt is. 9 Also, because it is more concentrated, Greek yogurt contains slightly more protein per serving, thereby helping people stay

6

The writer is considering deleting the underlined sentence. Should the writer do this?

- A) Yes, because it does not provide a transition from the previous paragraph.
- B) Yes, because it fails to support the main argument of the passage as introduced in the first paragraph.
- C) No, because it continues the explanation of how acid whey can be disposed of safely.
- D) No, because it sets up the argument in the paragraph for the benefits of Greek yogurt.

7

- A) NO CHANGE
- B) as
- C) like
- D) for

8

- A) NO CHANGE
- B) containing
- C) contains
- D) will contain

9

- A) NO CHANGE
- B) In other words,
- C) Therefore,
- D) For instance,

10 satiated for longer periods of time. These health benefits have prompted Greek yogurt's recent surge in popularity. In fact, Greek yogurt can be found in an increasing number of products such as snack food and frozen desserts. Because consumers reap the nutritional benefits of Greek yogurt and support those who make and sell 11 it, therefore farmers and businesses should continue finding safe and effective methods of producing the food.

10

- A) NO CHANGE
- B) fulfilled
- C) complacent
- D) sufficient

11

- A) NO CHANGE
- B) it, farmers
- C) it, so farmers
- D) it: farmers

Questions 12-22 are based on the following passage and supplementary material.

### Dark Snow

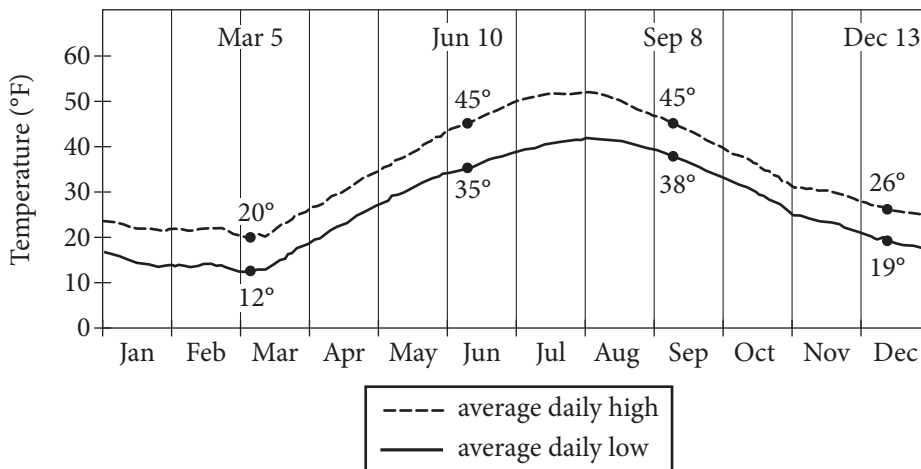
Most of Greenland's interior is covered by a thick layer of ice and compressed snow known as the Greenland Ice Sheet. The size of the ice sheet fluctuates seasonally: in summer, average daily high temperatures in Greenland can rise to slightly above 50 degrees Fahrenheit, partially melting the ice; in the winter, the sheet thickens as additional snow falls, and average daily low temperatures can drop **12** to as low as 20 degrees.

12

Which choice most accurately and effectively represents the information in the graph?

- A) NO CHANGE
- B) to 12 degrees Fahrenheit.
- C) to their lowest point on December 13.
- D) to 10 degrees Fahrenheit and stay there for months.

Average Daily High and Low Temperatures Recorded at Nuuk Weather Station, Greenland (1961—1990)



Adapted from WMO. ©2014 by World Meteorological Organization.

Typically, the ice sheet begins to show evidence of thawing in late **13** summer. This follows several weeks of higher temperatures. **14** For example, in the summer of 2012, virtually the entire Greenland Ice Sheet underwent thawing at or near its surface by mid-July, the earliest date on record. Most scientists looking for the causes of the Great Melt of 2012 have focused exclusively on rising temperatures. The summer of 2012 was the warmest in 170 years, records show. But Jason **15** Box, an associate professor of geology at Ohio State believes that another factor added to the early **16** thaw; the “dark snow” problem.

13

Which choice most effectively combines the two sentences at the underlined portion?

- A) summer, following
- B) summer, and this thawing follows
- C) summer, and such thawing follows
- D) summer and this evidence follows

14

- A) NO CHANGE
- B) However,
- C) As such,
- D) Moreover,

15

- A) NO CHANGE
- B) Box an associate professor of geology at Ohio State,
- C) Box, an associate professor of geology at Ohio State,
- D) Box, an associate professor of geology, at Ohio State

16

- A) NO CHANGE
- B) thaw; and it was
- C) thaw:
- D) thaw: being

According to Box, a leading Greenland expert, tundra fires in 2012 from as far away as North America produced great amounts of soot, some **17** of it drifted over Greenland in giant plumes of smoke and then **18** fell as particles onto the ice sheet. Scientists have long known that soot particles facilitate melting by darkening snow and ice, limiting **19** it's ability to reflect the Sun's rays. As Box explains, "Soot is an extremely powerful light absorber. It settles over the ice and captures the Sun's heat." The result is a self-reinforcing cycle. As the ice melts, the land and water under the ice become exposed, and since land and water are darker than snow, the surface absorbs even more heat, which **20** is related to the rising temperatures.

17

- A) NO CHANGE
- B) soot
- C) of which
- D) DELETE the underlined portion.

18

- A) NO CHANGE
- B) falls
- C) will fall
- D) had fallen

19

- A) NO CHANGE
- B) its
- C) there
- D) their

20

Which choice best completes the description of a self-reinforcing cycle?

- A) NO CHANGE
- B) raises the surface temperature.
- C) begins to cool at a certain point.
- D) leads to additional melting.

[1] Box's research is important because the fires of 2012 may not be a one-time phenomenon. [2] According to scientists, rising Arctic temperatures are making northern latitudes greener and thus more fire prone. [3] The pattern Box observed in 2012 may repeat

**21** itself again, with harmful effects on the Arctic ecosystem. [4] Box is currently organizing an expedition to gather this crucial information. [5] The next step for Box and his team is to travel to Greenland to perform direct sampling of the ice in order to determine just how much the soot is contributing to the melting of the ice sheet. [6] Members of the public will be able to track his team's progress—and even help fund the expedition—through a website Box has created. **22**

21

- A) NO CHANGE
- B) itself,
- C) itself, with damage and
- D) itself possibly,

22

To make this paragraph most logical, sentence 4 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 5.

Questions 23-33 are based on the following passage.

### Coworking: A Creative Solution

When I left my office job as a website developer at a small company for a position that allowed me to work full-time from home, I thought I had it made: I gleefully traded in my suits and dress shoes for sweatpants and slippers, my frantic early-morning bagged lunch packing for a leisurely midday trip to my refrigerator. The novelty of this comfortable work-from-home life, however,

**23** soon got worn off quickly. Within a month, I found myself feeling isolated despite having frequent email and instant messaging contact with my colleagues. Having become frustrated trying to solve difficult problems,

**24** no colleagues were nearby to share ideas. It was during this time that I read an article **25** into coworking spaces.

**23**

- A) NO CHANGE
- B) was promptly worn
- C) promptly wore
- D) wore

**24**

- A) NO CHANGE
- B) colleagues were important for sharing ideas.
- C) ideas couldn't be shared with colleagues.
- D) I missed having colleagues nearby to consult.

**25**

- A) NO CHANGE
- B) about
- C) upon
- D) for



The article, published by *Forbes* magazine, explained that coworking spaces are designated locations that, for a fee, individuals can use to conduct their work. The spaces are usually stocked with standard office **26** equipment, such as photocopiers, printers, and fax machines. **27** In these locations, however, the spaces often include small meeting areas and larger rooms for hosting presentations. **28** The cost of launching a new coworking business in the United States is estimated to be approximately \$58,000.

26

- A) NO CHANGE
- B) equipment, such as:
- C) equipment such as:
- D) equipment, such as,

27

- A) NO CHANGE
- B) In addition to equipment,
- C) For these reasons,
- D) Likewise,

28

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

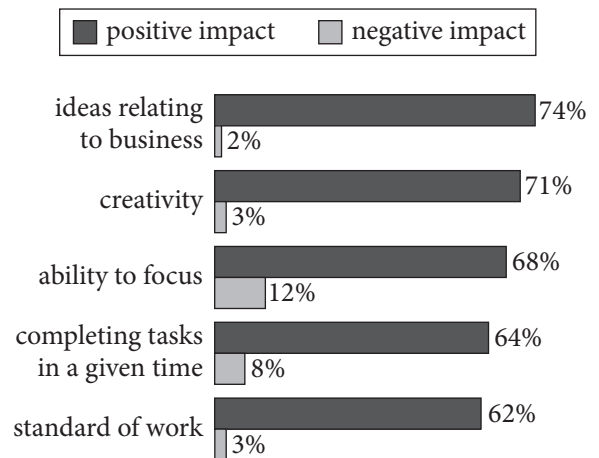
- A) Kept, because it provides a detail that supports the main topic of the paragraph.
- B) Kept, because it sets up the main topic of the paragraph that follows.
- C) Deleted, because it blurs the paragraph's main focus with a loosely related detail.
- D) Deleted, because it repeats information that has been provided in an earlier paragraph.

What most caught my interest, though, was a quotation from someone who described coworking spaces as “melting pots of creativity.” The article refers to a 2012 survey in which **29** 64 percent of respondents noted that coworking spaces prevented them from completing tasks in a given time. The article goes on to suggest that the most valuable resources provided by coworking spaces are actually the people **30** whom use them.

29

At this point, the writer wants to add specific information that supports the main topic of the paragraph.

Perceived Effect of Coworking on Business Skills



Adapted from “The 3rd Global Coworking Survey.” ©2013 by Deskmag.

Which choice most effectively completes the sentence with relevant and accurate information based on the graph above?

- A) NO CHANGE
- B) 71 percent of respondents indicated that using a coworking space increased their creativity.
- C) respondents credited coworking spaces with giving them 74 percent of their ideas relating to business.
- D) respondents revealed that their ability to focus on their work improved by 12 percent in a coworking space.

30

- A) NO CHANGE
- B) whom uses
- C) who uses
- D) who use

[1] Thus, even though I already had all the equipment I needed in my home office, I decided to try using a coworking space in my city. [2] Because I was specifically interested in coworking's reported benefits related to creativity, I chose a facility that offered a bright, open work area where I wouldn't be isolated. [3] Throughout the morning, more people appeared. [4] Periods of quiet, during which everyone worked independently, were broken up occasionally with lively conversation. **31**

I liked the experience so much that I now go to the coworking space a few times a week. Over time, I've gotten to know several of my coworking **32** colleagues: another website developer, a graphic designer, a freelance writer, and several mobile app coders. Even those of us who work in disparate fields are able to **33** share advice and help each other brainstorm. In fact, it's the diversity of their talents and experiences that makes my coworking colleagues so valuable.

**31**

The writer wants to add the following sentence to the paragraph.

After filling out a simple registration form and taking a quick tour of the facility, I took a seat at a table and got right to work on my laptop.

The best placement for the sentence is immediately

- A) before sentence 1.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

**32**

- A) NO CHANGE
- B) colleagues;
- C) colleagues,
- D) colleagues

**33**

- A) NO CHANGE
- B) give some wisdom
- C) proclaim our opinions
- D) opine

Questions 34-44 are based on the following passage.

### The Consolations of Philosophy

Long viewed by many as the stereotypical useless major, philosophy is now being seen by many students and prospective employers as in fact a very useful and practical major, offering students a host of transferable skills with relevance to the modern workplace. **34** In broad terms, philosophy is the study of meaning and the values underlying thought and behavior. But **35** more pragmatically, the discipline encourages students to analyze complex material, question conventional beliefs, and express thoughts in a concise manner.

Because philosophy **36** teaching students not what to think but how to think, the age-old discipline offers consistently useful tools for academic and professional achievement. **37** A 1994 survey concluded that only 18 percent of American colleges required at least one philosophy course. **38** Therefore, between 1992 and 1996, more than 400 independent philosophy departments were eliminated from institutions.

**34**

- A) NO CHANGE
- B) For example,
- C) In contrast,
- D) Nevertheless,

**35**

- A) NO CHANGE
- B) speaking in a more pragmatic way,
- C) speaking in a way more pragmatically,
- D) in a more pragmatic-speaking way,

**36**

- A) NO CHANGE
- B) teaches
- C) to teach
- D) and teaching

**37**

Which choice most effectively sets up the information that follows?

- A) Consequently, philosophy students have been receiving an increasing number of job offers.
- B) Therefore, because of the evidence, colleges increased their offerings in philosophy.
- C) Notwithstanding the attractiveness of this course of study, students have resisted majoring in philosophy.
- D) However, despite its many utilitarian benefits, colleges have not always supported the study of philosophy.

**38**

- A) NO CHANGE
- B) Thus,
- C) Moreover,
- D) However,

More recently, colleges have recognized the practicality and increasing popularity of studying philosophy and have markedly increased the number of philosophy programs offered. By 2008 there were 817 programs, up from 765 a decade before. In addition, the number of four-year graduates in philosophy has grown 46 percent in a decade. Also, studies have found that those students who major in philosophy often do better than students from other majors in both verbal reasoning and analytical **39** writing. These results can be measured by standardized test scores. On the Graduate Record Examination (GRE), for example, students intending to study philosophy in graduate school **40** has scored higher than students in all but four other majors.

These days, many **41** student's majoring in philosophy have no intention of becoming philosophers; instead they plan to apply those skills to other disciplines. Law and business specifically benefit from the complicated theoretical issues raised in the study of philosophy, but philosophy can be just as useful in engineering or any field requiring complex analytic skills.

**42** That these skills are transferable across professions

39

Which choice most effectively combines the sentences at the underlined portion?

- A) writing as
- B) writing, and these results can be
- C) writing, which can also be
- D) writing when the results are

40

- A) NO CHANGE
- B) have scored
- C) scores
- D) scoring

41

- A) NO CHANGE
- B) students majoring
- C) students major
- D) student's majors

42

At this point, the writer is considering adding the following sentence.

The ancient Greek philosopher Plato, for example, wrote many of his works in the form of dialogues.

Should the writer make this addition here?

- A) Yes, because it reinforces the passage's main point about the employability of philosophy majors.
- B) Yes, because it acknowledges a common counterargument to the passage's central claim.
- C) No, because it blurs the paragraph's focus by introducing a new idea that goes unexplained.
- D) No, because it undermines the passage's claim about the employability of philosophy majors.

43 which makes them especially beneficial to twenty-first-century students. Because today's students can expect to hold multiple jobs—some of which may not even exist yet—during 44 our lifetime, studying philosophy allows them to be flexible and adaptable. High demand, advanced exam scores, and varied professional skills all argue for maintaining and enhancing philosophy courses and majors within academic institutions.

43

- A) NO CHANGE
- B) that
- C) and
- D) DELETE the underlined portion.

44

- A) NO CHANGE
- B) one's
- C) his or her
- D) their

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

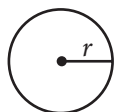
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

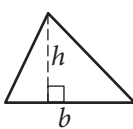


$$A = \pi r^2$$

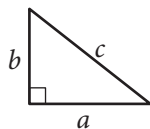
$$C = 2\pi r$$



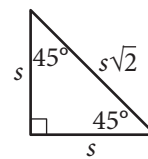
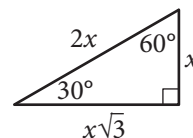
$$A = \ell w$$



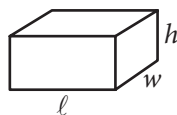
$$A = \frac{1}{2}bh$$



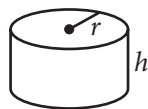
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



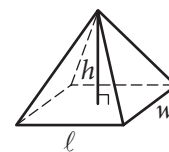
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.





1

If  $\frac{x-1}{3} = k$  and  $k = 3$ , what is the value of  $x$ ?

- A) 2
- B) 4
- C) 9
- D) 10

2

For  $i = \sqrt{-1}$ , what is the sum  $(7 + 3i) + (-8 + 9i)$ ?

- A)  $-1 + 12i$
- B)  $-1 - 6i$
- C)  $15 + 12i$
- D)  $15 - 6i$

3

On Saturday afternoon, Armand sent  $m$  text messages each hour for 5 hours, and Tyrone sent  $p$  text messages each hour for 4 hours. Which of the following represents the total number of messages sent by Armand and Tyrone on Saturday afternoon?

- A)  $9mp$
- B)  $20mp$
- C)  $5m + 4p$
- D)  $4m + 5p$

4

Kathy is a repair technician for a phone company. Each week, she receives a batch of phones that need repairs. The number of phones that she has left to fix at the end of each day can be estimated with the equation  $P = 108 - 23d$ , where  $P$  is the number of phones left and  $d$  is the number of days she has worked that week. What is the meaning of the value 108 in this equation?

- A) Kathy will complete the repairs within 108 days.
- B) Kathy starts each week with 108 phones to fix.
- C) Kathy repairs phones at a rate of 108 per hour.
- D) Kathy repairs phones at a rate of 108 per day.



5

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

Which of the following is equivalent to the expression above?

- A)  $4x^2y^2$
- B)  $8xy^2 - 6y^2$
- C)  $2x^2y + 2xy^2$
- D)  $2x^2y + 8xy^2 - 6y^2$

6

$$h = 3a + 28.6$$

A pediatrician uses the model above to estimate the height  $h$  of a boy, in inches, in terms of the boy's age  $a$ , in years, between the ages of 2 and 5. Based on the model, what is the estimated increase, in inches, of a boy's height each year?

- A) 3
- B) 5.7
- C) 9.5
- D) 14.3

7

$$m = \frac{\left(\frac{r}{1,200}\right)\left(1 + \frac{r}{1,200}\right)^N}{\left(1 + \frac{r}{1,200}\right)^N - 1} P$$

The formula above gives the monthly payment  $m$  needed to pay off a loan of  $P$  dollars at  $r$  percent annual interest over  $N$  months. Which of the following gives  $P$  in terms of  $m$ ,  $r$ , and  $N$ ?

- A)  $P = \frac{\left(\frac{r}{1,200}\right)\left(1 + \frac{r}{1,200}\right)^N}{\left(1 + \frac{r}{1,200}\right)^N - 1} m$
- B)  $P = \frac{\left(1 + \frac{r}{1,200}\right)^N - 1}{\left(\frac{r}{1,200}\right)\left(1 + \frac{r}{1,200}\right)^N} m$
- C)  $P = \left(\frac{r}{1,200}\right) m$
- D)  $P = \left(\frac{1,200}{r}\right) m$



8

If  $\frac{a}{b} = 2$ , what is the value of  $\frac{4b}{a}$  ?

- A) 0
- B) 1
- C) 2
- D) 4

9

$$\begin{aligned} 3x + 4y &= -23 \\ 2y - x &= -19 \end{aligned}$$

What is the solution  $(x, y)$  to the system of equations above?

- A)  $(-5, -2)$
- B)  $(3, -8)$
- C)  $(4, -6)$
- D)  $(9, -6)$

10

$$g(x) = ax^2 + 24$$

For the function  $g$  defined above,  $a$  is a constant and  $g(4) = 8$ . What is the value of  $g(-4)$  ?

- A) 8
- B) 0
- C) -1
- D) -8

11

$$b = 2.35 + 0.25x$$

$$c = 1.75 + 0.40x$$

In the equations above,  $b$  and  $c$  represent the price per pound, in dollars, of beef and chicken, respectively,  $x$  weeks after July 1 during last summer. What was the price per pound of beef when it was equal to the price per pound of chicken?

- A) \$2.60
- B) \$2.85
- C) \$2.95
- D) \$3.35

12

A line in the  $xy$ -plane passes through the origin and has a slope of  $\frac{1}{7}$ . Which of the following points lies on the line?

- A)  $(0, 7)$
- B)  $(1, 7)$
- C)  $(7, 7)$
- D)  $(14, 2)$



13

If  $x > 3$ , which of the following is equivalent

to  $\frac{1}{\frac{1}{x+2} + \frac{1}{x+3}}$  ?

A)  $\frac{2x+5}{x^2+5x+6}$

B)  $\frac{x^2+5x+6}{2x+5}$

C)  $2x+5$

D)  $x^2+5x+6$

14

If  $3x - y = 12$ , what is the value of  $\frac{8^x}{2^y}$  ?

A)  $2^{12}$

B)  $4^4$

C)  $8^2$

D) The value cannot be determined from the information given.

15

If  $(ax+2)(bx+7) = 15x^2 + cx + 14$  for all values of  $x$ , and  $a + b = 8$ , what are the two possible values for  $c$  ?

A) 3 and 5

B) 6 and 35

C) 10 and 21

D) 31 and 41

**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Answer:  $\frac{7}{12}$

	7	/	1	2	
	•	•	•	•	
	0	0	0	0	
1	1	•	1	1	
2	2	2	•	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
•	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

← Fraction line

Grid in result.

Answer: 2.5

	2	.	5	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	•	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	•	
4	4	4	4	
5	5	5	5	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

.	6	6	6	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	2	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	5	
6	•	•	•	
7	7	7	7	
8	8	8	8	
9	9	9	9	

.	6	6	7	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	2	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	5	
6	•	•	•	
7	7	7	•	
8	8	8	8	
9	9	9	9	

Answer: 201 – either position is correct

	2	0	1	
	•	•	•	•
	0	•	0	
1	1	1	•	
2	•	2	2	
3	3	3	3	

	2	0	1	
	•	•	•	•
	•	0	0	
1	1	•	1	
2	•	2	2	
3	3	3	3	

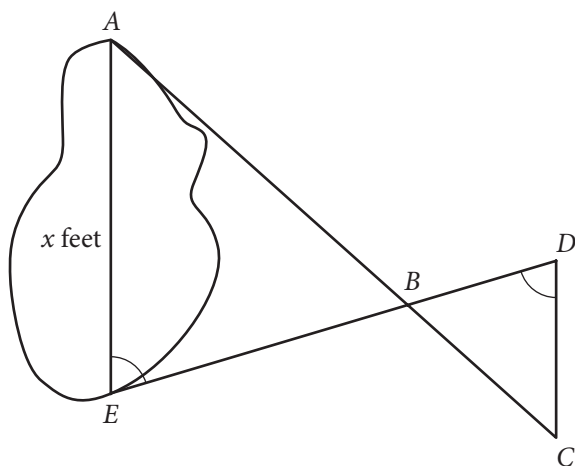
**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

If  $t > 0$  and  $t^2 - 4 = 0$ , what is the value of  $t$  ?

17



A summer camp counselor wants to find a length,  $x$ , in feet, across a lake as represented in the sketch above. The lengths represented by  $AB$ ,  $EB$ ,  $BD$ , and  $CD$  on the sketch were determined to be 1800 feet, 1400 feet, 700 feet, and 800 feet, respectively. Segments  $AC$  and  $DE$  intersect at  $B$ , and  $\angle AEB$  and  $\angle CDB$  have the same measure. What is the value of  $x$  ?

18

$$x + y = -9$$

$$x + 2y = -25$$

According to the system of equations above, what is the value of  $x$  ?

19

In a right triangle, one angle measures  $x^\circ$ , where

$$\sin x^\circ = \frac{4}{5}. \text{ What is } \cos(90^\circ - x^\circ) ?$$

20

If  $a = 5\sqrt{2}$  and  $2a = \sqrt{2x}$ , what is the value of  $x$  ?

# STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

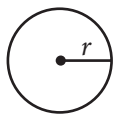
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

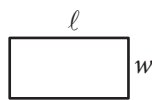
- The use of a calculator **is permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

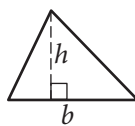


$$A = \pi r^2$$

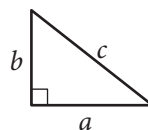
$$C = 2\pi r$$



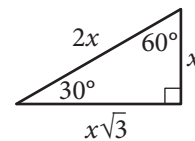
$$A = \ell w$$



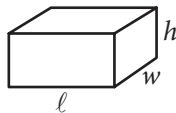
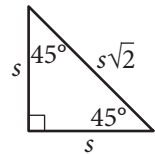
$$A = \frac{1}{2}bh$$



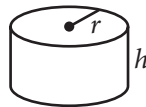
$$c^2 = a^2 + b^2$$



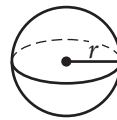
Special Right Triangles



$$V = \ell wh$$



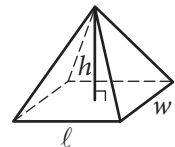
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

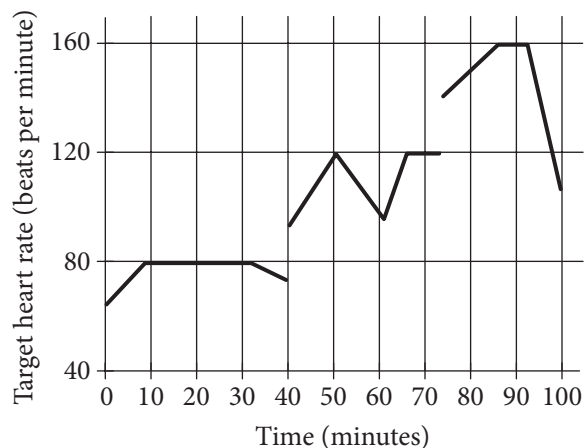
The sum of the measures in degrees of the angles of a triangle is 180.





1

John runs at different speeds as part of his training program. The graph shows his target heart rate at different times during his workout. On which interval is the target heart rate strictly increasing then strictly decreasing?



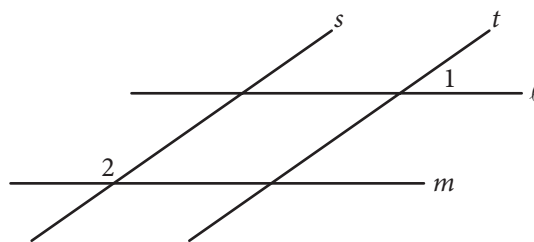
- A) Between 0 and 30 minutes
- B) Between 40 and 60 minutes
- C) Between 50 and 65 minutes
- D) Between 70 and 90 minutes

2

If  $y = kx$ , where  $k$  is a constant, and  $y = 24$  when  $x = 6$ , what is the value of  $y$  when  $x = 5$ ?

- A) 6
- B) 15
- C) 20
- D) 23

3



In the figure above, lines  $l$  and  $m$  are parallel and lines  $s$  and  $t$  are parallel. If the measure of  $\angle 1$  is  $35^\circ$ , what is the measure of  $\angle 2$ ?

- A)  $35^\circ$
- B)  $55^\circ$
- C)  $70^\circ$
- D)  $145^\circ$

4

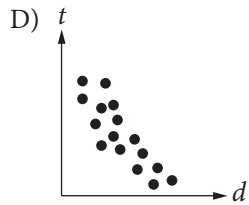
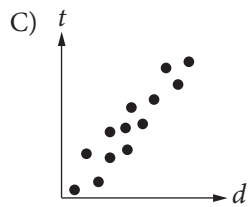
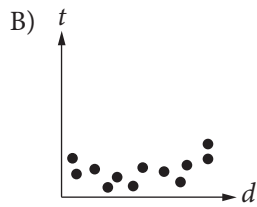
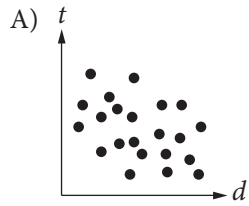
If  $16 + 4x$  is 10 more than 14, what is the value of  $8x$ ?

- A) 2
- B) 6
- C) 16
- D) 80



5

Which of the following graphs best shows a strong negative association between  $d$  and  $t$ ?



6

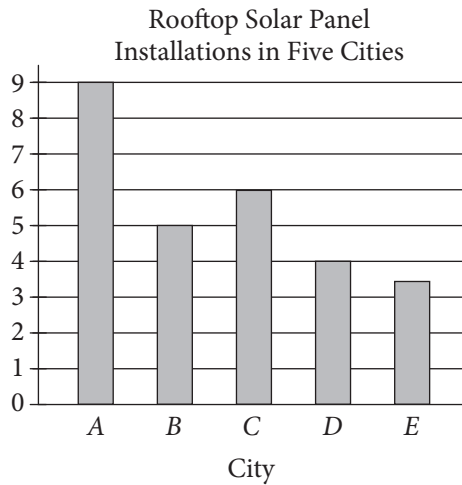
$1 \text{ decagram} = 10 \text{ grams}$ $1,000 \text{ milligrams} = 1 \text{ gram}$
---

A hospital stores one type of medicine in 2-decagram containers. Based on the information given in the box above, how many 1-milligram doses are there in one 2-decagram container?

- A) 0.002
- B) 200
- C) 2,000
- D) 20,000



7



The number of rooftops with solar panel installations in 5 cities is shown in the graph above. If the total number of installations is 27,500, what is an appropriate label for the vertical axis of the graph?

- A) Number of installations (in tens)
- B) Number of installations (in hundreds)
- C) Number of installations (in thousands)
- D) Number of installations (in tens of thousands)

8

For what value of  $n$  is  $|n - 1| + 1$  equal to 0?

- A) 0
- B) 1
- C) 2
- D) There is no such value of  $n$ .



Questions 9 and 10 refer to the following information.

$$a = 1,052 + 1.08t$$

The speed of a sound wave in air depends on the air temperature. The formula above shows the relationship between  $a$ , the speed of a sound wave, in feet per second, and  $t$ , the air temperature, in degrees Fahrenheit ( $^{\circ}\text{F}$ ).

9

Which of the following expresses the air temperature in terms of the speed of a sound wave?

- A)  $t = \frac{a - 1,052}{1.08}$   
 B)  $t = \frac{a + 1,052}{1.08}$   
 C)  $t = \frac{1,052 - a}{1.08}$   
 D)  $t = \frac{1.08}{a + 1,052}$

10

At which of the following air temperatures will the speed of a sound wave be closest to 1,000 feet per second?

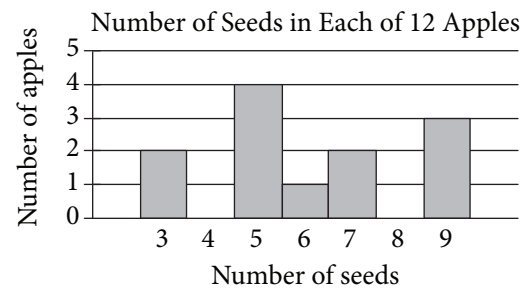
- A)  $-46^{\circ}\text{F}$   
 B)  $-48^{\circ}\text{F}$   
 C)  $-49^{\circ}\text{F}$   
 D)  $-50^{\circ}\text{F}$

11

Which of the following numbers is NOT a solution of the inequality  $3x - 5 \geq 4x - 3$  ?

- A)  $-1$   
 B)  $-2$   
 C)  $-3$   
 D)  $-5$

12



Based on the histogram above, of the following, which is closest to the average (arithmetic mean) number of seeds per apple?

- A) 4  
 B) 5  
 C) 6  
 D) 7



13

		Course			Total
		Algebra I	Geometry	Algebra II	
Gender	Female	35	53	62	150
	Male	44	59	57	160
	Total	79	112	119	310

A group of tenth-grade students responded to a survey that asked which math course they were currently enrolled in. The survey data were broken down as shown in the table above. Which of the following categories accounts for approximately 19 percent of all the survey respondents?

- A) Females taking Geometry
- B) Females taking Algebra II
- C) Males taking Geometry
- D) Males taking Algebra I

14

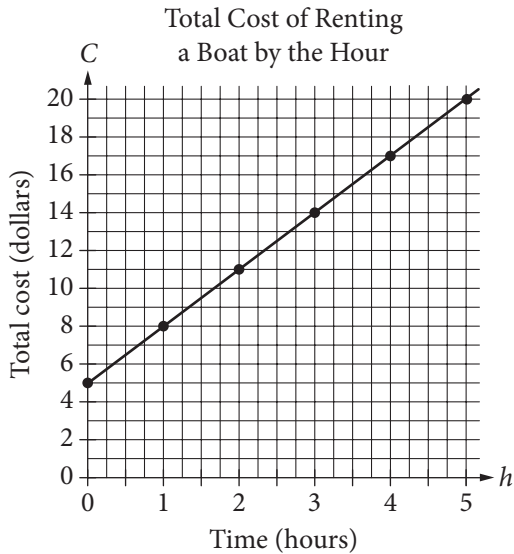
Lengths of Fish (in inches)						
8	9	9	9	10	10	11
11	12	12	12	12	13	13
13	14	14	15	15	16	24

The table above lists the lengths, to the nearest inch, of a random sample of 21 brown bullhead fish. The outlier measurement of 24 inches is an error. Of the mean, median, and range of the values listed, which will change the most if the 24-inch measurement is removed from the data?

- A) Mean
- B) Median
- C) Range
- D) They will all change by the same amount.



Questions 15 and 16 refer to the following information.



The graph above displays the total cost  $C$ , in dollars, of renting a boat for  $h$  hours.

15

What does the  $C$ -intercept represent in the graph?

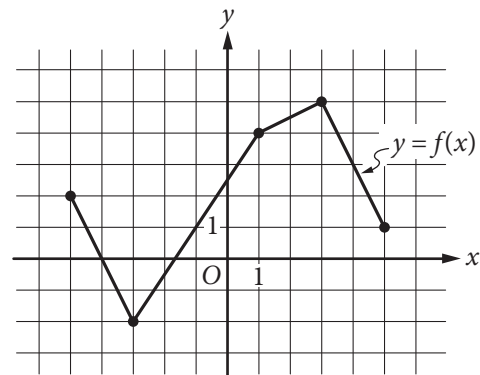
- A) The initial cost of renting the boat
- B) The total number of boats rented
- C) The total number of hours the boat is rented
- D) The increase in cost to rent the boat for each additional hour

16

Which of the following represents the relationship between  $h$  and  $C$ ?

- A)  $C = 5h$
- B)  $C = \frac{3}{4}h + 5$
- C)  $C = 3h + 5$
- D)  $h = 3C$

17



The complete graph of the function  $f$  is shown in the  $xy$ -plane above. For what value of  $x$  is the value of  $f(x)$  at its minimum?

- A)  $-5$
- B)  $-3$
- C)  $-2$
- D)  $3$



18

$$y < -x + a$$

$$y > x + b$$

In the  $xy$ -plane, if  $(0, 0)$  is a solution to the system of inequalities above, which of the following relationships between  $a$  and  $b$  must be true?

- A)  $a > b$
- B)  $b > a$
- C)  $|a| > |b|$
- D)  $a = -b$

19

A food truck sells salads for \$6.50 each and drinks for \$2.00 each. The food truck's revenue from selling a total of 209 salads and drinks in one day was \$836.50. How many salads were sold that day?

- A) 77
- B) 93
- C) 99
- D) 105



20

Alma bought a laptop computer at a store that gave a 20 percent discount off its original price. The total amount she paid to the cashier was  $p$  dollars, including an 8 percent sales tax on the discounted price. Which of the following represents the original price of the computer in terms of  $p$  ?

- A)  $0.88p$
- B)  $\frac{p}{0.88}$
- C)  $(0.8)(1.08)p$
- D)  $\frac{p}{(0.8)(1.08)}$

21

Dreams Recalled during One Week

	None	1 to 4	5 or more	Total
Group X	15	28	57	100
Group Y	21	11	68	100
Total	36	39	125	200

The data in the table above were produced by a sleep researcher studying the number of dreams people recall when asked to record their dreams for one week. Group X consisted of 100 people who observed early bedtimes, and Group Y consisted of 100 people who observed later bedtimes. If a person is chosen at random from those who recalled at least 1 dream, what is the probability that the person belonged to Group Y ?

- A)  $\frac{68}{100}$
- B)  $\frac{79}{100}$
- C)  $\frac{79}{164}$
- D)  $\frac{164}{200}$





Questions 22 and 23 refer to the following information.

Annual Budgets for Different Programs in Kansas, 2007 to 2010

Program	Year			
	2007	2008	2009	2010
Agriculture/natural resources	373,904	358,708	485,807	488,106
Education	2,164,607	2,413,984	2,274,514	3,008,036
General government	14,347,325	12,554,845	10,392,107	14,716,155
Highways and transportation	1,468,482	1,665,636	1,539,480	1,773,893
Human resources	4,051,050	4,099,067	4,618,444	5,921,379
Public safety	263,463	398,326	355,935	464,233

The table above lists the annual budget, in thousands of dollars, for each of six different state programs in Kansas from 2007 to 2010.

22

Which of the following best approximates the average rate of change in the annual budget for agriculture/natural resources in Kansas from 2008 to 2010 ?

- A) \$50,000,000 per year
- B) \$65,000,000 per year
- C) \$75,000,000 per year
- D) \$130,000,000 per year

23

Of the following, which program's ratio of its 2007 budget to its 2010 budget is closest to the human resources program's ratio of its 2007 budget to its 2010 budget?

- A) Agriculture/natural resources
- B) Education
- C) Highways and transportation
- D) Public safety



24

Which of the following is an equation of a circle in the  $xy$ -plane with center  $(0, 4)$  and a radius with endpoint  $\left(\frac{4}{3}, 5\right)$ ?

- A)  $x^2 + (y - 4)^2 = \frac{25}{9}$
- B)  $x^2 + (y + 4)^2 = \frac{25}{9}$
- C)  $x^2 + (y - 4)^2 = \frac{5}{3}$
- D)  $x^2 + (y + 4)^2 = \frac{3}{5}$

25

$$h = -4.9t^2 + 25t$$

The equation above expresses the approximate height  $h$ , in meters, of a ball  $t$  seconds after it is launched vertically upward from the ground with an initial velocity of 25 meters per second. After approximately how many seconds will the ball hit the ground?

- A) 3.5
- B) 4.0
- C) 4.5
- D) 5.0

26

Katarina is a botanist studying the production of pears by two types of pear trees. She noticed that Type A trees produced 20 percent more pears than Type B trees did. Based on Katarina's observation, if the Type A trees produced 144 pears, how many pears did the Type B trees produce?

- A) 115
- B) 120
- C) 124
- D) 173

27

A square field measures 10 meters by 10 meters. Ten students each mark off a randomly selected region of the field; each region is square and has side lengths of 1 meter, and no two regions overlap. The students count the earthworms contained in the soil to a depth of 5 centimeters beneath the ground's surface in each region. The results are shown in the table below.

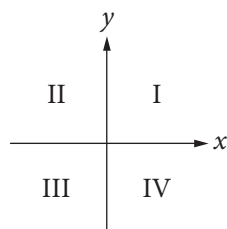
Region	Number of earthworms	Region	Number of earthworms
A	107	F	141
B	147	G	150
C	146	H	154
D	135	I	176
E	149	J	166

Which of the following is a reasonable approximation of the number of earthworms to a depth of 5 centimeters beneath the ground's surface in the entire field?

- A) 150
- B) 1,500
- C) 15,000
- D) 150,000



28



If the system of inequalities  $y \geq 2x + 1$  and  $y > \frac{1}{2}x - 1$  is graphed in the  $xy$ -plane above, which quadrant contains no solutions to the system?

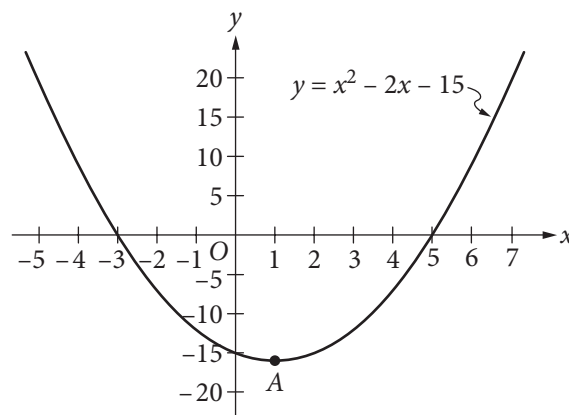
- A) Quadrant II
- B) Quadrant III
- C) Quadrant IV
- D) There are solutions in all four quadrants.

29

For a polynomial  $p(x)$ , the value of  $p(3)$  is  $-2$ . Which of the following must be true about  $p(x)$  ?

- A)  $x - 5$  is a factor of  $p(x)$ .
- B)  $x - 2$  is a factor of  $p(x)$ .
- C)  $x + 2$  is a factor of  $p(x)$ .
- D) The remainder when  $p(x)$  is divided by  $x - 3$  is  $-2$ .

30



Which of the following is an equivalent form of the equation of the graph shown in the  $xy$ -plane above, from which the coordinates of vertex  $A$  can be identified as constants in the equation?

- A)  $y = (x + 3)(x - 5)$
- B)  $y = (x - 3)(x + 5)$
- C)  $y = x(x - 2) - 15$
- D)  $y = (x - 1)^2 - 16$


**DIRECTIONS**

For questions 31–38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
•	•	•	•

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

← Fraction line

← Decimal point

Grid in result.

Answer: $\frac{7}{12}$			
7	/	1	2
•	•	•	•
0	0	0	0
1	1	•	1
2	2	2	•
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
•	7	7	7
8	8	8	8
9	9	9	9

Answer: 2.5			
2	.	5	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	3
4	4	4	4
5	5	5	•
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Acceptable ways to grid  $\frac{2}{3}$  are:

2	/	3	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	•
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•
7	7	7	•
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

2	0	1	
•	•	•	•
0	•	0	0
1	1	1	•
2	•	2	2
3	3	3	3

2	0	1	
•	•	•	•
•	•	0	0
1	1	•	1
2	2	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

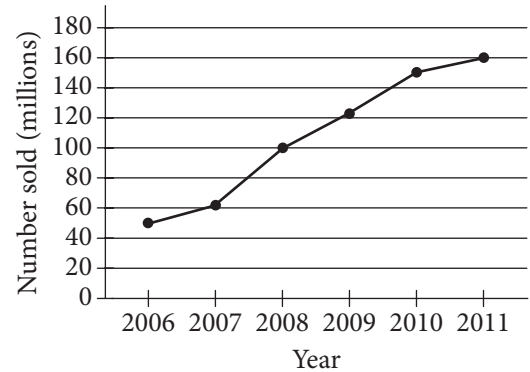
Wyatt can husk at least 12 dozen ears of corn per hour and at most 18 dozen ears of corn per hour. Based on this information, what is a possible amount of time, in hours, that it could take Wyatt to husk 72 dozen ears of corn?

32

The posted weight limit for a covered wooden bridge in Pennsylvania is 6000 pounds. A delivery truck that is carrying  $x$  identical boxes each weighing 14 pounds will pass over the bridge. If the combined weight of the empty delivery truck and its driver is 4500 pounds, what is the maximum possible value for  $x$  that will keep the combined weight of the truck, driver, and boxes below the bridge's posted weight limit?

33

Number of Portable Media Players Sold Worldwide Each Year from 2006 to 2011



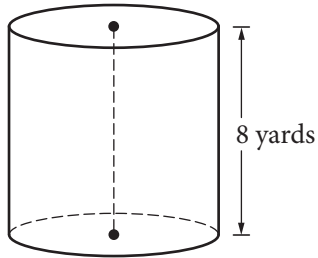
According to the line graph above, the number of portable media players sold in 2008 is what fraction of the number sold in 2011?

34

A local television station sells time slots for programs in 30-minute intervals. If the station operates 24 hours per day, every day of the week, what is the total number of 30-minute time slots the station can sell for Tuesday and Wednesday?



35



A dairy farmer uses a storage silo that is in the shape of the right circular cylinder above. If the volume of the silo is  $72\pi$  cubic yards, what is the diameter of the base of the cylinder, in yards?

36

$$h(x) = \frac{1}{(x-5)^2 + 4(x-5) + 4}$$

For what value of  $x$  is the function  $h$  above undefined?

**Questions 37 and 38 refer to the following information.**

Jessica opened a bank account that earns 2 percent interest compounded annually. Her initial deposit was \$100, and she uses the expression  $\$100(x)^t$  to find the value of the account after  $t$  years.

37

What is the value of  $x$  in the expression?

38

Jessica's friend Tyshaun found an account that earns 2.5 percent interest compounded annually. Tyshaun made an initial deposit of \$100 into this account at the same time Jessica made a deposit of \$100 into her account. After 10 years, how much more money will Tyshaun's initial deposit have earned than Jessica's initial deposit? (Round your answer to the nearest cent and ignore the dollar sign when gridding your response.)

# STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

# Scoring Your SAT<sup>®</sup> Practice Test #1

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide additional diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Keisha answered 29 of the 52 questions correctly on the SAT Reading Test and 20 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, she calculates that she received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. She adds 27 to 23 (gets 50) and then multiplies by 10 to determine her SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.



## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1; 3-4; 6; 9; 11-12; 18
- ▶ Math Test – Calculator: Questions 4; 8; 10-11; 15-16; 18-19; 28; 31-32

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 1-2; 5-7; 12-14; 17; 20-23; 26-27; 33-34

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 5; 7-8; 10; 13-16; 20
- ▶ Math Test – Calculator: Questions 9; 25; 29-30; 36-38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1-2; 5-6; 9-10; 12-14; 20-23; 27-29; 31; 33-35; 37-39; 42Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 3-4; 7-8; 11; 15-19; 24-26; 30; 32; 36; 40-41; 43-44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 3; 8; 12; 18; 22; 27; 34; 40; 45; 48
  - ▶ Writing and Language Test: Questions 1; 10; 13; 21; 23; 33; 35; 39Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 5; 10; 14; 17; 19; 23; 28-29; 37; 39
  - ▶ Writing and Language Test: Questions 2; 6; 12; 20; 28-29; 37; 42Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.

## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11-21; 32-41
- ▶ Writing and Language Test: Questions 1-2; 5-6; 9-10
- ▶ Math Test – No Calculator: Questions 7, 11
- ▶ Math Test – Calculator: Questions 7; 22-23; 33; 37-38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 22-31; 42-52
- ▶ Writing and Language Test: Questions 12-14; 20-22
- ▶ Math Test – No Calculator: Question 6
- ▶ Math Test – Calculator: Questions 6; 9; 14; 21; 25-27

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores to determine your Analysis in Science cross-test score.

# SAT Practice Test #1: Worksheets

## ANSWER KEY

### Reading Test Answers

1 B	12 B	23 D	34 C	45 D
2 B	13 D	24 D	35 B	46 C
3 C	14 A	25 C	36 D	47 B
4 A	15 A	26 B	37 C	48 A
5 C	16 C	27 D	38 C	49 D
6 D	17 C	28 C	39 B	50 B
7 D	18 D	29 A	40 C	51 D
8 B	19 A	30 A	41 B	52 A
9 C	20 B	31 D	42 B	
10 B	21 A	32 B	43 A	
11 A	22 B	33 A	44 A	

READING TEST  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Writing and Language Test Answers

1 D	12 B	23 D	34 A
2 B	13 A	24 D	35 A
3 A	14 B	25 B	36 B
4 C	15 C	26 A	37 D
5 C	16 C	27 B	38 C
6 D	17 C	28 C	39 A
7 B	18 A	29 B	40 B
8 C	19 D	30 D	41 B
9 A	20 D	31 C	42 C
10 A	21 B	32 A	43 D
11 B	22 D	33 A	44 D

WRITING AND  
 LANGUAGE TEST  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Math Test No Calculator Answers

1 D	11 D
2 A	12 D
3 C	13 B
4 B	14 A
5 C	15 D
6 A	16 2
7 B	17 1600
8 C	18 7
9 B	19 $\frac{4}{5}$ or 0.8
10 A	20 100

MATH TEST  
 NO CALCULATOR  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Math Test Calculator Answers

1 B	11 A	21 C	31 Any number between 4-6, inclusive
2 C	12 C	22 B	32 107
3 D	13 C	23 B	33 $\frac{5}{8}$ or 0.625
4 C	14 C	24 A	34 96
5 D	15 A	25 D	35 6
6 D	16 C	26 B	36 3
7 C	17 B	27 C	37 1.02
8 D	18 A	28 C	38 6.11
9 A	19 B	29 D	
10 B	20 D	30 D	

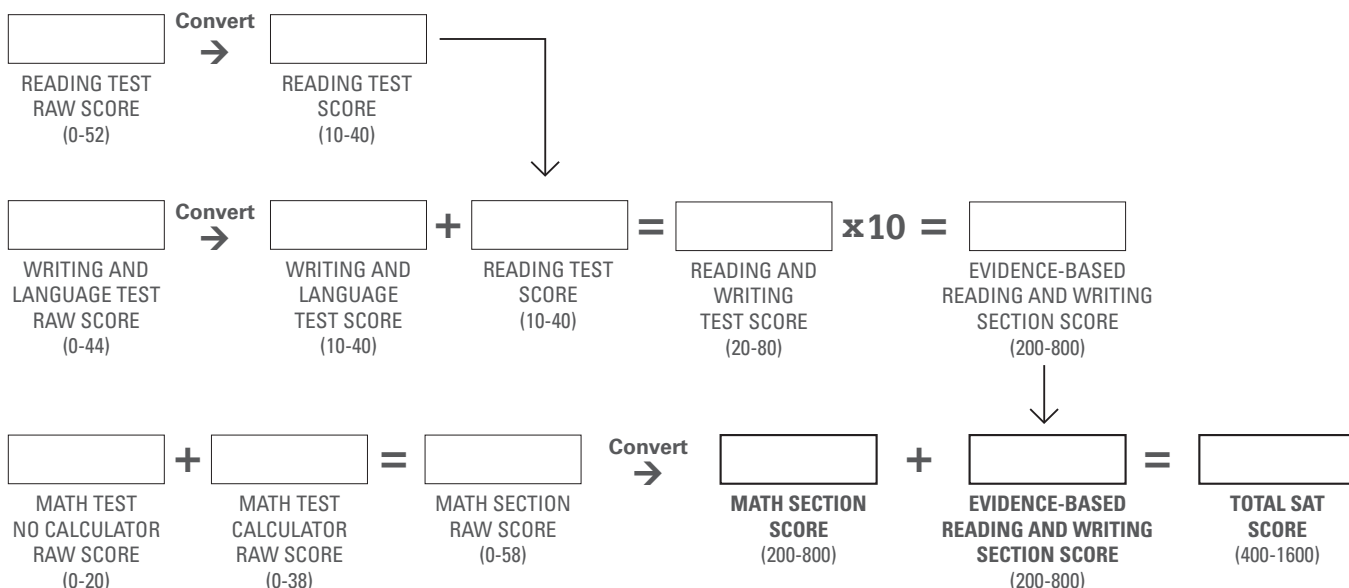
MATH TEST  
 CALCULATOR  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

# SAT Practice Test #1: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	530	28	29
1	200	10	10	31	540	28	30
2	210	10	10	32	550	29	30
3	230	11	10	33	560	29	31
4	240	12	11	34	560	30	32
5	260	13	12	35	570	30	32
6	280	14	13	36	580	31	33
7	290	15	13	37	590	31	34
8	310	15	14	38	600	32	34
9	320	16	15	39	600	32	35
10	330	17	16	40	610	33	36
11	340	17	16	41	620	33	37
12	360	18	17	42	630	34	38
13	370	19	18	43	640	35	39
14	380	19	19	44	650	35	40
15	390	20	19	45	660	36	
16	410	20	20	46	670	37	
17	420	21	21	47	670	37	
18	430	21	21	48	680	38	
19	440	22	22	49	690	38	
20	450	22	23	50	700	39	
21	460	23	23	51	710	40	
22	470	23	24	52	730	40	
23	480	24	25	53	740		
24	480	24	25	54	750		
25	490	25	26	55	760		
26	500	25	26	56	780		
27	510	26	27	57	790		
28	520	26	28	58	800		
29	520	27	28				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES

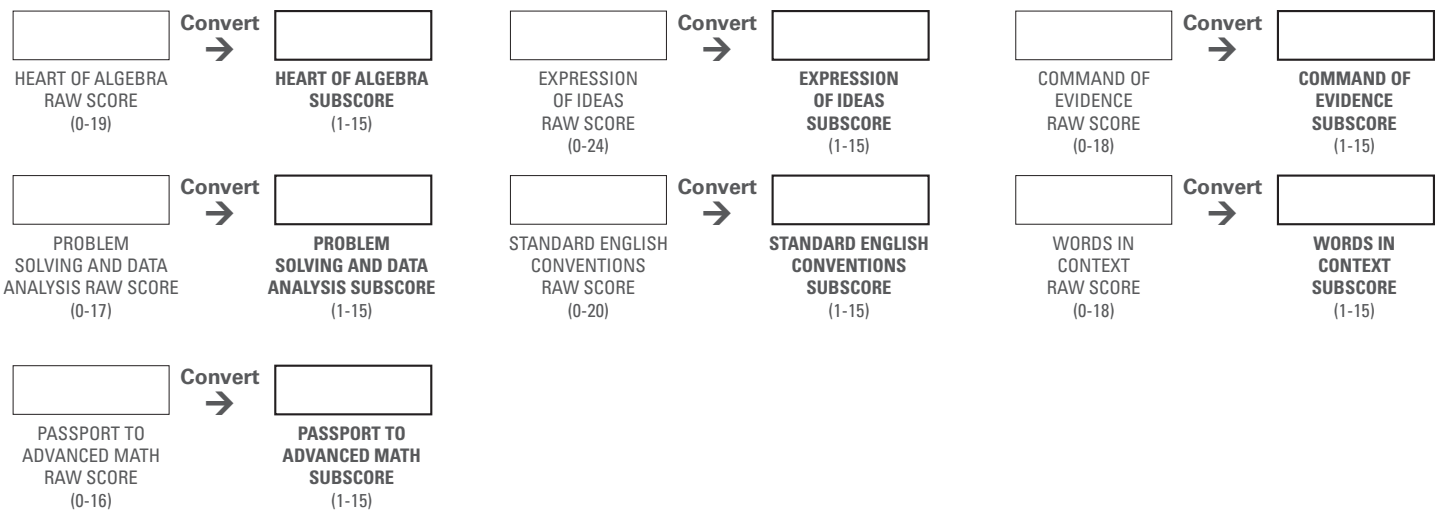


# SAT Practice Test #1: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	1	1	3	1	1
2	1	1	2	2	5	2	2
3	2	2	3	3	6	3	3
4	3	2	4	4	7	4	4
5	4	3	5	5	8	5	5
6	5	4	6	6	9	6	6
7	6	5	6	7	10	6	7
8	6	6	7	8	11	7	8
9	7	6	8	8	11	8	8
10	7	7	8	9	12	8	9
11	8	7	9	10	12	9	10
12	8	8	9	10	13	9	10
13	9	8	9	11	13	10	11
14	9	9	10	12	14	11	12
15	10	10	10	13	14	12	13
16	10	10	11	14	15	13	14
17	11	11	12	15		14	15
18	11	12	13			15	15
19	12	13	15				
20	12	15					
21	13						
22	14						
23	14						
24	15						

## CONVERSION EQUATION 2 SUBSCORES



# SAT Practice Test #1: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	28	26
1	10	11	19	29	27
2	11	12	20	30	27
3	12	13	21	30	28
4	14	14	22	31	29
5	15	15	23	32	30
6	16	16	24	32	30
7	17	17	25	33	31
8	18	18	26	34	32
9	20	19	27	35	33
10	21	20	28	35	33
11	22	20	29	36	34
12	23	21	30	37	35
13	24	22	31	38	36
14	25	23	32	38	37
15	26	24	33	39	38
16	27	24	34	40	39
17	28	25	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11-21; 32-41		22-31; 42-52	
Writing and Language Test	1-2; 5-6; 9-10		12-14; 20-22	
Math Test No Calculator	7, 11		6	
Math Test Calculator	7; 22-23; 33; 37-38		6; 9; 14; 21; 25-27	
Total				



# Exam 5



# SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○	27	A B C D	○ ○ ○ ○	40	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○	28	A B C D	○ ○ ○ ○	41	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	16	A B C D	○ ○ ○ ○	29	A B C D	○ ○ ○ ○	42	A B C D	○ ○ ○ ○
4	A B C D	○ ○ ○ ○	17	A B C D	○ ○ ○ ○	30	A B C D	○ ○ ○ ○	43	A B C D	○ ○ ○ ○
5	A B C D	○ ○ ○ ○	18	A B C D	○ ○ ○ ○	31	A B C D	○ ○ ○ ○	44	A B C D	○ ○ ○ ○
6	A B C D	○ ○ ○ ○	19	A B C D	○ ○ ○ ○	32	A B C D	○ ○ ○ ○	45	A B C D	○ ○ ○ ○
7	A B C D	○ ○ ○ ○	20	A B C D	○ ○ ○ ○	33	A B C D	○ ○ ○ ○	46	A B C D	○ ○ ○ ○
8	A B C D	○ ○ ○ ○	21	A B C D	○ ○ ○ ○	34	A B C D	○ ○ ○ ○	47	A B C D	○ ○ ○ ○
9	A B C D	○ ○ ○ ○	22	A B C D	○ ○ ○ ○	35	A B C D	○ ○ ○ ○	48	A B C D	○ ○ ○ ○
10	A B C D	○ ○ ○ ○	23	A B C D	○ ○ ○ ○	36	A B C D	○ ○ ○ ○	49	A B C D	○ ○ ○ ○
11	A B C D	○ ○ ○ ○	24	A B C D	○ ○ ○ ○	37	A B C D	○ ○ ○ ○	50	A B C D	○ ○ ○ ○
12	A B C D	○ ○ ○ ○	25	A B C D	○ ○ ○ ○	38	A B C D	○ ○ ○ ○	51	A B C D	○ ○ ○ ○
13	A B C D	○ ○ ○ ○	26	A B C D	○ ○ ○ ○	39	A B C D	○ ○ ○ ○	52	A B C D	○ ○ ○ ○



### SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 2

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○

**NO CALCULATOR ALLOWED**



## SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF  
INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

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#### SECTION 4 (Continued)

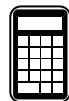
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<p><b>31</b></p> <table border="1" style="width: 100px; height: 20px; margin-bottom: 5px;"></table> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>32</b></p> <table border="1" style="width: 100px; height: 20px; margin-bottom: 5px;"></table> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>33</b></p> <table border="1" style="width: 100px; height: 20px; margin-bottom: 5px;"></table> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>34</b></p> <table border="1" style="width: 100px; height: 20px; margin-bottom: 5px;"></table> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>35</b></p> <table border="1" style="width: 100px; height: 20px; margin-bottom: 5px;"></table> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>
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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**CALCULATOR ALLOWED**



**Test begins on the next page.**

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is from Charlotte Brontë, *The Professor*, originally published in 1857.

No man likes to acknowledge that he has made a mistake in the choice of his profession, and every man, worthy of the name, will row long against wind and tide before he allows himself to cry out, “I am baffled!” and submits to be floated passively back to land. From the first week of my residence in X—I felt my occupation irksome. The thing itself—the work of copying and translating business-letters—was a dry and tedious task enough, but had that been all, I should long have borne with the nuisance; I am not of an impatient nature, and influenced by the double desire of getting my living and justifying to myself and others the resolution I had taken to become a tradesman, I should have endured in silence the rust and cramp of my best faculties; I should not have whispered, even inwardly, that I longed for liberty; I should have pent in every sigh by which my heart might have ventured to intimate its distress under the closeness, smoke, monotony, and joyless tumult of Bigben Close, and its panting desire for freer and fresher scenes; I should have set up the image of Duty, the fetish of Perseverance, in my small bedroom at Mrs. King’s lodgings, and they two should have been my household gods, from which

my darling, my cherished-in-secret, Imagination, the tender and the mighty, should never, either by softness or strength, have severed me. But this was not all; the antipathy which had sprung up between myself and my employer striking deeper root and spreading denser shade daily, excluded me from every glimpse of the sunshine of life; and I began to feel like a plant growing in humid darkness out of the slimy walls of a well.

Antipathy is the only word which can express the feeling Edward Crimsworth had for me—a feeling, in a great measure, involuntary, and which was liable to be excited by every, the most trifling movement, look, or word of mine. My southern accent annoyed him; the degree of education evinced in my language irritated him; my punctuality, industry, and accuracy, fixed his dislike, and gave it the high flavour and poignant relish of envy; he feared that I too should one day make a successful tradesman. Had I been in anything inferior to him, he would not have hated me so thoroughly, but I knew all that he knew, and, what was worse, he suspected that I kept the padlock of silence on mental wealth in which he was no sharer. If he could have once placed me in a ridiculous or mortifying position, he would have forgiven me much, but I was guarded by three faculties—Caution, Tact, Observation; and prowling and prying as was Edward’s malignity, it could never baffle the lynx-eyes of these, my natural sentinels. Day by day did his malice watch my tact, hoping it would sleep, and prepared to steal snake-like on its slumber; but tact, if it be genuine, never sleeps.

I had received my first quarter's wages, and was returning to my lodgings, possessed heart and soul with the pleasant feeling that the master who had paid me grudged every penny of that hard-earned pittance—I had long ceased to regard Mr. Crimsworth as my brother—he was a hard, grinding master; he wished to be an inexorable tyrant: that was all). Thoughts, not varied but strong, occupied my mind; two voices spoke within me; again and again they uttered the same monotonous phrases. One said: "William, your life is intolerable." The other: "What can you do to alter it?" I walked fast, for it was a cold, frosty night in January; as I approached my lodgings, I turned from a general view of my affairs to the particular speculation as to whether my fire would be out; looking towards the window of my sitting-room, I saw no cheering red gleam.

1

Which choice best summarizes the passage?

- A) A character describes his dislike for his new job and considers the reasons why.
- B) Two characters employed in the same office become increasingly competitive.
- C) A young man regrets privately a choice that he defends publicly.
- D) A new employee experiences optimism, then frustration, and finally despair.

2

The main purpose of the opening sentence of the passage is to

- A) establish the narrator's perspective on a controversy.
- B) provide context useful in understanding the narrator's emotional state.
- C) offer a symbolic representation of Edward Crimsworth's plight.
- D) contrast the narrator's good intentions with his malicious conduct.

3

During the course of the first paragraph, the narrator's focus shifts from

- A) recollection of past confidence to acknowledgment of present self-doubt.
- B) reflection on his expectations of life as a tradesman to his desire for another job.
- C) generalization about job dissatisfaction to the specifics of his own situation.
- D) evaluation of factors making him unhappy to identification of alternatives.

4

The references to "shade" and "darkness" at the end of the first paragraph mainly have which effect?

- A) They evoke the narrator's sense of dismay.
- B) They reflect the narrator's sinister thoughts.
- C) They capture the narrator's fear of confinement.
- D) They reveal the narrator's longing for rest.

5

The passage indicates that Edward Crimsworth's behavior was mainly caused by his

- A) impatience with the narrator's high spirits.
- B) scorn of the narrator's humble background.
- C) indignation at the narrator's rash actions.
- D) jealousy of the narrator's apparent superiority.

6

The passage indicates that when the narrator began working for Edward Crimsworth, he viewed Crimsworth as a

- A) harmless rival.
- B) sympathetic ally.
- C) perceptive judge.
- D) demanding mentor.



7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 28-31 (“the antipathy . . . life”)
- B) Lines 38-40 (“My southern . . . irritated him”)
- C) Lines 54-56 (“Day . . . slumber”)
- D) Lines 61-62 (“I had . . . brother”)

8

At the end of the second paragraph, the comparisons of abstract qualities to a lynx and a snake mainly have the effect of

- A) contrasting two hypothetical courses of action.
- B) conveying the ferocity of a resolution.
- C) suggesting the likelihood of an altercation.
- D) illustrating the nature of an adversarial relationship.

9

The passage indicates that, after a long day of work, the narrator sometimes found his living quarters to be

- A) treacherous.
- B) dreary.
- C) predictable.
- D) intolerable.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 17-21 (“I should . . . scenes”)
- B) Lines 21-23 (“I should . . . lodgings”)
- C) Lines 64-67 (“Thoughts . . . phrases”)
- D) Lines 68-74 (“I walked . . . gleam”)

**Questions 11-21 are based on the following passage and supplementary material.**

This passage is adapted from Iain King, “Can Economics Be Ethical?” ©2013 by Prospect Publishing.

Recent debates about the economy have rediscovered the question, “is that right?”, where “right” means more than just profits or efficiency.

Line Some argue that because the free markets allow  
5 for personal choice, they are already ethical. Others have accepted the ethical critique and embraced corporate social responsibility. But before we can label any market outcome as “immoral,” or sneer at economists who try to put a price on being ethical,  
10 we need to be clear on what we are talking about.

There are different views on where ethics should apply when someone makes an economic decision. Consider Adam Smith, widely regarded as the founder of modern economics. He was a moral  
15 philosopher who believed sympathy for others was the basis for ethics (we would call it empathy nowadays). But one of his key insights in *The Wealth of Nations* was that acting on this empathy could be counter-productive—he observed people becoming  
20 better off when they put their own empathy aside, and interacted in a self-interested way. Smith justifies selfish behavior by the outcome. Whenever planners use cost-benefit analysis to justify a new railway line, or someone restrains to boost his or her earning  
25 power, or a shopper buys one to get one free, they are using the same approach: empathizing with someone, and seeking an outcome that makes that person as well off as possible—although the person they are empathizing with may be themselves in the  
30 future.

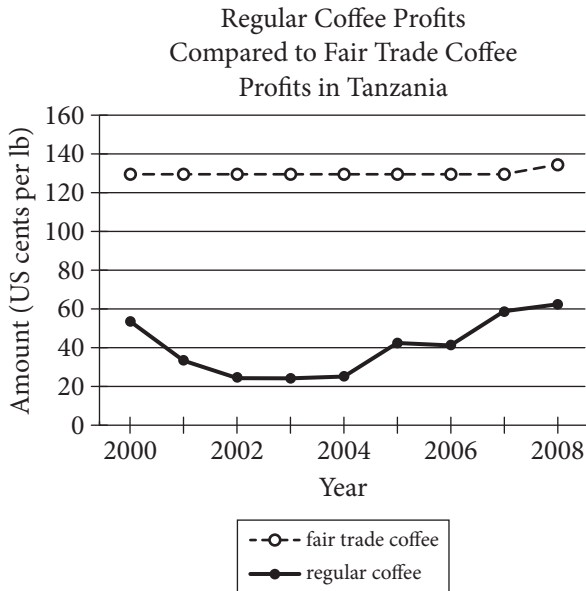
Instead of judging consequences, Aristotle said ethics was about having the right character—displaying virtues like courage and honesty. It is a view put into practice whenever  
35 business leaders are chosen for their good character. But it is a hard philosophy to teach—just how much loyalty should you show to a manufacturer that keeps losing money? Show too little and you’re a “greed is good” corporate raider; too much and you’re wasting  
40 money on unproductive capital. Aristotle thought there was a golden mean between the two extremes, and finding it was a matter of fine judgment. But if ethics is about character, it’s not clear what those characteristics should be.

45 There is yet another approach: instead of rooting ethics in character or the consequences of actions, we can focus on our actions themselves. From this perspective some things are right, some wrong—we should buy fair trade goods, we shouldn’t tell lies in  
50 advertisements. Ethics becomes a list of commandments, a catalog of “dos” and “don’ts.” When a finance official refuses to devalue a currency because they have promised not to, they are defining ethics this way. According to this approach  
55 devaluation can still be bad, even if it would make everybody better off.

Many moral dilemmas arise when these three versions pull in different directions but clashes are not inevitable. Take fair trade coffee (coffee that is  
60 sold with a certification that indicates the farmers and workers who produced it were paid a fair wage), for example: buying it might have good consequences, be virtuous, and also be the right way to act in a flawed market. Common ground like this  
65 suggests that, even without agreement on where ethics applies, ethical economics is still possible.

Whenever we feel queasy about “perfect” competitive markets, the problem is often rooted in a phony conception of people. The model of man on  
70 which classical economics is based—an entirely rational and selfish being—is a parody, as John Stuart Mill, the philosopher who pioneered the model, accepted. Most people—even economists—now accept that this “economic man” is a fiction.  
75 We behave like a herd; we fear losses more than we hope for gains; rarely can our brains process all the relevant facts.

These human quirks mean we can never make purely “rational” decisions. A new wave of behavioral  
80 economists, aided by neuroscientists, is trying to understand our psychology, both alone and in groups, so they can anticipate our decisions in the marketplace more accurately. But psychology can also help us understand why we react in disgust at  
85 economic injustice, or accept a moral law as universal. Which means that the relatively new science of human behavior might also define ethics for us. Ethical economics would then emerge from one of the least likely places: economists themselves.



Adapted from the Fair Trade Vancouver website.

11

The main purpose of the passage is to

- A) consider an ethical dilemma posed by cost-benefit analysis.
- B) describe a psychology study of ethical economic behavior.
- C) argue that the free market prohibits ethical economics.
- D) examine ways of evaluating the ethics of economics.

12

In the passage, the author anticipates which of the following objections to criticizing the ethics of free markets?

- A) Smith's association of free markets with ethical behavior still applies today.
- B) Free markets are the best way to generate high profits, so ethics are a secondary consideration.
- C) Free markets are ethical because they are made possible by devalued currency.
- D) Free markets are ethical because they enable individuals to make choices.

13

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 4-5 ("Some . . . ethical")
- B) Lines 7-10 ("But . . . about")
- C) Lines 21-22 ("Smith . . . outcome")
- D) Lines 52-54 ("When . . . way")

14

As used in line 6, “embraced” most nearly means

- A) lovingly held.
- B) readily adopted.
- C) eagerly hugged.
- D) reluctantly used.

15

The main purpose of the fifth paragraph (lines 45-56) is to

- A) develop a counterargument to the claim that greed is good.
- B) provide support for the idea that ethics is about character.
- C) describe a third approach to defining ethical economics.
- D) illustrate that one’s actions are a result of one’s character.

16

As used in line 58, “clashes” most nearly means

- A) conflicts.
- B) mismatches.
- C) collisions.
- D) brawls.

17

Which choice best supports the author’s claim that there is common ground shared by the different approaches to ethics described in the passage?

- A) Lines 11-12 (“There . . . decision”)
- B) Lines 47-50 (“From . . . advertisements”)
- C) Lines 59-64 (“Take . . . market”)
- D) Lines 75-77 (“We . . . facts”)

18

The main idea of the final paragraph is that

- A) human quirks make it difficult to predict people’s ethical decisions accurately.
- B) people universally react with disgust when faced with economic injustice.
- C) understanding human psychology may help to define ethics in economics.
- D) economists themselves will be responsible for reforming the free market.

19

Data in the graph about per-pound coffee profits in Tanzania most strongly support which of the following statements?

- A) Fair trade coffee consistently earned greater profits than regular coffee earned.
- B) The profits earned from regular coffee did not fluctuate.
- C) Fair trade coffee profits increased between 2004 and 2006.
- D) Fair trade and regular coffee were earning equal profits by 2008.

20

Data in the graph indicate that the greatest difference between per-pound profits from fair trade coffee and those from regular coffee occurred during which period?

- A) 2000 to 2002
- B) 2002 to 2004
- C) 2004 to 2005
- D) 2006 to 2008

21

Data in the graph provide most direct support for which idea in the passage?

- A) Acting on empathy can be counterproductive.
- B) Ethical economics is defined by character.
- C) Ethical economics is still possible.
- D) People fear losses more than they hope for gains.

**Questions 22-32 are based on the following passages.**

Passage 1 is adapted from Nicholas Carr, "Author Nicholas Carr: The Web Shatters Focus, Rewires Brains." ©2010 by Condé Nast. Passage 2 is from Steven Pinker, "Mind over Mass Media." ©2010 by The New York Times Company.

**Passage 1**

The mental consequences of our online info-crunching are not universally bad.

Certain cognitive skills are strengthened by our use of computers and the Net. These tend to involve  
 5 more primitive mental functions, such as hand-eye coordination, reflex response, and the processing of visual cues. One much-cited study of video gaming revealed that after just 10 days of playing action games on computers, a group of young people had  
 10 significantly boosted the speed with which they could shift their visual focus between various images and tasks.

It's likely that Web browsing also strengthens brain functions related to fast-paced problem  
 15 solving, particularly when it requires spotting patterns in a welter of data. A British study of the way women search for medical information online indicated that an experienced Internet user can, at least in some cases, assess the trustworthiness and  
 20 probable value of a Web page in a matter of seconds. The more we practice surfing and scanning, the more adept our brain becomes at those tasks.

But it would be a serious mistake to look narrowly at such benefits and conclude that the Web is making  
 25 us smarter. In a *Science* article published in early 2009, prominent developmental psychologist Patricia Greenfield reviewed more than 40 studies of the effects of various types of media on intelligence and learning ability. She concluded that "every medium  
 30 develops some cognitive skills at the expense of others." Our growing use of the Net and other screen-based technologies, she wrote, has led to the "widespread and sophisticated development of visual-spatial skills." But those gains go hand in hand  
 35 with a weakening of our capacity for the kind of "deep processing" that underpins "mindful knowledge acquisition, inductive analysis, critical thinking, imagination, and reflection."

We know that the human brain is highly  
 40 plastic; neurons and synapses change as circumstances change. When we adapt to a new cultural phenomenon, including the use of a new

medium, we end up with a different brain, says Michael Merzenich, a pioneer of the field of  
 45 neuroplasticity. That means our online habits continue to reverberate in the workings of our brain cells even when we're not at a computer. We're exercising the neural circuits devoted to skimming and multitasking while ignoring those used for  
 50 reading and thinking deeply.

### Passage 2

Critics of new media sometimes use science itself to press their case, citing research that shows how  
 "experience can change the brain." But cognitive neuroscientists roll their eyes at such talk. Yes, every  
 55 time we learn a fact or skill the wiring of the brain changes; it's not as if the information is stored in the pancreas. But the existence of neural plasticity does not mean the brain is a blob of clay pounded into shape by experience.

60 Experience does not revamp the basic information-processing capacities of the brain. Speed-reading programs have long claimed to do just that, but the verdict was rendered by Woody Allen after he read Leo Tolstoy's famously long novel  
 65 *War and Peace* in one sitting: "It was about Russia." Genuine multitasking, too, has been exposed as a myth, not just by laboratory studies but by the familiar sight of an SUV undulating between lanes as the driver cuts deals on his cell phone.

70 Moreover, the effects of experience are highly specific to the experiences themselves. If you train people to do one thing (recognize shapes, solve math puzzles, find hidden words), they get better at doing that thing, but almost nothing else. Music doesn't  
 75 make you better at math, conjugating Latin doesn't make you more logical, brain-training games don't make you smarter. Accomplished people don't bulk up their brains with intellectual calisthenics; they immerse themselves in their fields. Novelists read  
 80 lots of novels, scientists read lots of science.

The effects of consuming electronic media are likely to be far more limited than the panic implies. Media critics write as if the brain takes on the qualities of whatever it consumes, the informational  
 85 equivalent of "you are what you eat." As with ancient peoples who believed that eating fierce animals made them fierce, they assume that watching quick cuts in rock videos turns your mental life into quick cuts or that reading bullet points and online postings turns  
 90 your thoughts into bullet points and online postings.

22

The author of Passage 1 indicates which of the following about the use of screen-based technologies?

- A) It should be thoroughly studied.
- B) It makes the brain increasingly rigid.
- C) It has some positive effects.
- D) It should be widely encouraged.

23

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-4 ("Certain . . . Net")
- B) Lines 23-25 ("But . . . smarter")
- C) Lines 25-29 ("In a . . . ability")
- D) Lines 29-31 ("She . . . others")

24

The author of Passage 1 indicates that becoming adept at using the Internet can

- A) make people complacent about their health.
- B) undermine the ability to think deeply.
- C) increase people's social contacts.
- D) improve people's self-confidence.

25

As used in line 40, "plastic" most nearly means

- A) creative.
- B) artificial.
- C) malleable.
- D) sculptural.

26

The author of Passage 2 refers to the novel *War and Peace* primarily to suggest that Woody Allen

- A) did not like Tolstoy’s writing style.
- B) could not comprehend the novel by speed-reading it.
- C) had become quite skilled at multitasking.
- D) regretted having read such a long novel.

27

According to the author of Passage 2, what do novelists and scientists have in common?

- A) They take risks when they pursue knowledge.
- B) They are eager to improve their minds.
- C) They are curious about other subjects.
- D) They become absorbed in their own fields.

28

The analogy in the final sentence of Passage 2 has primarily which effect?

- A) It uses ornate language to illustrate a difficult concept.
- B) It employs humor to soften a severe opinion of human behavior.
- C) It alludes to the past to evoke a nostalgic response.
- D) It criticizes the view of a particular group.

29

The main purpose of each passage is to

- A) compare brain function in those who play games on the Internet and those who browse on it.
- B) report on the problem-solving skills of individuals with varying levels of Internet experience.
- C) take a position on increasing financial support for studies related to technology and intelligence.
- D) make an argument about the effects of electronic media use on the brain.

30

Which choice best describes the relationship between the two passages?

- A) Passage 2 relates first-hand experiences that contrast with the clinical approach in Passage 1.
- B) Passage 2 critiques the conclusions drawn from the research discussed in Passage 1.
- C) Passage 2 takes a high-level view of a result that Passage 1 examines in depth.
- D) Passage 2 predicts the negative reactions that the findings discussed in Passage 1 might produce.

31

On which of the following points would the authors of both passages most likely agree?

- A) Computer-savvy children tend to demonstrate better hand-eye coordination than do their parents.
- B) Those who criticize consumers of electronic media tend to overreact in their criticism.
- C) Improved visual-spatial skills do not generalize to improved skills in other areas.
- D) Internet users are unlikely to prefer reading onscreen text to reading actual books.

32

Which choice provides the best evidence that the author of Passage 2 would agree to some extent with the claim attributed to Michael Merzenich in lines 41-43, Passage 1?

- A) Lines 51-53 (“Critics . . . brain”)
- B) Lines 54-56 (“Yes . . . changes”)
- C) Lines 57-59 (“But . . . experience”)
- D) Lines 83-84 (“Media . . . consumes”)



**Questions 33-42 are based on the following passage.**

This passage is adapted from Elizabeth Cady Stanton's address to the 1869 Woman Suffrage Convention in Washington, DC.

I urge a sixteenth amendment, because “manhood suffrage,” or a man’s government, is civil, religious, and social disorganization. The male element is a destructive force, stern, selfish, aggrandizing, loving war, violence, conquest, acquisition, breeding in the material and moral world alike discord, disorder, disease, and death. See what a record of blood and cruelty the pages of history reveal! Through what slavery, slaughter, and sacrifice, through what inquisitions and imprisonments, pains and persecutions, black codes and gloomy creeds, the soul of humanity has struggled for the centuries, while mercy has veiled her face and all hearts have been dead alike to love and hope!

The male element has held high carnival thus far; it has fairly run riot from the beginning, overpowering the feminine element everywhere, crushing out all the diviner qualities in human nature, until we know but little of true manhood and womanhood, of the latter comparatively nothing, for it has scarce been recognized as a power until within the last century. Society is but the reflection of man himself, untempered by woman’s thought; the hard iron rule we feel alike in the church, the state, and the home. No one need wonder at the disorganization, at the fragmentary condition of everything, when we remember that man, who represents but half a complete being, with but half an idea on every subject, has undertaken the absolute control of all sublunary matters.

People object to the demands of those whom they choose to call the strong-minded, because they say “the right of suffrage will make the women masculine.” That is just the difficulty in which we are involved today. Though disfranchised, we have few women in the best sense; we have simply so many reflections, varieties, and dilutions of the masculine gender. The strong, natural characteristics of womanhood are repressed and ignored in

dependence, for so long as man feeds woman she will try to please the giver and adapt herself to his condition. To keep a foothold in society, woman must be as near like man as possible, reflect his ideas, opinions, virtues, motives, prejudices, and vices. She must respect his statutes, though they strip her of every inalienable right, and conflict with that higher law written by the finger of God on her own soul. . . .

. . . [M]an has been molding woman to his ideas by direct and positive influences, while she, if not a negation, has used indirect means to control him, and in most cases developed the very characteristics both in him and herself that needed repression. And now man himself stands appalled at the results of his own excesses, and mourns in bitterness that falsehood, selfishness, and violence are the law of life. The need of this hour is not territory, gold mines, railroads, or specie payments but a new evangel of womanhood, to exalt purity, virtue, morality, true religion, to lift man up into the higher realms of thought and action.

We ask woman’s enfranchisement, as the first step toward the recognition of that essential element in government that can only secure the health, strength, and prosperity of the nation. Whatever is done to lift woman to her true position will help to usher in a new day of peace and perfection for the race.

In speaking of the masculine element, I do not wish to be understood to say that all men are hard, selfish, and brutal, for many of the most beautiful spirits the world has known have been clothed with manhood; but I refer to those characteristics, though often marked in woman, that distinguish what is called the stronger sex. For example, the love of acquisition and conquest, the very pioneers of civilization, when expended on the earth, the sea, the elements, the riches and forces of nature, are powers of destruction when used to subjugate one man to another or to sacrifice nations to ambition.

Here that great conservator of woman’s love, if permitted to assert itself, as it naturally would in freedom against oppression, violence, and war, would hold all these destructive forces in check, for woman knows the cost of life better than man does, and not with her consent would one drop of blood ever be shed, one life sacrificed in vain.



33

The central problem that Stanton describes in the passage is that women have been

- A) denied equal educational opportunities, which has kept them from reaching their potential.
- B) prevented from exerting their positive influence on men, which has led to societal breakdown.
- C) prevented from voting, which has resulted in poor candidates winning important elections.
- D) blocked by men from serving as legislators, which has allowed the creation of unjust laws.

34

Stanton uses the phrase “high carnival” (line 15) mainly to emphasize what she sees as the

- A) utter domination of women by men.
- B) freewheeling spirit of the age.
- C) scandalous decline in moral values.
- D) growing power of women in society.

35

Stanton claims that which of the following was a relatively recent historical development?

- A) The control of society by men
- B) The spread of war and injustice
- C) The domination of domestic life by men
- D) The acknowledgment of women’s true character

36

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-7 (“The male . . . death”)
- B) Lines 15-22 (“The male . . . century”)
- C) Lines 22-25 (“Society . . . home”)
- D) Lines 48-52 (“[M]an . . . repression”)

37

As used in line 24, “rule” most nearly refers to

- A) a general guideline.
- B) a controlling force.
- C) an established habit.
- D) a procedural method.

38

It can reasonably be inferred that “the strong-minded” (line 32) was a term generally intended to

- A) praise women who fight for their long-denied rights.
- B) identify women who demonstrate intellectual skill.
- C) criticize women who enter male-dominated professions.
- D) condemn women who agitate for the vote for their sex.

39

As used in line 36, “best” most nearly means

- A) superior.
- B) excellent.
- C) genuine.
- D) rarest.

40

Stanton contends that the situation she describes in the passage has become so dire that even men have begun to

- A) lament the problems they have created.
- B) join the call for woman suffrage.
- C) consider women their social equals.
- D) ask women how to improve civic life.

41

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 25-30 (“No one . . . matters”)
- B) Lines 53-55 (“And now . . . life”)
- C) Lines 56-60 (“The need . . . action”)
- D) Lines 61-64 (“We ask . . . nation”)

42

The sixth paragraph (lines 67-78) is primarily concerned with establishing a contrast between

- A) men and women.
- B) the spiritual world and the material world.
- C) bad men and good men.
- D) men and masculine traits.

**Questions 43-52 are based on the following passage and supplementary material.**

This passage is adapted from Geoffrey Giller, “Long a Mystery, How 500-Meter-High Undersea Waves Form Is Revealed.” ©2014 by Scientific American.

Line  
5  
10  
Some of the largest ocean waves in the world are nearly impossible to see. Unlike other large waves, these rollers, called internal waves, do not ride the ocean surface. Instead, they move underwater, undetectable without the use of satellite imagery or sophisticated monitoring equipment. Despite their hidden nature, internal waves are fundamental parts of ocean water dynamics, transferring heat to the ocean depths and bringing up cold water from below. And they can reach staggering heights—some as tall as skyscrapers.

Because these waves are involved in ocean mixing and thus the transfer of heat, understanding them is crucial to global climate modeling, says Tom Peacock, a researcher at the Massachusetts Institute of Technology. Most models fail to take internal waves into account. “If we want to have more and more accurate climate models, we have to be able to capture processes such as this,” Peacock says.

20 Peacock and his colleagues tried to do just that. Their study, published in November in *Geophysical Research Letters*, focused on internal waves generated in the Luzon Strait, which separates Taiwan and the Philippines. Internal waves in this region, thought to  
25 be some of the largest in the world, can reach about 500 meters high. “That’s the same height as the Freedom Tower that’s just been built in New York,” Peacock says.

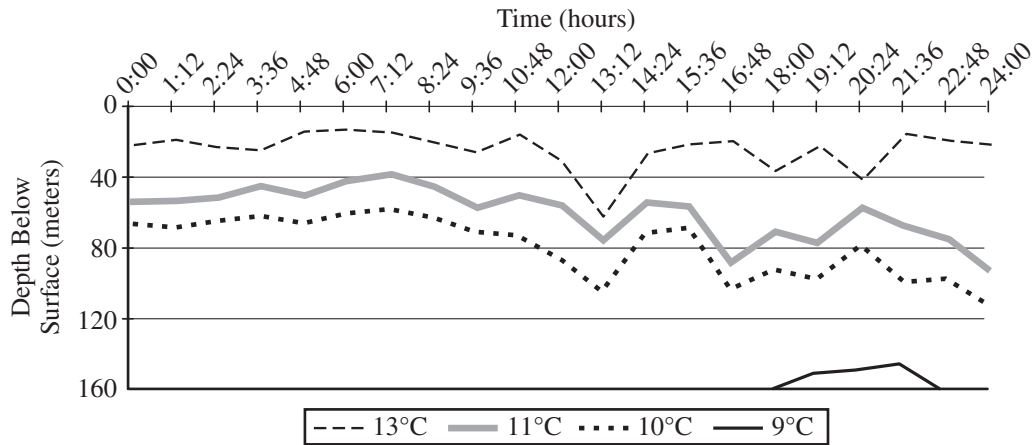
30 Although scientists knew of this phenomenon in the South China Sea and beyond, they didn’t know exactly how internal waves formed. To find out, Peacock and a team of researchers from M.I.T. and Woods Hole Oceanographic Institution worked with France’s National Center for Scientific Research  
35 using a giant facility there called the Coriolis Platform. The rotating platform, about 15 meters (49.2 feet) in diameter, turns at variable speeds and can simulate Earth’s rotation. It also has walls, which means scientists can fill it with water and create  
40 accurate, large-scale simulations of various oceanographic scenarios.

Peacock and his team built a carbon-fiber resin scale model of the Luzon Strait, including the islands and surrounding ocean floor topography. Then they  
45 filled the platform with water of varying salinity to replicate the different densities found at the strait, with denser, saltier water below and lighter, less briny water above. Small particles were added to the solution and illuminated with lights from below in  
50 order to track how the liquid moved. Finally, they re-created tides using two large plungers to see how the internal waves themselves formed.

The Luzon Strait’s underwater topography, with a distinct double-ridge shape, turns out to be  
55 responsible for generating the underwater waves. As the tide rises and falls and water moves through the strait, colder, denser water is pushed up over the ridges into warmer, less dense layers above it. This action results in bumps of colder water trailed  
60 by warmer water that generate an internal wave. As these waves move toward land, they become steeper—much the same way waves at the beach become taller before they hit the shore—until they break on a continental shelf.

65 The researchers were also able to devise a mathematical model that describes the movement and formation of these waves. Whereas the model is specific to the Luzon Strait, it can still help researchers understand how internal waves are  
70 generated in other places around the world. Eventually, this information will be incorporated into global climate models, making them more accurate. “It’s very clear, within the context of these [global climate] models, that internal waves play a role in  
75 driving ocean circulations,” Peacock says.

CHANGES IN DEPTH OF ISOTHERMS\*  
IN AN INTERNAL WAVE OVER A 24-HOUR PERIOD



\* Bands of water of constant temperatures

Adapted from Justin Small et al., "Internal Solitons in the Ocean: Prediction from SAR." ©1998 by Oceanography, Defence Evaluation and Research Agency.

43

The first paragraph serves mainly to

- A) explain how a scientific device is used.
- B) note a common misconception about an event.
- C) describe a natural phenomenon and address its importance.
- D) present a recent study and summarize its findings.

44

As used in line 19, "capture" is closest in meaning to

- A) control.
- B) record.
- C) secure.
- D) absorb.

45

According to Peacock, the ability to monitor internal waves is significant primarily because

- A) it will allow scientists to verify the maximum height of such waves.
- B) it will allow researchers to shift their focus to improving the quality of satellite images.
- C) the study of wave patterns will enable regions to predict and prevent coastal damage.
- D) the study of such waves will inform the development of key scientific models.

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-2 ("Some . . . see")
- B) Lines 4-6 ("they . . . equipment")
- C) Lines 17-19 ("If . . . this")
- D) Lines 24-26 ("Internal . . . high")

47

As used in line 65, “devise” most nearly means

- A) create.
- B) solve.
- C) imagine.
- D) begin.

48

Based on information in the passage, it can reasonably be inferred that all internal waves

- A) reach approximately the same height even though the locations and depths of continental shelves vary.
- B) may be caused by similar factors but are influenced by the distinct topographies of different regions.
- C) can be traced to inconsistencies in the tidal patterns of deep ocean water located near islands.
- D) are generated by the movement of dense water over a relatively flat section of the ocean floor.

49

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 29-31 (“Although . . . formed”)
- B) Lines 56-58 (“As the . . . it”)
- C) Lines 61-64 (“As these . . . shelf”)
- D) Lines 67-70 (“Whereas . . . world”)

50

In the graph, which isotherm displays an increase in depth below the surface during the period 19:12 to 20:24?

- A) 9°C
- B) 10°C
- C) 11°C
- D) 13°C

51

Which concept is supported by the passage and by the information in the graph?

- A) Internal waves cause water of varying salinity to mix.
- B) Internal waves push denser water above layers of less dense water.
- C) Internal waves push bands of cold water above bands of warmer water.
- D) Internal waves do not rise to break the ocean’s surface.

52

How does the graph support the author’s point that internal waves affect ocean water dynamics?

- A) It demonstrates that wave movement forces warmer water down to depths that typically are colder.
- B) It reveals the degree to which an internal wave affects the density of deep layers of cold water.
- C) It illustrates the change in surface temperature that takes place during an isolated series of deep waves.
- D) It shows that multiple waves rising near the surface of the ocean disrupt the flow of normal tides.

## STOP

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**

**No Test Material On This Page**

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Librarians Help Navigate in the Digital Age

In recent years, public libraries in the United States have experienced **1** reducing in their operating funds due to cuts imposed at the federal, state, and local government levels. **2** However, library staffing has been cut by almost four percent since 2008, and the demand for librarians continues to decrease, even though half of public libraries report that they have an insufficient number of staff to meet their patrons’ needs. Employment in all job sectors in the United States is projected to grow by fourteen percent over the next

1

- A) NO CHANGE
- B) reductions
- C) deducting
- D) deducts

2

- A) NO CHANGE
- B) Consequently,
- C) Nevertheless,
- D) Previously,

decade, yet the expected growth rate for librarians is predicted to be only seven percent, or half of the overall rate. This trend, combined with the increasing accessibility of information via the Internet, **3** has led some to claim that librarianship is in decline as a profession. As public libraries adapt to rapid technological advances in information distribution, librarians' roles are actually expanding.

The share of library materials that is in nonprint formats **4** is increasing steadily; in 2010, at least 18.5 million e-books were available **5** for them to circulate. As a result, librarians must now be proficient curators of electronic information, compiling, **6** catalog, and updating these collections. But perhaps even more importantly, librarians function as first responders for their communities' computer needs. Since

3

- A) NO CHANGE
- B) have
- C) which have
- D) which has

4

At this point, the writer is considering adding the following information.

—e-books, audio and video materials, and online journals—

Should the writer make this addition here?

- A) Yes, because it provides specific examples of the materials discussed in the sentence.
- B) Yes, because it illustrates the reason for the increase mentioned later in the sentence.
- C) No, because it interrupts the flow of the sentence by supplying irrelevant information.
- D) No, because it weakens the focus of the passage by discussing a subject other than librarians.

5

- A) NO CHANGE
- B) to be circulated by them.
- C) for their circulating.
- D) for circulation.

6

- A) NO CHANGE
- B) librarians cataloging,
- C) to catalog,
- D) cataloging,



one of the fastest growing library services is public access computer use, there is great demand for computer instruction. **7** In fact, librarians' training now includes courses on research and Internet search methods. Many of whom teach classes in Internet navigation, database and software use, and digital information literacy. While these classes are particularly helpful to young students developing basic research skills, **8** but adult patrons can also benefit from librarian assistance in that they can acquire job-relevant computer skills. **9** Free to all who utilize their services, public libraries and librarians are especially valuable, because they offer free resources that may be difficult to find elsewhere, such as help with online job

7

Which choice most effectively combines the underlined sentences?

- A) In fact, librarians' training now includes courses on research and Internet search methods; many librarians teach classes in Internet navigation, database and software use, and digital information literacy is taught by them.
- B) In fact, many librarians, whose training now includes courses on research and Internet search methods, teach classes in Internet navigation, database and software use, and digital information literacy.
- C) Training now includes courses on research and Internet search methods; many librarians, in fact, are teaching classes in Internet navigation, database and software use, and digital information literacy.
- D) Including courses on research and Internet search methods in their training is, in fact, why many librarians teach classes in Internet navigation, database and software use, and digital information literacy.

8

- A) NO CHANGE
- B) and
- C) for
- D) DELETE the underlined portion.

9

Which choice most effectively sets up the examples given at the end of the sentence?

- A) NO CHANGE
- B) During periods of economic recession,
- C) Although their value cannot be measured,
- D) When it comes to the free services libraries provide,

searches as well as résumé and job material development. An overwhelming number of public libraries also report that they provide help with electronic government resources related to income taxes, **10** law troubles, and retirement programs.

In sum, the Internet does not replace the need for librarians, and librarians are hardly obsolete. **11** Like books, librarians have been around for a long time, but the Internet is extremely useful for many types of research.

**10**

- A) NO CHANGE
- B) legal issues,
- C) concerns related to law courts,
- D) matters for the law courts,

**11**

Which choice most clearly ends the passage with a restatement of the writer's primary claim?

- A) NO CHANGE
- B) Although their roles have diminished significantly, librarians will continue to be employed by public libraries for the foreseeable future.
- C) The growth of electronic information has led to a diversification of librarians' skills and services, positioning them as savvy resource specialists for patrons.
- D) However, given their extensive training and skills, librarians who have been displaced by budget cuts have many other possible avenues of employment.

Questions 12-22 are based on the following passage.

### Tiny Exhibit, Big Impact

— 1 —

The first time I visited the Art Institute of Chicago, I expected to be impressed by its famous large paintings. **12** On one hand, I couldn't wait to view **13** painter, Georges Seurat's, 10-foot-wide *A Sunday Afternoon on the Island of La Grande Jatte* in its full size. It took me by surprise, then, when my favorite exhibit at the museum was one of **14** it's tiniest; the Thorne Miniature Rooms.

12

- A) NO CHANGE
- B) For instance,
- C) However,
- D) Similarly,

13

- A) NO CHANGE
- B) painter, Georges Seurat's
- C) painter Georges Seurat's,
- D) painter Georges Seurat's

14

- A) NO CHANGE
- B) its tiniest;
- C) its tiniest:
- D) it's tiniest,

— 2 —

Viewing the exhibit, I was amazed by the intricate details of some of the more ornately decorated rooms. I marveled at a replica of a salon (a formal living room) dating back to the reign of French king Louis XV.

**15** Built into the dark paneled walls are bookshelves stocked with leather-bound volumes. The couch and chairs, in keeping with the style of the time, are characterized by elegantly curved arms and **16** legs, they are covered in luxurious velvet. A dime-sized portrait of a French aristocratic woman hangs in a golden frame.

— 3 —

This exhibit showcases sixty-eight miniature rooms inserted into a wall at eye level. Each furnished room consists of three walls; the fourth wall is a glass pane through which museumgoers observe. The rooms and their furnishings were painstakingly created to scale at 1/12th their actual size, so that one inch in the exhibit correlates with one foot in real life. A couch, for example, is seven inches long, and **17** that is based on a seven-foot-long couch. Each room represents a distinctive style of European, American, or Asian interior design from the thirteenth to twentieth centuries.

**15**

At this point, the writer is considering adding the following sentence.

Some scholars argue that the excesses of King Louis XV's reign contributed significantly to the conditions that resulted in the French Revolution.

Should the writer make this addition here?

- A) Yes, because it provides historical context for the Thorne Miniature Rooms exhibit.
- B) Yes, because it explains why salons are often ornately decorated.
- C) No, because it interrupts the paragraph's description of the miniature salon.
- D) No, because it implies that the interior designer of the salon had political motivations.

**16**

- A) NO CHANGE
- B) legs, the couch and chairs
- C) legs and
- D) legs,

**17**

Which choice gives a second supporting example that is most similar to the example already in the sentence?

- A) NO CHANGE
- B) a tea cup is about a quarter of an inch.
- C) there are even tiny cushions on some.
- D) household items are also on this scale.

— 4 —

The plainer rooms are more sparsely **18** furnished. Their architectural features, furnishings, and decorations are just as true to the periods they represent. One of my favorite rooms in the whole exhibit, in fact, is an 1885 summer kitchen. The room is simple but spacious, with a small sink and counter along one wall, a cast-iron wood stove and some hanging pots and pans against another wall, and **19** a small table under a window of the third wall. Aside from a few simple wooden chairs placed near the edges of the room, the floor is open and obviously well worn.

18

Which choice most effectively combines the sentences at the underlined portion?

- A) furnished by their
- B) furnished, but their
- C) furnished: their
- D) furnished, whereas

19

Which choice most closely matches the stylistic pattern established earlier in the sentence?

- A) NO CHANGE
- B) a small table is under the third wall's window.
- C) the third wall has a window and small table.
- D) the third wall has a small table against it and a window.

— 5 —

As I walked through the exhibit, I overheard a **20** visitors' remark, "You know, that grandfather clock actually runs. Its glass door swings open, and the clock can be wound up." **21** Dotted with pin-sized knobs, another visitor noticed my fascination with a tiny writing desk and its drawers. "All of those little drawers pull out. And you see that hutch? Can you believe it has a secret compartment?" Given the exquisite craftsmanship and level of detail I'd already seen, I certainly could.

**Question 22** asks about the previous passage as a whole.

**20**

- A) NO CHANGE
- B) visitors remarking,
- C) visitor remarked,
- D) visitor remark,

**21**

- A) NO CHANGE
- B) Another visitor, dotted with pin-sized knobs, noticed my fascination with a tiny writing desk and its drawers.
- C) Another visitor dotted with pin-sized knobs noticed my fascination with a tiny writing desk and its drawers.
- D) Another visitor noticed my fascination with a tiny writing desk and its drawers, dotted with pin-sized knobs.

**Think about the previous passage as a whole as you answer question 22.**

**22**

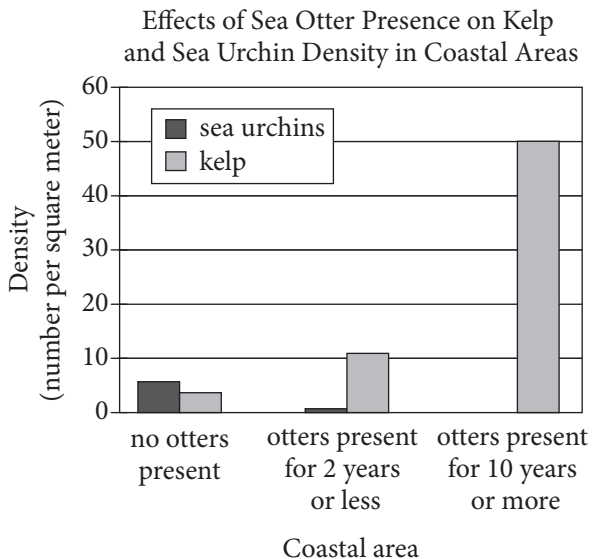
To make the passage most logical, paragraph 2 should be placed

- A) where it is now.
- B) after paragraph 3.
- C) after paragraph 4.
- D) after paragraph 5.

Questions 23-33 are based on the following passage and supplementary material.

### Environmentalists Otters

It has long been known that the sea otters **23** living along the West Coast of North America help keep kelp forests in their habitat healthy and vital. They do this by feeding on sea urchins and other herbivorous invertebrates that graze voraciously on kelp. With sea otters to keep the population of sea urchins in check, kelp forests can flourish. In fact, **24** two years or less of sea otters can completely eliminate sea urchins in a coastal area (see chart).



Adapted from David O. Duggins, "Kelp Beds and Sea Otters: An Experimental Approach." ©1980 by the Ecological Society of America.

Without sea otters present, **25** nevertheless, kelp forests run the danger of becoming barren stretches of coastal wasteland known as urchin barrens.

23

- A) NO CHANGE
- B) living along the West Coast of North America, they help
- C) that live along the West Coast of North America and help to
- D) that live along the West Coast of North America, where they help

24

Which choice offers an accurate interpretation of the data in the chart?

- A) NO CHANGE
- B) even two years or less of sea otter presence can reduce the sea urchin threat
- C) kelp density increases proportionally as sea urchin density increases
- D) even after sea otters were present for ten years or more, kelp density was still lower than sea urchin density

25

- A) NO CHANGE
- B) however,
- C) hence,
- D) likewise,

[1] What was less well-known, until recently at least, was how this relationship among sea otters, sea urchins, and kelp forests might help fight global warming. [2] The amount of carbon dioxide in the atmosphere has increased 40 percent **26**. [3] A recent study by two professors at the University of California, Santa Cruz, Chris Wilmers and James Estes, **27** suggests, that kelp forests protected by sea otters can absorb as much as twelve times the amount of carbon dioxide from the atmosphere as those where sea urchins are allowed to **28** devour the kelp. [4] Like **29** their terrestrial plant cousins, kelp removes carbon dioxide from the atmosphere, turning it into sugar fuel through photosynthesis, and releases oxygen back into the air.

26

At this point, the writer is considering adding the following information.

since the start of the Industrial Revolution, resulting in a rise in global temperatures

Should the writer make this addition here?

- A) Yes, because it establishes the relationship between the level of carbon dioxide in the atmosphere and global warming.
- B) Yes, because it explains the key role sea otters, sea urchins, and kelp forests play in combating global warming.
- C) No, because it contradicts the claim made in the previous paragraph that sea otters help keep kelp forests healthy.
- D) No, because it mentions the Industrial Revolution, blurring the focus of the paragraph.

27

- A) NO CHANGE
- B) suggests—that
- C) suggests, “that
- D) suggests that

28

- A) NO CHANGE
- B) dispatch
- C) overindulge on
- D) dispose of

29

- A) NO CHANGE
- B) they’re
- C) its
- D) it’s



[5] Scientists knew this but did not recognize **30** how large a role they played in helping kelp forests to significantly decrease the amount of carbon dioxide in the atmosphere. [6] Far from making no difference to the ecosystem, the presence of otters was found to increase the carbon storage of kelp forests by 4.4 to 8.7 megatons annually, offsetting the amount of carbon dioxide emitted by three million to six million passenger cars each year. **31**

Wilmers and Estes caution, however, that **32** having more otters will not automatically solve the problem of higher levels of carbon dioxide in the air. But they suggest that the presence of otters provides a good model of how carbon can be sequestered, **33** or removed; from the atmosphere through the management of animal populations. If ecologists can better understand what kinds of impacts animals might have on the environment, Wilmers contends, “there might be opportunities for win-win conservation scenarios, whereby animal species are protected or enhanced, and carbon gets sequestered.”

**30**

- A) NO CHANGE
- B) how large a role that it played
- C) how large a role sea otters played
- D) that they played such a large role

**31**

Where is the most logical place in this paragraph to add the following sentence?

What Wilmers and Estes discovered in their study, therefore, surprised them.

- A) After sentence 1
- B) After sentence 3
- C) After sentence 4
- D) After sentence 5

**32**

- A) NO CHANGE
- B) increasing the otter population
- C) the otters multiplying
- D) having more otters than other locations

**33**

- A) NO CHANGE
- B) or removed from,
- C) or, removed from,
- D) or removed, from

Questions 34-44 are based on the following passage.

### A Quick Fix in a Throwaway Culture

Planned obsolescence, a practice **34** at which products are designed to have a limited period of **35** usefulness, has been a cornerstone of manufacturing strategy for the past 80 years. This approach increases sales, but it also stands in **36** austere contrast to a time when goods were produced to be durable. Planned obsolescence wastes materials as well as energy in making and shipping new products. It also reinforces the belief that it is easier to replace goods than to mend them, as repair shops are rare and **37** repair methods are often specialized. In 2009, an enterprising movement, the Repair Café, challenged this widely accepted belief.

34

- A) NO CHANGE
- B) from which
- C) so that
- D) whereby

35

- A) NO CHANGE
- B) usefulness—
- C) usefulness;
- D) usefulness

36

- A) NO CHANGE
- B) egregious
- C) unmitigated
- D) stark

37

Which choice provides information that best supports the claim made by this sentence?

- A) NO CHANGE
- B) obsolete goods can become collectible items.
- C) no one knows whether something will fall into disrepair again.
- D) new designs often have “bugs” that must be worked out.

[1] More like a **38** fair then an actual café, the first Repair Café took place in Amsterdam, the Netherlands. [2] It was the brainchild of former journalist Martine Postma, **39** wanting to take a practical stand in a throwaway culture. [3] Her goals were **40** straightforward, however: reduce waste, maintain and perpetuate knowledge and skills, and strengthen community. [4] Participants bring all manner of damaged articles—clothing, appliances, furniture, and more—to be repaired by a staff of volunteer specialists including tailors, electricians, and carpenters. [5] Since the inaugural Repair Café, others have been hosted in theater foyers, community centers, hotels, and auditoriums. [6] While **41** they await for service, patrons can enjoy coffee and snacks and mingle with their neighbors in need. **42**

38

- A) NO CHANGE
- B) fair than
- C) fare than
- D) fair, then

39

- A) NO CHANGE
- B) whom wants
- C) who wanted
- D) she wanted

40

- A) NO CHANGE
- B) straightforward, therefore:
- C) straightforward, nonetheless:
- D) straightforward:

41

- A) NO CHANGE
- B) awaiting
- C) they waited
- D) waiting

42

To make this paragraph most logical, sentence 5 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 3.
- D) after sentence 6.

Though only about 3 percent of the Netherlands' municipal waste ends up in landfills, Repair Cafés still raise awareness about what may otherwise be mindless acts of waste by providing a venue for people to share and learn valuable skills that are in danger of being lost. **43** It is easy to classify old but fixable items as “junk” in an era that places great emphasis on the next big thing. In helping people consider how the goods they use on a daily basis work and are made, Repair Cafés restore a sense of relationship between human beings and material goods.

Though the concept remained a local trend at first, international Repair Cafés, all affiliated with the Dutch Repair Café via its website, have since arisen in France, Germany, South Africa, the United States, and other countries **44** on top of that. The original provides a central source for start-up tips and tools, as well as marketing advice to new Repair Cafés. As a result, the Repair Café has become a global network united by common ideals. Ironically, innovators are now looking back to old ways of doing things and applying them in today's cities in an effort to transform the way people relate to and think about the goods they consume.

43

At this point, the writer is considering adding the following sentence.

As the number of corporate and service-based jobs has increased, the need for people who work with their hands has diminished.

Should the writer make this addition here?

- A) Yes, because it provides an example of specific repair skills being lost.
- B) Yes, because it elaborates on the statistic about the Netherlands' municipal waste.
- C) No, because it blurs the paragraph's focus by introducing a topic that is not further explained.
- D) No, because it contradicts the claims made in the rest of the paragraph.

44

- A) NO CHANGE
- B) in addition.
- C) likewise.
- D) DELETE the underlined portion, and end the sentence with a period.

## STOP

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

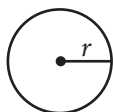
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

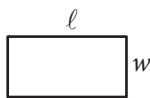
- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

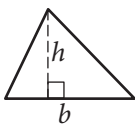


$$A = \pi r^2$$

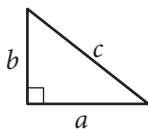
$$C = 2\pi r$$



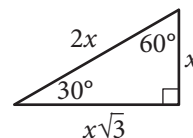
$$A = \ell w$$



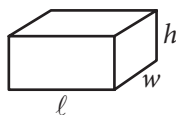
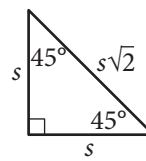
$$A = \frac{1}{2}bh$$



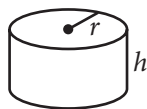
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



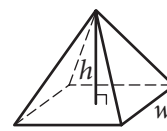
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

If  $5x + 6 = 10$ , what is the value of  $10x + 3$  ?

- A) 4
- B) 9
- C) 11
- D) 20

2

$$\begin{aligned}x + y &= 0 \\ 3x - 2y &= 10\end{aligned}$$

Which of the following ordered pairs  $(x, y)$  satisfies the system of equations above?

- A)  $(3, -2)$
- B)  $(2, -2)$
- C)  $(-2, 2)$
- D)  $(-2, -2)$

3

A landscaping company estimates the price of a job, in dollars, using the expression  $60 + 12nh$ , where  $n$  is the number of landscapers who will be working and  $h$  is the total number of hours the job will take using  $n$  landscapers. Which of the following is the best interpretation of the number 12 in the expression?

- A) The company charges \$12 per hour for each landscaper.
- B) A minimum of 12 landscapers will work on each job.
- C) The price of every job increases by \$12 every hour.
- D) Each landscaper works 12 hours a day.

4

$$9a^4 + 12a^2b^2 + 4b^4$$

Which of the following is equivalent to the expression shown above?

- A)  $(3a^2 + 2b^2)^2$
- B)  $(3a + 2b)^4$
- C)  $(9a^2 + 4b^2)^2$
- D)  $(9a + 4b)^4$



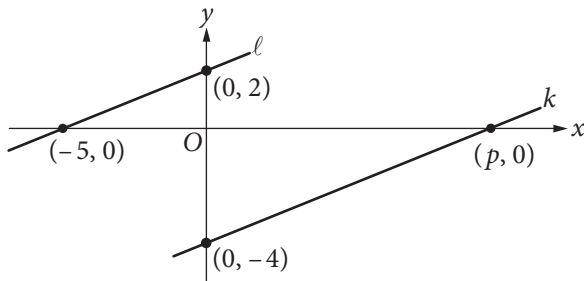
5

$$\sqrt{2k^2 + 17} - x = 0$$

If  $k > 0$  and  $x = 7$  in the equation above, what is the value of  $k$ ?

- A) 2
- B) 3
- C) 4
- D) 5

6



In the  $xy$ -plane above, line  $\ell$  is parallel to line  $k$ . What is the value of  $p$ ?

- A) 4
- B) 5
- C) 8
- D) 10

7

If  $\frac{x^a}{x^b} = x^{16}$ ,  $x > 1$ , and  $a + b = 2$ , what is the value

of  $a - b$ ?

- A) 8
- B) 14
- C) 16
- D) 18

8

$$nA = 360$$

The measure  $A$ , in degrees, of an exterior angle of a regular polygon is related to the number of sides,  $n$ , of the polygon by the formula above. If the measure of an exterior angle of a regular polygon is greater than  $50^\circ$ , what is the greatest number of sides it can have?

- A) 5
- B) 6
- C) 7
- D) 8



9

The graph of a line in the  $xy$ -plane has slope 2 and contains the point  $(1, 8)$ . The graph of a second line passes through the points  $(1, 2)$  and  $(2, 1)$ . If the two lines intersect at the point  $(a, b)$ , what is the value of  $a + b$  ?

- A) 4
- B) 3
- C) -1
- D) -4

10

Which of the following equations has a graph in the  $xy$ -plane for which  $y$  is always greater than or equal to  $-1$  ?

- A)  $y = |x| - 2$
- B)  $y = x^2 - 2$
- C)  $y = (x - 2)^2$
- D)  $y = x^3 - 2$

11

Which of the following complex numbers is equivalent to  $\frac{3 - 5i}{8 + 2i}$  ? (Note:  $i = \sqrt{-1}$ )

- A)  $\frac{3}{8} - \frac{5i}{2}$
- B)  $\frac{3}{8} + \frac{5i}{2}$
- C)  $\frac{7}{34} - \frac{23i}{34}$
- D)  $\frac{7}{34} + \frac{23i}{34}$

12

$$R = \frac{F}{N + F}$$

A website uses the formula above to calculate a seller's rating,  $R$ , based on the number of favorable reviews,  $F$ , and unfavorable reviews,  $N$ . Which of the following expresses the number of favorable reviews in terms of the other variables?

- A)  $F = \frac{RN}{R - 1}$
- B)  $F = \frac{RN}{1 - R}$
- C)  $F = \frac{N}{1 - R}$
- D)  $F = \frac{N}{R - 1}$





13

What is the sum of all values of  $m$  that satisfy  $2m^2 - 16m + 8 = 0$  ?

- A)  $-8$
- B)  $-4\sqrt{3}$
- C)  $4\sqrt{3}$
- D)  $8$

14

A radioactive substance decays at an annual rate of 13 percent. If the initial amount of the substance is 325 grams, which of the following functions  $f$  models the remaining amount of the substance, in grams,  $t$  years later?

- A)  $f(t) = 325(0.87)^t$
- B)  $f(t) = 325(0.13)^t$
- C)  $f(t) = 0.87(325)^t$
- D)  $f(t) = 0.13(325)^t$

15

The expression  $\frac{5x-2}{x+3}$  is equivalent to which of the following?

- A)  $\frac{5-2}{3}$
- B)  $5 - \frac{2}{3}$
- C)  $5 - \frac{2}{x+3}$
- D)  $5 - \frac{17}{x+3}$

**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Answer:  $\frac{7}{12}$

	7	/	1	2	
	•	•	•	•	
	0	0	0	0	
1	1	•	1	1	
2	2	2	•	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
•	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

← Fraction line

Grid in result.

Answer: 2.5

	2	.	5	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	•	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	•	
4	4	4	4	
5	5	5	5	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

	.	6	6	6	
	•	•	•	•	
	0	0	0		
1	1	1	1		
2	2	2	2		
3	3	3	3		
4	4	4	4		
5	5	5	5		
6	•	•	•		
7	7	7	7		
8	8	8	8		
9	9	9	9		

	.	6	6	7	
	•	•	•	•	
	0	0	0		
1	1	1	1		
2	2	2	2		
3	3	3	3		
4	4	4	4		
5	5	5	5		
6	•	•	•		
7	7	7	7	•	
8	8	8	8		
9	9	9	9		

Answer: 201 – either position is correct

	2	0	1	
	•	•	•	•
	0	•	0	
1	1	1	•	
2	•	2	2	
3	3	3	3	

	2	0	1	
	•	•	•	•
	•	0	0	
1	1	•	1	
2	•	2	2	
3	3	3	3	

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

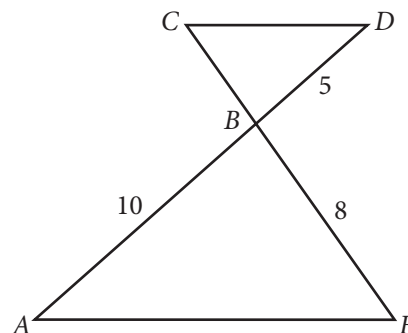
The sales manager of a company awarded a total of \$3000 in bonuses to the most productive salespeople. The bonuses were awarded in amounts of \$250 or \$750. If at least one \$250 bonus and at least one \$750 bonus were awarded, what is one possible number of \$250 bonuses awarded?

17

$$2x(3x + 5) + 3(3x + 5) = ax^2 + bx + c$$

In the equation above,  $a$ ,  $b$ , and  $c$  are constants. If the equation is true for all values of  $x$ , what is the value of  $b$ ?

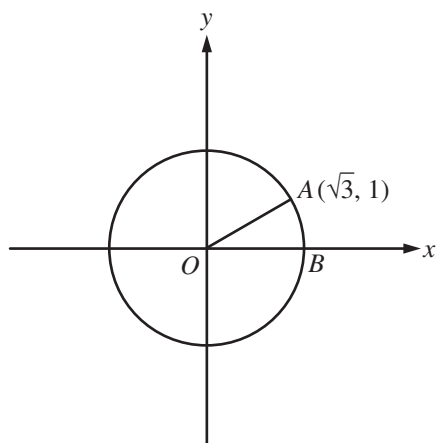
18



In the figure above,  $\overline{AE} \parallel \overline{CD}$  and segment  $AD$  intersects segment  $CE$  at  $B$ . What is the length of segment  $CE$ ?



19



In the  $xy$ -plane above,  $O$  is the center of the circle, and the measure of  $\angle AOB$  is  $\frac{\pi}{a}$  radians. What is the value of  $a$ ?

20

$$ax + by = 12$$

$$2x + 8y = 60$$

In the system of equations above,  $a$  and  $b$  are constants. If the system has infinitely many solutions, what is the value of  $\frac{a}{b}$ ?

## STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

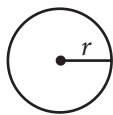
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

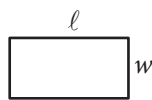
- The use of a calculator **is permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

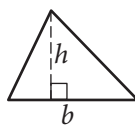


$$A = \pi r^2$$

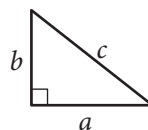
$$C = 2\pi r$$



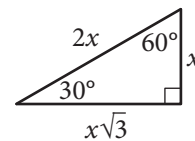
$$A = \ell w$$



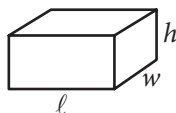
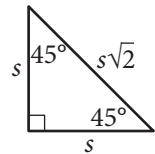
$$A = \frac{1}{2}bh$$



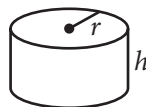
$$c^2 = a^2 + b^2$$



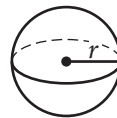
Special Right Triangles



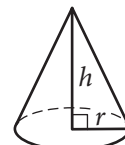
$$V = \ell wh$$



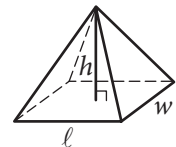
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

A musician has a new song available for downloading or streaming. The musician earns \$0.09 each time the song is downloaded and \$0.002 each time the song is streamed. Which of the following expressions represents the amount, in dollars, that the musician earns if the song is downloaded  $d$  times and streamed  $s$  times?

- A)  $0.002d + 0.09s$
- B)  $0.002d - 0.09s$
- C)  $0.09d + 0.002s$
- D)  $0.09d - 0.002s$

2

A quality control manager at a factory selects 7 lightbulbs at random for inspection out of every 400 lightbulbs produced. At this rate, how many lightbulbs will be inspected if the factory produces 20,000 lightbulbs?

- A) 300
- B) 350
- C) 400
- D) 450

3

$$\ell = 24 + 3.5m$$

One end of a spring is attached to a ceiling. When an object of mass  $m$  kilograms is attached to the other end of the spring, the spring stretches to a length of  $\ell$  centimeters as shown in the equation above. What is  $m$  when  $\ell$  is 73?

- A) 14
- B) 27.7
- C) 73
- D) 279.5

**Questions 4 and 5 refer to the following information.**

The amount of money a performer earns is directly proportional to the number of people attending the performance. The performer earns \$120 at a performance where 8 people attend.

4

How much money will the performer earn when 20 people attend a performance?

- A) \$960
- B) \$480
- C) \$300
- D) \$240

5

The performer uses 43% of the money earned to pay the costs involved in putting on each performance. The rest of the money earned is the performer's profit. What is the profit the performer makes at a performance where 8 people attend?

- A) \$51.60
- B) \$57.00
- C) \$68.40
- D) \$77.00

6

When 4 times the number  $x$  is added to 12, the result is 8. What number results when 2 times  $x$  is added to 7?

- A)  $-1$
- B)  $5$
- C)  $8$
- D)  $9$

7

$$y = x^2 - 6x + 8$$

The equation above represents a parabola in the  $xy$ -plane. Which of the following equivalent forms of the equation displays the  $x$ -intercepts of the parabola as constants or coefficients?

- A)  $y - 8 = x^2 - 6x$
- B)  $y + 1 = (x - 3)^2$
- C)  $y = x(x - 6) + 8$
- D)  $y = (x - 2)(x - 4)$



8

In a video game, each player starts the game with  $k$  points and loses 2 points each time a task is not completed. If a player who gains no additional points and fails to complete 100 tasks has a score of 200 points, what is the value of  $k$  ?

- A) 0
- B) 150
- C) 250
- D) 400

9

A worker uses a forklift to move boxes that weigh either 40 pounds or 65 pounds each. Let  $x$  be the number of 40-pound boxes and  $y$  be the number of 65-pound boxes. The forklift can carry up to either 45 boxes or a weight of 2,400 pounds. Which of the following systems of inequalities represents this relationship?

- A)  $\begin{cases} 40x + 65y \leq 2,400 \\ x + y \leq 45 \end{cases}$
- B)  $\begin{cases} \frac{x}{40} + \frac{y}{65} \leq 2,400 \\ x + y \leq 45 \end{cases}$
- C)  $\begin{cases} 40x + 65y \leq 45 \\ x + y \leq 2,400 \end{cases}$
- D)  $\begin{cases} x + y \leq 2,400 \\ 40x + 65y \leq 2,400 \end{cases}$

10

A function  $f$  satisfies  $f(2) = 3$  and  $f(3) = 5$ . A function  $g$  satisfies  $g(3) = 2$  and  $g(5) = 6$ . What is the value of  $f(g(3))$  ?

- A) 2
- B) 3
- C) 5
- D) 6

11

Number of hours Tony plans to read the novel per day	3
Number of parts in the novel	8
Number of chapters in the novel	239
Number of words Tony reads per minute	250
Number of pages in the novel	1,078
Number of words in the novel	349,168

Tony is planning to read a novel. The table above shows information about the novel, Tony's reading speed, and the amount of time he plans to spend reading the novel each day. If Tony reads at the rates given in the table, which of the following is closest to the number of days it would take Tony to read the entire novel?

- A) 6
- B) 8
- C) 23
- D) 324





12

On January 1, 2000, there were 175,000 tons of trash in a landfill that had a capacity of 325,000 tons. Each year since then, the amount of trash in the landfill increased by 7,500 tons. If  $y$  represents the time, in years, after January 1, 2000, which of the following inequalities describes the set of years where the landfill is at or above capacity?

- A)  $325,000 - 7,500 \leq y$
- B)  $325,000 \leq 7,500y$
- C)  $150,000 \geq 7,500y$
- D)  $175,000 + 7,500y \geq 325,000$

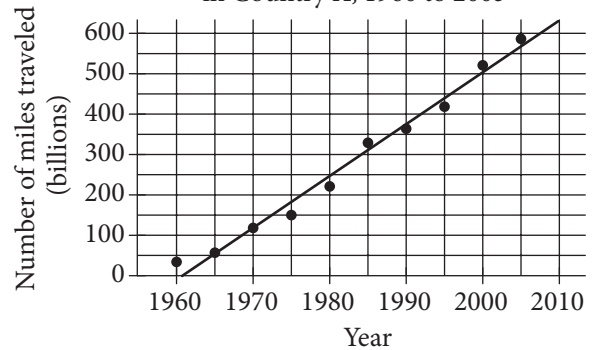
13

A researcher conducted a survey to determine whether people in a certain large town prefer watching sports on television to attending the sporting event. The researcher asked 117 people who visited a local restaurant on a Saturday, and 7 people refused to respond. Which of the following factors makes it least likely that a reliable conclusion can be drawn about the sports-watching preferences of all people in the town?

- A) Sample size
- B) Population size
- C) The number of people who refused to respond
- D) Where the survey was given

14

Miles Traveled by Air Passengers  
in Country X, 1960 to 2005



According to the line of best fit in the scatterplot above, which of the following best approximates the year in which the number of miles traveled by air passengers in Country X was estimated to be 550 billion?

- A) 1997
- B) 2000
- C) 2003
- D) 2008



15

The distance traveled by Earth in one orbit around the Sun is about 580,000,000 miles. Earth makes one complete orbit around the Sun in one year. Of the following, which is closest to the average speed of Earth, in miles per hour, as it orbits the Sun?

- A) 66,000
- B) 93,000
- C) 210,000
- D) 420,000

16

Results on the Bar Exam of Law School Graduates

	Passed bar exam	Did not pass bar exam
Took review course	18	82
Did not take review course	7	93

The table above summarizes the results of 200 law school graduates who took the bar exam. If one of the surveyed graduates who passed the bar exam is chosen at random for an interview, what is the probability that the person chosen did not take the review course?

- A)  $\frac{18}{25}$
- B)  $\frac{7}{25}$
- C)  $\frac{25}{200}$
- D)  $\frac{7}{200}$

17

The atomic weight of an unknown element, in atomic mass units (amu), is approximately 20% less than that of calcium. The atomic weight of calcium is 40 amu. Which of the following best approximates the atomic weight, in amu, of the unknown element?

- A) 8
- B) 20
- C) 32
- D) 48

18

A survey was taken of the value of homes in a county, and it was found that the mean home value was \$165,000 and the median home value was \$125,000. Which of the following situations could explain the difference between the mean and median home values in the county?

- A) The homes have values that are close to each other.
- B) There are a few homes that are valued much less than the rest.
- C) There are a few homes that are valued much more than the rest.
- D) Many of the homes have values between \$125,000 and \$165,000.



Questions 19 and 20 refer to the following information.

A sociologist chose 300 students at random from each of two schools and asked each student how many siblings he or she has. The results are shown in the table below.

Students' Sibling Survey

Number of siblings	Lincoln School	Washington School
0	120	140
1	80	110
2	60	30
3	30	10
4	10	10

There are a total of 2,400 students at Lincoln School and 3,300 students at Washington School.

19

What is the median number of siblings for all the students surveyed?

- A) 0
- B) 1
- C) 2
- D) 3

20

Based on the survey data, which of the following most accurately compares the expected total number of students with 4 siblings at the two schools?

- A) The total number of students with 4 siblings is expected to be equal at the two schools.
- B) The total number of students with 4 siblings at Lincoln School is expected to be 30 more than at Washington School.
- C) The total number of students with 4 siblings at Washington School is expected to be 30 more than at Lincoln School.
- D) The total number of students with 4 siblings at Washington School is expected to be 900 more than at Lincoln School.

21

A project manager estimates that a project will take  $x$  hours to complete, where  $x > 100$ . The goal is for the estimate to be within 10 hours of the time it will actually take to complete the project. If the manager meets the goal and it takes  $y$  hours to complete the project, which of the following inequalities represents the relationship between the estimated time and the actual completion time?

- A)  $x + y < 10$
- B)  $y > x + 10$
- C)  $y < x - 10$
- D)  $-10 < y - x < 10$



Questions 22 and 23 refer to the following information.

$$I = \frac{P}{4\pi r^2}$$

At a large distance  $r$  from a radio antenna, the intensity of the radio signal  $I$  is related to the power of the signal  $P$  by the formula above.

22

Which of the following expresses the square of the distance from the radio antenna in terms of the intensity of the radio signal and the power of the signal?

- A)  $r^2 = \frac{IP}{4\pi}$
- B)  $r^2 = \frac{P}{4\pi I}$
- C)  $r^2 = \frac{4\pi I}{P}$
- D)  $r^2 = \frac{I}{4\pi P}$

23

For the same signal emitted by a radio antenna, Observer A measures its intensity to be 16 times the intensity measured by Observer B. The distance of Observer A from the radio antenna is what fraction of the distance of Observer B from the radio antenna?

- A)  $\frac{1}{4}$
- B)  $\frac{1}{16}$
- C)  $\frac{1}{64}$
- D)  $\frac{1}{256}$

24

$$x^2 + y^2 + 4x - 2y = -1$$

The equation of a circle in the  $xy$ -plane is shown above. What is the radius of the circle?

- A) 2
- B) 3
- C) 4
- D) 9

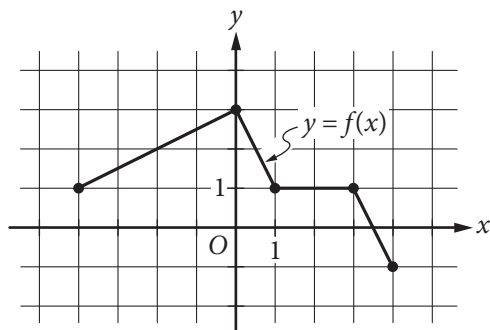


25

The graph of the linear function  $f$  has intercepts at  $(a, 0)$  and  $(0, b)$  in the  $xy$ -plane. If  $a + b = 0$  and  $a \neq b$ , which of the following is true about the slope of the graph of  $f$ ?

- A) It is positive.
- B) It is negative.
- C) It equals zero.
- D) It is undefined.

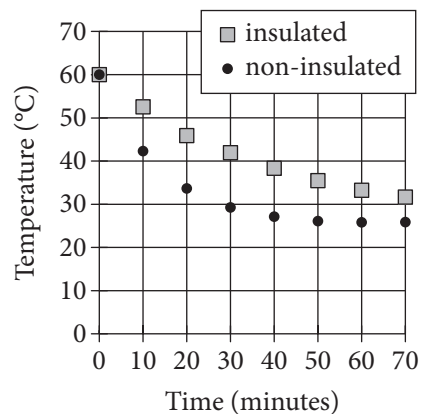
26



The complete graph of the function  $f$  is shown in the  $xy$ -plane above. Which of the following are equal to 1?

- I.  $f(-4)$
  - II.  $f\left(\frac{3}{2}\right)$
  - III.  $f(3)$
- A) III only
  - B) I and III only
  - C) II and III only
  - D) I, II, and III

27

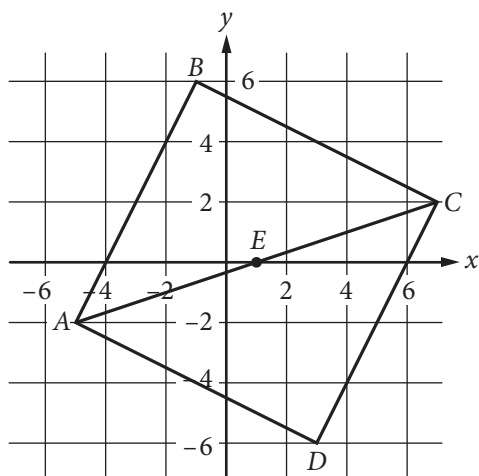


Two samples of water of equal mass are heated to 60 degrees Celsius ( $^{\circ}\text{C}$ ). One sample is poured into an insulated container, and the other sample is poured into a non-insulated container. The samples are then left for 70 minutes to cool in a room having a temperature of  $25^{\circ}\text{C}$ . The graph above shows the temperature of each sample at 10-minute intervals. Which of the following statements correctly compares the average rates at which the temperatures of the two samples change?

- A) In every 10-minute interval, the magnitude of the rate of change of temperature of the insulated sample is greater than that of the non-insulated sample.
- B) In every 10-minute interval, the magnitude of the rate of change of temperature of the non-insulated sample is greater than that of the insulated sample.
- C) In the intervals from 0 to 10 minutes and from 10 to 20 minutes, the rates of change of temperature of the insulated sample are of greater magnitude, whereas in the intervals from 40 to 50 minutes and from 50 to 60 minutes, the rates of change of temperature of the non-insulated sample are of greater magnitude.
- D) In the intervals from 0 to 10 minutes and from 10 to 20 minutes, the rates of change of temperature of the non-insulated sample are of greater magnitude, whereas in the intervals from 40 to 50 minutes and from 50 to 60 minutes, the rates of change of temperature of the insulated sample are of greater magnitude.



28



In the  $xy$ -plane above,  $ABCD$  is a square and point  $E$  is the center of the square. The coordinates of points  $C$  and  $E$  are  $(7, 2)$  and  $(1, 0)$ , respectively. Which of the following is an equation of the line that passes through points  $B$  and  $D$ ?

- A)  $y = -3x - 1$
- B)  $y = -3(x - 1)$
- C)  $y = -\frac{1}{3}x + 4$
- D)  $y = -\frac{1}{3}x - 1$

29

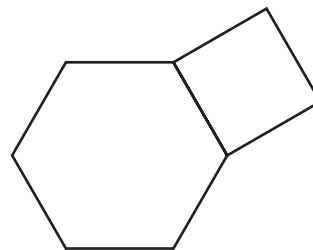
$$y = 3$$

$$y = ax^2 + b$$

In the system of equations above,  $a$  and  $b$  are constants. For which of the following values of  $a$  and  $b$  does the system of equations have exactly two real solutions?

- A)  $a = -2, b = 2$
- B)  $a = -2, b = 4$
- C)  $a = 2, b = 4$
- D)  $a = 4, b = 3$

30



The figure above shows a regular hexagon with sides of length  $a$  and a square with sides of length  $a$ . If the area of the hexagon is  $384\sqrt{3}$  square inches, what is the area, in square inches, of the square?

- A) 256
- B) 192
- C)  $64\sqrt{3}$
- D)  $16\sqrt{3}$


**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{7}{12}$

	7	/	1	2	
	•	•	•	•	
	0	0	0	0	
1	1	•	1	1	
2	2	2	•	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
•	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

← Fraction line

Answer: 2.5

	2	.	5	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	•	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	•	2	2	
3	3	3	•	
4	4	4	4	
5	5	5	5	
6	6	6	6	
7	7	7	7	
8	8	8	8	
9	9	9	9	

.	6	6	6	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	2	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	5	
6	•	•	•	
7	7	7	7	
8	8	8	8	
9	9	9	9	

.	6	6	7	
	•	•	•	•
	0	0	0	
1	1	1	1	
2	2	2	2	
3	3	3	3	
4	4	4	4	
5	5	5	5	
6	•	•	6	
7	7	7	•	
8	8	8	8	
9	9	9	9	

Answer: 201 – either position is correct

	2	0	1	
	•	•	•	•
	0	•	0	
1	1	1	•	
2	•	2	2	
3	3	3	3	

	2	0	1	
	•	•	•	•
	•	0	0	
1	•	1	•	
2	•	2	2	
3	•	3	3	

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

A coastal geologist estimates that a certain country's beaches are eroding at a rate of 1.5 feet per year. According to the geologist's estimate, how long will it take, in years, for the country's beaches to erode by 21 feet?

32

If  $h$  hours and 30 minutes is equal to 450 minutes, what is the value of  $h$  ?

33

In the  $xy$ -plane, the point  $(3, 6)$  lies on the graph of the function  $f(x) = 3x^2 - bx + 12$ . What is the value of  $b$  ?

34

In one semester, Doug and Laura spent a combined 250 hours in the tutoring lab. If Doug spent 40 more hours in the lab than Laura did, how many hours did Laura spend in the lab?



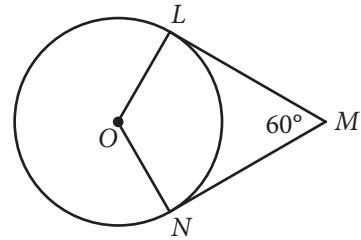


35

$$a = 18t + 15$$

Jane made an initial deposit to a savings account. Each week thereafter she deposited a fixed amount to the account. The equation above models the amount  $a$ , in dollars, that Jane has deposited after  $t$  weekly deposits. According to the model, how many dollars was Jane's initial deposit? (Disregard the \$ sign when gridding your answer.)

36



In the figure above, point  $O$  is the center of the circle, line segments  $LM$  and  $MN$  are tangent to the circle at points  $L$  and  $N$ , respectively, and the segments intersect at point  $M$  as shown. If the circumference of the circle is 96, what is the length of minor arc  $\widehat{LN}$  ?



Questions 37 and 38 refer to the following information.

A botanist is cultivating a rare species of plant in a controlled environment and currently has 3000 of these plants. The population of this species that the botanist expects to grow next year,  $N_{\text{next year}}$ , can be estimated from the number of plants this year,  $N_{\text{this year}}$ , by the equation below.

$$N_{\text{next year}} = N_{\text{this year}} + 0.2 \left( N_{\text{this year}} \right) \left( 1 - \frac{N_{\text{this year}}}{K} \right)$$

The constant  $K$  in this formula is the number of plants the environment is able to support.

37

According to the formula, what will be the number of plants two years from now if  $K = 4000$ ? (Round your answer to the nearest whole number.)

38

The botanist would like to increase the number of plants that the environment can support so that the population of the species will increase more rapidly. If the botanist's goal is that the number of plants will increase from 3000 this year to 3360 next year, how many plants must the modified environment support?

**STOP**

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.

# Scoring Your SAT<sup>®</sup> Practice Test #2

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT<sup>®</sup> will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide additional diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test Score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Micah answered 29 of the 52 questions correctly on the SAT Reading Test and 20 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, he calculates that he received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. He adds 27 to 23 (gets 50) and then multiplies by 10 to determine his SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.

## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1-3; 6; 8-9; 16; 20
- ▶ Math Test – Calculator: Questions 1; 3; 6; 8-9; 12; 21; 25; 28; 34-35

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 2; 4-5; 11; 13-20; 27; 31-32; 37-38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 4-5; 7; 10; 12-15; 17
- ▶ Math Test – Calculator: Questions 7; 10; 22-23; 26; 29; 33

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 2; 4; 7; 9-12; 15; 17-19; 22; 24-26; 28; 31-32; 36-37; 40; 42-44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1; 3; 5-6; 8; 13-14; 16; 20-21; 23; 27; 29-30; 33-35; 38-39; 41Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 4; 8; 16; 25; 28; 34; 37; 39; 44; 47
  - ▶ Writing and Language Test: Questions 7; 10; 18-19; 28; 32; 36; 44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 10; 13; 20-21; 23; 32; 36; 41; 46; 51
  - ▶ Writing and Language Test: Questions 4; 9; 15; 17; 24; 26; 37; 43Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.

## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11-21; 33-42
- ▶ Writing and Language Test: Questions 36-37; 40; 42-44
- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 4-5; 11-13; 16; 18; 35

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 22-32; 43-52
- ▶ Writing and Language Test: Questions 24-26; 28; 31-32
- ▶ Math Test – No Calculator: Question 14
- ▶ Math Test – Calculator: Questions: 3; 15; 17; 22-23; 27; 31

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores to determine your Analysis in Science cross-test score.

# SAT Practice Test #2: Worksheets

## ANSWER KEY

### Reading Test Answers

1 A	12 D	23 A	34 A	45 D
2 B	13 A	24 B	35 D	46 C
3 C	14 B	25 C	36 B	47 A
4 A	15 C	26 B	37 B	48 B
5 D	16 A	27 D	38 D	49 D
6 B	17 C	28 D	39 C	50 D
7 D	18 C	29 D	40 A	51 D
8 D	19 A	30 B	41 B	52 A
9 B	20 B	31 C	42 D	
10 D	21 C	32 B	43 C	
11 D	22 C	33 B	44 B	

READING TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Writing and Language Test Answers

1 B	12 B	23 A	34 D
2 B	13 D	24 B	35 A
3 A	14 C	25 B	36 D
4 A	15 C	26 A	37 A
5 D	16 C	27 D	38 B
6 D	17 B	28 A	39 C
7 B	18 B	29 C	40 D
8 D	19 A	30 C	41 D
9 B	20 D	31 D	42 C
10 B	21 D	32 B	43 C
11 C	22 B	33 D	44 D

WRITING AND  
LANGUAGE TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test No Calculator Answers

1 C	11 C
2 B	12 B
3 A	13 D
4 A	14 A
5 C	15 D
6 D	16 3, 6, or 9
7 A	17 19
8 C	18 12
9 B	19 6
10 C	20 1/4 or .25

MATH TEST  
NO CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test Calculator Answers

1 C	11 B	21 D	31 14
2 B	12 D	22 B	32 7
3 A	13 D	23 A	33 11
4 C	14 C	24 A	34 105
5 C	15 A	25 A	35 15
6 B	16 B	26 D	36 32
7 D	17 C	27 D	37 3284
8 D	18 C	28 B	38 7500
9 A	19 B	29 B	
10 B	20 C	30 A	

MATH TEST  
CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

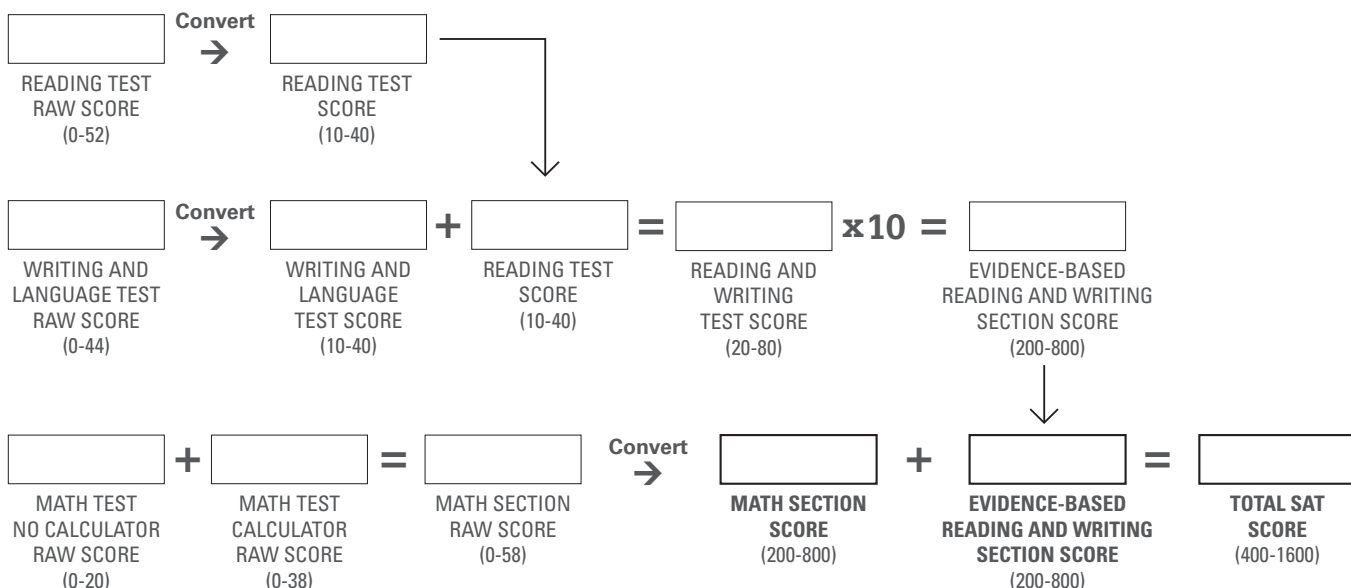


# SAT Practice Test #2: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	550	27	29
1	200	10	10	31	560	28	29
2	210	10	10	32	570	28	30
3	230	11	11	33	570	29	31
4	250	12	12	34	580	29	31
5	270	13	13	35	590	30	32
6	290	14	14	36	600	30	33
7	300	15	14	37	610	31	33
8	320	15	15	38	620	31	34
9	330	16	16	39	630	32	35
10	340	17	17	40	640	32	36
11	360	18	17	41	650	33	37
12	370	18	18	42	650	33	38
13	380	19	18	43	660	34	39
14	390	19	19	44	670	34	40
15	400	20	20	45	680	35	
16	420	20	20	46	690	35	
17	430	21	21	47	690	36	
18	440	21	22	48	700	37	
19	450	22	22	49	710	37	
20	460	22	23	50	720	38	
21	470	23	23	51	730	39	
22	480	23	24	52	740	40	
23	490	24	25	53	750		
24	500	24	25	54	760		
25	510	24	26	55	770		
26	510	25	26	56	780		
27	520	25	27	57	790		
28	530	26	27	58	800		
29	540	27	28				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES

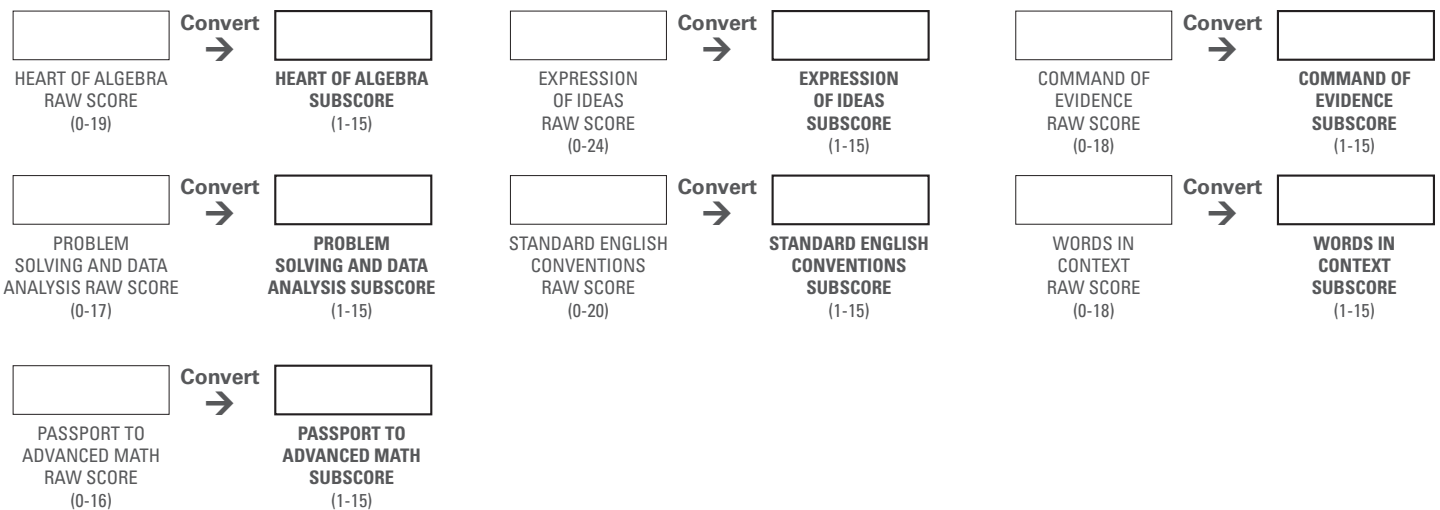


# SAT Practice Test #2: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	1	1	3	1	1
2	1	1	2	2	5	2	2
3	2	2	3	3	6	3	3
4	3	2	4	4	7	4	4
5	4	3	5	5	8	5	5
6	5	4	6	6	9	6	6
7	6	5	6	7	10	6	7
8	6	6	7	8	11	7	8
9	7	6	8	8	11	8	8
10	7	7	8	9	12	8	9
11	8	7	9	10	12	9	10
12	8	8	9	10	13	9	10
13	9	8	9	11	13	10	11
14	9	9	10	12	14	11	12
15	10	10	10	13	14	12	13
16	10	10	11	14	15	13	14
17	11	11	12	15		14	15
18	11	12	13			15	15
19	12	13	15				
20	12	15					
21	13						
22	14						
23	14						
24	15						

## CONVERSION EQUATION 2 SUBSCORES



# SAT Practice Test #2: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	26	26
1	10	11	19	26	26
2	10	12	20	27	27
3	12	13	21	28	28
4	13	14	22	29	29
5	15	15	23	29	29
6	16	16	24	30	30
7	16	17	25	31	31
8	17	18	26	31	31
9	18	19	27	32	32
10	19	19	28	33	33
11	20	20	29	34	34
12	21	21	30	35	34
13	22	22	31	36	35
14	23	22	32	37	36
15	24	23	33	38	37
16	24	24	34	39	38
17	25	25	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11-21; 33-42		22-32; 43-52	
Writing and Language Test	36-37; 40; 42-44		24-26; 28; 31-32	
Math Test No Calculator	None		3	
Math Test Calculator	4-5; 11-13; 16; 18; 35		15; 17; 22-23; 27; 31	
Total				



# Exam 6

# SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○	27	A B C D	○ ○ ○ ○	40	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○	28	A B C D	○ ○ ○ ○	41	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	16	A B C D	○ ○ ○ ○	29	A B C D	○ ○ ○ ○	42	A B C D	○ ○ ○ ○
4	A B C D	○ ○ ○ ○	17	A B C D	○ ○ ○ ○	30	A B C D	○ ○ ○ ○	43	A B C D	○ ○ ○ ○
5	A B C D	○ ○ ○ ○	18	A B C D	○ ○ ○ ○	31	A B C D	○ ○ ○ ○	44	A B C D	○ ○ ○ ○
6	A B C D	○ ○ ○ ○	19	A B C D	○ ○ ○ ○	32	A B C D	○ ○ ○ ○	45	A B C D	○ ○ ○ ○
7	A B C D	○ ○ ○ ○	20	A B C D	○ ○ ○ ○	33	A B C D	○ ○ ○ ○	46	A B C D	○ ○ ○ ○
8	A B C D	○ ○ ○ ○	21	A B C D	○ ○ ○ ○	34	A B C D	○ ○ ○ ○	47	A B C D	○ ○ ○ ○
9	A B C D	○ ○ ○ ○	22	A B C D	○ ○ ○ ○	35	A B C D	○ ○ ○ ○	48	A B C D	○ ○ ○ ○
10	A B C D	○ ○ ○ ○	23	A B C D	○ ○ ○ ○	36	A B C D	○ ○ ○ ○	49	A B C D	○ ○ ○ ○
11	A B C D	○ ○ ○ ○	24	A B C D	○ ○ ○ ○	37	A B C D	○ ○ ○ ○	50	A B C D	○ ○ ○ ○
12	A B C D	○ ○ ○ ○	25	A B C D	○ ○ ○ ○	38	A B C D	○ ○ ○ ○	51	A B C D	○ ○ ○ ○
13	A B C D	○ ○ ○ ○	26	A B C D	○ ○ ○ ○	39	A B C D	○ ○ ○ ○	52	A B C D	○ ○ ○ ○



### SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 2

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS** ○ ⊗ ⊖ ⊕ ⊗ ⊕ ⊖ ⊗ ⊕ ⊖

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	/ ○ ○	17	□ □ □ □	/ ○ ○	18	□ □ □ □	/ ○ ○	19	□ □ □ □	/ ○ ○	20	□ □ □ □	/ ○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	

**NO CALCULATOR ALLOWED**



### SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS

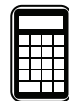


It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED





**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ●      **EXAMPLES OF INCOMPLETE MARKS**


It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 4 (Continued)**

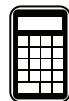
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**CALCULATOR  
ALLOWED**



**Test begins on the next page.**

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is adapted from Saki, "The Schartz-Metterklume Method." Originally published in 1911.

Lady Carlotta stepped out on to the platform of the small wayside station and took a turn or two up and down its uninteresting length, to kill time till the train should be pleased to proceed on its way. Then, *Line* in the roadway beyond, she saw a horse struggling with a more than ample load, and a carter of the sort that seems to bear a sullen hatred against the animal that helps him to earn a living. Lady Carlotta promptly betook her to the roadway, and put rather a different complexion on the struggle. Certain of her acquaintances were wont to give her plentiful admonition as to the undesirability of interfering on behalf of a distressed animal, such interference being "none of her business." Only once had she put the *15* doctrine of non-interference into practice, when one of its most eloquent exponents had been besieged for nearly three hours in a small and extremely uncomfortable may-tree by an angry boar-pig, while Lady Carlotta, on the other side of the fence, had *20* proceeded with the water-colour sketch she was engaged on, and refused to interfere between the boar and his prisoner. It is to be feared that she lost the friendship of the ultimately rescued lady. On this occasion she merely lost the train, which gave way to *25* the first sign of impatience it had shown throughout the journey, and steamed off without her. She bore the desertion with philosophical indifference; her

friends and relations were thoroughly well used to the fact of her luggage arriving without her. *30* She wired a vague non-committal message to her destination to say that she was coming on "by another train." Before she had time to think what her next move might be she was confronted by an imposingly attired lady, who seemed to be taking a *35* prolonged mental inventory of her clothes and looks. "You must be Miss Hope, the governess I've come to meet," said the apparition, in a tone that admitted of very little argument. "Very well, if I must I must," said Lady Carlotta to *40* herself with dangerous meekness. "I am Mrs. Quabarl," continued the lady; "and where, pray, is your luggage?" "It's gone astray," said the alleged governess, falling in with the excellent rule of life that the absent *45* are always to blame; the luggage had, in point of fact, behaved with perfect correctitude. "I've just telegraphed about it," she added, with a nearer approach to truth. "How provoking," said Mrs. Quabarl; "these *50* railway companies are so careless. However, my maid can lend you things for the night," and she led the way to her car. During the drive to the Quabarl mansion Lady Carlotta was impressively introduced to the *55* nature of the charge that had been thrust upon her; she learned that Claude and Wilfrid were delicate, sensitive young people, that Irene had the artistic temperament highly developed, and that Viola was

something or other else of a mould equally  
60 commonplace among children of that class and type  
in the twentieth century.

“I wish them not only to be TAUGHT,” said Mrs. Quabarl, “but INTERESTED in what they learn. In their history lessons, for instance, you must try to  
65 make them feel that they are being introduced to the life-stories of men and women who really lived, not merely committing a mass of names and dates to memory. French, of course, I shall expect you to talk at meal-times several days in the week.”

70 “I shall talk French four days of the week and Russian in the remaining three.”

“Russian? My dear Miss Hope, no one in the house speaks or understands Russian.”

75 Lady Carlotta coldly.

Mrs. Quabarl, to use a colloquial expression, was knocked off her perch. She was one of those imperfectly self-assured individuals who are magnificent and autocratic as long as they are not  
80 seriously opposed. The least show of unexpected resistance goes a long way towards rendering them cowed and apologetic. When the new governess failed to express wondering admiration of the large newly-purchased and expensive car, and lightly  
85 alluded to the superior advantages of one or two makes which had just been put on the market, the discomfiture of her patroness became almost abject. Her feelings were those which might have animated a general of ancient warfaring days, on beholding his  
90 heaviest battle-elephant ignominiously driven off the field by slingers and javelin throwers.

1

Which choice best summarizes the passage?

- A) A woman weighs the positive and negative aspects of accepting a new job.
- B) A woman does not correct a stranger who mistakes her for someone else.
- C) A woman impersonates someone else to seek revenge on an acquaintance.
- D) A woman takes an immediate dislike to her new employer.

2

In line 2, “turn” most nearly means

- A) slight movement.
- B) change in rotation.
- C) short walk.
- D) course correction.

3

The passage most clearly implies that other people regarded Lady Carlotta as

- A) outspoken.
- B) tactful.
- C) ambitious.
- D) unfriendly.

4

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 10-14 (“Certain . . . business”)
- B) Lines 22-23 (“It is . . . lady”)
- C) Lines 23-26 (“On this . . . her”)
- D) Lines 30-32 (“She . . . train”)

5

The description of how Lady Carlotta “put the doctrine of non-interference into practice” (lines 14-15) mainly serves to

- A) foreshadow her capacity for deception.
- B) illustrate the subtle cruelty in her nature.
- C) provide a humorous insight into her character.
- D) explain a surprising change in her behavior.

6

In line 55, “charge” most nearly means

- A) responsibility.
- B) attack.
- C) fee.
- D) expense.

7

The narrator indicates that Claude, Wilfrid, Irene, and Viola are

- A) similar to many of their peers.
- B) unusually creative and intelligent.
- C) hostile to the idea of a governess.
- D) more educated than others of their age.

8

The narrator implies that Mrs. Quabarl favors a form of education that emphasizes

- A) traditional values.
- B) active engagement.
- C) artistic experimentation.
- D) factual retention.

9

As presented in the passage, Mrs. Quabarl is best described as

- A) superficially kind but actually selfish.
- B) outwardly imposing but easily defied.
- C) socially successful but irrationally bitter.
- D) naturally generous but frequently imprudent.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 49-50 (“How . . . careless”)
- B) Lines 62-68 (“I wish . . . memory”)
- C) Lines 70-73 (“I shall . . . Russian”)
- D) Lines 77-82 (“She was . . . apologetic”)

**Questions 11-20 are based on the following passage and supplementary material.**

This passage is adapted from Taras Grescoe, *Straphanger: Saving Our Cities and Ourselves from the Automobile*. ©2012 by Taras Grescoe.

Though there are 600 million cars on the planet, and counting, there are also seven billion people, which means that for the vast majority of us getting  
 Line around involves taking buses, ferryboats, commuter  
 5 trains, streetcars, and subways. In other words, traveling to work, school, or the market means being a straphanger: somebody who, by choice or necessity, relies on public transport, rather than a privately owned automobile.

10 Half the population of New York, Toronto, and London do not own cars. Public transport is how most of the people of Asia and Africa, the world's most populous continents, travel. Every day, subway systems carry 155 million passengers, thirty-four  
 15 times the number carried by all the world's airplanes, and the global public transport market is now valued at \$428 billion annually. A century and a half after the invention of the internal combustion engine, private car ownership is still an anomaly.

20 And yet public transportation, in many minds, is the opposite of glamour—a squalid last resort for those with one too many impaired driving charges, too poor to afford insurance, or too decrepit to get behind the wheel of a car. In much of North  
 25 America, they are right: taking transit is a depressing experience. Anybody who has waited far too long on a street corner for the privilege of boarding a lurching, overcrowded bus, or wrestled luggage onto subways and shuttles to get to a big city airport,  
 30 knows that transit on this continent tends to be underfunded, ill-maintained, and ill-planned. Given the opportunity, who wouldn't drive? Hopping in a car almost always gets you to your destination more quickly.

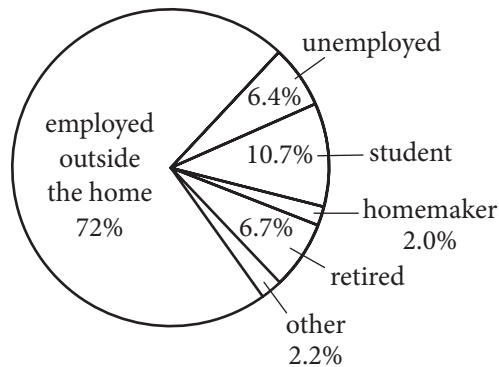
35 It doesn't have to be like this. Done right, public transport can be faster, more comfortable, and cheaper than the private automobile. In Shanghai, German-made magnetic levitation trains skim over elevated tracks at 266 miles an hour, whisking people  
 40 to the airport at a third of the speed of sound. In provincial French towns, electric-powered streetcars run silently on rubber tires, sliding through narrow streets along a single guide rail set into cobblestones. From Spain to Sweden, Wi-Fi equipped high-speed  
 45 trains seamlessly connect with highly ramified metro

networks, allowing commuters to work on laptops as they prepare for same-day meetings in once distant capital cities. In Latin America, China, and India, working people board fast-loading buses that move  
 50 like subway trains along dedicated busways, leaving the sedans and SUVs of the rich mired in dawn-to-dusk traffic jams. And some cities have transformed their streets into cycle-path freeways, making giant strides in public health and safety and  
 55 the sheer livability of their neighborhoods—in the process turning the workaday bicycle into a viable form of mass transit.

If you credit the demographers, this transit trend has legs. The “Millenials,” who reached adulthood  
 60 around the turn of the century and now outnumber baby boomers, tend to favor cities over suburbs, and are far more willing than their parents to ride buses and subways. Part of the reason is their ease with iPads, MP3 players, Kindles, and smartphones: you  
 65 can get some serious texting done when you're not driving, and earbuds offer effective insulation from all but the most extreme commuting annoyances. Even though there are more teenagers in the country than ever, only ten million have a driver's license  
 70 (versus twelve million a generation ago). Baby boomers may have been raised in Leave It to Beaver suburbs, but as they retire, a significant contingent is favoring older cities and compact towns where they have the option of walking and riding bikes. Seniors,  
 75 too, are more likely to use transit, and by 2025, there will be 64 million Americans over the age of sixty-five. Already, dwellings in older neighborhoods in Washington, D.C., Atlanta, and Denver, especially those near light-rail or subway stations, are  
 80 commanding enormous price premiums over suburban homes. The experience of European and Asian cities shows that if you make buses, subways, and trains convenient, comfortable, fast, and safe, a surprisingly large percentage of citizens will opt to  
 85 ride rather than drive.

**Figure 1**

Primary Occupation of Public Transportation Passengers in US Cities

**Figure 2**

Purpose of Public Transportation Trips in US Cities

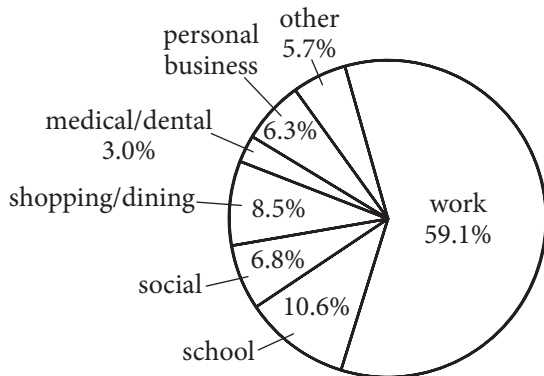


Figure 1 and figure 2 are adapted from the American Public Transportation Association, "A-Profile of Public Transportation Passenger Demographics and Travel Characteristics Reported in On-Board Surveys." ©2007 by American Public Transportation Association.

11

What function does the third paragraph (lines 20-34) serve in the passage as a whole?

- A) It acknowledges that a practice favored by the author of the passage has some limitations.
- B) It illustrates with detail the arguments made in the first two paragraphs of the passage.
- C) It gives an overview of a problem that has not been sufficiently addressed by the experts mentioned in the passage.
- D) It advocates for abandoning a practice for which the passage as a whole provides mostly favorable data.

12

Which choice does the author explicitly cite as an advantage of automobile travel in North America?

- A) Environmental impact
- B) Convenience
- C) Speed
- D) Cost

13

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 5-9 ("In . . . automobile")
- B) Lines 20-24 ("And . . . car")
- C) Lines 24-26 ("In . . . experience")
- D) Lines 32-34 ("Hopping . . . quickly")

14

The central idea of the fourth paragraph (lines 35-57) is that

- A) European countries excel at public transportation.
- B) some public transportation systems are superior to travel by private automobile.
- C) Americans should mimic foreign public transportation systems when possible.
- D) much international public transportation is engineered for passengers to work while on board.

15

Which choice provides the best evidence for the answer to the previous question?

- A) Line 35 (“It . . . this”)
- B) Lines 35-37 (“Done . . . automobile”)
- C) Lines 37-40 (“In . . . sound”)
- D) Lines 44-48 (“From . . . cities”)

16

As used in line 58, “credit” most nearly means

- A) endow.
- B) attribute.
- C) believe.
- D) honor.

17

As used in line 61, “favor” most nearly means

- A) indulge.
- B) prefer.
- C) resemble.
- D) serve.

18

Which choice best supports the conclusion that public transportation is compatible with the use of personal electronic devices?

- A) Lines 59-63 (“The . . . subways”)
- B) Lines 63-67 (“Part . . . annoyances”)
- C) Lines 68-70 (“Even . . . ago”)
- D) Lines 77-81 (“Already . . . homes”)

19

Which choice is supported by the data in the first figure?

- A) The number of students using public transportation is greater than the number of retirees using public transportation.
- B) The number of employed people using public transportation and the number of unemployed people using public transportation is roughly the same.
- C) People employed outside the home are less likely to use public transportation than are homemakers.
- D) Unemployed people use public transportation less often than do people employed outside the home.

20

Taken together, the two figures suggest that most people who use public transportation

- A) are employed outside the home and take public transportation to work.
- B) are employed outside the home but take public transportation primarily in order to run errands.
- C) use public transportation during the week but use their private cars on weekends.
- D) use public transportation only until they are able to afford to buy a car.



**Questions 21-30 are based on the following passage.**

This passage is adapted from Thor Hanson, *Feathers*. ©2011 by Thor Hanson. Scientists have long debated how the ancestors of birds evolved the ability to fly. The ground-up theory assumes they were fleet-footed ground dwellers that captured prey by leaping and flapping their upper limbs. The tree-down theory assumes they were tree climbers that leapt and glided among branches.

At field sites around the world, Ken Dial saw a pattern in how young pheasants, quail, tinamous, and other ground birds ran along behind their  
 Line 5 parents. “They jumped up like popcorn,” he said, describing how they would flap their half-formed wings and take short hops into the air. So when a group of graduate students challenged him to come up with new data on the age-old ground-up-tree-down debate, he designed a project  
 10 to see what clues might lie in how baby game birds learned to fly.

Ken settled on the Chukar Partridge as a model species, but he might not have made his discovery without a key piece of advice from the local  
 15 rancher in Montana who was supplying him with birds. When the cowboy stopped by to see how things were going, Ken showed him his nice, tidy laboratory setup and explained how the birds’ first hops and flights would be measured. The rancher  
 20 was incredulous. “He took one look and said, in pretty colorful language, ‘What are those birds doing on the ground? They hate to be on the ground! Give them something to climb on!’ ” At first it seemed unnatural—ground birds don’t like the ground? But  
 25 as he thought about it Ken realized that all the species he’d watched in the wild preferred to rest on ledges, low branches, or other elevated perches where they were safe from predators. They really only used the ground for feeding and traveling. So he brought  
 30 in some hay bales for the Chukars to perch on and then left his son in charge of feeding and data collection while he went away on a short work trip.

Barely a teenager at the time, young Terry Dial was visibly upset when his father got back. “I asked  
 35 him how it went,” Ken recalled, “and he said,

“Terrible! The birds are cheating!” Instead of flying up to their perches, the baby Chukars were using their legs. Time and again Terry had watched them run right up the side of a hay bale, flapping all the  
 40 while. Ken dashed out to see for himself, and that was the “aha” moment. “The birds were using their wings and legs cooperatively,” he told me, and that single observation opened up a world of possibilities.

Working together with Terry (who has since gone  
 45 on to study animal locomotion), Ken came up with a series of ingenious experiments, filming the birds as they raced up textured ramps tilted at increasing angles. As the incline increased, the partridges began to flap, but they angled their wings differently from  
 50 birds in flight. They aimed their flapping down and backward, using the force not for lift but to keep their feet firmly pressed against the ramp. “It’s like the spoiler on the back of a race car,” he explained, which is a very apt analogy. In Formula One racing,  
 55 spoilers are the big aerodynamic fins that push the cars downward as they speed along, increasing traction and handling. The birds were doing the very same thing with their wings to help them scramble up otherwise impossible slopes.

Ken called the technique WAIR, for wing-assisted  
 60 incline running, and went on to document it in a wide range of species. It not only allowed young birds to climb vertical surfaces within the first few weeks of life but also gave adults an energy-efficient  
 65 alternative to flying. In the Chukar experiments, adults regularly used WAIR to ascend ramps steeper than 90 degrees, essentially running up the wall and onto the ceiling.

In an evolutionary context, WAIR takes on  
 70 surprising explanatory powers. With one fell swoop, the Dials came up with a viable origin for the flapping flight stroke of birds (something gliding animals don’t do and thus a shortcoming of the tree-down theory) and an aerodynamic function for  
 75 half-formed wings (one of the main drawbacks to the ground-up hypothesis).

21

Which choice best reflects the overall sequence of events in the passage?

- A) An experiment is proposed but proves unworkable; a less ambitious experiment is attempted, and it yields data that give rise to a new set of questions.
- B) A new discovery leads to reconsideration of a theory; a classic study is adapted, and the results are summarized.
- C) An anomaly is observed and simulated experimentally; the results are compared with previous findings, and a novel hypothesis is proposed.
- D) An unexpected finding arises during the early phase of a study; the study is modified in response to this finding, and the results are interpreted and evaluated.

22

As used in line 7, “challenged” most nearly means

- A) dared.
- B) required.
- C) disputed with.
- D) competed with.

23

Which statement best captures Ken Dial’s central assumption in setting up his research?

- A) The acquisition of flight in young birds sheds light on the acquisition of flight in their evolutionary ancestors.
- B) The tendency of certain young birds to jump erratically is a somewhat recent evolved behavior.
- C) Young birds in a controlled research setting are less likely than birds in the wild to require perches when at rest.
- D) Ground-dwelling and tree-climbing predecessors to birds evolved in parallel.

24

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-4 (“At field . . . parents”)
- B) Lines 6-11 (“So when . . . fly”)
- C) Lines 16-19 (“When . . . measured”)
- D) Lines 23-24 (“At first . . . the ground”)

25

In the second paragraph (lines 12-32), the incident involving the local rancher mainly serves to

- A) reveal Ken Dial’s motivation for undertaking his project.
- B) underscore certain differences between laboratory and field research.
- C) show how an unanticipated piece of information influenced Ken Dial’s research.
- D) introduce a key contributor to the tree-down theory.

26

After Ken Dial had his “aha’ moment” (line 41), he

- A) tried to train the birds to fly to their perches.
- B) studied videos to determine why the birds no longer hopped.
- C) observed how the birds dealt with gradually steeper inclines.
- D) consulted with other researchers who had studied Chukar Partridges.

27

The passage identifies which of the following as a factor that facilitated the baby Chukars’ traction on steep ramps?

- A) The speed with which they climbed
- B) The position of their flapping wings
- C) The alternation of wing and foot movement
- D) Their continual hopping motions

28

As used in line 61, “document” most nearly means

- A) portray.
- B) record.
- C) publish.
- D) process.

29

What can reasonably be inferred about gliding animals from the passage?

- A) Their young tend to hop along beside their parents instead of flying beside them.
- B) Their method of locomotion is similar to that of ground birds.
- C) They use the ground for feeding more often than for perching.
- D) They do not use a flapping stroke to aid in climbing slopes.

30

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 4-6 (“They jumped . . . air”)
- B) Lines 28-29 (“They really . . . traveling”)
- C) Lines 57-59 (“The birds . . . slopes”)
- D) Lines 72-74 (“something . . . theory”)

**Questions 31-41 are based on the following passages.**

Passage 1 is adapted from Talleyrand et al., *Report on Public Instruction*. Originally published in 1791. Passage 2 is adapted from Mary Wollstonecraft, *A Vindication of the Rights of Woman*. Originally published in 1792. Talleyrand was a French diplomat; the *Report* was a plan for national education. Wollstonecraft, a British novelist and political writer, wrote *Vindication* in response to Talleyrand.

**Passage 1**

That half the human race is excluded by the other half from any participation in government; that they are native by birth but foreign by law in the very land  
 Line where they were born; and that they are  
 5 property-owners yet have no direct influence or representation: are all political phenomena apparently impossible to explain on abstract principle. But on another level of ideas, the question changes and may be easily resolved. The purpose of  
 10 all these institutions must be the happiness of the greatest number. Everything that leads us farther from this purpose is in error; everything that brings us closer is truth. If the exclusion from public employments decreed against women leads to a  
 15 greater sum of mutual happiness for the two sexes, then this becomes a law that all Societies have been compelled to acknowledge and sanction.  
 Any other ambition would be a reversal of our primary destinies; and it will never be in women’s  
 20 interest to change the assignment they have received.  
 It seems to us incontestable that our common happiness, above all that of women, requires that they never aspire to the exercise of political rights and functions. Here we must seek their interests in  
 25 the wishes of nature. Is it not apparent, that their delicate constitutions, their peaceful inclinations, and the many duties of motherhood, set them apart from strenuous habits and onerous duties, and summon them to gentle occupations and the cares of the  
 30 home? And is it not evident that the great conserving principle of Societies, which makes the division of powers a source of harmony, has been expressed and revealed by nature itself, when it divided the functions of the two sexes in so obviously distinct a  
 35 manner? This is sufficient; we need not invoke principles that are inapplicable to the question. Let us not make rivals of life’s companions. You must, you truly must allow the persistence of a union that no interest, no rivalry, can possibly undo. Understand  
 40 that the good of all demands this of you.

### Passage 2

Contending for the rights of woman, my main argument is built on this simple principle, that if she be not prepared by education to become the companion of man, she will stop the progress of knowledge and virtue; for truth must be common to all, or it will be inefficacious with respect to its influence on general practice. And how can woman be expected to co-operate unless she know why she ought to be virtuous? unless freedom strengthen her reason till she comprehend her duty, and see in what manner it is connected with her real good? If children are to be educated to understand the true principle of patriotism, their mother must be a patriot; and the love of mankind, from which an orderly train of virtues spring, can only be produced by considering the moral and civil interest of mankind; but the education and situation of woman, at present, shuts her out from such investigations. . . .

Consider, sir, dispassionately, these observations—for a glimpse of this truth seemed to open before you when you observed, “that to see one half of the human race excluded by the other from all participation of government, was a political phenomenon that, according to abstract principles, it was impossible to explain.” If so, on what does your constitution rest? If the abstract rights of man will bear discussion and explanation, those of woman, by a parity of reasoning, will not shrink from the same test: though a different opinion prevails in this country, built on the very arguments which you use to justify the oppression of woman—prescription.

Consider—I address you as a legislator—whether, when men contend for their freedom, and to be allowed to judge for themselves respecting their own happiness, it be not inconsistent and unjust to subjugate women, even though you firmly believe that you are acting in the manner best calculated to promote their happiness? Who made man the exclusive judge, if woman partake with him the gift of reason?

In this style, argue tyrants of every denomination, from the weak king to the weak father of a family; they are all eager to crush reason; yet always assert that they usurp its throne only to be useful. Do you not act a similar part, when you force all women, by denying them civil and political rights, to remain immured in their families groping in the dark?

31

As used in line 21, “common” most nearly means

- A) average.
- B) shared.
- C) coarse.
- D) similar.

32

It can be inferred that the authors of Passage 1 believe that running a household and raising children

- A) are rewarding for men as well as for women.
- B) yield less value for society than do the roles performed by men.
- C) entail very few activities that are difficult or unpleasant.
- D) require skills similar to those needed to run a country or a business.

33

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 4-6 (“they are . . . representation”)
- B) Lines 13-17 (“If the . . . sanction”)
- C) Lines 25-30 (“Is it . . . home”)
- D) Lines 30-35 (“And . . . manner”)

34

According to the author of Passage 2, in order for society to progress, women must

- A) enjoy personal happiness and financial security.
- B) follow all currently prescribed social rules.
- C) replace men as figures of power and authority.
- D) receive an education comparable to that of men.

35

As used in line 50, “reason” most nearly means

- A) motive.
- B) sanity.
- C) intellect.
- D) explanation.

36

In Passage 2, the author claims that freedoms granted by society’s leaders have

- A) privileged one gender over the other.
- B) resulted in a general reduction in individual virtue.
- C) caused arguments about the nature of happiness.
- D) ensured equality for all people.

37

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 41-45 (“Contending . . . virtue”)
- B) Lines 45-47 (“truth . . . practice”)
- C) Lines 65-66 (“If so . . . rest”)
- D) Lines 72-75 (“Consider . . . happiness”)

38

In lines 61-65, the author of Passage 2 refers to a statement made in Passage 1 in order to

- A) call into question the qualifications of the authors of Passage 1 regarding gender issues.
- B) dispute the assertion made about women in the first sentence of Passage 1.
- C) develop her argument by highlighting what she sees as flawed reasoning in Passage 1.
- D) validate the concluding declarations made by the authors of Passage 1 about gender roles.

39

Which best describes the overall relationship between Passage 1 and Passage 2?

- A) Passage 2 strongly challenges the point of view in Passage 1.
- B) Passage 2 draws alternative conclusions from the evidence presented in Passage 1.
- C) Passage 2 elaborates on the proposal presented in Passage 1.
- D) Passage 2 restates in different terms the argument presented in Passage 1.

40

The authors of both passages would most likely agree with which of the following statements about women in the eighteenth century?

- A) Their natural preferences were the same as those of men.
- B) They needed a good education to be successful in society.
- C) They were just as happy in life as men were.
- D) They generally enjoyed fewer rights than men did.

41

How would the authors of Passage 1 most likely respond to the points made in the final paragraph of Passage 2?

- A) Women are not naturally suited for the exercise of civil and political rights.
- B) Men and women possess similar degrees of reasoning ability.
- C) Women do not need to remain confined to their traditional family duties.
- D) The principles of natural law should not be invoked when considering gender roles.



**Questions 42-52 are based on the following passage and supplementary material.**

This passage is adapted from Richard J. Sharpe and Lisa Heyden, "Honey Bee Colony Collapse Disorder is Possibly Caused by a Dietary Pyrethrum Deficiency." ©2009 by Elsevier Ltd. Colony collapse disorder is characterized by the disappearance of adult worker bees from hives.

Honey bees are hosts to the pathogenic large ectoparasitic mite *Varroa destructor* (Varroa mites).

Line These mites feed on bee hemolymph (blood) and can  
kill bees directly or by increasing their susceptibility  
5 to secondary infection with fungi, bacteria or viruses.  
Little is known about the natural defenses that keep  
the mite infections under control.

Pyrethrums are a group of flowering plants which  
include *Chrysanthemum coccineum*, *Chrysanthemum*  
10 *cinerariifolium*, *Chrysanthemum marschalli*, and  
related species. These plants produce potent  
insecticides with anti-mite activity. The naturally  
occurring insecticides are known as pyrethrums.

A synonym for the naturally occurring pyrethrums is  
15 pyrethrin and synthetic analogues of pyrethrums are  
known as pyrethroids. In fact, the human mite  
infestation known as scabies (*Sarcoptes scabiei*) is  
treated with a topical pyrethrum cream.

We suspect that the bees of commercial bee  
20 colonies which are fed mono-crops are nutritionally  
deficient. In particular, we postulate that the problem  
is a diet deficient in anti-mite toxins: pyrethrums,  
and possibly other nutrients which are inherent in  
such plants. Without, at least, intermittent feeding on

25 the pyrethrum producing plants, bee colonies are  
susceptible to mite infestations which can become  
fatal either directly or due to a secondary infection of  
immunocompromised or nutritionally deficient bees.  
This secondary infection can be viral, bacterial or

30 fungal and may be due to one or more pathogens.  
In addition, immunocompromised or nutritionally  
deficient bees may be further weakened when  
commercially produced insecticides are introduced  
into their hives by bee keepers in an effort to fight  
35 mite infestation. We further postulate that the proper  
dosage necessary to prevent mite infestation may be  
better left to the bees, who may seek out or avoid  
pyrethrum containing plants depending on the  
amount necessary to defend against mites and the  
40 amount already consumed by the bees, which in  
higher doses could be potentially toxic to them.

This hypothesis can best be tested by a trial  
wherein a small number of commercial honey bee  
colonies are offered a number of pyrethrum  
45 producing plants, as well as a typical bee food source  
such as clover, while controls are offered only the  
clover. Mites could then be introduced to each hive  
with note made as to the choice of the bees, and the  
effects of the mite parasites on the experimental  
50 colonies versus control colonies.

It might be beneficial to test wild-type honey bee  
colonies in this manner as well, in case there could be  
some genetic difference between them that affects the  
bees' preferences for pyrethrum producing flowers.

**Pathogen Occurrence in Honey Bee Colonies With and Without Colony Collapse Disorder**

Pathogen	Percent of colonies affected by pathogen	
	Colonies with colony collapse disorder (%)	Colonies without colony collapse disorder (%)
Viruses		
IAPV	83	5
KBV	100	76
Fungi		
<i>Nosema apis</i>	90	48
<i>Nosema ceranae</i>	100	81
All four pathogens	77	0

Adapted from Diana L. Cox-Foster et al., "A Metagenomic Survey of Microbes in Honey Bee Colony Collapse Disorder." ©2007 by American Association for the Advancement of Science.

The table above shows, for colonies with colony collapse disorder and for colonies without colony collapse disorder, the percent of colonies having honey bees infected by each of four pathogens and by all four pathogens together.

42

How do the words “can,” “may,” and “could” in the third paragraph (lines 19-41) help establish the tone of the paragraph?

- A) They create an optimistic tone that makes clear the authors are hopeful about the effects of their research on colony collapse disorder.
- B) They create a dubious tone that makes clear the authors do not have confidence in the usefulness of the research described.
- C) They create a tentative tone that makes clear the authors suspect but do not know that their hypothesis is correct.
- D) They create a critical tone that makes clear the authors are skeptical of claims that pyrethrums are inherent in mono-crops.

43

In line 42, the authors state that a certain hypothesis “can best be tested by a trial.” Based on the passage, which of the following is a hypothesis the authors suggest be tested in a trial?

- A) Honeybees that are exposed to both pyrethrums and mites are likely to develop a secondary infection by a virus, a bacterium, or a fungus.
- B) Beekeepers who feed their honeybee colonies a diet of a single crop need to increase the use of insecticides to prevent mite infestations.
- C) A honeybee diet that includes pyrethrums results in honeybee colonies that are more resistant to mite infestations.
- D) Humans are more susceptible to varroa mites as a result of consuming nutritionally deficient food crops.

44

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-5 (“These mites . . . viruses”)
- B) Lines 16-18 (“In fact . . . cream”)
- C) Lines 19-21 (“We suspect . . . deficient”)
- D) Lines 24-28 (“Without . . . bees”)

45

The passage most strongly suggests that beekeepers’ attempts to fight mite infestations with commercially produced insecticides have what unintentional effect?

- A) They increase certain mite populations.
- B) They kill some beneficial forms of bacteria.
- C) They destroy bees’ primary food source.
- D) They further harm the health of some bees.

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-2 (“Honey bees . . . mites”)
- B) Lines 6-7 (“Little . . . control”)
- C) Lines 31-35 (“In addition . . . infestation”)
- D) Lines 47-50 (“Mites . . . control colonies”)

47

As used in line 35, “postulate” most nearly means to

- A) make an unfounded assumption.
- B) put forth an idea or claim.
- C) question a belief or theory.
- D) conclude based on firm evidence.

48

The main purpose of the fourth paragraph (lines 42-50) is to

- A) summarize the results of an experiment that confirmed the authors’ hypothesis about the role of clover in the diets of wild-type honeybees.
- B) propose an experiment to investigate how different diets affect commercial honeybee colonies’ susceptibility to mite infestations.
- C) provide a comparative nutritional analysis of the honey produced by the experimental colonies and by the control colonies.
- D) predict the most likely outcome of an unfinished experiment summarized in the third paragraph (lines 19-41).

49

An unstated assumption made by the authors about clover is that the plants

- A) do not produce pyrethrums.
- B) are members of the *Chrysanthemum* genus.
- C) are usually located near wild-type honeybee colonies.
- D) will not be a good food source for honeybees in the control colonies.

50

Based on data in the table, in what percent of colonies with colony collapse disorder were the honeybees infected by all four pathogens?

- A) 0 percent
- B) 77 percent
- C) 83 percent
- D) 100 percent

51

Based on data in the table, which of the four pathogens infected the highest percentage of honeybee colonies without colony collapse disorder?

- A) IAPV
- B) KBV
- C) *Nosema apis*
- D) *Nosema ceranae*

52

Do the data in the table provide support for the authors' claim that infection with varroa mites increases a honeybee's susceptibility to secondary infections?

- A) Yes, because the data provide evidence that infection with a pathogen caused the colonies to undergo colony collapse disorder.
- B) Yes, because for each pathogen, the percent of colonies infected is greater for colonies with colony collapse disorder than for colonies without colony collapse disorder.
- C) No, because the data do not provide evidence about bacteria as a cause of colony collapse disorder.
- D) No, because the data do not indicate whether the honeybees had been infected with mites.

## STOP

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**



# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Shed Some Light on the Workplace

Studies have shown that employees are happier, **1** healthier, and more productive when they work in an environment **2** in which temperatures are carefully controlled. New buildings may be designed with these studies in mind, but many older buildings were not, resulting in spaces that often depend primarily on artificial lighting. While employers may balk at the expense of reconfiguring such buildings to increase the amount of natural light, the investment has been shown to be well worth it in the long run—for both employees and employers.

1

- A) NO CHANGE
- B) healthy, and more
- C) healthier, and they are
- D) healthier, being more

2

Which choice provides the most appropriate introduction to the passage?

- A) NO CHANGE
- B) that affords them adequate amounts of natural light.
- C) that is thoroughly sealed to prevent energy loss.
- D) in which they feel comfortable asking managers for special accommodations.

For one thing, lack of exposure to natural light has a significant impact on employees' health. A study conducted in 2013 by Northwestern University in Chicago showed that inadequate natural light could result in eye strain, headaches, and fatigue, as well as interference with the body's circadian rhythms. **3** Circadian rhythms, which are controlled by the **4** bodies biological clocks, influence body temperature, hormone release, cycles of sleep and wakefulness, and other bodily functions. Disruptions of circadian rhythms have been linked to sleep disorders, diabetes, depression, and bipolar disorder. Like any other health problems, these ailments can increase employee absenteeism, which, in turn, **5** is costly for employers. Employees who feel less than 100 percent and are sleep deprived are also less prone to work at their maximal productivity. One company in California **6** gained a huge boost in its employees' morale when it moved from an artificially lit distribution facility to one with natural illumination.

3

At this point, the writer is considering adding the following sentence.

Workers in offices with windows sleep an average of 46 minutes more per night than workers in offices without windows.

Should the writer make this addition here?

- A) Yes, because it supplies quantitative data that will be examined in the rest of the paragraph.
- B) Yes, because it explains the nature of the bodily functions referred to in the next sentence.
- C) No, because it interrupts the discussion of circadian rhythms.
- D) No, because it does not take into account whether workers were exposed to sunlight outside the office.

4

- A) NO CHANGE
- B) bodies' biological clocks',
- C) body's biological clocks,
- D) body's biological clock's,

5

- A) NO CHANGE
- B) are
- C) is being
- D) have been

6

Which choice best supports the statement made in the previous sentence?

- A) NO CHANGE
- B) saw a 5 percent increase in productivity
- C) saved a great deal on its operational costs
- D) invested large amounts of time and capital

7 Artificial light sources are also costly aside from lowering worker productivity. They typically constitute anywhere from 25 to 50 percent of a building's energy use. When a plant in Seattle, Washington, was redesigned for more natural light, the company was able to enjoy annual electricity cost reductions of \$500,000 8 each year.

7

In context, which choice best combines the underlined sentences?

- A) Aside from lowering worker productivity, artificial light sources are also costly, typically constituting anywhere from 25 to 50 percent of a building's energy use.
- B) The cost of artificial light sources, aside from lowering worker productivity, typically constitutes anywhere from 25 to 50 percent of a building's energy use.
- C) Typically constituting 25 to 50 percent of a building's energy use, artificial light sources lower worker productivity and are costly.
- D) Artificial lights, which lower worker productivity and are costly, typically constitute anywhere from 25 to 50 percent of a building's energy use.

8

- A) NO CHANGE
- B) every year.
- C) per year.
- D) DELETE the underlined portion and end the sentence with a period.

Among the possibilities to reconfigure a building's lighting is the installation of full-pane windows to allow the greatest degree of sunlight to reach office interiors.

**9** Thus, businesses can install light tubes, **10** these are pipes placed in workplace roofs to capture and funnel sunlight down into a building's interior. Glass walls and dividers can also be used to replace solid walls as a means **11** through distributing natural light more freely. Considering the enormous costs of artificial lighting, both in terms of money and productivity, investment in such improvements should be a natural choice for businesses.

9

- A) NO CHANGE
- B) Nevertheless,
- C) Alternatively,
- D) Finally,

10

- A) NO CHANGE
- B) they are
- C) which are
- D) those being

11

- A) NO CHANGE
- B) of
- C) from
- D) DELETE the underlined portion.

Questions 12-22 are based on the following passage.

### Transforming the American West Through Food and Hospitality

Just as travelers taking road trips today may need to take a break for food at a rest area along the highway, settlers traversing the American West by train in the mid-1800s often found **12** themselves in need of refreshment. However, food available on rail lines was generally of terrible quality. **13** Despite having worked for railroad companies, Fred Harvey, an English-born **14** entrepreneur. He decided to open his own restaurant business to serve rail customers. Beginning in the 1870s, he opened dozens of restaurants in rail stations and dining cars. These Harvey Houses, which constituted the first restaurant chain in the United States, **15** was unique for its high standards of service and quality. The menu was modeled after those of fine restaurants, so the food was leagues beyond the **16** sinister fare travelers were accustomed to receiving in transit.

12

- A) NO CHANGE
- B) himself or herself
- C) their selves
- D) oneself

13

Which choice provides the most logical introduction to the sentence?

- A) NO CHANGE
- B) He had lived in New York and New Orleans, so
- C) To capitalize on the demand for good food,
- D) DELETE the underlined portion.

14

- A) NO CHANGE
- B) entrepreneur:
- C) entrepreneur; he
- D) entrepreneur,

15

- A) NO CHANGE
- B) were unique for their
- C) was unique for their
- D) were unique for its

16

Which choice best maintains the tone established in the passage?

- A) NO CHANGE
- B) surly
- C) abysmal
- D) icky

His restaurants were immediately successful, but Harvey was not content to follow conventional business practices. **17** Although women did not traditionally work in restaurants in the nineteenth century, Harvey decided to try employing women as waitstaff. In 1883, he placed an advertisement seeking educated, well-mannered, articulate young women between the ages of 18 and 30. **18** Response to the advertisement was overwhelming, even tremendous, and Harvey soon replaced the male servers at his restaurants with women. Those who were hired as “Harvey Girls” joined an elite group of workers, who were expected to complete a 30-day training program and follow a strict code of rules for conduct and curfews. In the workplace, the women donned identical black-and-white uniforms and carried out their duties with precision. Not only were such regulations meant to ensure the efficiency of the business and the safety of the workers, **19** but also helped to raise people’s generally low opinion of the restaurant industry.

17

The writer is considering deleting the previous sentence. Should the writer make this change?

- A) Yes, because it introduces information that is irrelevant at this point in the passage.
- B) Yes, because it does not logically follow from the previous paragraph.
- C) No, because it provides a logical introduction to the paragraph.
- D) No, because it provides a specific example in support of arguments made elsewhere in the passage.

18

- A) NO CHANGE
- B) Response to the advertisement was overwhelming,
- C) Overwhelming, even tremendous, was the response to the advertisement,
- D) There was an overwhelming, even tremendous, response to the advertisement,

19

- A) NO CHANGE
- B) but also helping
- C) also helping
- D) but they also helped

In return for the servers' work, the position paid quite well for the time: \$17.50 a month, plus tips, meals, room and board, laundry service, and travel expenses. **20**

For as long as Harvey Houses served rail travelers through the mid-twentieth century, working there was a steady and lucrative position for women. Living independently and demonstrating an intense work **21** ethic; the Harvey Girls became known as a transformative force in the American **22** West. Advancing the roles of women in the restaurant industry and the American workforce as a whole, the Harvey Girls raised the standards for restaurants and blazed a trail in the fast-changing landscape of the western territories.

20

Which choice most logically follows the previous sentence?

- A) The growth of Harvey's business coincided with the expansion of the Santa Fe Railway, which served large sections of the American West.
- B) Harvey would end up opening dozens of restaurants and dining cars, plus 15 hotels, over his lucrative career.
- C) These benefits enabled the Harvey Girls to save money and build new and exciting lives for themselves in the so-called Wild West.
- D) The compensation was considered excellent at the time, though it may not seem like much money by today's standards.

21

- A) NO CHANGE
- B) ethic:
- C) ethic, and
- D) ethic,

22

The writer is considering revising the underlined portion of the sentence to read:

West, inspiring books, documentaries, and even a musical.

Should the writer add this information here?

- A) Yes, because it provides examples of the Harvey Girls' influence.
- B) Yes, because it serves as a transitional point in the paragraph.
- C) No, because it should be placed earlier in the passage.
- D) No, because it contradicts the main claim of the passage.

Questions 23-33 are based on the following passage and supplementary material.

### How Do You Like Those Apples?

Marketed as SmartFresh, the chemical 1-MCP (1-methylcyclopropene) has been used by fruit growers since 2002 in the United States and elsewhere to preserve the crispness and lengthen the storage life of apples and other fruit, which often must travel long distances before being eaten by consumers. **23** 1-MCP lengthens storage life by three to four times when applied to apples. This extended life allows producers to sell their apples in the off-season, months after the apples have been harvested. And at a cost of about one cent per pound of apples, 1-MCP is a highly cost-effective treatment. However, 1-MCP is not a panacea for fruit producers or sellers: there are problems and limitations associated with its use.

23

Which choice most effectively combines the underlined sentences?

- A) When applied to apples, 1-MCP lengthens storage life by three to four times, allowing producers to sell their apples in the off-season, months after the apples have been harvested.
- B) Producers are allowed to sell their apples months after they have been harvested—in the off-season—because 1-MCP, when applied to apples, lengthens their storage life by three to four times.
- C) 1-MCP lengthens storage life, when applied to apples, by three to four times, allowing producers to sell their apples months after the apples have been harvested in the off-season.
- D) Months after apples have been harvested, producers are allowed to sell their apples, in the off-season, because 1-MCP lengthens storage life when applied to apples by three to four times.



[1] 1-MCP works by limiting a fruit's production of ethylene, **24** it is a chemical that causes fruit to ripen and eventually rot. [2] While 1-MCP keeps apples **25** tight and crisp for months, it also limits **26** their scent production. [3] This may not be much of a problem with certain kinds of apples that are not naturally very fragrant, such as Granny Smith, but for apples that are prized for their fruity fragrance, such as McIntosh, this can be a problem with consumers, **27** that will reject apples lacking the expected aroma. [4] But some fruits do not respond as well to 1-MCP as others **28** did, and some even respond adversely. [5] Furthermore, some fruits, particularly those that naturally produce a large

24

- A) NO CHANGE
- B) being
- C) that is
- D) DELETE the underlined portion.

25

- A) NO CHANGE
- B) firm
- C) stiff
- D) taut

26

- A) NO CHANGE
- B) there
- C) its
- D) it's

27

- A) NO CHANGE
- B) they
- C) which
- D) who

28

- A) NO CHANGE
- B) do,
- C) have,
- D) will,

amount of ethylene, do not respond as well to 1-MCP treatment. [6] Take Bartlett **29** pears, for instance, unless they are treated with exactly the right amount of 1-MCP at exactly the right time, they will remain hard and green until they rot, and consumers who experience this will be unlikely to purchase them again. **30**

**29**

- A) NO CHANGE
- B) pears, for instance:
- C) pears for instance,
- D) pears. For instance,

**30**

To make this paragraph most logical, sentence 4 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 5.

Finally, researchers have found that 1-MCP actually increases susceptibility to some pathologies in certain apple varieties. For example, Empire apples are prone to a condition that causes the flesh of the apple to turn brown. Traditionally, apple producers have dealt with this problem by leaving the apples in the open air for three weeks before storing them in a controlled atmosphere with tightly regulated temperature, humidity, and carbon dioxide levels. As the graph shows, the flesh of untreated Empire apples that are first stored in the open air undergoes **31** roughly five percent less browning than the flesh of untreated Empire apples that are immediately put into storage in a controlled environment. However, when Empire apples are treated with 1-MCP, **32** their flesh turns brown when the apples are first stored in the open air, though not under other conditions. Although

31

Which choice offers an accurate interpretation of the data in the graph?

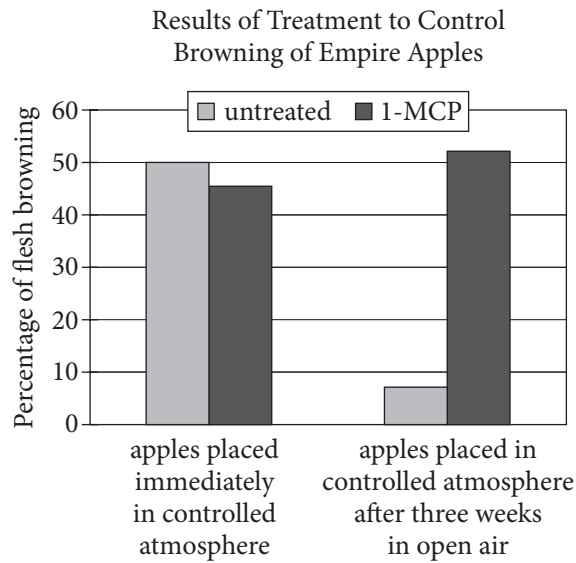
- A) NO CHANGE
- B) slightly more browning than
- C) twice as much browning as
- D) substantially less browning than

32

Which choice offers an accurate interpretation of the data in the graph?

- A) NO CHANGE
- B) roughly half of their flesh turns brown, regardless of whether the apples are first stored in the open air.
- C) their flesh browns when they are put directly into a controlled atmosphere but not when they are first stored in the open air.
- D) their flesh turns brown when they are first stored in the open air, though not as quickly as the apple flesh in an untreated group does.

researchers continue to search for the right combination of factors that will keep fruits fresh and attractive, **33** the problem may be that consumers are overly concerned with superficial qualities rather than the actual freshness of the fruit.



Adapted from Hannah J. James, Jacqueline F. Nock, and Chris B. Watkins, "The Failure of Postharvest Treatments to Control Firm Flesh Browning in Empire Apples." ©2010 by The New York State Horticultural Society.

33

The writer wants a conclusion that conveys how the shortcomings of 1-MCP presented in the passage affect the actions of people in the fruit industry. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) many of the improvements to fruit quality they have discovered so far have required trade-offs in other properties of the fruit.
- C) for now many fruit sellers must weigh the relative values of aroma, color, and freshness when deciding whether to use 1-MCP.
- D) it must be acknowledged that 1-MCP, despite some inadequacies, has enabled the fruit industry to ship and store fruit in ways that were impossible before.

Questions 34-44 are based on the following passage.

### More than One Way to Dress a Cat

From Michelangelo's *David* to Vincent van Gogh's series of self-portraits to Grant Wood's iconic image of a farming couple in *American Gothic*, **34** Gothic. These works by human artists have favored representations of members of their own species to those of other species. Indeed, when we think about animals depicted in well-known works of art, the image of dogs playing poker—popularized in a series of paintings by American artist C. M. **35** Coolidge, may be the first and only one that comes to mind. Yet some of the earliest known works of art, including paintings and drawings tens of thousands of years old found on cave walls in Spain and France, **36** portrays animals. Nor has artistic homage to our fellow creatures entirely died out in the millennia since, **37** despite the many years that have passed between then and now.

**34**

- A) NO CHANGE
- B) *Gothic*. Works
- C) *Gothic*; these works
- D) *Gothic*, works

**35**

- A) NO CHANGE
- B) Coolidge—
- C) Coolidge;
- D) Coolidge

**36**

- A) NO CHANGE
- B) portraying
- C) portray
- D) has portrayed

**37**

The writer wants to link the first paragraph with the ideas that follow. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) with special attention being paid to domestic animals such as cats.
- C) even though most paintings in museums are of people, not animals.
- D) as the example of one museum in Russia shows.

[1] The State Hermitage Museum in St. Petersburg, one of Russia's greatest art museums, has long had a productive partnership with a much loved animal: the cat. [2] For centuries, cats have guarded this famous museum, ridding it of mice, rats, and other rodents that could damage the art, not to mention **38** scared off visitors. [3] Peter the Great introduced the first cat to the Hermitage in the early eighteenth century. [4] Later Catherine the Great declared the cats to be official guardians of the galleries. [5] Continuing the tradition, Peter's daughter Elizaveta introduced the best and strongest cats in Russia to the Hermitage. [6] Today, the museum holds a yearly festival honoring these faithful workers. **39**

**38**

- A) NO CHANGE
- B) scaring
- C) scare
- D) have scared

**39**

To make this paragraph most logical, sentence 5 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 3.
- D) after sentence 6.

These cats are so cherished by the museum that officials recently **40** decreed original paintings to be made of six of them. In each, a cat is depicted upright in a humanlike pose and clothed in imperial-era Russian attire. The person chosen for this **41** task, digital artist, Eldar Zakirov painted the cats in the style traditionally used by portrait artists, in so doing **42** presenting the cats as noble individuals worthy of respect. One portrait, *The Hermitage Court Chamber Herald Cat*, includes an

40

- A) NO CHANGE
- B) commissioned
- C) forced
- D) licensed

41

- A) NO CHANGE
- B) task, digital artist, Eldar Zakirov,
- C) task digital artist Eldar Zakirov,
- D) task, digital artist Eldar Zakirov,

42

Which choice most effectively sets up the examples that follow?

- A) NO CHANGE
- B) managing to capture unique characteristics of each cat.
- C) commenting on the absurdity of dressing up cats in royal robes.
- D) indicating that the cats were very talented mouse catchers.

aristocratic tilt of feline ears as well as a stately sweep of tail emerging from the stiff scarlet and gold of royal court dress. The wise, thoughtful green eyes of the subject of *The Hermitage Court Outrunner Cat* mimic those of a trusted royal advisor. **43** Some may find it peculiar to observe cats portrayed in formal court poses, but these felines, by **44** mastering the art of killing mice and rats, are benefactors of the museum as important as any human.

43

At this point, the writer is considering adding the following sentence.

The museum occupies six historic buildings, including the Winter Palace, a former residence of Russian emperors.

Should the writer make this addition here?

- A) Yes, because it shows the link between Peter the Great and the cat paintings.
- B) Yes, because it helps explain why Russian art celebrates animals.
- C) No, because it fails to indicate why the Winter Palace became an art museum.
- D) No, because it provides background information that is irrelevant to the paragraph.

44

- A) NO CHANGE
- B) acting as the lead predator in the museum's ecosystem,
- C) hunting down and killing all the mice and rats one by one,
- D) protecting the museum's priceless artworks from destructive rodents,

## STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**





# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

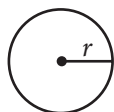
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

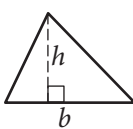


$$A = \pi r^2$$

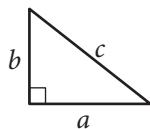
$$C = 2\pi r$$



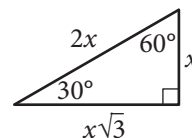
$$A = \ell w$$



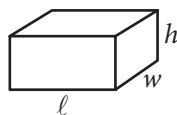
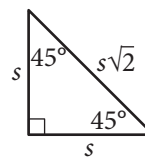
$$A = \frac{1}{2}bh$$



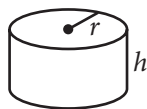
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



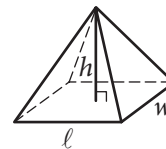
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

A painter will paint  $n$  walls with the same size and shape in a building using a specific brand of paint. The painter's fee can be calculated by the expression  $nK\ell h$ , where  $n$  is the number of walls,  $K$  is a constant with units of dollars per square foot,  $\ell$  is the length of each wall in feet, and  $h$  is the height of each wall in feet. If the customer asks the painter to use a more expensive brand of paint, which of the factors in the expression would change?

- A)  $h$
- B)  $\ell$
- C)  $K$
- D)  $n$

2

If  $3r = 18$ , what is the value of  $6r + 3$  ?

- A) 6
- B) 27
- C) 36
- D) 39

3

Which of the following is equal to  $a^{\frac{2}{3}}$ , for all values of  $a$  ?

- A)  $\sqrt{a^3}$
- B)  $\sqrt{a^3}$
- C)  $\sqrt[3]{a^{\frac{1}{2}}}$
- D)  $\sqrt[3]{a^2}$

4

The number of states that joined the United States between 1776 and 1849 is twice the number of states that joined between 1850 and 1900. If 30 states joined the United States between 1776 and 1849 and  $x$  states joined between 1850 and 1900, which of the following equations is true?

- A)  $30x = 2$
- B)  $2x = 30$
- C)  $\frac{x}{2} = 30$
- D)  $x + 30 = 2$



5

If  $\frac{5}{x} = \frac{15}{x+20}$ , what is the value of  $\frac{x}{5}$  ?

- A) 10
- B) 5
- C) 2
- D)  $\frac{1}{2}$

6

$$\begin{aligned} 2x - 3y &= -14 \\ 3x - 2y &= -6 \end{aligned}$$

If  $(x, y)$  is a solution to the system of equations above, what is the value of  $x - y$  ?

- A) -20
- B) -8
- C) -4
- D) 8

7

$x$	$f(x)$
0	3
2	1
4	0
5	-2

The function  $f$  is defined by a polynomial. Some values of  $x$  and  $f(x)$  are shown in the table above. Which of the following must be a factor of  $f(x)$  ?

- A)  $x - 2$
- B)  $x - 3$
- C)  $x - 4$
- D)  $x - 5$

8

The line  $y = kx + 4$ , where  $k$  is a constant, is graphed in the  $xy$ -plane. If the line contains the point  $(c, d)$ , where  $c \neq 0$  and  $d \neq 0$ , what is the slope of the line in terms of  $c$  and  $d$  ?

- A)  $\frac{d-4}{c}$
- B)  $\frac{c-4}{d}$
- C)  $\frac{4-d}{c}$
- D)  $\frac{4-c}{d}$



9

$$kx - 3y = 4$$

$$4x - 5y = 7$$

In the system of equations above,  $k$  is a constant and  $x$  and  $y$  are variables. For what value of  $k$  will the system of equations have no solution?

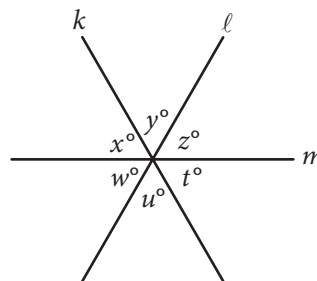
- A)  $\frac{12}{5}$   
 B)  $\frac{16}{7}$   
 C)  $-\frac{16}{7}$   
 D)  $-\frac{12}{5}$

10

In the  $xy$ -plane, the parabola with equation  $y = (x - 11)^2$  intersects the line with equation  $y = 25$  at two points,  $A$  and  $B$ . What is the length of  $\overline{AB}$ ?

- A) 10  
 B) 12  
 C) 14  
 D) 16

11



Note: Figure not drawn to scale.

In the figure above, lines  $k$ ,  $l$ , and  $m$  intersect at a point. If  $x + y = u + w$ , which of the following must be true?

- I.  $x = z$   
 II.  $y = w$   
 III.  $z = t$
- A) I and II only  
 B) I and III only  
 C) II and III only  
 D) I, II, and III

12

$$y = a(x - 2)(x + 4)$$

In the quadratic equation above,  $a$  is a nonzero constant. The graph of the equation in the  $xy$ -plane is a parabola with vertex  $(c, d)$ . Which of the following is equal to  $d$ ?

- A)  $-9a$   
 B)  $-8a$   
 C)  $-5a$   
 D)  $-2a$



13

The equation  $\frac{24x^2 + 25x - 47}{ax - 2} = -8x - 3 - \frac{53}{ax - 2}$  is true for all values of  $x \neq \frac{2}{a}$ , where  $a$  is a constant.

What is the value of  $a$  ?

- A) -16
- B) -3
- C) 3
- D) 16

14

What are the solutions to  $3x^2 + 12x + 6 = 0$  ?

- A)  $x = -2 \pm \sqrt{2}$
- B)  $x = -2 \pm \frac{\sqrt{30}}{3}$
- C)  $x = -6 \pm \sqrt{2}$
- D)  $x = -6 \pm 6\sqrt{2}$

15

$$C = \frac{5}{9}(F - 32)$$

The equation above shows how a temperature  $F$ , measured in degrees Fahrenheit, relates to a temperature  $C$ , measured in degrees Celsius. Based on the equation, which of the following must be true?

- I. A temperature increase of 1 degree Fahrenheit is equivalent to a temperature increase of  $\frac{5}{9}$  degree Celsius.
- II. A temperature increase of 1 degree Celsius is equivalent to a temperature increase of 1.8 degrees Fahrenheit.
- III. A temperature increase of  $\frac{5}{9}$  degree Fahrenheit is equivalent to a temperature increase of 1 degree Celsius.

- A) I only
- B) II only
- C) III only
- D) I and II only

**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Answer:  $\frac{7}{12}$

	7	/	1	2	
	•	•	•	•	
	0	0	0	0	
1	1	•	1	1	
2	2	2	•	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
•	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

← Fraction line

Grid in result.

Answer: 2.5

	2	.	5	
	•	•	•	•
	0	0	0	0
1	1	1	1	1
2	•	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	•	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3	
	•	•	•	•
	0	0	0	0
1	1	1	1	1
2	•	2	2	2
3	3	3	•	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

	.	6	6	6	
	•	•	•	•	
	0	0	0	0	
1	1	1	1	1	
2	2	2	2	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	•	•	•	6	
7	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

	.	6	6	7	
	•	•	•	•	
	0	0	0	0	
1	1	1	1	1	
2	2	2	2	2	
3	3	3	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	•	•	•	6	
7	7	7	7	•	
8	8	8	8	8	
9	9	9	9	9	

Answer: 201 – either position is correct

	2	0	1	
	•	•	•	•
	0	•	0	0
1	1	1	•	1
2	•	2	2	2
3	3	3	3	3

	2	0	1	
	•	•	•	•
	0	•	0	0
1	1	•	1	1
2	•	2	2	2
3	3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

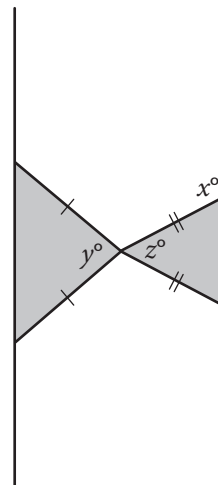
$$x^3(x^2 - 5) = -4x$$

If  $x > 0$ , what is one possible solution to the equation above?

17

If  $\frac{7}{9}x - \frac{4}{9}x = \frac{1}{4} + \frac{5}{12}$ , what is the value of  $x$ ?

18



Note: Figure not drawn to scale.

Two isosceles triangles are shown above. If  $180 - z = 2y$  and  $y = 75$ , what is the value of  $x$ ?



19

At a lunch stand, each hamburger has 50 more calories than each order of fries. If 2 hamburgers and 3 orders of fries have a total of 1700 calories, how many calories does a hamburger have?

20

In triangle  $ABC$ , the measure of  $\angle B$  is  $90^\circ$ ,  $BC = 16$ , and  $AC = 20$ . Triangle  $DEF$  is similar to triangle  $ABC$ , where vertices  $D$ ,  $E$ , and  $F$  correspond to vertices  $A$ ,  $B$ , and  $C$ , respectively, and each side of triangle  $DEF$  is  $\frac{1}{3}$  the length of the corresponding side of triangle  $ABC$ . What is the value of  $\sin F$  ?

**STOP**

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**





# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

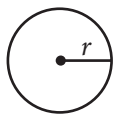
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

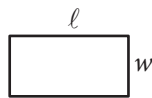
- The use of a calculator **is permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

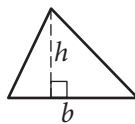


$$A = \pi r^2$$

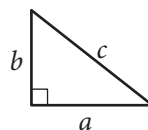
$$C = 2\pi r$$



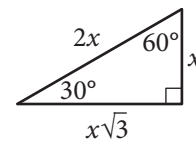
$$A = \ell w$$



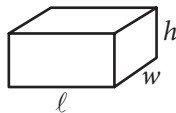
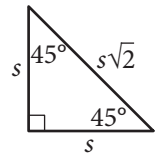
$$A = \frac{1}{2}bh$$



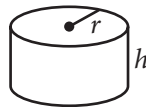
$$c^2 = a^2 + b^2$$



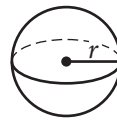
Special Right Triangles



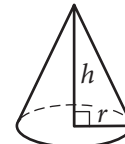
$$V = \ell wh$$



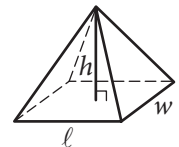
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

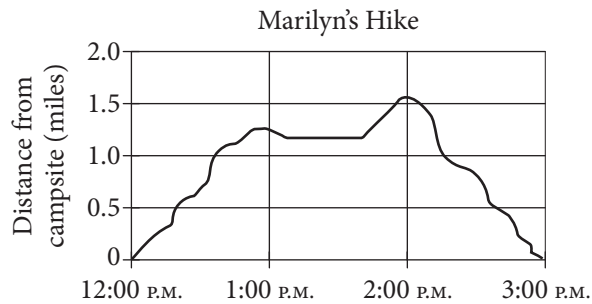
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1



The graph above shows Marilyn's distance from her campsite during a 3-hour hike. She stopped for 30 minutes during her hike to have lunch. Based on the graph, which of the following is closest to the time she finished lunch and continued her hike?

- A) 12:40 P.M.
- B) 1:10 P.M.
- C) 1:40 P.M.
- D) 2:00 P.M.

2

Gender	Age		Total
	Under 40	40 or older	
Male	12	2	14
Female	8	3	11
Total	20	5	25

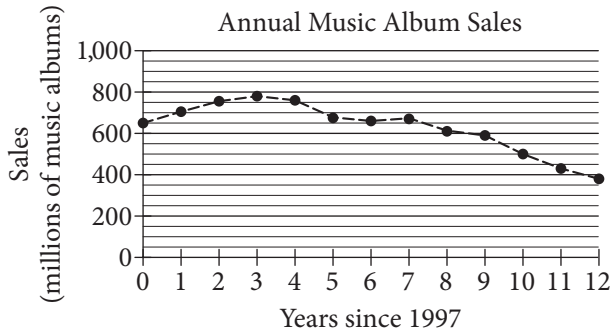
The table above shows the distribution of age and gender for 25 people who entered a contest. If the contest winner will be selected at random, what is the probability that the winner will be either a female under age 40 or a male age 40 or older?

- A)  $\frac{4}{25}$
- B)  $\frac{10}{25}$
- C)  $\frac{11}{25}$
- D)  $\frac{16}{25}$



3

The graph below shows the total number of music album sales, in millions, each year from 1997 through 2009.



Based on the graph, which of the following best describes the general trend in music album sales from 1997 through 2009?

- A) Sales generally increased each year since 1997.
- B) Sales generally decreased each year since 1997.
- C) Sales increased until 2000 and then generally decreased.
- D) Sales generally remained steady from 1997 through 2009.

4

$n$	1	2	3	4
$f(n)$	-2	1	4	7

The table above shows some values of the linear function  $f$ . Which of the following defines  $f$ ?

- A)  $f(n) = n - 3$
- B)  $f(n) = 2n - 4$
- C)  $f(n) = 3n - 5$
- D)  $f(n) = 4n - 6$

5

At Lincoln High School, approximately 7 percent of enrolled juniors and 5 percent of enrolled seniors were inducted into the National Honor Society last year. If there were 562 juniors and 602 seniors enrolled at Lincoln High School last year, which of the following is closest to the total number of juniors and seniors at Lincoln High School last year who were inducted into the National Honor Society?

- A) 140
- B) 69
- C) 39
- D) 30

6

$$3x^2 - 5x + 2$$

$$5x^2 - 2x - 6$$

Which of the following is the sum of the two polynomials shown above?

- A)  $8x^2 - 7x - 4$
- B)  $8x^2 + 7x - 4$
- C)  $8x^4 - 7x^2 - 4$
- D)  $8x^4 + 7x^2 - 4$



7

If  $\frac{3}{5}w = \frac{4}{3}$ , what is the value of  $w$ ?

- A)  $\frac{9}{20}$
- B)  $\frac{4}{5}$
- C)  $\frac{5}{4}$
- D)  $\frac{20}{9}$

8

The average number of students per classroom at Central High School from 2000 to 2010 can be modeled by the equation  $y = 0.56x + 27.2$ , where  $x$  represents the number of years since 2000, and  $y$  represents the average number of students per classroom. Which of the following best describes the meaning of the number 0.56 in the equation?

- A) The total number of students at the school in 2000
- B) The average number of students per classroom in 2000
- C) The estimated increase in the average number of students per classroom each year
- D) The estimated difference between the average number of students per classroom in 2010 and in 2000

9

Nate walks 25 meters in 13.7 seconds. If he walks at this same rate, which of the following is closest to the distance he will walk in 4 minutes?

- A) 150 meters
- B) 450 meters
- C) 700 meters
- D) 1,400 meters



Questions 10 and 11 refer to the following information.

Planet	Acceleration due to gravity $\left(\frac{\text{m}}{\text{sec}^2}\right)$
Mercury	3.6
Venus	8.9
Earth	9.8
Mars	3.8
Jupiter	26.0
Saturn	11.1
Uranus	10.7
Neptune	14.1

The chart above shows approximations of the acceleration due to gravity in meters per second squared  $\left(\frac{\text{m}}{\text{sec}^2}\right)$  for the eight planets in our solar system. The weight of an object on a given planet can be found by using the formula  $W = mg$ , where  $W$  is the weight of the object measured in newtons,  $m$  is the mass of the object measured in kilograms, and  $g$  is the acceleration due to gravity on the planet measured in  $\frac{\text{m}}{\text{sec}^2}$ .

10

What is the weight, in newtons, of an object on Mercury with a mass of 90 kilograms?

- A) 25
- B) 86
- C) 101
- D) 324

11

An object on Earth has a weight of 150 newtons. On which planet would the same object have an approximate weight of 170 newtons?

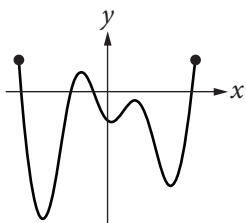
- A) Venus
- B) Saturn
- C) Uranus
- D) Neptune



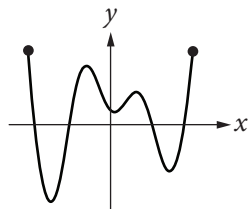
12

If the function  $f$  has five distinct zeros, which of the following could represent the complete graph of  $f$  in the  $xy$ -plane?

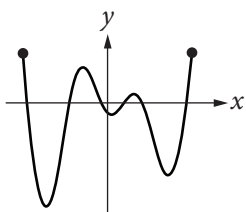
A)



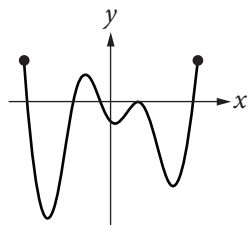
B)



C)



D)



13

$$h = -16t^2 + vt + k$$

The equation above gives the height  $h$ , in feet, of a ball  $t$  seconds after it is thrown straight up with an initial speed of  $v$  feet per second from a height of  $k$  feet. Which of the following gives  $v$  in terms of  $h$ ,  $t$ , and  $k$ ?

A)  $v = h + k - 16t$

B)  $v = \frac{h - k + 16}{t}$

C)  $v = \frac{h + k}{t} - 16t$

D)  $v = \frac{h - k}{t} + 16t$

14

The cost of using a telephone in a hotel meeting room is \$0.20 per minute. Which of the following equations represents the total cost  $c$ , in dollars, for  $h$  hours of phone use?

A)  $c = 0.20(60h)$

B)  $c = 0.20h + 60$

C)  $c = \frac{60h}{0.20}$

D)  $c = \frac{0.20h}{60}$

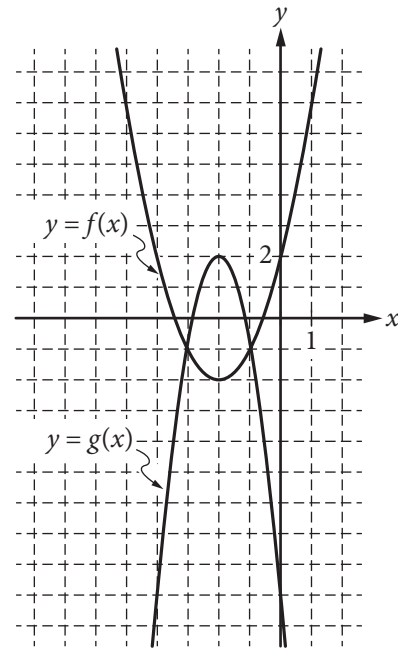


15

In order to determine if treatment X is successful in improving eyesight, a research study was conducted. From a large population of people with poor eyesight, 300 participants were selected at random. Half of the participants were randomly assigned to receive treatment X, and the other half did not receive treatment X. The resulting data showed that participants who received treatment X had significantly improved eyesight as compared to those who did not receive treatment X. Based on the design and results of the study, which of the following is an appropriate conclusion?

- A) Treatment X is likely to improve the eyesight of people who have poor eyesight.
- B) Treatment X improves eyesight better than all other available treatments.
- C) Treatment X will improve the eyesight of anyone who takes it.
- D) Treatment X will cause a substantial improvement in eyesight.

16



Graphs of the functions  $f$  and  $g$  are shown in the  $xy$ -plane above. For which of the following values of  $x$  does  $f(x) + g(x) = 0$  ?

- A)  $-3$
- B)  $-2$
- C)  $-1$
- D)  $0$



Questions 17 and 18 refer to the following information.

$$S(P) = \frac{1}{2}P + 40$$

$$D(P) = 220 - P$$

The quantity of a product supplied and the quantity of the product demanded in an economic market are functions of the price of the product. The functions above are the estimated supply and demand functions for a certain product. The function  $S(P)$  gives the quantity of the product supplied to the market when the price is  $P$  dollars, and the function  $D(P)$  gives the quantity of the product demanded by the market when the price is  $P$  dollars.

17

How will the quantity of the product supplied to the market change if the price of the product is increased by \$10?

- A) The quantity supplied will decrease by 5 units.
- B) The quantity supplied will increase by 5 units.
- C) The quantity supplied will increase by 10 units.
- D) The quantity supplied will increase by 50 units.

18

At what price will the quantity of the product supplied to the market equal the quantity of the product demanded by the market?

- A) \$90
- B) \$120
- C) \$133
- D) \$155

19

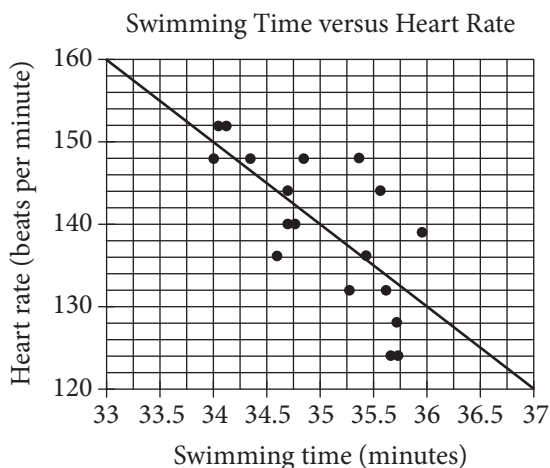
Graphene, which is used in the manufacture of integrated circuits, is so thin that a sheet weighing one ounce can cover up to 7 football fields. If a football field has an area of approximately  $1\frac{1}{3}$  acres, about how many acres could 48 ounces of graphene cover?

- A) 250
- B) 350
- C) 450
- D) 1,350





20



Michael swam 2,000 yards on each of eighteen days. The scatterplot above shows his swim time for and corresponding heart rate after each swim. The line of best fit for the data is also shown. For the swim that took 34 minutes, Michael's actual heart rate was about how many beats per minutes less than the rate predicted by the line of best fit?

- A) 1
- B) 2
- C) 3
- D) 4

21

Of the following four types of savings account plans, which option would yield exponential growth of the money in the account?

- A) Each successive year, 2% of the initial savings is added to the value of the account.
- B) Each successive year, 1.5% of the initial savings and \$100 is added to the value of the account.
- C) Each successive year, 1% of the current value is added to the value of the account.
- D) Each successive year, \$100 is added to the value of the account.

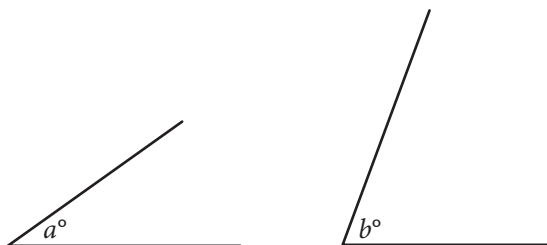
22

The sum of three numbers is 855. One of the numbers,  $x$ , is 50% more than the sum of the other two numbers. What is the value of  $x$ ?

- A) 570
- B) 513
- C) 214
- D) 155



23



Note: Figures not drawn to scale.

The angles shown above are acute and  $\sin(a^\circ) = \cos(b^\circ)$ . If  $a = 4k - 22$  and  $b = 6k - 13$ , what is the value of  $k$ ?

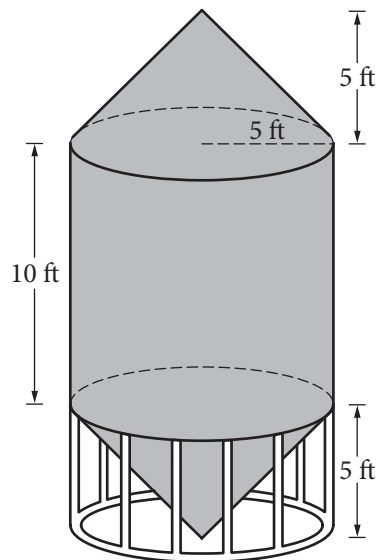
- A) 4.5
- B) 5.5
- C) 12.5
- D) 21.5

24

Mr. Kohl has a beaker containing  $n$  milliliters of solution to distribute to the students in his chemistry class. If he gives each student 3 milliliters of solution, he will have 5 milliliters left over. In order to give each student 4 milliliters of solution, he will need an additional 21 milliliters. How many students are in the class?

- A) 16
- B) 21
- C) 23
- D) 26

25



A grain silo is built from two right circular cones and a right circular cylinder with internal measurements represented by the figure above. Of the following, which is closest to the volume of the grain silo, in cubic feet?

- A) 261.8
- B) 785.4
- C) 916.3
- D) 1,047.2



26

In the  $xy$ -plane, the line determined by the points  $(2, k)$  and  $(k, 32)$  passes through the origin. Which of the following could be the value of  $k$  ?

- A) 0
- B) 4
- C) 8
- D) 16

27

A rectangle was altered by increasing its length by 10 percent and decreasing its width by  $p$  percent. If these alterations decreased the area of the rectangle by 12 percent, what is the value of  $p$  ?

- A) 12
- B) 15
- C) 20
- D) 22

28

In planning maintenance for a city's infrastructure, a civil engineer estimates that, starting from the present, the population of the city will decrease by 10 percent every 20 years. If the present population of the city is 50,000, which of the following expressions represents the engineer's estimate of the population of the city  $t$  years from now?

- A)  $50,000(0.1)^{20t}$
- B)  $50,000(0.1)^{\frac{t}{20}}$
- C)  $50,000(0.9)^{20t}$
- D)  $50,000(0.9)^{\frac{t}{20}}$



29

Gender	Handedness	
	Left	Right
Female		
Male		
Total	18	122

The incomplete table above summarizes the number of left-handed students and right-handed students by gender for the eighth-grade students at Keisel Middle School. There are 5 times as many right-handed female students as there are left-handed female students, and there are 9 times as many right-handed male students as there are left-handed male students. If there is a total of 18 left-handed students and 122 right-handed students in the school, which of the following is closest to the probability that a right-handed student selected at random is female? (Note: Assume that none of the eighth-grade students are both right-handed and left-handed.)

- A) 0.410
- B) 0.357
- C) 0.333
- D) 0.250

30

$$\begin{aligned} 3x + b &= 5x - 7 \\ 3y + c &= 5y - 7 \end{aligned}$$

In the equations above,  $b$  and  $c$  are constants.

If  $b$  is  $c$  minus  $\frac{1}{2}$ , which of the following is true?

- A)  $x$  is  $y$  minus  $\frac{1}{4}$ .
- B)  $x$  is  $y$  minus  $\frac{1}{2}$ .
- C)  $x$  is  $y$  minus 1.
- D)  $x$  is  $y$  plus  $\frac{1}{2}$ .


**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
•	•	•	•

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

← Fraction line

← Decimal point

Grid in result.

Answer: $\frac{7}{12}$			
7	/	1	2
•	•	•	•
0	0	0	0
1	1	•	1
2	2	2	•
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
•	7	7	7
8	8	8	8
9	9	9	9

Answer: 2.5			
2	.	5	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	3
4	4	4	4
5	5	5	•
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Acceptable ways to grid  $\frac{2}{3}$  are:

2	/	3	
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	•
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•
7	7	7	•
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

2	0	1	
•	•	•	•
0	•	0	0
1	1	1	•
2	•	2	2
3	3	3	3

2	0	1	
•	•	•	•
•	•	0	0
1	1	•	1
2	2	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

Tickets for a school talent show cost \$2 for students and \$3 for adults. If Chris spends at least \$11 but no more than \$14 on  $x$  student tickets and 1 adult ticket, what is one possible value of  $x$  ?

32

Ages of the First 12 United States Presidents at the Beginning of Their Terms in Office

President	Age (years)	President	Age (years)
Washington	57	Jackson	62
Adams	62	Van Buren	55
Jefferson	58	Harrison	68
Madison	58	Tyler	51
Monroe	59	Polk	50
Adams	58	Taylor	65

The table above lists the ages of the first 12 United States presidents when they began their terms in office. According to the table, what was the mean age, in years, of these presidents at the beginning of their terms? (Round your answer to the nearest tenth.)

33

$$(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$$

If the expression above is rewritten in the form  $ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants, what is the value of  $b$  ?

34

In a circle with center  $O$ , central angle  $AOB$  has a measure of  $\frac{5\pi}{4}$  radians. The area of the sector formed by central angle  $AOB$  is what fraction of the area of the circle?



35

An online store receives customer satisfaction ratings between 0 and 100, inclusive. In the first 10 ratings the store received, the average (arithmetic mean) of the ratings was 75. What is the least value the store can receive for the 11th rating and still be able to have an average of at least 85 for the first 20 ratings?

36

$$y \leq -15x + 3000$$

$$y \leq 5x$$

In the  $xy$ -plane, if a point with coordinates  $(a, b)$  lies in the solution set of the system of inequalities above, what is the maximum possible value of  $b$ ?



---

**Questions 37 and 38 refer to the following information.**

If shoppers enter a store at an average rate of  $r$  shoppers per minute and each stays in the store for an average time of  $T$  minutes, the average number of shoppers in the store,  $N$ , at any one time is given by the formula  $N = rT$ . This relationship is known as Little's law.

The owner of the Good Deals Store estimates that during business hours, an average of 3 shoppers per minute enter the store and that each of them stays an average of 15 minutes. The store owner uses Little's law to estimate that there are 45 shoppers in the store at any time.

37

Little's law can be applied to any part of the store, such as a particular department or the checkout lines. The store owner determines that, during business hours, approximately 84 shoppers per hour make a purchase and each of these shoppers spend an average of 5 minutes in the checkout line. At any time during business hours, about how many shoppers, on average, are waiting in the checkout line to make a purchase at the Good Deals Store?

38

The owner of the Good Deals Store opens a new store across town. For the new store, the owner estimates that, during business hours, an average of 90 shoppers per hour enter the store and each of them stays an average of 12 minutes. The average number of shoppers in the new store at any time is what percent less than the average number of shoppers in the original store at any time? (Note: Ignore the percent symbol when entering your answer. For example, if the answer is 42.1%, enter 42.1)

---

**STOP**

**If you finish before time is called, you may check your work on this section only.**

**Do not turn to any other section.**



**No Test Material On This Page**

# Scoring Your SAT<sup>®</sup> Practice Test #3

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide additional diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Ada answered 28 of the 52 questions correctly on the SAT Reading Test and 18 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, she calculates that she received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. She adds 27 to 23 (gets 50) and then multiplies by 10 to determine her SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.

## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 2; 4; 6; 8-9; 15; 17; 19
- ▶ Math Test – Calculator: Questions 4; 7-8; 14; 18; 22; 24; 26; 30-31; 36

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 1-3; 5; 9-11; 15; 19-21; 27; 29; 32; 35; 37-38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1; 3; 5; 7; 10; 12-14; 16
- ▶ Math Test – Calculator: Questions 6; 12-13; 16-17; 28; 33

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 2-3; 6-9; 13; 16-18; 20; 22-23; 25; 30-33; 37; 39-40; 42-44
  - ▶ Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1; 4-5; 10-12; 14-15; 19; 21; 24; 26-29; 34-36; 38; 41Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 2; 6; 16-17; 22; 28; 31; 35; 42; 47
  - ▶ Writing and Language Test: Questions 7-8; 16; 18; 23; 25; 40; 44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 4; 10; 15; 19; 24; 30; 37; 44; 50; 52
  - ▶ Writing and Language Test: Questions 3; 6; 13; 22; 31-32; 42-43Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.

## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11-20; 31-41
- ▶ Writing and Language Test: Questions 13; 16-18; 20; 22
- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 3; 8; 17-18; 21; 28; 32; 37

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 21-30; 42-52
- ▶ Writing and Language Test: Questions 23; 25; 30-33
- ▶ Math Test – No Calculator: Question 15
- ▶ Math Test – Calculator: Questions 9-10; 13; 15; 19-20; 25

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores to determine your Analysis in Science cross-test score.

# SAT Practice Test #3: Worksheets

## ANSWER KEY

### Reading Test Answers

1 B	12 C	23 A	34 D	45 D
2 C	13 D	24 B	35 C	46 C
3 A	14 B	25 C	36 A	47 B
4 A	15 B	26 C	37 D	48 B
5 C	16 C	27 B	38 C	49 A
6 A	17 B	28 B	39 A	50 B
7 A	18 B	29 D	40 D	51 D
8 B	19 A	30 D	41 A	52 D
9 B	20 A	31 B	42 C	
10 D	21 D	32 C	43 C	
11 A	22 A	33 C	44 D	

READING TEST  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Writing and Language Test Answers

1 A	12 A	23 A	34 D
2 B	13 C	24 D	35 B
3 C	14 D	25 B	36 C
4 C	15 B	26 A	37 D
5 A	16 C	27 D	38 C
6 B	17 C	28 B	39 C
7 A	18 B	29 B	40 B
8 D	19 D	30 B	41 D
9 C	20 C	31 D	42 A
10 C	21 D	32 B	43 D
11 B	22 A	33 C	44 D

WRITING AND  
 LANGUAGE TEST  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Math Test No Calculator Answers

1 C	11 B
2 D	12 A
3 D	13 B
4 B	14 A
5 C	15 D
6 C	16 1 or 2
7 C	17 2
8 A	18 105
9 A	19 370
10 A	20 $\frac{3}{5}$ or 0.6

MATH TEST  
 NO CALCULATOR  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

### Math Test Calculator Answers

1 C	11 B	21 C	31 4 or 5
2 B	12 D	22 B	32 58.6
3 C	13 D	23 C	33 9
4 C	14 A	24 D	34 $\frac{5}{8}$ or 0.625
5 B	15 A	25 D	35 50
6 A	16 B	26 C	36 750
7 D	17 B	27 C	37 7
8 C	18 B	28 D	38 60
9 B	19 C	29 A	
10 D	20 B	30 A	

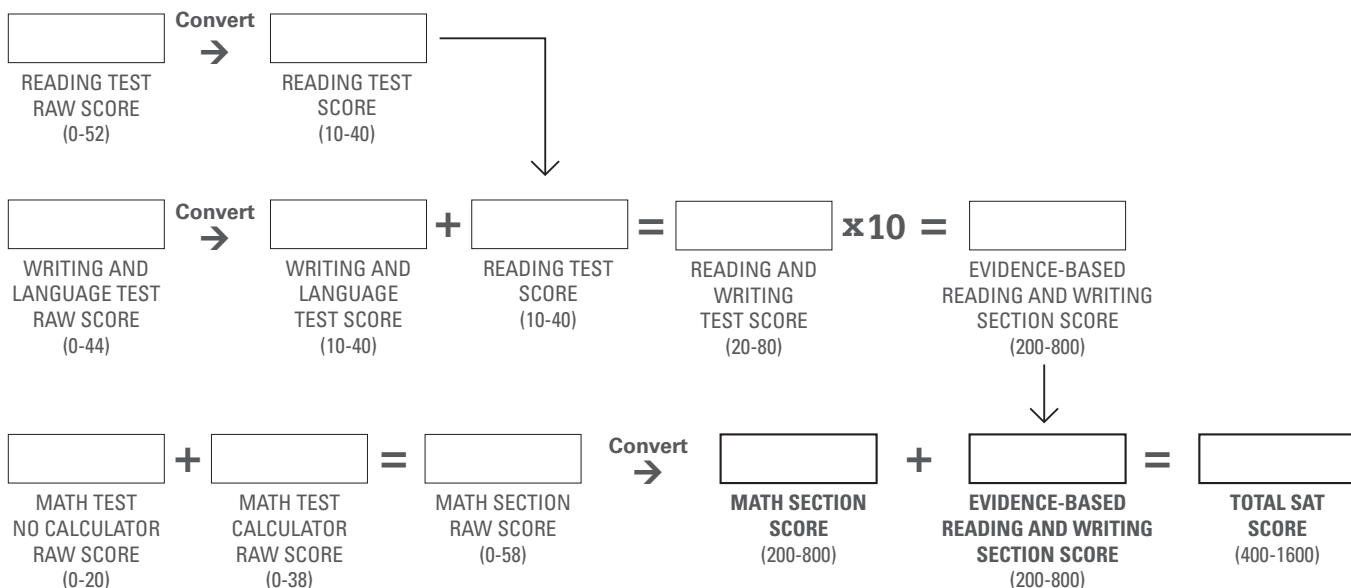
MATH TEST  
 CALCULATOR  
 RAW SCORE  
 (NUMBER OF  
 CORRECT ANSWERS)

# SAT Practice Test #3: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	570	28	30
1	200	10	10	31	580	29	30
2	210	10	10	32	580	29	31
3	230	11	11	33	590	29	32
4	250	12	12	34	600	30	33
5	270	13	13	35	610	30	33
6	290	14	14	36	620	31	34
7	300	14	15	37	630	31	34
8	320	15	15	38	630	32	35
9	330	16	16	39	640	32	35
10	340	17	17	40	650	33	36
11	360	17	18	41	660	33	37
12	370	18	19	42	660	34	38
13	380	19	19	43	670	34	39
14	390	19	20	44	680	35	40
15	410	20	21	45	680	36	
16	420	21	22	46	690	36	
17	430	21	22	47	690	37	
18	440	22	23	48	700	38	
19	450	22	24	49	710	38	
20	460	23	24	50	710	39	
21	470	24	25	51	720	40	
22	480	24	25	52	730	40	
23	490	25	26	53	740		
24	500	25	26	54	750		
25	510	26	27	55	770		
26	530	26	27	56	780		
27	540	27	28	57	790		
28	550	27	29	58	800		
29	560	28	29				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES



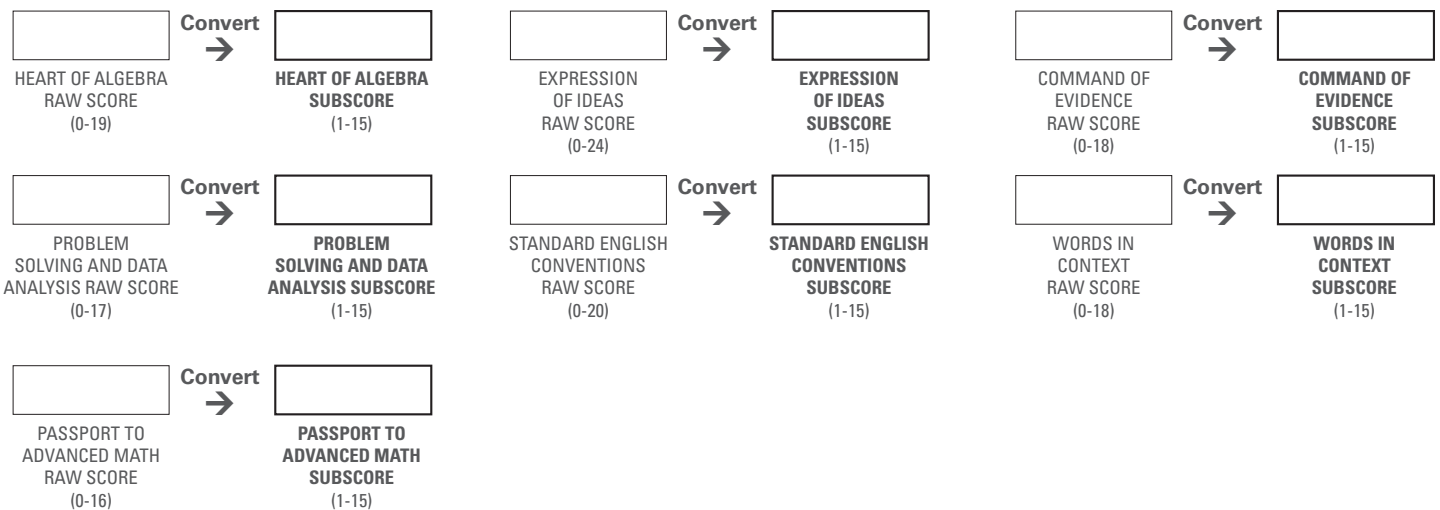


# SAT Practice Test #3: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	1	2	2	1	2
2	2	1	2	3	3	1	3
3	3	2	3	4	5	3	4
4	4	4	5	5	6	4	5
5	5	4	6	6	7	5	6
6	6	5	6	7	8	6	7
7	6	6	7	8	9	6	8
8	7	6	8	8	9	7	8
9	8	7	9	9	10	8	9
10	8	7	9	10	11	8	10
11	8	8	10	10	11	9	10
12	9	8	11	11	12	10	11
13	9	9	11	12	13	10	12
14	10	9	12	13	13	11	12
15	10	10	13	13	14	12	13
16	11	11	13	14	15	13	14
17	11	11	14	15		14	15
18	12	12	15			15	15
19	12	13	15				
20	13	15					
21	13						
22	14						
23	14						
24	15						

## CONVERSION EQUATION 2 SUBSCORES



# SAT Practice Test #3: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	27	27
1	10	11	19	28	27
2	11	12	20	29	28
3	12	13	21	29	29
4	14	14	22	30	29
5	15	15	23	30	30
6	16	16	24	31	31
7	17	17	25	32	31
8	18	18	26	33	32
9	19	19	27	33	32
10	20	20	28	34	33
11	21	21	29	35	34
12	22	22	30	36	34
13	23	23	31	36	35
14	24	23	32	37	36
15	25	24	33	38	37
16	25	25	34	39	38
17	26	26	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11-20; 31-41		21-30; 42-52	
Writing and Language Test	13; 16-18; 20; 22		23; 25; 30-33	
Math Test No Calculator	None		15	
Math Test Calculator	3; 8; 17-18; 21; 28; 32; 37		9-10; 13; 15; 19-20; 25	
<b>Total</b>				



# Exam 7

# SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○	27	A B C D	○ ○ ○ ○	40	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○	28	A B C D	○ ○ ○ ○	41	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	16	A B C D	○ ○ ○ ○	29	A B C D	○ ○ ○ ○	42	A B C D	○ ○ ○ ○
4	A B C D	○ ○ ○ ○	17	A B C D	○ ○ ○ ○	30	A B C D	○ ○ ○ ○	43	A B C D	○ ○ ○ ○
5	A B C D	○ ○ ○ ○	18	A B C D	○ ○ ○ ○	31	A B C D	○ ○ ○ ○	44	A B C D	○ ○ ○ ○
6	A B C D	○ ○ ○ ○	19	A B C D	○ ○ ○ ○	32	A B C D	○ ○ ○ ○	45	A B C D	○ ○ ○ ○
7	A B C D	○ ○ ○ ○	20	A B C D	○ ○ ○ ○	33	A B C D	○ ○ ○ ○	46	A B C D	○ ○ ○ ○
8	A B C D	○ ○ ○ ○	21	A B C D	○ ○ ○ ○	34	A B C D	○ ○ ○ ○	47	A B C D	○ ○ ○ ○
9	A B C D	○ ○ ○ ○	22	A B C D	○ ○ ○ ○	35	A B C D	○ ○ ○ ○	48	A B C D	○ ○ ○ ○
10	A B C D	○ ○ ○ ○	23	A B C D	○ ○ ○ ○	36	A B C D	○ ○ ○ ○	49	A B C D	○ ○ ○ ○
11	A B C D	○ ○ ○ ○	24	A B C D	○ ○ ○ ○	37	A B C D	○ ○ ○ ○	50	A B C D	○ ○ ○ ○
12	A B C D	○ ○ ○ ○	25	A B C D	○ ○ ○ ○	38	A B C D	○ ○ ○ ○	51	A B C D	○ ○ ○ ○
13	A B C D	○ ○ ○ ○	26	A B C D	○ ○ ○ ○	39	A B C D	○ ○ ○ ○	52	A B C D	○ ○ ○ ○



**SAT PRACTICE ANSWER SHEET**

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 2**

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	/ ○ ○	17	□ □ □ □	/ ○ ○	18	□ □ □ □	/ ○ ○	19	□ □ □ □	/ ○ ○	20	□ □ □ □	/ ○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	

**NO CALCULATOR ALLOWED**



## SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF  
INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 4 (Continued)

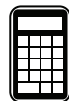
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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**CALCULATOR ALLOWED**







**Test begins on the next page.**

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is adapted from MacDonald Harris, *The Balloonist*. ©2011 by The Estate of Donald Heiney. During the summer of 1897, the narrator of this story, a fictional Swedish scientist, has set out for the North Pole in a hydrogen-powered balloon.

My emotions are complicated and not readily verifiable. I feel a vast yearning that is simultaneously a pleasure and a pain. I am certain  
Line of the consummation of this yearning, but I don't  
5 know yet what form it will take, since I do not understand quite what it is that the yearning desires. For the first time there is borne in upon me the full truth of what I myself said to the doctor only an hour ago: that my motives in this undertaking are not  
10 entirely clear. For years, for a lifetime, the machinery of my destiny has worked in secret to prepare for this moment; its clockwork has moved exactly toward this time and place and no other. Rising slowly from the earth that bore me and gave me sustenance, I am  
15 carried helplessly toward an uninhabited and hostile, or at best indifferent, part of the earth, littered with the bones of explorers and the wrecks of ships, frozen supply caches, messages scrawled with chilled fingers and hidden in cairns that no eye will ever see.  
20 Nobody has succeeded in this thing, and many have died. Yet in freely willing this enterprise, in choosing this moment and no other when the south wind will carry me exactly northward at a velocity of eight knots, I have converted the machinery of my

25 fate into the servant of my will. All this I understand, as I understand each detail of the technique by which this is carried out. What I don't understand is why I am so intent on going to this particular place. Who wants the North Pole! What good is it! Can you eat  
30 it? Will it carry you from Gothenburg to Malmö like a railway? The Danish ministers have declared from their pulpits that participation in polar expeditions is beneficial to the soul's eternal well-being, or so I read in a newspaper. It isn't clear how this doctrine is to  
35 be interpreted, except that the Pole is something difficult or impossible to attain which must nevertheless be sought for, because man is condemned to seek out and know everything whether or not the knowledge gives him pleasure. In  
40 short, it is the same unthinking lust for knowledge that drove our First Parents out of the garden.

And suppose you were to find it in spite of all, this wonderful place that everybody is so anxious to stand on! *What* would you find? Exactly nothing.  
45 A point precisely identical to all the others in a completely featureless wasteland stretching around it for hundreds of miles. It is an abstraction, a mathematical fiction. No one but a Swedish madman could take the slightest interest in it. Here I am. The  
50 wind is still from the south, bearing us steadily northward at the speed of a trotting dog. Behind us, perhaps forever, lie the Cities of Men with their

teacups and their brass bedsteads. I am going forth of my own volition to join the ghosts of Bering and  
 55 poor Franklin, of frozen De Long and his men.  
 What I am on the brink of knowing, I now see, is not an ephemeral mathematical spot but myself. The doctor was right, even though I dislike him.  
 Fundamentally I am a dangerous madman, and what  
 60 I do is both a challenge to my egotism and a surrender to it.

1

Over the course of the passage, the narrator's attitude shifts from

- A) fear about the expedition to excitement about it.
- B) doubt about his abilities to confidence in them.
- C) uncertainty of his motives to recognition of them.
- D) disdain for the North Pole to appreciation of it.

2

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 10-12 ("For . . . moment")
- B) Lines 21-25 ("Yet . . . will")
- C) Lines 42-44 ("And . . . stand on")
- D) Lines 56-57 ("What . . . myself")

3

As used in lines 1-2, "not readily verifiable" most nearly means

- A) unable to be authenticated.
- B) likely to be contradicted.
- C) without empirical support.
- D) not completely understood.

4

The sentence in lines 10-13 ("For years . . . other") mainly serves to

- A) expose a side of the narrator that he prefers to keep hidden.
- B) demonstrate that the narrator thinks in a methodical and scientific manner.
- C) show that the narrator feels himself to be influenced by powerful and independent forces.
- D) emphasize the length of time during which the narrator has prepared for his expedition.

5

The narrator indicates that many previous explorers seeking the North Pole have

- A) perished in the attempt.
- B) made surprising discoveries.
- C) failed to determine its exact location.
- D) had different motivations than his own.

6

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 20-21 ("Nobody . . . died")
- B) Lines 25-27 ("All . . . out")
- C) Lines 31-34 ("The . . . newspaper")
- D) Lines 51-53 ("Behind . . . bedsteads")

7

Which choice best describes the narrator's view of his expedition to the North Pole?

- A) Immoral but inevitable
- B) Absurd but necessary
- C) Socially beneficial but misunderstood
- D) Scientifically important but hazardous

8

The question the narrator asks in lines 30-31 (“Will it . . . railway”) most nearly implies that

- A) balloons will never replace other modes of transportation.
- B) the North Pole is farther away than the cities usually reached by train.
- C) people often travel from one city to another without considering the implications.
- D) reaching the North Pole has no foreseeable benefit to humanity.

9

As used in line 49, “take the slightest interest in” most nearly means

- A) accept responsibility for.
- B) possess little regard for.
- C) pay no attention to.
- D) have curiosity about.

10

As used in line 50, “bearing” most nearly means

- A) carrying.
- B) affecting.
- C) yielding.
- D) enduring.

**Questions 11-21 are based on the following passage and supplementary material.**

This passage is adapted from Alan Ehrenhalt, *The Great Inversion and the Future of the American City*. ©2013 by Vintage. Ehrenhalt is an urbanologist—a scholar of cities and their development. Demographic inversion is a phenomenon that describes the rearrangement of living patterns throughout a metropolitan area.

We are not witnessing the abandonment of the suburbs, or a movement of millions of people back to the city all at once. The 2010 census certainly did not  
 Line turn up evidence of a middle-class stampede to the  
 5 nation’s cities. The news was mixed: Some of the larger cities on the East Coast tended to gain population, albeit in small increments. Those in the Midwest, including Chicago, tended to lose substantial numbers. The cities that showed gains in  
 10 overall population during the entire decade tended to be in the South and Southwest. But when it comes to measuring demographic inversion, raw census numbers are an ineffective blunt instrument. A closer look at the results shows that the most powerful  
 15 demographic events of the past decade were the movement of African Americans out of central cities (180,000 of them in Chicago alone) and the settlement of immigrant groups in suburbs, often ones many miles distant from downtown.  
 20 Central-city areas that gained affluent residents in the first part of the decade maintained that population in the recession years from 2007 to 2009. They also, according to a 2011 study by Brookings, suffered considerably less from increased  
 25 unemployment than the suburbs did. Not many young professionals moved to new downtown condos in the recession years because few such residences were being built. But there is no reason to believe that the demographic trends prevailing prior  
 30 to the construction bust will not resume once that bust is over. It is important to remember that demographic inversion is not a proxy for population growth; it can occur in cities that are growing, those whose numbers are flat, and even in those  
 35 undergoing a modest decline in size.

America’s major cities face enormous fiscal problems, many of them the result of public pension obligations they incurred in the more prosperous years of the past two decades. Some, Chicago

40 prominent among them, simply are not producing enough revenue to support the level of public services to which most of the citizens have grown to feel entitled. How the cities are going to solve this problem, I do not know. What I do know is that if  
45 fiscal crisis were going to drive affluent professionals out of central cities, it would have done so by now. There is no evidence that it has.

The truth is that we are living at a moment in which the massive outward migration of the affluent  
50 that characterized the second half of the twentieth century is coming to an end. And we need to adjust our perceptions of cities, suburbs, and urban mobility as a result.

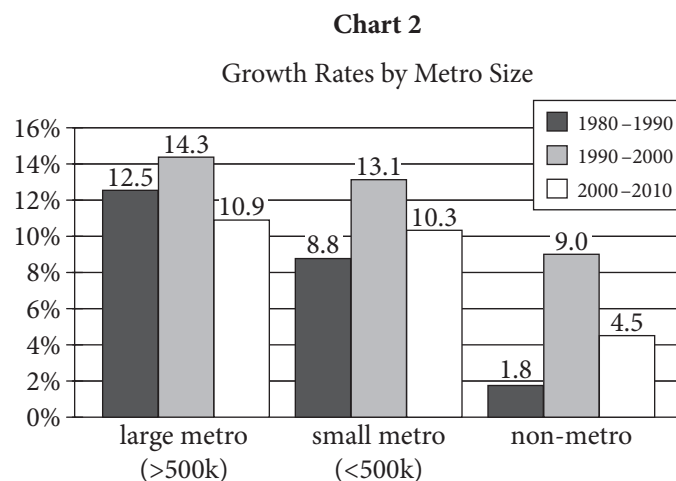
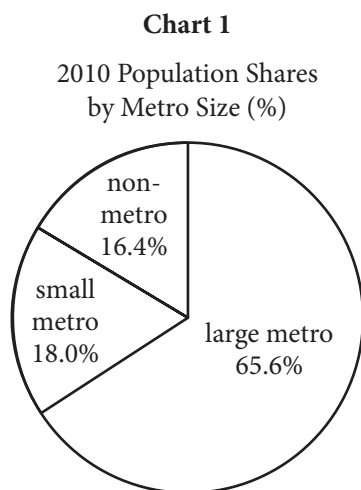
Much of our perspective on the process of  
55 metropolitan settlement dates, whether we realize it or not, from a paper written in 1925 by the University of Chicago sociologist Ernest W. Burgess. It was Burgess who defined four urban/suburban zones of settlement: a central business district; an  
60 area of manufacturing just beyond it; then a residential area inhabited by the industrial and immigrant working class; and finally an outer enclave of single-family dwellings.

Burgess was right about the urban America of  
65 1925; he was right about the urban America of 1974. Virtually every city in the country had a downtown,

where the commercial life of the metropolis was conducted; it had a factory district just beyond; it had districts of working-class residences just beyond that;  
70 and it had residential suburbs for the wealthy and the upper middle class at the far end of the continuum. As a family moved up the economic ladder, it also moved outward from crowded working-class districts to more spacious apartments and,  
75 eventually, to a suburban home. The suburbs of Burgess's time bore little resemblance to those at the end of the twentieth century, but the theory still essentially worked. People moved ahead in life by moving farther out.

80 But in the past decade, in quite a few places, this model has ceased to describe reality. There are still downtown commercial districts, but there are no factory districts lying next to them. There are scarcely any factories at all. These close-in parts of  
85 the city, whose few residents Burgess described as dwelling in "submerged regions of poverty, degradation and disease," are increasingly the preserve of the affluent who work in the commercial core. And just as crucially newcomers to America are  
90 not settling on the inside and accumulating the resources to move out; they are living in the suburbs from day one.

United States Population by Metropolitan Size/Status, 1980–2010



Adapted from William H. Frey, "Population Growth in Metro America since 1980: Putting the Volatile 2000s in Perspective." Published 2012 by Metropolitan Policy Program, Brookings Institution.

11

Which choice best summarizes the first paragraph of the passage (lines 1-35)?

- A) The 2010 census demonstrated a sizeable growth in the number of middle-class families moving into inner cities.
- B) The 2010 census is not a reliable instrument for measuring population trends in American cities.
- C) Population growth and demographic inversion are distinct phenomena, and demographic inversion is evident in many American cities.
- D) Population growth in American cities has been increasing since roughly 2000, while suburban populations have decreased.

12

According to the passage, members of which group moved away from central-city areas in large numbers in the early 2000s?

- A) The unemployed
- B) Immigrants
- C) Young professionals
- D) African Americans

13

In line 34, “flat” is closest in meaning to

- A) static.
- B) deflated.
- C) featureless.
- D) obscure.

14

According to the passage, which choice best describes the current financial situation in many major American cities?

- A) Expected tax increases due to demand for public works
- B) Economic hardship due to promises made in past years
- C) Greater overall prosperity due to an increased inner-city tax base
- D) Insufficient revenues due to a decrease in manufacturing

15

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 36-39 (“America’s . . . decades”)
- B) Lines 43-44 (“How . . . not know”)
- C) Lines 44-46 (“What . . . now”)
- D) Lines 48-51 (“The truth . . . end”)

16

The passage implies that American cities in 1974

- A) were witnessing the flight of minority populations to the suburbs.
- B) had begun to lose their manufacturing sectors.
- C) had a traditional four-zone structure.
- D) were already experiencing demographic inversion.

17

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 54-57 (“Much . . . Ernest W. Burgess”)
- B) Lines 58-59 (“It was . . . settlement”)
- C) Lines 66-71 (“Virtually . . . continuum”)
- D) Lines 72-75 (“As . . . home”)

18

As used in line 68, “conducted” is closest in meaning to

- A) carried out.
- B) supervised.
- C) regulated.
- D) inhibited.

19

The author of the passage would most likely consider the information in chart 1 to be

- A) excellent evidence for the arguments made in the passage.
- B) possibly accurate but too crude to be truly informative.
- C) compelling but lacking in historical information.
- D) representative of a perspective with which the author disagrees.

20

According to chart 2, the years 2000–2010 were characterized by

- A) less growth in metropolitan areas of all sizes than had taken place in the 1990s.
- B) more growth in small metropolitan areas than in large metropolitan areas.
- C) a significant decline in the population of small metropolitan areas compared to the 1980s.
- D) roughly equal growth in large metropolitan areas and nonmetropolitan areas.

21

Chart 2 suggests which of the following about population change in the 1990s?

- A) Large numbers of people moved from suburban areas to urban areas in the 1990s.
- B) Growth rates fell in smaller metropolitan areas in the 1990s.
- C) Large numbers of people moved from metropolitan areas to nonmetropolitan areas in the 1990s.
- D) The US population as a whole grew more in the 1990s than in the 1980s.



**Questions 22-31 are based on the following passage.**

This passage is adapted from Emily Anthes, *Frankenstein's Cat*. ©2013 by Emily Anthes.

When scientists first learned how to edit the genomes of animals, they began to imagine all the ways they could use this new power. Creating brightly colored novelty pets was not a high priority. Instead, most researchers envisioned far more consequential applications, hoping to create genetically engineered animals that saved human lives. One enterprise is now delivering on this dream. Welcome to the world of “pharming,” in which simple genetic tweaks turn animals into living pharmaceutical factories.

Many of the proteins that our cells crank out naturally make for good medicine. Our bodies’ own enzymes, hormones, clotting factors, and antibodies are commonly used to treat cancer, diabetes, autoimmune diseases, and more. The trouble is that it’s difficult and expensive to make these compounds on an industrial scale, and as a result, patients can face shortages of the medicines they need. Dairy animals, on the other hand, are expert protein producers, their udders swollen with milk. So the creation of the first transgenic animals—first mice, then other species—in the 1980s gave scientists an idea: What if they put the gene for a human antibody or enzyme into a cow, goat, or sheep? If they put the gene in just the right place, under the control of the right molecular switch, maybe they could engineer animals that produced healing human proteins in their milk. Then doctors could collect medicine by the bucketful.

Throughout the 1980s and ’90s, studies provided proof of principle, as scientists created transgenic mice, sheep, goats, pigs, cattle, and rabbits that did in fact make therapeutic compounds in their milk. At first, this work was merely gee-whiz, scientific geekery, lab-bound thought experiments come true. That all changed with ATryn, a drug produced by the Massachusetts firm GTC Biotherapeutics. ATryn is antithrombin, an anticoagulant that can be used to prevent life-threatening blood clots. The compound, made by our liver cells, plays a key role in keeping our bodies clot-free. It acts as a molecular bouncer, sidling up to clot-forming compounds and escorting them out of the bloodstream. But as many as 1 in

2,000 Americans are born with a genetic mutation that prevents them from making antithrombin. These patients are prone to clots, especially in their legs and lungs, and they are at elevated risk of suffering from fatal complications during surgery and childbirth. Supplemental antithrombin can reduce this risk, and GTC decided to try to manufacture the compound using genetically engineered goats.

To create its special herd of goats, GTC used microinjection, the same technique that produced GloFish and AquAdvantage salmon. The company’s scientists took the gene for human antithrombin and injected it directly into fertilized goat eggs. Then they implanted the eggs in the wombs of female goats. When the kids were born, some of them proved to be transgenic, the human gene nestled safely in their cells. The researchers paired the antithrombin gene with a promoter (which is a sequence of DNA that controls gene activity) that is normally active in the goat’s mammary glands during milk production. When the transgenic females lactated, the promoter turned the transgene on and the goats’ udders filled with milk containing antithrombin. All that was left to do was to collect the milk, and extract and purify the protein. *Et voilà*—human medicine! And, for GTC, liquid gold. ATryn hit the market in 2006, becoming the world’s first transgenic animal drug. Over the course of a year, the “milking parlors” on GTC’s 300-acre farm in Massachusetts can collect more than a kilogram of medicine from a single animal.

22

The primary purpose of the passage is to

- A) present the background of a medical breakthrough.
- B) evaluate the research that led to a scientific discovery.
- C) summarize the findings of a long-term research project.
- D) explain the development of a branch of scientific study.

23

The author's attitude toward pharming is best described as one of

- A) apprehension.
- B) ambivalence.
- C) appreciation.
- D) astonishment.

24

As used in line 20, "expert" most nearly means

- A) knowledgeable.
- B) professional.
- C) capable.
- D) trained.

25

What does the author suggest about the transgenic studies done in the 1980s and 1990s?

- A) They were limited by the expensive nature of animal research.
- B) They were not expected to yield products ready for human use.
- C) They were completed when an anticoagulant compound was identified.
- D) They focused only on the molecular properties of cows, goats, and sheep.

26

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 16-19 ("The trouble . . . need")
- B) Lines 25-29 ("If they . . . milk")
- C) Lines 35-36 ("At first . . . true")
- D) Lines 37-40 ("That all . . . clots")

27

According to the passage, which of the following is true of antithrombin?

- A) It reduces compounds that lead to blood clots.
- B) It stems from a genetic mutation that is rare in humans.
- C) It is a sequence of DNA known as a promoter.
- D) It occurs naturally in goats' mammary glands.

28

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 12-16 ("Many . . . more")
- B) Lines 42-44 ("It acts . . . bloodstream")
- C) Lines 44-46 ("But as . . . antithrombin")
- D) Lines 62-65 ("The researchers . . . production")

29

Which of the following does the author suggest about the "female goats" mentioned in line 59?

- A) They secreted antithrombin in their milk after giving birth.
- B) Some of their kids were not born with the antithrombin gene.
- C) They were the first animals to receive microinjections.
- D) Their cells already contained genes usually found in humans.

30

The most likely purpose of the parenthetical information in lines 63-64 is to

- A) illustrate an abstract concept.
- B) describe a new hypothesis.
- C) clarify a claim.
- D) define a term.

31

The phrase “liquid gold” (line 71) most directly suggests that

- A) GTC has invested a great deal of money in the microinjection technique.
- B) GTC’s milking parlors have significantly increased milk production.
- C) transgenic goats will soon be a valuable asset for dairy farmers.
- D) ATryn has proved to be a financially beneficial product for GTC.

**Questions 32-41 are based on the following passages.**

Passage 1 is adapted from Edmund Burke, *Reflections on the Revolution in France*. Originally published in 1790. Passage 2 is adapted from Thomas Paine, *Rights of Man*. Originally published in 1791.

**Passage 1**

To avoid . . . the evils of inconstancy and versatility, ten thousand times worse than those of obstinacy and the blindest prejudice, we have  
 Line consecrated the state, that no man should approach  
 5 to look into its defects or corruptions but with due caution; that he should never dream of beginning its reformation by its subversion; that he should approach to the faults of the state as to the wounds of a father, with pious awe and trembling solicitude. By  
 10 this wise prejudice we are taught to look with horror on those children of their country who are prompt rashly to hack that aged parent in pieces, and put him into the kettle of magicians, in hopes that by their poisonous weeds, and wild incantations, they may  
 15 regenerate the paternal constitution, and renovate their father’s life.

Society is indeed a contract. Subordinate contracts for objects of mere occasional interest may be dissolved at pleasure—but the state ought not to be  
 20 considered as nothing better than a partnership agreement in a trade of pepper and coffee, calico or tobacco, or some other such low concern, to be taken up for a little temporary interest, and to be dissolved by the fancy of the parties. It is to be looked on with  
 25 other reverence; because it is not a partnership in things subservient only to the gross animal existence of a temporary and perishable nature. It is a partnership in all science; a partnership in all art; a partnership in every virtue, and in all perfection.  
 30 As the ends of such a partnership cannot be obtained in many generations, it becomes a partnership not only between those who are living, but between those who are living, those who are dead, and those who are to be born. . . . The municipal corporations of  
 35 that universal kingdom are not morally at liberty at their pleasure, and on their speculations of a contingent improvement, wholly to separate and tear asunder the bands of their subordinate community, and to dissolve it into an unsocial, uncivil,  
 40 unconnected chaos of elementary principles.

**Passage 2**

Every age and generation must be as free to act for itself, *in all cases*, as the ages and generations which preceded it. The vanity and presumption of governing beyond the grave, is the most ridiculous  
45 and insolent of all tyrannies.

Man has no property in man; neither has any generation a property in the generations which are to follow. The Parliament or the people of 1688, or of any other period, had no more right to dispose of the  
50 people of the present day, or to bind or to control them in any shape whatever, than the parliament or the people of the present day have to dispose of, bind, or control those who are to live a hundred or a thousand years hence.

Every generation is, and must be, competent to all the purposes which its occasions require. It is the living, and not the dead, that are to be accommodated. When man ceases to be, his power and his wants cease with him; and having no longer  
55 any participation in the concerns of this world, he has no longer any authority in directing who shall be its governors, or how its government shall be organized, or how administered. . . .

Those who have quitted the world, and those who  
65 are not yet arrived at it, are as remote from each other, as the utmost stretch of mortal imagination can conceive. What possible obligation, then, can exist between them; what rule or principle can be laid down, that two nonentities, the one out of existence,  
70 and the other not in, and who never can meet in this world, that the one should control the other to the end of time? . . .

The circumstances of the world are continually changing, and the opinions of men change also; and  
75 as government is for the living, and not for the dead, it is the living only that has any right in it. That which may be thought right and found convenient in one age, may be thought wrong and found inconvenient in another. In such cases, who is to  
80 decide, the living, or the dead?

32

In Passage 1, Burke indicates that a contract between a person and society differs from other contracts mainly in its

- A) brevity and prominence.
- B) complexity and rigidity.
- C) precision and usefulness.
- D) seriousness and permanence.

33

As used in line 4, “state” most nearly refers to a

- A) style of living.
- B) position in life.
- C) temporary condition.
- D) political entity.

34

As used in line 22, “low” most nearly means

- A) petty.
- B) weak.
- C) inadequate.
- D) depleted.

35

It can most reasonably be inferred from Passage 2 that Paine views historical precedents as

- A) generally helpful to those who want to change society.
- B) surprisingly difficult for many people to comprehend.
- C) frequently responsible for human progress.
- D) largely irrelevant to current political decisions.

36

How would Paine most likely respond to Burke’s statement in lines 30-34, Passage 1 (“As the . . . born”)?

- A) He would assert that the notion of a partnership across generations is less plausible to people of his era than it was to people in the past.
- B) He would argue that there are no politically meaningful links between the dead, the living, and the unborn.
- C) He would question the possibility that significant changes to a political system could be accomplished within a single generation.
- D) He would point out that we cannot know what judgments the dead would make about contemporary issues.

37

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 41-43 (“Every . . . it”)
- B) Lines 43-45 (“The vanity . . . tyrannies”)
- C) Lines 56-58 (“It is . . . accommodated”)
- D) Lines 67-72 (“What . . . time”)

38

Which choice best describes how Burke would most likely have reacted to Paine’s remarks in the final paragraph of Passage 2?

- A) With approval, because adapting to new events may enhance existing partnerships.
- B) With resignation, because changing circumstances are an inevitable aspect of life.
- C) With skepticism, because Paine does not substantiate his claim with examples of governments changed for the better.
- D) With disapproval, because changing conditions are insufficient justification for changing the form of government.

39

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-4 (“To avoid . . . state”)
- B) Lines 7-9 (“he should . . . solicitude”)
- C) Lines 27-29 (“It is . . . perfection”)
- D) Lines 34-38 (“The municipal . . . community”)

40

Which choice best states the relationship between the two passages?

- A) Passage 2 challenges the primary argument of Passage 1.
- B) Passage 2 advocates an alternative approach to a problem discussed in Passage 1.
- C) Passage 2 provides further evidence to support an idea introduced in Passage 1.
- D) Passage 2 exemplifies an attitude promoted in Passage 1.

41

The main purpose of both passages is to

- A) suggest a way to resolve a particular political struggle.
- B) discuss the relationship between people and their government.
- C) evaluate the consequences of rapid political change.
- D) describe the duties that governments have to their citizens.

**Questions 42-52 are based on the following passage and supplementary material.**

This passage is adapted from Carolyn Gramling, “Source of Mysterious Medieval Eruption Identified.” ©2013 by American Association for the Advancement of Science.

About 750 years ago, a powerful volcano erupted somewhere on Earth, kicking off a centuries-long cold snap known as the Little Ice Age. Identifying the volcano responsible has been tricky.

Line  
5 That a powerful volcano erupted somewhere in the world, sometime in the Middle Ages, is written in polar ice cores in the form of layers of sulfate deposits and tiny shards of volcanic glass. These cores suggest that the amount of sulfur the mystery  
10 volcano sent into the stratosphere put it firmly among the ranks of the strongest climate-perturbing eruptions of the current geological epoch, the Holocene, a period that stretches from 10,000 years ago to the present. A haze of stratospheric sulfur  
15 cools the climate by reflecting solar energy back into space.

In 2012, a team of scientists led by geochemist Gifford Miller strengthened the link between the mystery eruption and the onset of the Little Ice Age  
20 by using radiocarbon dating of dead plant material from beneath the ice caps on Baffin Island and Iceland, as well as ice and sediment core data, to determine that the cold summers and ice growth began abruptly between 1275 and 1300 C.E. (and  
25 became intensified between 1430 and 1455 C.E.). Such a sudden onset pointed to a huge volcanic eruption injecting sulfur into the stratosphere and starting the cooling. Subsequent, unusually large and frequent eruptions of other volcanoes, as well as  
30 sea-ice/ocean feedbacks persisting long after the aerosols have been removed from the atmosphere, may have prolonged the cooling through the 1700s.

Volcanologist Franck Lavigne and colleagues now think they’ve identified the volcano in question:  
35 Indonesia’s Samalas. One line of evidence, they note, is historical records. According to Babad Lombok, records of the island written on palm leaves in Old Javanese, Samalas erupted catastrophically before the end of the 13th century, devastating surrounding  
40 villages—including Lombok’s capital at the time, Pamatatan—with ash and fast-moving sweeps of hot rock and gas called pyroclastic flows.

The researchers then began to reconstruct the formation of the large, 800-meter-deep caldera [a  
45 basin-shaped volcanic crater] that now sits atop the

volcano. They examined 130 outcrops on the flanks of the volcano, exposing sequences of pumice—ash hardened into rock—and other pyroclastic material. The volume of ash deposited, and the estimated  
50 height of the eruption plume (43 kilometers above sea level) put the eruption’s magnitude at a minimum of 7 on the volcanic explosivity index (which has a scale of 1 to 8)—making it one of the largest known in the Holocene.

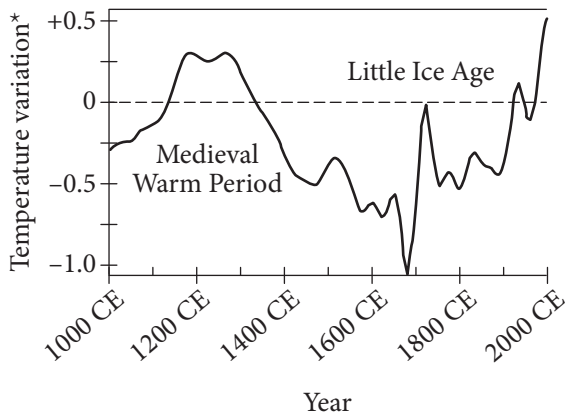
55 The team also performed radiocarbon analyses on carbonized tree trunks and branches buried within the pyroclastic deposits to confirm the date of the eruption; it could not, they concluded, have happened before 1257 C.E., and certainly happened  
60 in the 13th century.

It’s not a total surprise that an Indonesian volcano might be the source of the eruption, Miller says. “An equatorial eruption is more consistent with the apparent climate impacts.” And, he adds, with sulfate  
65 appearing in both polar ice caps—Arctic and Antarctic—there is “a strong consensus” that this also supports an equatorial source.

Another possible candidate—both in terms of timing and geographical location—is Ecuador’s  
70 Quilotoa, estimated to have last erupted between 1147 and 1320 C.E. But when Lavigne’s team examined shards of volcanic glass from this volcano, they found that they didn’t match the chemical composition of the glass found in polar ice cores,  
75 whereas the Samalas glass is a much closer match. That, they suggest, further strengthens the case that Samalas was responsible for the medieval “year without summer” in 1258 C.E.



Estimated Temperature in Central England  
1000 CE to 2000 CE



\*Variation from the 1961-1990 average temperature, in °C, represented at 0.

Adapted from John P. Rafferty, "Little Ice Age." Originally published in 2011. ©2014 by Encyclopedia Britannica, Inc.

42

The main purpose of the passage is to

- A) describe periods in Earth's recent geologic history.
- B) explain the methods scientists use in radiocarbon analysis.
- C) describe evidence linking the volcano Samalas to the Little Ice Age.
- D) explain how volcanic glass forms during volcanic eruptions.

43

Over the course of the passage, the focus shifts from

- A) a criticism of a scientific model to a new theory.
- B) a description of a recorded event to its likely cause.
- C) the use of ice core samples to a new method of measuring sulfates.
- D) the use of radiocarbon dating to an examination of volcanic glass.

44

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 17-25 ("In 2012 . . . 1455 C.E.")
- B) Lines 43-46 ("The researchers . . . atop the volcano")
- C) Lines 46-48 ("They examined . . . material")
- D) Lines 55-60 ("The team . . . 13th century")

45

The author uses the phrase "is written in" (line 6) most likely to

- A) demonstrate the concept of the hands-on nature of the work done by scientists.
- B) highlight the fact that scientists often write about their discoveries.
- C) underscore the sense of importance that scientists have regarding their work.
- D) reinforce the idea that the evidence is there and can be interpreted by scientists.

46

Where does the author indicate the medieval volcanic eruption most probably was located?

- A) Near the equator, in Indonesia
- B) In the Arctic region
- C) In the Antarctic region
- D) Near the equator, in Ecuador

47

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-3 ("About 750 . . . Ice Age")
- B) Lines 26-28 ("Such a . . . the cooling")
- C) Lines 49-54 ("The volume . . . the Holocene")
- D) Lines 61-64 ("It's not . . . climate impacts")

48

- As used in line 68, the phrase “Another possible candidate” implies that
- A) powerful volcanic eruptions occur frequently.
  - B) the effects of volcanic eruptions can last for centuries.
  - C) scientists know of other volcanoes that erupted during the Middle Ages.
  - D) other volcanoes have calderas that are very large.

49

- Which choice best supports the claim that Quilotoa was not responsible for the Little Ice Age?
- A) Lines 3-4 (“Identifying . . . tricky”)
  - B) Lines 26-28 (“Such a . . . cooling”)
  - C) Lines 43-46 (“The researchers . . . atop the volcano”)
  - D) Lines 71-75 (“But . . . closer match”)

50

- According to the data in the figure, the greatest below-average temperature variation occurred around what year?
- A) 1200 CE
  - B) 1375 CE
  - C) 1675 CE
  - D) 1750 CE

51

- The passage and the figure are in agreement that the onset of the Little Ice Age began
- A) around 1150 CE.
  - B) just before 1300 CE.
  - C) just before 1500 CE.
  - D) around 1650 CE.

52

- What statement is best supported by the data presented in the figure?
- A) The greatest cooling during the Little Ice Age occurred hundreds of years after the temperature peaks of the Medieval Warm Period.
  - B) The sharp decline in temperature supports the hypothesis of an equatorial volcanic eruption in the Middle Ages.
  - C) Pyroclastic flows from volcanic eruptions continued for hundreds of years after the eruptions had ended.
  - D) Radiocarbon analysis is the best tool scientists have to determine the temperature variations after volcanic eruptions.

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Ghost Mural

In 1932 the well-known Mexican muralist David Alfaro Siqueiros was commissioned to paint a mural on the second-story exterior wall of a historic building in downtown Los Angeles. Siqueiros was asked to celebrate tropical America in his work, **1** he accordingly titled it “América Tropical.” He painted the mural’s first two sections, featuring images of a tropical rainforest and a Maya pyramid, during the day. **2** Also, to avoid

1

- A) NO CHANGE
- B) which he accordingly titled
- C) accordingly he titled it
- D) it was titled accordingly

2

- A) NO CHANGE
- B) However,
- C) Although,
- D) Moreover,

scrutiny, Siqueiros painted the final section of the mural, the **3** centerpiece at night.

**4** The reason for Siqueiros’s secrecy became clear when the mural was **5** confided. The centerpiece of the work was dominated by images of native people being oppressed and **6** including an eagle symbolizing the United States. Siqueiros’s political message did not please the wealthy citizens who had commissioned his work. They eventually ordered the mural to be literally whitewashed, or painted over with white paint.

However, by the 1970s, the white paint had begun to fade, and the bright colors of the mural were beginning to show through. At the same time, a social and civil rights movement for Mexican Americans was working to raise awareness of Mexican American cultural identity. Artists associated with **7** this began to rediscover and promote the work of the Mexican muralists, particularly Siqueiros. To them, “América Tropical” was an example of how art in public spaces could be used to celebrate Mexican American heritage while at the same time making a political statement. Inspired by Siqueiros and the other muralists, this new generation of artists strove to emulate the old mural masters.

3

- A) NO CHANGE
- B) centerpiece,
- C) centerpiece;
- D) centerpiece—

4

Which choice best connects the sentence with the previous paragraph?

- A) NO CHANGE
- B) All three sections of the mural were on display
- C) The community turned out in large numbers
- D) Siqueiros was informed of people’s reactions

5

- A) NO CHANGE
- B) promulgated.
- C) imparted.
- D) unveiled.

6

- A) NO CHANGE
- B) included
- C) includes
- D) had included

7

- A) NO CHANGE
- B) it
- C) them
- D) this movement

8 The result was an explosion of mural painting that spread throughout California and the southwestern United States in the 1970s. It was the Chicano mural movement. Hundreds of large, colorful new murals depicting elements of Mexican American life and history appeared during this period, some in designated cultural locations but many more in abandoned lots, on unused buildings, or 9  painted on infrastructure such as highways and bridges. Many of these murals can still be seen today, although some have not been well maintained.

8

Which choice most effectively combines the underlined sentences?

- A) The result was an explosion, the Chicano mural movement, of mural painting that spread throughout California and the southwestern United States in the 1970s.
- B) The result was the Chicano mural movement, an explosion of mural painting that spread throughout California and the southwestern United States in the 1970s.
- C) The explosion of mural painting that spread throughout California and the southwestern United States in the 1970s was the resulting Chicano mural movement.
- D) An explosion of mural painting resulted and it spread throughout California and the southwestern United States in the 1970s; it was the Chicano mural movement.

9

- A) NO CHANGE
- B) they were painted on
- C) on
- D) DELETE the underlined portion.

Fortunately, a new group of artists has discovered the murals, and efforts are underway to clean, restore, and repaint them. Once again, Siqueiros’s “América Tropical” is **10** leading the way. After a lengthy and complex restoration process, this powerful work is now a tourist attraction, complete with a visitor center and a rooftop viewing platform. **11** Advocates hope that Siqueiros’s mural will once more serve as an inspiration, this time inspiring viewers to save and restore an important cultural and artistic legacy.

**10**

Which choice most effectively sets up the information that follows?

- A) NO CHANGE
- B) being cleaned and restored.
- C) at risk of destruction.
- D) awaiting its moment of appreciation.

**11**

At this point, the writer is considering adding the following sentence.

When it was painted in 1932, Siqueiros’s mural was considered offensive, but now it is acclaimed.

Should the writer make this addition here?

- A) Yes, because it provides historical context for the changes discussed in the passage.
- B) Yes, because it provides a useful reminder of how people once viewed Siqueiros’s work.
- C) No, because it unnecessarily repeats information from earlier in the passage.
- D) No, because it makes a claim about Siqueiros’s work that is not supported by the passage.

Questions 12-22 are based on the following passage.

### The Hype of Healthier Organic Food

Some people buy organic food because they believe organically grown crops are more nutritious and safer for consumption than **12** the people who purchase their conventionally grown counterparts, which are usually produced with pesticides and synthetic fertilizers. In the name of health, **13** spending \$1.60 for every dollar they would have spent on food that is **14** grown in a manner that is considered conventional. Scientific evidence, **15** therefore, suggests that consumers do not reap significant benefits, in terms of either nutritional value or safety, from organic food.

12

- A) NO CHANGE
- B) the purchase of
- C) purchasing
- D) DELETE the underlined portion.

13

- A) NO CHANGE
- B) these consumers spend
- C) having spent
- D) to spend

14

- A) NO CHANGE
- B) grown with conventional methods, using pesticides and synthetic fertilizers.
- C) conventionally and therefore not organically grown.
- D) conventionally grown.

15

- A) NO CHANGE
- B) furthermore,
- C) however,
- D) subsequently,

Although advocates of organic food **16** preserve that organic produce is healthier than conventionally grown produce because it has more vitamins and minerals, this assertion is not supported by scientific research. **17** For instance, one review published in *The American Journal of Clinical Nutrition* provided analysis of the results of comparative studies conducted over a span of 50 years; researchers consistently found no evidence that organic crops are more nutritious than conventionally grown ones in terms of their vitamin and mineral content. **18** Similarly, Stanford University researchers who examined almost 250 studies comparing the nutritional content of different kinds of organic foods with that of their nonorganic counterparts found very little difference between the two.

16

- A) NO CHANGE
- B) carry on
- C) maintain
- D) sustain

17

- A) NO CHANGE
- B) However,
- C) In addition,
- D) Likewise,

18

At this point, the writer is considering adding the following sentence.

The United States Department of Agriculture (USDA) reports that organic agricultural products are now available in approximately 20,000 markets specializing in natural foods.

Should the writer make this addition here?

- A) Yes, because it adds a relevant research finding from a government agency.
- B) Yes, because it supports the passage's argument that organic food is less nutritious than conventionally grown food.
- C) No, because it is not relevant to the paragraph's discussion of scientific evidence.
- D) No, because it introduces a term that has not been defined in the passage.

Evidence also undermines the claim that organic food is safer to eat. While researchers have found lower levels of pesticide residue in organic produce than in nonorganic produce, the pesticide residue detected in conventional produce falls within acceptable safety limits. According to such organizations as the US Environmental Protection Agency, the minute amounts of residue falling within such limits **19** have no negative impact on human health. **20**

19

- A) NO CHANGE
- B) is having
- C) has had
- D) has

20

At this point, the writer wants to further reinforce the paragraph's claim about the safety of nonorganic food. Which choice most effectively accomplishes this goal?

- A) To be labeled organic, a product must meet certain standards determined and monitored by the US Department of Agriculture.
- B) Organic food, however, is regulated to eliminate artificial ingredients that include certain types of preservatives, sweeteners, colorings, and flavors.
- C) Moreover, consumers who are concerned about ingesting pesticide residue can eliminate much of it by simply washing or peeling produce before eating it.
- D) In fact, the Environmental Protection Agency estimates that about one-fifth of the pesticides used worldwide are applied to crops in the United States.

Based on scientific evidence, organic food offers neither significant nutritional nor safety benefits for consumers. Proponents of organic food, of course, are quick to add that **21** their are numerous other reasons to buy organic **22** food, such as, a desire to protect the environment from potentially damaging pesticides or a preference for the taste of organically grown foods. Research regarding these issues is less conclusive than the findings regarding nutritional content and pesticide residue safety limits. What is clear, though, is this: if a consumer's goal is to buy the healthiest and safest food to eat, the increased cost of organic food is a waste of money.

21

- A) NO CHANGE
- B) there are
- C) there is
- D) their is

22

- A) NO CHANGE
- B) food such as:
- C) food such as,
- D) food, such as



Questions 23-33 are based on the following passage and supplementary material.

### You Are Where You Say

Research on regional variations in English-language use has not only yielded answers to such **23** life-altering questions as how people in different parts of the United States refer to carbonated beverages (“soda”? “pop”? “coke”?) **24** it also illustrates how technology can change the very nature of research. While traditional, human-intensive data collection **25** has all but disappeared in language studies, the explosion of social media has opened new avenues for investigation.

[1] Perhaps the epitome of traditional methodology is the *Dictionary of American Regional English*, colloquially known as *DARE*. [2] Its fifth and final alphabetical volume—ending with “zydeco”—released in 2012, the dictionary represents decades of arduous work. [3] Over a six-year period from 1965 to 1970, university graduate students conducted interviews in more than a thousand communities across the nation. [4] Their goal was to determine what names people used for such everyday objects and concepts as a submarine sandwich

23

The writer wants to convey an attitude of genuine interest and to avoid the appearance of mockery. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) galvanizing
- C) intriguing
- D) weird

24

- A) NO CHANGE
- B) and also illustrates
- C) but also illustrates
- D) illustrating

25

Which choice most effectively sets up the contrast in the sentence and is consistent with the information in the rest of the passage?

- A) NO CHANGE
- B) still has an important place
- C) remains the only option
- D) yields questionable results

(a “hero” in New York City but a “dagwood” in many parts of Minnesota, Iowa, and Colorado) and a heavy rainstorm (variously a “gully washer,” “pour-down,” or “stump mover”). [5] The work that dictionary founder Frederic G. Cassidy had expected to be finished by 1976 was not, in fact, completed in his lifetime. [6] The wait did not dampen enthusiasm among **26** scholars. Scholars consider the work a signal achievement in linguistics. **27**

Not all research into regional English varieties **28** requires such time, effort, and resources, however. Today’s researchers have found that the veritable army of trained volunteers traveling the country conducting face-to-face interviews can sometimes be **29** replaced by another army the vast array of individuals volunteering details about their lives—and, inadvertently, their language—through social media. Brice Russ of Ohio State University, for example, has employed software to sort through postings on one social media **30** cite in search of particular words and phrases of interest as well as the location from which users are posting. From these data,

26

- A) NO CHANGE
- B) scholars, and these scholars
- C) scholars, but scholars
- D) scholars, who

27

To improve the cohesion and flow of this paragraph, the writer wants to add the following sentence.

Data gathering proved to be the quick part of the project.

The sentence would most logically be placed after

- A) sentence 2.
- B) sentence 3.
- C) sentence 4.
- D) sentence 5.

28

- A) NO CHANGE
- B) are requiring
- C) have required
- D) require

29

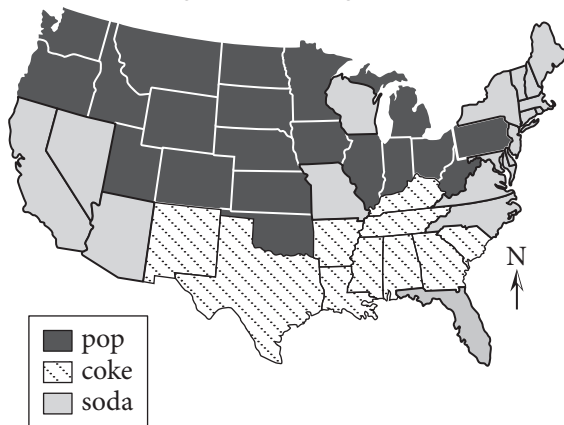
- A) NO CHANGE
- B) replaced—by another army,
- C) replaced by another army;
- D) replaced by another army:

30

- A) NO CHANGE
- B) site in search of
- C) sight in search for
- D) cite in search for

he was able, among other things, to confirm regional variations in people’s terms for soft drinks. As the map shows, “soda” is commonly heard in the middle and western portions of the United States; “pop” is frequently used in many southern states; and “coke” is predominant in the northeastern and southwest regions but used elsewhere as well. **31** As interesting as Russ’s findings are, though, **32** they’re true value lies in their reminder that the Internet is not merely a sophisticated tool for collecting data but is also **33** itself a rich source of data.

Soft Drink Descriptions by State  
Highest Percentage Reported



Adapted from Jennifer M. Smith, Department of Geography, The Pennsylvania State University, with data from [www.popvssoda.com](http://www.popvssoda.com)

31

The writer wants the information in the passage to correspond as closely as possible with the information in the map. Given that goal and assuming that the rest of the previous sentence would remain unchanged, in which sequence should the three terms for soft drinks be discussed?

- A) NO CHANGE
- B) “pop,” “soda,” “coke”
- C) “pop,” “coke,” “soda”
- D) “soda,” “coke,” “pop”

32

- A) NO CHANGE
- B) their true value lies in their
- C) there true value lies in they’re
- D) their true value lies in there

33

Which choice most effectively concludes the sentence and paragraph?

- A) NO CHANGE
- B) where we can learn what terms people use to refer to soft drinks.
- C) a useful way to stay connected to friends, family, and colleagues.
- D) helpful to researchers.

Questions 34-44 are based on the following passage.

### Creating Worlds: A Career in Game Design

If you love video games and have thought about how the games you play might be changed or improved, or if you've imagined creating a video game of your own, you might want to consider a career as a video game designer. There **34** were a number of steps you can take to determine whether game design is the right field for you and, if it is, to prepare yourself for such a career.

Before making the choice, you should have some sense of what a video game designer does. Every video game, whether for a console, computer, or mobile device, starts with a concept that originates in the mind of a designer. The designer envisions the game's fundamental **35** elements: the settings, characters, and plots that make each game unique, and is thus a primary creative force behind a video game.

Conceptualizing a game is only the beginning of a video game designer's **36** job, however, no matter how good a concept is, it will never be translated into a video game unless it is communicated effectively to all the other members of the video game development team. **37** A designer must generate extensive documentation and

**34**

- A) NO CHANGE
- B) has been
- C) are
- D) was

**35**

- A) NO CHANGE
- B) elements: the settings, characters, and plots that make each game unique—
- C) elements—the settings, characters, and plots that make each game unique—
- D) elements; the settings, characters, and plots that make each game unique;

**36**

- A) NO CHANGE
- B) job, however. No
- C) job—however, no
- D) job however no

**37**

At this point, the writer is considering adding the following sentence.

Successful communication is essential if a designer's idea is to become a reality.

Should the writer make this addition here?

- A) Yes, because it supports the conclusion drawn in the following sentence.
- B) Yes, because it illustrates a general principle discussed in the paragraph.
- C) No, because it distracts from the focus of the paragraph by introducing irrelevant material.
- D) No, because it merely reformulates the thought expressed in the preceding sentence.

**38** explain his or her ideas clearly in order to ensure that the programmers, artists, and others on the team all share the same vision. **39** Likewise, anyone considering a career as a video game designer must be **40** skilled writers and speakers. In addition, because video game development is a collaborative effort and because the development of any one game may take months or even years, a designer must be an effective team player as well as detail oriented.

[1] A basic understanding of computer programming is essential. [2] In fact, many designers **41** initially begin their pursuits as programmers. [3] Consider taking some general computer science courses as well as courses in artificial intelligence and graphics in order to increase your understanding of the technical challenges involved in developing a video game. [4] Courses in psychology and human behavior may help you develop **42** emphatic collaboration skills, while courses in the humanities, such as in literature and film, should give you the background necessary to develop effective narrative structures. [5] A

38

Which choice results in a sentence that best supports the point developed in this paragraph?

- A) NO CHANGE
- B) possess a vivid imagination
- C) assess his or her motivations carefully
- D) learn to accept constructive criticism

39

- A) NO CHANGE
- B) Nevertheless,
- C) Consequently,
- D) However,

40

- A) NO CHANGE
- B) a skilled writer and speaker.
- C) skilled both as writers and speakers.
- D) both skilled writers and speakers.

41

- A) NO CHANGE
- B) start to begin their work
- C) initiate their progression
- D) begin their careers

42

- A) NO CHANGE
- B) paramount
- C) eminent
- D) important

designer also needs careful educational preparation.

[6] Finally, because a designer should understand the business aspects of the video game industry, such as budgeting and marketing, you may want to consider taking some business courses. [7] Although demanding and deadline driven, **43** video game design can be a lucrative and rewarding field for people who love gaming and have prepared themselves with the necessary skills and knowledge. **44**

**43**

- A) NO CHANGE
- B) the choice of video game design
- C) you should choose video game design because it
- D) choosing to design video games

**44**

To make this paragraph most logical, sentence 5 should be

- A) placed where it is now.
- B) placed before sentence 1.
- C) placed after sentence 3.
- D) DELETED from the paragraph.

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

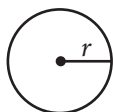
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

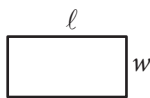
- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

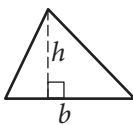


$$A = \pi r^2$$

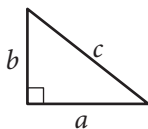
$$C = 2\pi r$$



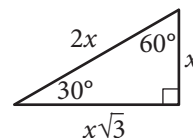
$$A = \ell w$$



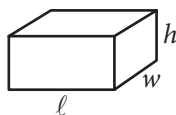
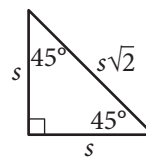
$$A = \frac{1}{2}bh$$



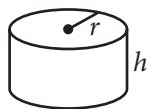
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



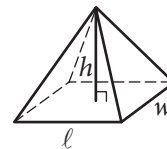
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

Which of the following expressions is equal to 0 for some value of  $x$  ?

- A)  $|x - 1| - 1$
- B)  $|x + 1| + 1$
- C)  $|1 - x| + 1$
- D)  $|x - 1| + 1$

2

$$f(x) = \frac{3}{2}x + b$$

In the function above,  $b$  is a constant. If  $f(6) = 7$ , what is the value of  $f(-2)$  ?

- A)  $-5$
- B)  $-2$
- C)  $1$
- D)  $7$

3

$$\frac{x}{y} = 6$$

$$4(y + 1) = x$$

If  $(x, y)$  is the solution to the system of equations above, what is the value of  $y$  ?

- A) 2
- B) 4
- C) 12
- D) 24

4

If  $f(x) = -2x + 5$ , what is  $f(-3x)$  equal to?

- A)  $-6x - 5$
- B)  $6x + 5$
- C)  $6x - 5$
- D)  $6x^2 - 15x$





5

$$3(2x + 1)(4x + 1)$$

Which of the following is equivalent to the expression above?

- A)  $45x$
- B)  $24x^2 + 3$
- C)  $24x^2 + 18x + 3$
- D)  $18x^2 + 6$

6

If  $\frac{a-b}{b} = \frac{3}{7}$ , which of the following must also be true?

- A)  $\frac{a}{b} = -\frac{4}{7}$
- B)  $\frac{a}{b} = \frac{10}{7}$
- C)  $\frac{a+b}{b} = \frac{10}{7}$
- D)  $\frac{a-2b}{b} = -\frac{11}{7}$

7

While preparing to run a marathon, Amelia created a training schedule in which the distance of her longest run every week increased by a constant amount. If Amelia's training schedule requires that her longest run in week 4 is a distance of 8 miles and her longest run in week 16 is a distance of 26 miles, which of the following best describes how the distance Amelia runs changes between week 4 and week 16 of her training schedule?

- A) Amelia increases the distance of her longest run by 0.5 miles each week.
- B) Amelia increases the distance of her longest run by 2 miles each week.
- C) Amelia increases the distance of her longest run by 2 miles every 3 weeks.
- D) Amelia increases the distance of her longest run by 1.5 miles each week.



8

Which of the following equations represents a line that is parallel to the line with equation  $y = -3x + 4$  ?

- A)  $6x + 2y = 15$
- B)  $3x - y = 7$
- C)  $2x - 3y = 6$
- D)  $x + 3y = 1$

9

$$\sqrt{x-a} = x - 4$$

If  $a = 2$ , what is the solution set of the equation above?

- A)  $\{3, 6\}$
- B)  $\{2\}$
- C)  $\{3\}$
- D)  $\{6\}$

10

If  $\frac{t+5}{t-5} = 10$ , what is the value of  $t$  ?

- A)  $\frac{45}{11}$
- B) 5
- C)  $\frac{11}{2}$
- D)  $\frac{55}{9}$

11

$$x = 2y + 5$$

$$y = (2x - 3)(x + 9)$$

How many ordered pairs  $(x, y)$  satisfy the system of equations shown above?

- A) 0
- B) 1
- C) 2
- D) Infinitely many

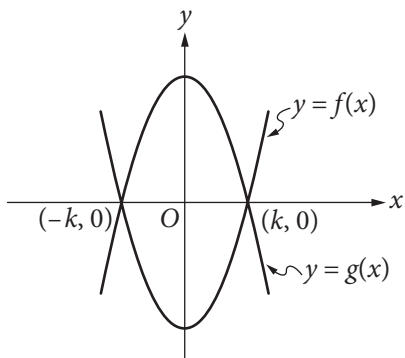


12

Ken and Paul each ordered a sandwich at a restaurant. The price of Ken's sandwich was  $x$  dollars, and the price of Paul's sandwich was \$1 more than the price of Ken's sandwich. If Ken and Paul split the cost of the sandwiches evenly and each paid a 20% tip, which of the following expressions represents the amount, in dollars, each of them paid? (Assume there is no sales tax.)

- A)  $0.2x + 0.2$
- B)  $0.5x + 0.1$
- C)  $1.2x + 0.6$
- D)  $2.4x + 1.2$

13



The functions  $f$  and  $g$ , defined by  $f(x) = 8x^2 - 2$  and  $g(x) = -8x^2 + 2$ , are graphed in the  $xy$ -plane above. The graphs of  $f$  and  $g$  intersect at the points  $(k, 0)$  and  $(-k, 0)$ . What is the value of  $k$ ?

- A)  $\frac{1}{4}$
- B)  $\frac{1}{2}$
- C) 1
- D) 2

14

$$\frac{8 - i}{3 - 2i}$$

If the expression above is rewritten in the form  $a + bi$ , where  $a$  and  $b$  are real numbers, what is the value of  $a$ ? (Note:  $i = \sqrt{-1}$ )

- A) 2
- B)  $\frac{8}{3}$
- C) 3
- D)  $\frac{11}{3}$

15

$$x^2 - \frac{k}{2}x = 2p$$

In the quadratic equation above,  $k$  and  $p$  are constants. What are the solutions for  $x$ ?

- A)  $x = \frac{k}{4} \pm \frac{\sqrt{k^2 + 2p}}{4}$
- B)  $x = \frac{k}{4} \pm \frac{\sqrt{k^2 + 32p}}{4}$
- C)  $x = \frac{k}{2} \pm \frac{\sqrt{k^2 + 2p}}{2}$
- D)  $x = \frac{k}{2} \pm \frac{\sqrt{k^2 + 32p}}{4}$

**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & / & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

← Fraction line

← Decimal point

Grid in result.

Answer: $\frac{7}{12}$				Answer: 2.5			
7	/	1	2	2	.	5	
•	•	•	•	•	•	•	•
0	0	0	0	0	0	0	0
①	①	•	①	①	①	①	①
②	②	②	•	②	•	②	②
③	③	③	③	③	③	③	③
④	④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤	•
⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
•	⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨

Acceptable ways to grid  $\frac{2}{3}$  are:

2	/	3		.	6	6	6	.	6	6	7
•	•	•	•	•	•	•	•	•	•	•	•
0	0	0	0	0	0	0	0	0	0	0	0
①	①	①	①	①	①	①	①	①	①	①	①
②	•	②	②	②	②	②	②	②	②	②	②
③	③	③	•	③	③	③	③	③	③	③	③
④	④	④	④	④	④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	•	•	•	⑥	•	•	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	•
⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧

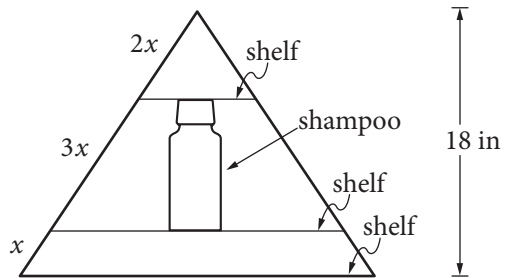
Answer: 201 – either position is correct

2	0	1		2	0	1	
•	•	•	•	•	•	•	•
0	•	0	0	•	0	0	0
①	①	①	•	①	①	•	①
②	•	②	②	•	②	②	②
③	③	③	③	③	③	③	③

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

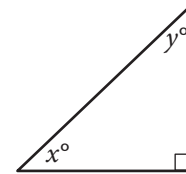


16



Jim has a triangular shelf system that attaches to his showerhead. The total height of the system is 18 inches, and there are three parallel shelves as shown above. What is the maximum height, in inches, of a shampoo bottle that can stand upright on the middle shelf?

17



In the triangle above, the sine of  $x^\circ$  is 0.6. What is the cosine of  $y^\circ$ ?

18

$$x^3 - 5x^2 + 2x - 10 = 0$$

For what real value of  $x$  is the equation above true?



19

$$-3x + 4y = 20$$

$$6x + 3y = 15$$

If  $(x, y)$  is the solution to the system of equations above, what is the value of  $x$  ?

20

The mesosphere is the layer of Earth's atmosphere between 50 kilometers and 85 kilometers above Earth's surface. At a distance of 50 kilometers from Earth's surface, the temperature in the mesosphere is  $-5^\circ$  Celsius, and at a distance of 80 kilometers from Earth's surface, the temperature in the mesosphere is  $-80^\circ$  Celsius. For every additional 10 kilometers from Earth's surface, the temperature in the mesosphere decreases by  $k^\circ$  Celsius, where  $k$  is a constant. What is the value of  $k$  ?

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

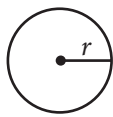
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

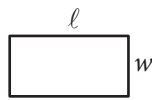
- The use of a calculator **is permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

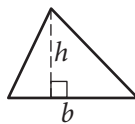


$$A = \pi r^2$$

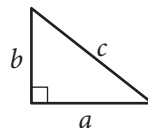
$$C = 2\pi r$$



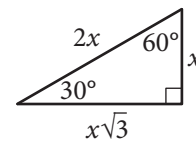
$$A = \ell w$$



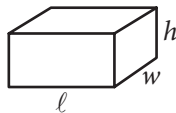
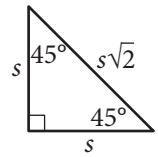
$$A = \frac{1}{2}bh$$



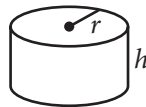
$$c^2 = a^2 + b^2$$



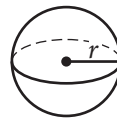
Special Right Triangles



$$V = \ell wh$$



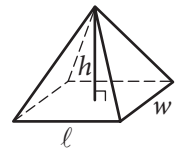
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

The monthly membership fee for an online television and movie service is \$9.80. The cost of viewing television shows online is included in the membership fee, but there is an additional fee of \$1.50 to rent each movie online. For one month, Jill's membership and movie rental fees were \$12.80. How many movies did Jill rent online that month?

- A) 1
- B) 2
- C) 3
- D) 4

2

One of the requirements for becoming a court reporter is the ability to type 225 words per minute. Donald can currently type 180 words per minute, and believes that with practice he can increase his typing speed by 5 words per minute each month. Which of the following represents the number of words per minute that Donald believes he will be able to type  $m$  months from now?

- A)  $5 + 180m$
- B)  $225 + 5m$
- C)  $180 + 5m$
- D)  $180 - 5m$

3

If a 3-pound pizza is sliced in half and each half is sliced into thirds, what is the weight, in ounces, of each of the slices? (1 pound = 16 ounces)

- A) 4
- B) 6
- C) 8
- D) 16

4

Nick surveyed a random sample of the freshman class of his high school to determine whether the Fall Festival should be held in October or November. Of the 90 students surveyed, 25.6% preferred October. Based on this information, about how many students in the entire 225-person class would be expected to prefer having the Fall Festival in October?

- A) 50
- B) 60
- C) 75
- D) 80





5

The density of an object is equal to the mass of the object divided by the volume of the object. What is the volume, in milliliters, of an object with a mass of 24 grams and a density of 3 grams per milliliter?

- A) 0.125
- B) 8
- C) 21
- D) 72

6

Last week Raul worked 11 more hours than Angelica. If they worked a combined total of 59 hours, how many hours did Angelica work last week?

- A) 24
- B) 35
- C) 40
- D) 48

7

Movies with Greatest Ticket Sales in 2012

MPAA rating	Type of movie				Total
	Action	Animated	Comedy	Drama	
PG	2	7	0	2	11
PG-13	10	0	4	8	22
R	6	0	5	6	17
Total	18	7	9	16	50

The table above represents the 50 movies that had the greatest ticket sales in 2012, categorized by movie type and Motion Picture Association of America (MPAA) rating. What proportion of the movies are comedies with a PG-13 rating?

- A)  $\frac{2}{25}$
- B)  $\frac{9}{50}$
- C)  $\frac{2}{11}$
- D)  $\frac{11}{25}$

8

Line  $\ell$  in the  $xy$ -plane contains points from each of Quadrants II, III, and IV, but no points from Quadrant I. Which of the following must be true?

- A) The slope of line  $\ell$  is undefined.
- B) The slope of line  $\ell$  is zero.
- C) The slope of line  $\ell$  is positive.
- D) The slope of line  $\ell$  is negative.



Number of Registered Voters  
in the United States in 2012, in Thousands

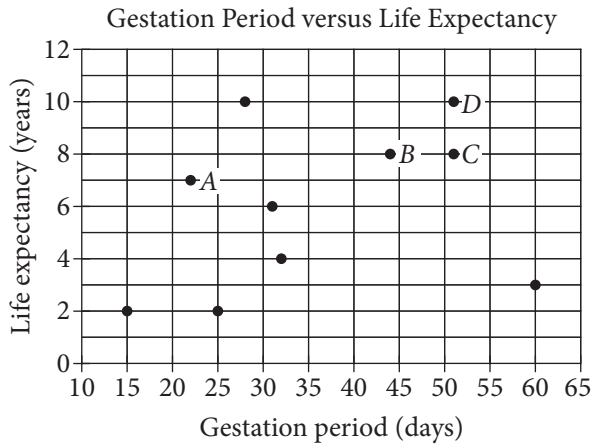
Region	Age, in years					Total
	18 to 24	25 to 44	45 to 64	65 to 74	75 and older	
Northeast	2,713	8,159	10,986	3,342	2,775	27,975
Midwest	3,453	11,237	13,865	4,221	3,350	36,126
South	5,210	18,072	21,346	7,272	4,969	56,869
West	3,390	10,428	11,598	3,785	2,986	32,187
Total	14,766	47,896	57,795	18,620	14,080	153,157

The table above shows the number of registered voters in 2012, in thousands, in four geographic regions and five age groups. Based on the table, if a registered voter who was 18 to 44 years old in 2012 is chosen at random, which of the following is closest to the probability that the registered voter was from the Midwest region?

- A) 0.10
- B) 0.25
- C) 0.40
- D) 0.75



Questions 10 and 11 refer to the following information.



A curator at a wildlife society created the scatterplot above to examine the relationship between the gestation period and life expectancy of 10 species of animals.

10

What is the life expectancy, in years, of the animal that has the longest gestation period?

- A) 3
- B) 4
- C) 8
- D) 10

11

Of the labeled points, which represents the animal for which the ratio of life expectancy to gestation period is greatest?

- A) A
- B) B
- C) C
- D) D

12

In the  $xy$ -plane, the graph of function  $f$  has  $x$ -intercepts at  $-3$ ,  $-1$ , and  $1$ . Which of the following could define  $f$ ?

- A)  $f(x) = (x - 3)(x - 1)(x + 1)$
- B)  $f(x) = (x - 3)(x - 1)^2$
- C)  $f(x) = (x - 1)(x + 1)(x + 3)$
- D)  $f(x) = (x + 1)^2(x + 3)$



13

The population of mosquitoes in a swamp is estimated over the course of twenty weeks, as shown in the table.

Time (weeks)	Population
0	100
5	1,000
10	10,000
15	100,000
20	1,000,000

Which of the following best describes the relationship between time and the estimated population of mosquitoes during the twenty weeks?

- A) Increasing linear
- B) Decreasing linear
- C) Exponential growth
- D) Exponential decay

14

$$1,000\left(1 + \frac{r}{1,200}\right)^{12}$$

The expression above gives the amount of money, in dollars, generated in a year by a \$1,000 deposit in a bank account that pays an annual interest rate of  $r\%$ , compounded monthly. Which of the following expressions shows how much additional money is generated at an interest rate of 5% than at an interest rate of 3%?

A)  $1,000\left(1 + \frac{5-3}{1,200}\right)^{12}$

B)  $1,000\left(1 + \frac{\frac{5}{3}}{1,200}\right)^{12}$

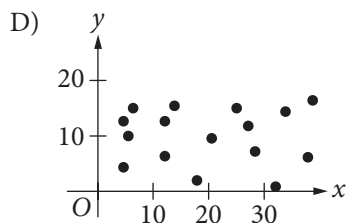
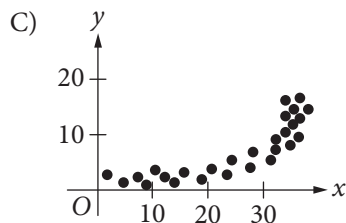
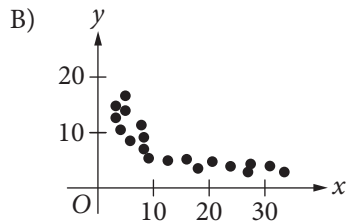
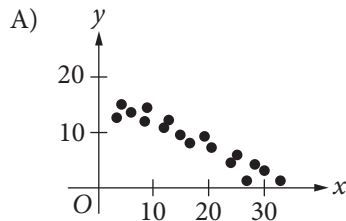
C)  $\frac{1,000\left(1 + \frac{5}{1,200}\right)^{12}}{1,000\left(1 + \frac{3}{1,200}\right)^{12}}$

D)  $1,000\left(1 + \frac{5}{1,200}\right)^{12} - 1,000\left(1 + \frac{3}{1,200}\right)^{12}$



15

Which of the following scatterplots shows a relationship that is appropriately modeled with the equation  $y = ax^b$ , where  $a$  is positive and  $b$  is negative?



Questions 16 and 17 refer to the following information.

Mr. Martinson is building a concrete patio in his backyard and deciding where to buy the materials and rent the tools needed for the project. The table below shows the materials' cost and daily rental costs for three different stores.

Store	Materials' Cost, $M$ (dollars)	Rental cost of wheelbarrow, $W$ (dollars per day)	Rental cost of concrete mixer, $K$ (dollars per day)
A	750	15	65
B	600	25	80
C	700	20	70

The total cost,  $y$ , for buying the materials and renting the tools in terms of the number of days,  $x$ , is given by  $y = M + (W + K)x$ .

16

For what number of days,  $x$ , will the total cost of buying the materials and renting the tools from Store B be less than or equal to the total cost of buying the materials and renting the tools from Store A?

- A)  $x \leq 6$
- B)  $x \geq 6$
- C)  $x \leq 7.3$
- D)  $x \geq 7.3$



17

If the relationship between the total cost,  $y$ , of buying the materials and renting the tools at Store C and the number of days,  $x$ , for which the tools are rented is graphed in the  $xy$ -plane, what does the slope of the line represent?

- A) The total cost of the project
  - B) The total cost of the materials
  - C) The total daily cost of the project
  - D) The total daily rental costs of the tools
- 

18

Jim has identical drinking glasses each in the shape of a right circular cylinder with internal diameter of 3 inches. He pours milk from a gallon jug into each glass until it is full. If the height of milk in each glass is about 6 inches, what is the largest number of full milk glasses that he can pour from one gallon of milk? (Note: There are 231 cubic inches in 1 gallon.)

- A) 2
- B) 4
- C) 5
- D) 6

19

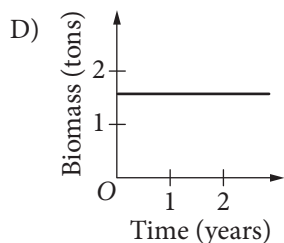
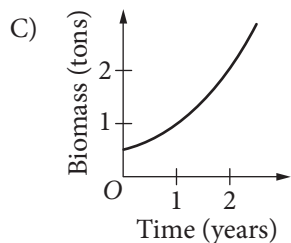
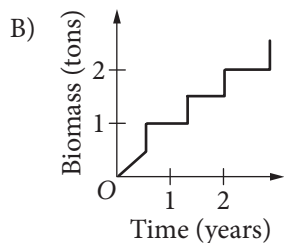
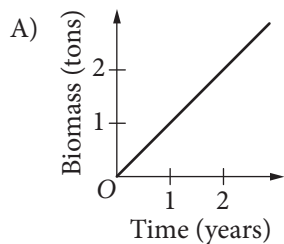
If  $3p - 2 \geq 1$ , what is the least possible value of  $3p + 2$  ?

- A) 5
- B) 3
- C) 2
- D) 1

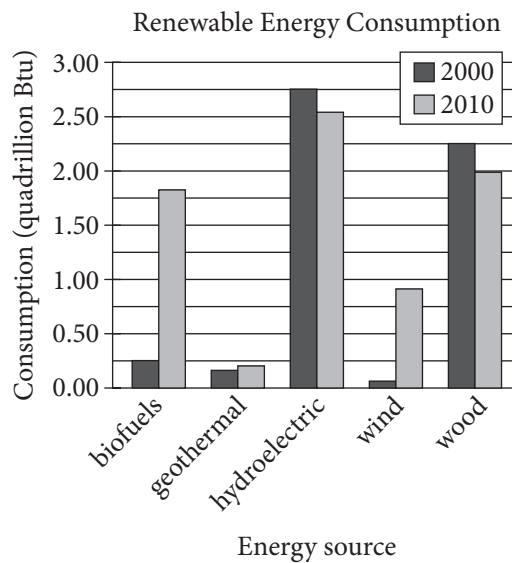


20

The mass of living organisms in a lake is defined to be the biomass of the lake. If the biomass in a lake doubles each year, which of the following graphs could model the biomass in the lake as a function of time? (Note: In each graph below,  $O$  represents  $(0, 0)$ .)



Questions 21 and 22 refer to the following information.



The bar graph above shows renewable energy consumption in quadrillions of British thermal units (Btu) in the United States, by energy source, for several energy sources in the years 2000 and 2010.

21

In a scatterplot of this data, where renewable energy consumption in the year 2000 is plotted along the  $x$ -axis and renewable energy consumption in the year 2010 is plotted along the  $y$ -axis for each of the given energy sources, how many data points would be above the line  $y = x$  ?

- A) 1
- B) 2
- C) 3
- D) 4



22

Of the following, which best approximates the percent decrease in consumption of wood power in the United States from 2000 to 2010 ?

- A) 6%
- B) 11%
- C) 21%
- D) 26%



23

The tables below give the distribution of high temperatures in degrees Fahrenheit ( $^{\circ}\text{F}$ ) for City A and City B over the same 21 days in March.

City A

Temperature ( $^{\circ}\text{F}$ )	Frequency
80	3
79	14
78	2
77	1
76	1

City B

Temperature ( $^{\circ}\text{F}$ )	Frequency
80	6
79	3
78	2
77	4
76	6

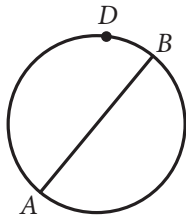
Which of the following is true about the data shown for these 21 days?

- A) The standard deviation of temperatures in City A is larger.
- B) The standard deviation of temperatures in City B is larger.
- C) The standard deviation of temperatures in City A is the same as that of City B.
- D) The standard deviation of temperatures in these cities cannot be calculated with the data provided.





24



In the circle above, segment  $AB$  is a diameter. If the length of arc  $\widehat{ADB}$  is  $8\pi$ , what is the length of the radius of the circle?

- A) 2
- B) 4
- C) 8
- D) 16

25

$$f(x) = 2x^3 + 6x^2 + 4x$$

$$g(x) = x^2 + 3x + 2$$

The polynomials  $f(x)$  and  $g(x)$  are defined above. Which of the following polynomials is divisible by  $2x + 3$  ?

- A)  $h(x) = f(x) + g(x)$
- B)  $p(x) = f(x) + 3g(x)$
- C)  $r(x) = 2f(x) + 3g(x)$
- D)  $s(x) = 3f(x) + 2g(x)$

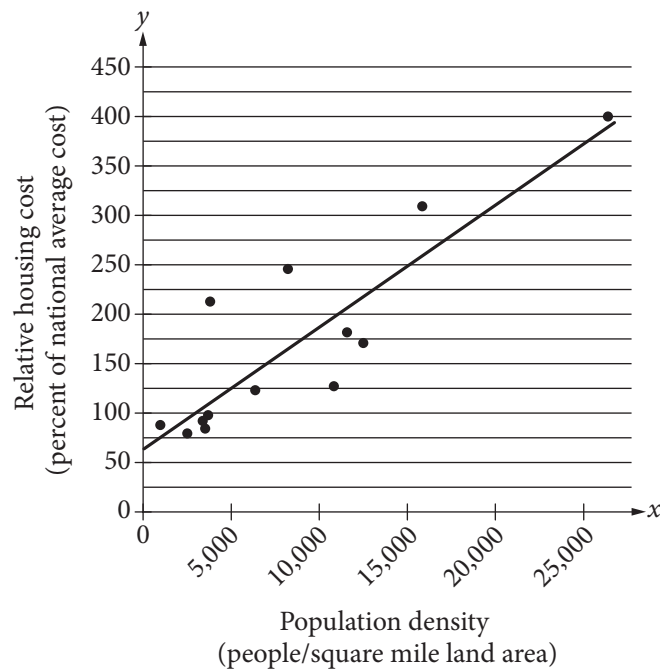
26

Let  $x$  and  $y$  be numbers such that  $-y < x < y$ . Which of the following must be true?

- I.  $|x| < y$
  - II.  $x > 0$
  - III.  $y > 0$
- A) I only
  - B) I and II only
  - C) I and III only
  - D) I, II, and III



The relative housing cost for a US city is defined to be the ratio  $\frac{\text{average housing cost for the city}}{\text{national average housing cost}}$ , expressed as a percent.



The scatterplot above shows the relative housing cost and the population density for several large US cities in the year 2005. The line of best fit is also shown and has equation  $y = 0.0125x + 61$ . Which of the following best explains how the number 61 in the equation relates to the scatterplot?

- A) In 2005, the lowest housing cost in the United States was about \$61 per month.
- B) In 2005, the lowest housing cost in the United States was about 61% of the highest housing cost.
- C) In 2005, even in cities with low population densities, housing costs were never below 61% of the national average.
- D) In 2005, even in cities with low population densities, housing costs were likely at least 61% of the national average.



28

$$f(x) = (x + 6)(x - 4)$$

Which of the following is an equivalent form of the function  $f$  above in which the minimum value of  $f$  appears as a constant or coefficient?

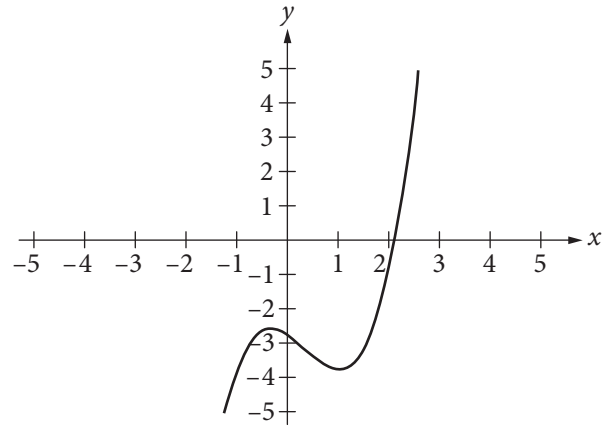
- A)  $f(x) = x^2 - 24$
- B)  $f(x) = x^2 + 2x - 24$
- C)  $f(x) = (x - 1)^2 - 21$
- D)  $f(x) = (x + 1)^2 - 25$

29

If  $x$  is the average (arithmetic mean) of  $m$  and 9,  $y$  is the average of  $2m$  and 15, and  $z$  is the average of  $3m$  and 18, what is the average of  $x$ ,  $y$ , and  $z$  in terms of  $m$ ?

- A)  $m + 6$
- B)  $m + 7$
- C)  $2m + 14$
- D)  $3m + 21$

30



The function  $f(x) = x^3 - x^2 - x - \frac{11}{4}$  is graphed in the  $xy$ -plane above. If  $k$  is a constant such that the equation  $f(x) = k$  has three real solutions, which of the following could be the value of  $k$ ?

- A) 2
- B) 0
- C) -2
- D) -3

**DIRECTIONS**

For questions 31–38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
•	•	•	•

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{7}{12}$

7	/	1	2
•	•	•	•
0	0	0	0
1	1	•	1
2	2	2	•
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
•	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

	2	.	5
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	3
4	4	4	4
5	5	5	•
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
•	•	•	•
0	0	0	0
1	1	1	1
2	•	2	2
3	3	3	•
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	•
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	•	•	6
7	7	7	•
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

	2	0	1
•	•	•	•
0	0	•	0
1	1	1	•
2	•	2	2
3	3	3	3

	2	0	1
•	•	•	•
0	•	0	0
1	1	•	1
2	•	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

A partially filled pool contains 600 gallons of water. A hose is turned on, and water flows into the pool at the rate of 8 gallons per minute. How many gallons of water will be in the pool after 70 minutes?

32

The normal systolic blood pressure  $P$ , in millimeters of mercury, for an adult male  $x$  years old can be modeled by the equation  $P = \frac{x + 220}{2}$ . According to the model, for every increase of 1 year in age, by how many millimeters of mercury will the normal systolic blood pressure for an adult male increase?

33

The *pes*, a Roman measure of length, is approximately equal to 11.65 inches. It is also equivalent to 16 smaller Roman units called digits. Based on these relationships, 75 Roman digits is equivalent to how many feet, to the nearest hundredth? (12 inches = 1 foot)

34

In a study of bat migration habits, 240 male bats and 160 female bats have been tagged. If 100 more female bats are tagged, how many more male bats must be tagged so that  $\frac{3}{5}$  of the total number of bats in the study are male?

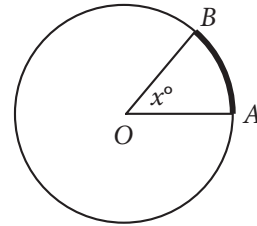


35

$$q = \frac{1}{2}nv^2$$

The dynamic pressure  $q$  generated by a fluid moving with velocity  $v$  can be found using the formula above, where  $n$  is the constant density of the fluid. An aeronautical engineer uses the formula to find the dynamic pressure of a fluid moving with velocity  $v$  and the same fluid moving with velocity  $1.5v$ . What is the ratio of the dynamic pressure of the faster fluid to the dynamic pressure of the slower fluid?

36



Note: Figure not drawn to scale.

In the figure above, the circle has center  $O$  and has radius 10. If the length of arc  $\widehat{AB}$  (shown in bold) is between 5 and 6, what is one possible integer value of  $x$  ?



---

**Questions 37 and 38 refer to the following information.**

The stock price of one share in a certain company is worth \$360 today. A stock analyst believes that the stock will lose 28 percent of its value each week for the next three weeks. The analyst uses the equation  $V = 360(r)^t$  to model the value,  $V$ , of the stock after  $t$  weeks.

37

What value should the analyst use for  $r$  ?

38

To the nearest dollar, what does the analyst believe the value of the stock will be at the end of three weeks? (Note: Disregard the \$ sign when gridding your answer.)

---

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Scoring Your SAT<sup>®</sup> Practice Test #4

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide additional diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Sofia answered 29 of the 52 questions correctly on the SAT Reading Test and 19 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, she calculates that she received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. She adds 27 to 23 (gets 50) and then multiplies by 10 to determine her SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.

## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1-3; 7-8; 12; 19-20
- ▶ Math Test – Calculator: Questions 1-2; 6; 8; 16-17; 19; 26; 29; 32; 34

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 3-5; 7; 9-11; 13-15; 20-23; 27; 31; 33

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 4-6; 9-11; 13; 15; 18
- ▶ Math Test – Calculator: Questions 12; 25; 28; 30; 35; 37-38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 2; 4-5; 8; 10-11; 14-18; 20; 23; 25-27; 31; 33; 37-39; 41-42; 44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1; 3; 6-7; 9; 12-13; 19; 21-22; 24; 28-30; 32; 34-36; 40; 43Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 3; 9; 13; 18; 24; 31; 33-34; 45; 48
  - ▶ Writing and Language Test: Questions 5; 8; 14; 16; 23; 26; 41-42Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 2; 6; 15; 20; 28; 39; 44; 47; 50; 52
  - ▶ Writing and Language Test: Questions 10-11; 18; 20; 25; 31; 37-38Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.

## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11-21; 32-41
- ▶ Writing and Language Test: Questions 23; 25-27; 31; 33
- ▶ Math Test – No Calculator: Question 12
- ▶ Math Test – Calculator: Questions 9; 14; 16-17; 27; 33; 37

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 22-31; 42-52
- ▶ Writing and Language Test: Questions 14-18; 20
- ▶ Math Test – No Calculator: Question 20
- ▶ Math Test – Calculator: Questions 5; 10-11; 13; 21-22; 32

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores to determine your Analysis in Science cross-test score.

# SAT Practice Test #4: Worksheets

## ANSWER KEY

### Reading Test Answers

1 C	12 D	23 C	34 A	45 D
2 D	13 A	24 C	35 D	46 A
3 D	14 B	25 B	36 B	47 D
4 C	15 A	26 C	37 D	48 C
5 A	16 C	27 A	38 D	49 D
6 A	17 C	28 B	39 D	50 C
7 B	18 A	29 B	40 A	51 B
8 D	19 B	30 D	41 B	52 A
9 D	20 A	31 D	42 C	
10 A	21 D	32 D	43 B	
11 C	22 A	33 D	44 A	

READING TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Writing and Language Test Answers

1 B	12 D	23 C	34 C
2 B	13 B	24 C	35 C
3 B	14 D	25 B	36 B
4 A	15 C	26 D	37 D
5 D	16 C	27 C	38 A
6 B	17 A	28 A	39 C
7 D	18 C	29 D	40 B
8 B	19 A	30 B	41 D
9 C	20 C	31 C	42 D
10 A	21 B	32 B	43 A
11 C	22 D	33 A	44 B

WRITING AND  
LANGUAGE TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test No Calculator Answers

1 A	11 C
2 A	12 C
3 A	13 B
4 B	14 A
5 C	15 B
6 B	16 9
7 D	17 $\frac{3}{5}$ or 0.6
8 A	18 5
9 D	19 0
10 D	20 25

MATH TEST  
NO CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test Calculator Answers

1 B	11 A	21 C	31 1160
2 C	12 C	22 B	32 $\frac{1}{2}$ or 0.5
3 C	13 C	23 B	33 4.55
4 B	14 D	24 C	34 150
5 B	15 B	25 B	35 $\frac{9}{4}$ or 2.25
6 A	16 A	26 C	36 29, 30, 31, 32, 33, or 34
7 A	17 D	27 D	37 0.72
8 D	18 C	28 D	38 134
9 B	19 A	29 B	
10 A	20 C	30 D	

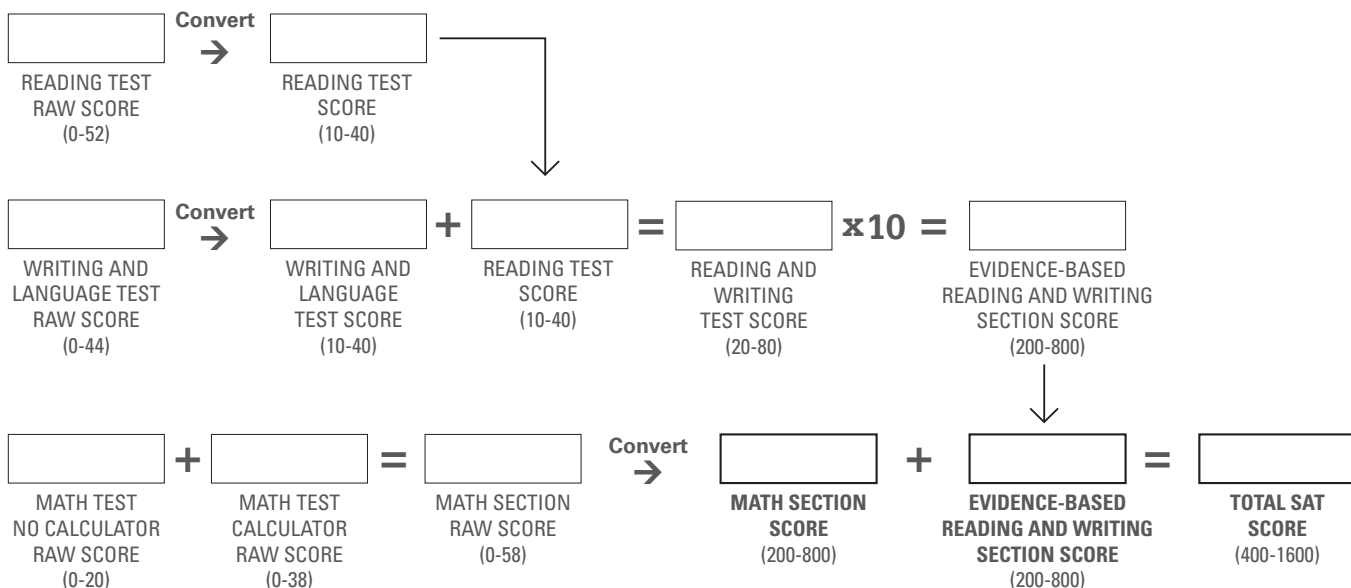
MATH TEST  
CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

# SAT Practice Test #4: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	580	27	30
1	200	10	10	31	590	28	31
2	210	10	10	32	600	28	31
3	230	11	10	33	600	28	32
4	250	12	11	34	610	29	32
5	270	13	12	35	620	29	33
6	280	14	13	36	630	30	33
7	300	15	14	37	640	30	34
8	320	16	15	38	650	31	35
9	340	16	16	39	660	31	36
10	350	17	16	40	670	32	37
11	360	18	17	41	680	32	37
12	370	18	18	42	690	33	38
13	390	19	19	43	700	33	39
14	410	20	19	44	710	34	40
15	420	20	20	45	710	35	
16	430	21	21	46	720	35	
17	450	21	22	47	730	36	
18	460	22	23	48	730	37	
19	470	22	23	49	740	38	
20	480	23	24	50	750	39	
21	490	23	24	51	750	39	
22	500	23	25	52	760	40	
23	510	24	26	53	770		
24	520	24	26	54	780		
25	530	25	27	55	790		
26	540	25	27	56	790		
27	550	26	28	57	800		
28	560	26	29	58	800		
29	570	27	29				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES

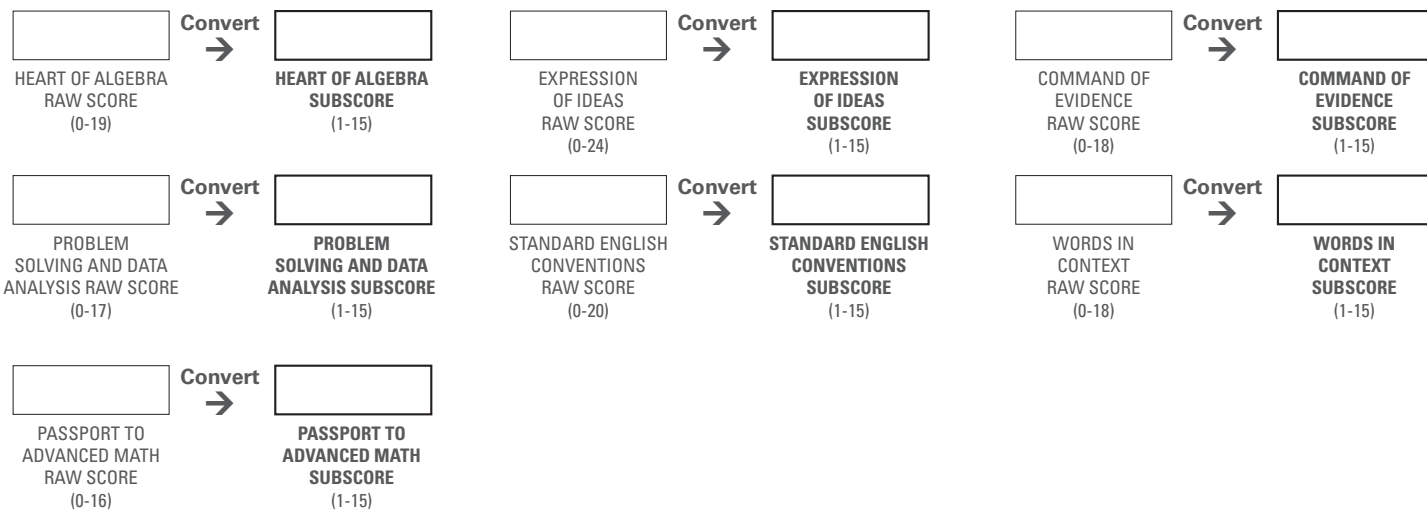


# SAT Practice Test #4: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	1	1	3	1	1
2	1	1	2	2	5	2	2
3	2	2	4	4	6	3	3
4	3	3	5	5	7	4	4
5	4	5	6	6	8	5	5
6	5	5	7	7	9	6	6
7	5	6	8	8	10	6	7
8	6	7	8	8	11	7	8
9	7	7	9	9	12	7	9
10	7	8	9	9	12	8	9
11	8	8	10	10	13	9	10
12	8	9	11	11	13	9	10
13	9	9	11	12	14	10	11
14	9	10	12	13	14	10	12
15	9	11	13	13	15	11	13
16	10	12	14	14	15	12	14
17	11	12	14	15		13	15
18	11	13	15			15	15
19	12	14	15				
20	12	15					
21	13						
22	13						
23	14						
24	15						

## CONVERSION EQUATION 2 SUBSCORES





# SAT Practice Test #4: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	28	26
1	10	11	19	29	26
2	11	13	20	29	27
3	13	14	21	30	28
4	15	15	22	31	28
5	16	16	23	31	29
6	17	17	24	32	30
7	18	18	25	33	30
8	19	18	26	34	31
9	20	19	27	34	32
10	21	20	28	35	33
11	22	21	29	36	34
12	23	22	30	37	35
13	24	22	31	38	36
14	25	23	32	38	37
15	26	24	33	39	38
16	27	24	34	40	39
17	28	25	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11-21; 32-41		22-31; 42-52	
Writing and Language Test	3; 25-27; 31; 33		14-18; 20	
Math Test No Calculator	12		20	
Math Test Calculator	9; 14; 16-17; 27; 33; 37		5; 10-11; 13; 21-22; 32	
Total				



# Exam 8

### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A	B	C	D	14	A	B	C	D	27	A	B	C	D	40	A	B	C	D
2	○	○	○	○	15	○	○	○	○	28	○	○	○	○	41	○	○	○	○
3	A	B	C	D	16	A	B	C	D	29	A	B	C	D	42	A	B	C	D
4	○	○	○	○	17	○	○	○	○	30	○	○	○	○	43	○	○	○	○
5	A	B	C	D	18	A	B	C	D	31	A	B	C	D	44	A	B	C	D
6	○	○	○	○	19	○	○	○	○	32	○	○	○	○	45	○	○	○	○
7	A	B	C	D	20	A	B	C	D	33	A	B	C	D	46	A	B	C	D
8	○	○	○	○	21	○	○	○	○	34	○	○	○	○	47	○	○	○	○
9	A	B	C	D	22	A	B	C	D	35	A	B	C	D	48	A	B	C	D
10	○	○	○	○	23	○	○	○	○	36	○	○	○	○	49	○	○	○	○
11	A	B	C	D	24	A	B	C	D	37	A	B	C	D	50	A	B	C	D
12	○	○	○	○	25	○	○	○	○	38	○	○	○	○	51	○	○	○	○
13	A	B	C	D	26	A	B	C	D	39	A	B	C	D	52	A	B	C	D
	○	○	○	○		○	○	○	○		○	○	○	○		○	○	○	○



**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 2**

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	17	□ □ □ □	18	□ □ □ □	19	□ □ □ □	20	□ □ □ □
/	○ ○	/	○ ○	/	○ ○	/	○ ○	/	○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○

**NO CALCULATOR ALLOWED**



## SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF  
INCOMPLETE MARKS

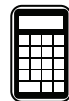


It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

### SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR  
ALLOWED



**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS** 

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 4 (Continued)**

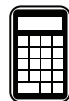
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<b>31</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>32</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>33</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>34</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>35</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○
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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<b>36</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>37</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○	<b>38</b> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> /    ○ ○ . ○ ○ ○ ○ 0 ○ ○ ○ ○ 1 ○ ○ ○ ○ 2 ○ ○ ○ ○ 3 ○ ○ ○ ○ 4 ○ ○ ○ ○ 5 ○ ○ ○ ○ 6 ○ ○ ○ ○ 7 ○ ○ ○ ○ 8 ○ ○ ○ ○ 9 ○ ○ ○ ○
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**CALCULATOR  
ALLOWED**



**Test begins on the next page.**



# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is adapted from William Maxwell, *The Folded Leaf*. ©1959 by William Maxwell. Originally published in 1945.

The Alcazar Restaurant was on Sheridan Road near Devon Avenue. It was long and narrow, with tables for two along the walls and tables for four down the middle. The decoration was *art moderne*,  
 5 except for the series of murals depicting the four seasons, and the sick ferns in the front window. Lymie sat down at the second table from the cash register, and ordered his dinner. The history book, which he propped against the catsup and the glass  
 10 sugar bowl, had been used by others before him. Blank pages front and back were filled in with maps, drawings, dates, comic cartoons, and organs of the body; also with names and messages no longer clear and never absolutely legible. On nearly every other  
 15 page there was some marginal notation, either in ink or in very hard pencil. And unless someone had upset a glass of water, the marks on page 177 were from tears.

While Lymie read about the Peace of Paris, signed  
 20 on the thirtieth of May, 1814, between France and the Allied powers, his right hand managed again and again to bring food up to his mouth. Sometimes he chewed, sometimes he swallowed whole the food that he had no idea he was eating. The Congress of  
 25 Vienna met, with some allowance for delays, early in November of the same year, and all the powers engaged in the war on either side sent

plenipotentiaries. It was by far the most splendid and important assembly ever convoked to discuss and  
 30 determine the affairs of Europe. The Emperor of Russia, the King of Prussia, the Kings of Bavaria, Denmark, and Wurttemberg, all were present in person at the court of the Emperor Francis I in the Austrian capital. When Lymie put down his fork and  
 35 began to count them off, one by one, on the fingers of his left hand, the waitress, whose name was Irma, thought he was through eating and tried to take his plate away. He stopped her. Prince Metternich (his right thumb) presided over the Congress, and  
 40 Prince Talleyrand (the index finger) represented France.

A party of four, two men and two women, came into the restaurant, all talking at once, and took possession of the center table nearest Lymie.  
 45 The women had shingled hair and short tight skirts which exposed the underside of their knees when they sat down. One of the women had the face of a young boy but disguised by one trick or another (rouge, lipstick, powder, wet bangs plastered against  
 50 the high forehead, and a pair of long pendent earrings) to look like a woman of thirty-five, which as a matter of fact she was. The men were older. They laughed more than there seemed any occasion for, while they were deciding between soup and shrimp  
 55 cocktail, and their laughter was too loud. But it was the women's voices, the terrible not quite sober pitch of the women's voices which caused Lymie to skim over two whole pages without knowing what was on them. Fortunately he realized this and went back.  
 60 Otherwise he might never have known about the

secret treaty concluded between England, France, and Austria, when the pretensions of Prussia and Russia, acting in concert, seemed to threaten a renewal of the attack. The results of the Congress  
65 were stated clearly at the bottom of page 67 and at the top of page 68, but before Lymie got halfway through them, a coat that he recognized as his father's was hung on the hook next to his chair. Lymie closed the book and said, "I didn't think you  
70 were coming."

Time is probably no more unkind to sporting characters than it is to other people, but physical decay unsustained by respectability is somehow more noticeable. Mr. Peters' hair was turning gray and his  
75 scalp showed through on top. He had lost weight also; he no longer filled out his clothes the way he used to. His color was poor, and the flower had disappeared from his buttonhole. In its place was an American Legion button.

80 Apparently he himself was not aware that there had been any change. He straightened his tie self-consciously and when Irma handed him a menu, he gestured with it so that the two women at the next table would notice the diamond ring on the fourth  
85 finger of his right hand. Both of these things, and also the fact that his hands showed signs of the manicurist, one can blame on the young man who had his picture taken with a derby hat on the back of his head, and also sitting with a girl in the curve of  
90 the moon. The young man had never for one second deserted Mr. Peters. He was always there, tugging at Mr. Peters' elbow, making him do things that were not becoming in a man of forty-five.

1

Over the course of the passage, the primary focus shifts from

- A) Lymie's inner thoughts to observations made by the other characters.
- B) an exchange between strangers to a satisfying personal relationship.
- C) the physical setting of the scene to the different characters' personality traits.
- D) Lymie's experience reading a book to descriptions of people in the restaurant.

2

The main purpose of the first paragraph is to

- A) introduce the passage's main character by showing his nightly habits.
- B) indicate the date the passage takes place by presenting period details.
- C) convey the passage's setting by describing a place and an object.
- D) foreshadow an event that is described in detail later in the passage.

3

It can reasonably be inferred that Irma, the waitress, thinks Lymie is "through eating" (line 37) because

- A) he has begun reading his book.
- B) his plate is empty.
- C) he is no longer holding his fork.
- D) he has asked her to clear the table.

4

Lymie's primary impression of the "party of four" (line 42) is that they

- A) are noisy and distracting.
- B) are a refreshing change from the other customers.
- C) resemble characters from his history book.
- D) represent glamour and youth.

5

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 45-47 ("The women . . . down")
- B) Lines 47-52 ("One . . . was")
- C) Lines 55-59 ("But . . . them")
- D) Line 69 ("Lymie . . . book")

6

The narrator indicates that Lymie finally closes the history book because

- A) his father has joined him at the table.
- B) the people at the other table are too disruptive.
- C) he has finished the chapter about the Congress.
- D) he is preparing to leave the restaurant.

7

The primary impression created by the narrator's description of Mr. Peters in lines 74-79 is that he is

- A) healthy and fit.
- B) angry and menacing.
- C) nervous and hesitant.
- D) aging and shriveled.

8

The main idea of the last paragraph is that Mr. Peters

- A) neglects to spend any time with his family members.
- B) behaves as if he is a younger version of himself.
- C) is very conscious of symbols of wealth and power.
- D) is preoccupied with the knowledge that he is growing old.

9

Which choice best supports the conclusion that Mr. Peters wants to attract attention?

- A) Lines 80-81 (“Apparently . . . change”)
- B) Lines 81-85 (“He straightened . . . hand”)
- C) Lines 90-91 (“The young . . . Mr. Peters”)
- D) Lines 91-93 (“He was . . . forty-five”)

10

As used in line 93, “becoming” most nearly means

- A) emerging.
- B) fitting.
- C) developing.
- D) happening.

**Questions 11-21 are based on the following passages.**

Passage 1 is adapted from Catharine Beecher, *Essay on Slavery and Abolitionism*. Originally published in 1837. Passage 2 is adapted from Angelina E. Grimké, *Letters to Catharine Beecher*. Originally published in 1838. Grimké encouraged Southern women to oppose slavery publicly. Passage 1 is Beecher's response to Grimké's views. Passage 2 is Grimké's response to Beecher.

**Passage 1**

Heaven has appointed to one sex the superior, and to the other the subordinate station, and this without any reference to the character or conduct of  
 Line either. It is therefore as much for the dignity as it is  
 5 for the interest of females, in all respects to conform to the duties of this relation. . . . But while woman holds a subordinate relation in society to the other sex, it is not because it was designed that her duties or her influence should be any the less important, or  
 10 all-pervading. But it was designed that the mode of gaining influence and of exercising power should be altogether different and peculiar. . . .

A man may act on society by the collision of intellect, in public debate; he may urge his measures  
 15 by a sense of shame, by fear and by personal interest; he may coerce by the combination of public sentiment; he may drive by physical force, and he does not outstep the boundaries of his sphere. But all the power, and all the conquests that are lawful to  
 20 woman, are those only which appeal to the kindly, generous, peaceful and benevolent principles.

Woman is to win every thing by peace and love; by making herself so much respected, esteemed and loved, that to yield to her opinions and to gratify her  
 25 wishes, will be the free-will offering of the heart. But this is to be all accomplished in the domestic and social circle. There let every woman become so cultivated and refined in intellect, that her taste and judgment will be respected; so benevolent in feeling  
 30 and action; that her motives will be revered;—so unassuming and unambitious, that collision and competition will be banished;—so “gentle and easy to be entreated,” as that every heart will repose in her presence; then, the fathers, the husbands, and the  
 35 sons, will find an influence thrown around them, to which they will yield not only willingly but proudly. . . .

A woman may seek the aid of co-operation and combination among her own sex, to assist her in her  
 40 appropriate offices of piety, charity, maternal and

domestic duty; but whatever, in any measure, throws a woman into the attitude of a combatant, either for herself or others—whatever binds her in a party conflict—whatever obliges her in any way to exert  
 45 coercive influences, throws her out of her appropriate sphere. If these general principles are correct, they are entirely opposed to the plan of arraying females in any Abolition movement.

**Passage 2**

The investigation of the rights of the slave has led  
 50 me to a better understanding of my own. I have found the Anti-Slavery cause to be the high school of morals in our land—the school in which *human rights* are more fully investigated, and better understood and taught, than in any other. Here a  
 55 great fundamental principle is uplifted and illuminated, and from this central light, rays innumerable stream all around.

Human beings have *rights*, because they are *moral* beings: the rights of *all* men grow out of their moral  
 60 nature; and as all men have the same moral nature, they have essentially the same rights. These rights may be wrested from the slave, but they cannot be alienated: his title to himself is as perfect now, as is that of Lyman Beecher:<sup>1</sup> it is stamped on his moral  
 65 being, and is, like it, imperishable. Now if rights are founded in the nature of our moral being, then the *mere circumstance of sex* does not give to man higher rights and responsibilities, than to woman. To suppose that it does, would be to deny the  
 70 self-evident truth, that the “physical constitution is the mere instrument of the moral nature.” To suppose that it does, would be to break up utterly the relations, of the two natures, and to reverse their functions, exalting the animal nature into a monarch,  
 75 and humbling the moral into a slave; making the former a proprietor, and the latter its property.

When human beings are regarded as *moral* beings, *sex*, instead of being enthroned upon the summit, administering upon rights and  
 80 responsibilities, sinks into insignificance and nothingness. My doctrine then is, that whatever it is morally right for man to do, it is morally right for woman to do. Our duties originate, not from difference of sex, but from the diversity of our  
 85 relations in life, the various gifts and talents committed to our care, and the different eras in which we live.

<sup>1</sup> Lyman Beecher was a famous minister and the father of Catharine Beecher.

11

In Passage 1, Beecher makes which point about the status of women relative to that of men?

- A) Women depend on men for their safety and security, but men are largely independent of women.
- B) Women are inferior to men, but women play a role as significant as that played by men.
- C) Women have fewer rights than men do, but women also have fewer responsibilities.
- D) Women are superior to men, but tradition requires women to obey men.

12

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 6-10 (“But . . . all-pervading”)
- B) Lines 13-14 (“A man . . . debate”)
- C) Lines 16-18 (“he may coerce . . . sphere”)
- D) Lines 41-46 (“but whatever . . . sphere”)

13

In Passage 1, Beecher implies that women’s effect on public life is largely

- A) overlooked, because few men are interested in women’s thoughts about politics.
- B) indirect, because women exert their influence within the home and family life.
- C) unnecessary, because men are able to govern society themselves.
- D) symbolic, because women tend to be more idealistic about politics than men are.

14

As used in line 2, “station” most nearly means

- A) region.
- B) studio.
- C) district.
- D) rank.

15

As used in line 12, “peculiar” most nearly means

- A) eccentric.
- B) surprising.
- C) distinctive.
- D) infrequent.

16

What is Grimké’s central claim in Passage 2?

- A) The rights of individuals are not determined by race or gender.
- B) Men and women must learn to work together to improve society.
- C) Moral rights are the most important distinction between human beings and animals.
- D) Men and women should have equal opportunities to flourish.

17

In Passage 2, Grimké makes which point about human rights?

- A) They are viewed differently in various cultures around the world.
- B) They retain their moral authority regardless of whether they are recognized by law.
- C) They are sometimes at odds with moral responsibilities.
- D) They have become more advanced and refined throughout history.

18

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 58-61 (“Human . . . same rights”)
- B) Lines 61-65 (“These . . . imperishable”)
- C) Lines 71-76 (“To suppose . . . property”)
- D) Lines 77-81 (“When . . . nothingness”)

19

Which choice best states the relationship between the two passages?

- A) Passage 2 illustrates the practical difficulties of a proposal made in Passage 1.
- B) Passage 2 takes issue with the primary argument of Passage 1.
- C) Passage 2 provides a historical context for the perspective offered in Passage 1.
- D) Passage 2 elaborates upon several ideas implied in Passage 1.

20

Based on the passages, both authors would agree with which of the following claims?

- A) Women have moral duties and responsibilities.
- B) Men often work selflessly for political change.
- C) The ethical obligations of women are often undervalued.
- D) Political activism is as important for women as it is for men.

21

Beecher would most likely have reacted to lines 65-68 (“Now . . . woman”) of Passage 2 with

- A) sympathy, because she feels that human beings owe each other a debt to work together in the world.
- B) agreement, because she feels that human responsibilities are a natural product of human rights.
- C) dismay, because she feels that women actually have a more difficult role to play in society than men do.
- D) disagreement, because she feels that the natures of men and women are fundamentally different.

**Questions 22-31 are based on the following passage and supplementary material.**

This passage is adapted from Bryan Walsh, “Whole Food Blues: Why Organic Agriculture May Not Be So Sustainable.” ©2012 by Time Inc.

When it comes to energy, everyone loves efficiency. Cutting energy waste is one of those goals that both sides of the political divide can agree on, even if they sometimes diverge on how best to get 5 there. Energy efficiency allows us to get more out of our given resources, which is good for the economy and (mostly) good for the environment as well. In an increasingly hot and crowded world, the only sustainable way to live is to get more out of less. 10 Every environmentalist would agree.

But change the conversation to food, and suddenly efficiency doesn’t look so good. Conventional industrial agriculture has become incredibly efficient on a simple land to food basis. 15 Thanks to fertilizers, mechanization and irrigation, each American farmer feeds over 155 people worldwide. Conventional farming gets more and more crop per square foot of cultivated land—over 170 bushels of corn per acre in Iowa, for 20 example—which can mean less territory needs to be converted from wilderness to farmland. And since a third of the planet is already used for agriculture—destroying forests and other wild habitats along the way—anything that could help us 25 produce more food on less land would seem to be good for the environment.

Of course, that’s not how most environmentalists regard their arugula [a leafy green]. They have embraced organic food as better for the planet—and 30 healthier and tastier, too—than the stuff produced by agricultural corporations. Environmentalists disdain the enormous amounts of energy needed and waste created by conventional farming, while organic practices—forgoing artificial fertilizers and chemical 35 pesticides—are considered far more sustainable. Sales of organic food rose 7.7% in 2010, up to \$26.7 billion—and people are making those purchases for their consciences as much as their taste buds.

Yet a new meta-analysis in *Nature* does the math 40 and comes to a hard conclusion: organic farming yields 25% fewer crops on average than conventional agriculture. More land is therefore needed to produce fewer crops—and that means organic farming may not be as good for the planet as 45 we think.



In the *Nature* analysis, scientists from McGill University in Montreal and the University of Minnesota performed an analysis of 66 studies comparing conventional and organic methods across 50 34 different crop species, from fruits to grains to legumes. They found that organic farming delivered a lower yield for every crop type, though the disparity varied widely. For rain-watered legume crops like beans or perennial crops like fruit trees, organic 55 trailed conventional agriculture by just 5%. Yet for major cereal crops like corn or wheat, as well as most vegetables—all of which provide the bulk of the world’s calories—conventional agriculture outperformed organics by more than 25%.

60 The main difference is nitrogen, the chemical key to plant growth. Conventional agriculture makes use of 171 million metric tons of synthetic fertilizer each year, and all that nitrogen enables much faster plant growth than the slower release of nitrogen from the 65 compost or cover crops used in organic farming. When we talk about a Green Revolution, we really mean a nitrogen revolution—along with a lot of water.

But not all the nitrogen used in conventional 70 fertilizer ends up in crops—much of it ends up running off the soil and into the oceans, creating vast polluted dead zones. We’re already putting more nitrogen into the soil than the planet can stand over the long term. And conventional agriculture also 75 depends heavily on chemical pesticides, which can have unintended side effects.

What that means is that while conventional agriculture is more efficient—sometimes much more efficient—than organic farming, there are trade-offs 80 with each. So an ideal global agriculture system, in the views of the study’s authors, may borrow the best from both systems, as Jonathan Foley of the University of Minnesota explained:

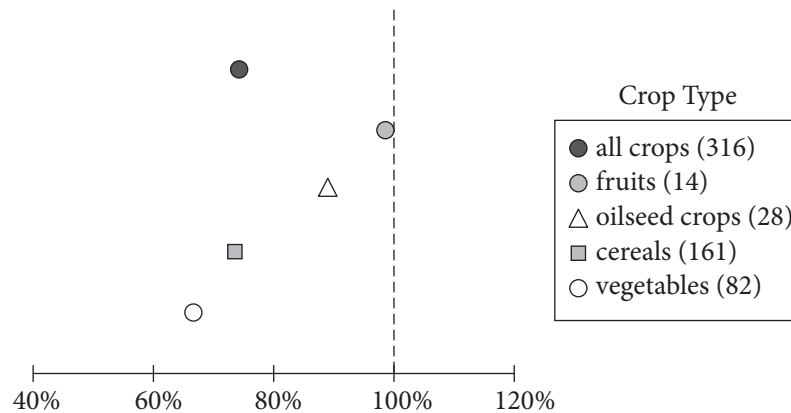
85 The bottom line? Today’s organic farming practices are probably best deployed in fruit and vegetable farms, where growing nutrition (not just bulk calories) is the primary goal. But for delivering sheer calories, especially in our staple crops of wheat, rice, maize, soybeans and so on, 90 conventional farms have the advantage right now.

Looking forward, I think we will need to deploy 95 different kinds of practices (especially new, mixed approaches that take the best of organic and conventional farming systems) where they are best suited—geographically, economically, socially, etc.



**Figure 1**

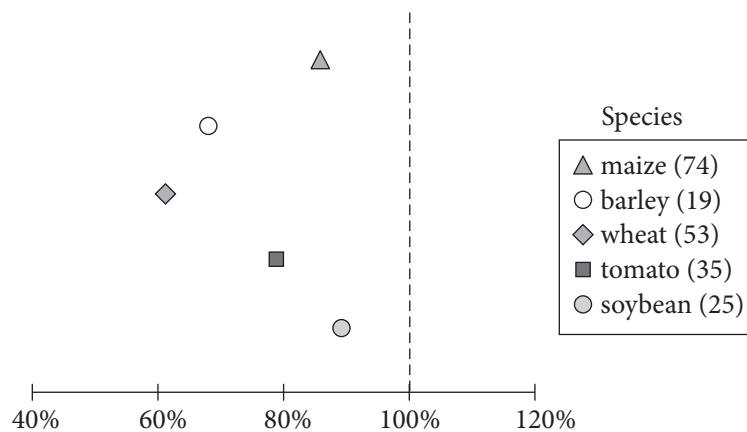
Organic Yield as a Percentage of Conventional Yield, by Crop Type



At 100%, the organic yield is the same as the conventional yield. The number of observations for each crop type is shown in parentheses.

**Figure 2**

Organic Yield as a Percentage of Conventional Yield, by Species



At 100%, the organic yield is the same as the conventional yield. The number of observations for each species is shown in parentheses.

Figures adapted from Verena Seufert, Navin Ramankutty, and Jonathan A. Foley, "Comparing the Yields of Organic and Conventional Agriculture." ©2012 by Nature Publishing Group.

22

As used in line 14, “simple” most nearly means

- A) straightforward.
- B) modest.
- C) unadorned.
- D) easy.

23

According to the passage, a significant attribute of conventional agriculture is its ability to

- A) produce a wide variety of fruits and vegetables.
- B) maximize the output of cultivated land.
- C) satisfy the dietary needs of the world’s population.
- D) lessen the necessity of nitrogen in plant growth.

24

Which choice best reflects the perspective of the “environmentalists” (line 27) on conventional agriculture?

- A) It produces inferior fruits and vegetables and is detrimental to the environment.
- B) It is energy efficient and reduces the need to convert wilderness to farmland.
- C) It is good for the environment only in the short run.
- D) It depletes critical resources but protects wildlife habitats.

25

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 27-28 (“Of course . . . green”)
- B) Lines 28-31 (“They . . . corporations”)
- C) Lines 31-35 (“Environmentalists . . . sustainable”)
- D) Lines 42-45 (“More . . . think”)

26

Which statement best expresses a relationship between organic farming and conventional farming that is presented in the passage?

- A) Both are equally sustainable, but they differ dramatically in the amount of land they require to produce equivalent yields.
- B) Both rely on artificial chemicals for pest control, but organic farmers use the chemicals sparingly in conjunction with natural remedies.
- C) Both use nitrogen to encourage plant growth, but the nitrogen used in conventional farming comes from synthetic sources.
- D) Both create a substantial amount of nitrogen runoff, but only the type of nitrogen found in fertilizers used in conventional farming can be dangerous.

27

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 13-14 (“Conventional . . . basis”)
- B) Lines 22-26 (“And since . . . environment”)
- C) Lines 51-53 (“They . . . widely”)
- D) Lines 61-65 (“Conventional . . . farming”)

28

According to Foley, an “ideal global agriculture system” (line 80)

- A) focuses primarily on yield percentages and global markets.
- B) considers multiple factors in the selection of farming techniques.
- C) weighs the economic interests of farmers against the needs of consumers.
- D) puts the nutritional value of produce first and foremost.

29

In line 88, “sheer” most nearly means

- A) transparent.
- B) abrupt.
- C) steep.
- D) pure.

30

Which statement is best supported by the information provided in figure 1?

- A) The organic yield as a percentage of conventional yield is greater for vegetables than for fruits.
- B) The organic yield as a percentage of conventional yield is similar for cereals and all crops.
- C) The reported number of observations for each crop type exceeds 82.
- D) The organic yield as a percentage of conventional yield is greater for vegetable crops than it is for oilseed crops.

31

Which of the following claims is supported by figure 2?

- A) Of the organically grown species represented, soybeans have the lowest yield.
- B) The organically grown maize and barley represented are comparable in their yields to conventionally grown maize and barley.
- C) Of the organically grown species represented, tomatoes have the highest yield.
- D) The organically grown species represented have lower yields than their conventionally grown counterparts do.

**Questions 32-41 are based on the following passage and supplementary material.**

This passage is adapted from John Bohannon, “Why You Shouldn’t Trust Internet Comments.” ©2013 by American Association for the Advancement of Science.

The “wisdom of crowds” has become a mantra of the Internet age. Need to choose a new vacuum cleaner? Check out the reviews on online merchant  
 Line Amazon. But a new study suggests that such online  
 5 scores don’t always reveal the best choice. A massive controlled experiment of Web users finds that such ratings are highly susceptible to irrational “herd behavior”—and that the herd can be manipulated.

Sometimes the crowd really is wiser than you. The  
 10 classic examples are guessing the weight of a bull or the number of gumballs in a jar. Your guess is probably going to be far from the mark, whereas the average of many people’s choices is remarkably close to the true number.

15 But what happens when the goal is to judge something less tangible, such as the quality or worth of a product? According to one theory, the wisdom of the crowd still holds—measuring the aggregate of people’s opinions produces a stable, reliable  
 20 value. Skeptics, however, argue that people’s opinions are easily swayed by those of others. So nudging a crowd early on by presenting contrary opinions—for example, exposing them to some very good or very bad attitudes—will steer the crowd in a  
 25 different direction. To test which hypothesis is true, you would need to manipulate huge numbers of people, exposing them to false information and determining how it affects their opinions.

A team led by Sinan Aral, a network scientist at  
 30 the Massachusetts Institute of Technology in Cambridge, did exactly that. Aral has been secretly working with a popular website that aggregates news stories. The website allows users to make comments about news stories and vote each other’s comments  
 35 up or down. The vote tallies are visible as a number next to each comment, and the position of the comments is chronological. (Stories on the site get an average of about ten comments and about three votes per comment.) It’s a follow-up to his experiment  
 40 using people’s ratings of movies to measure how much individual people influence each other online (answer: a lot). This time, he wanted to know how much the crowd influences the individual, and whether it can be controlled from outside.

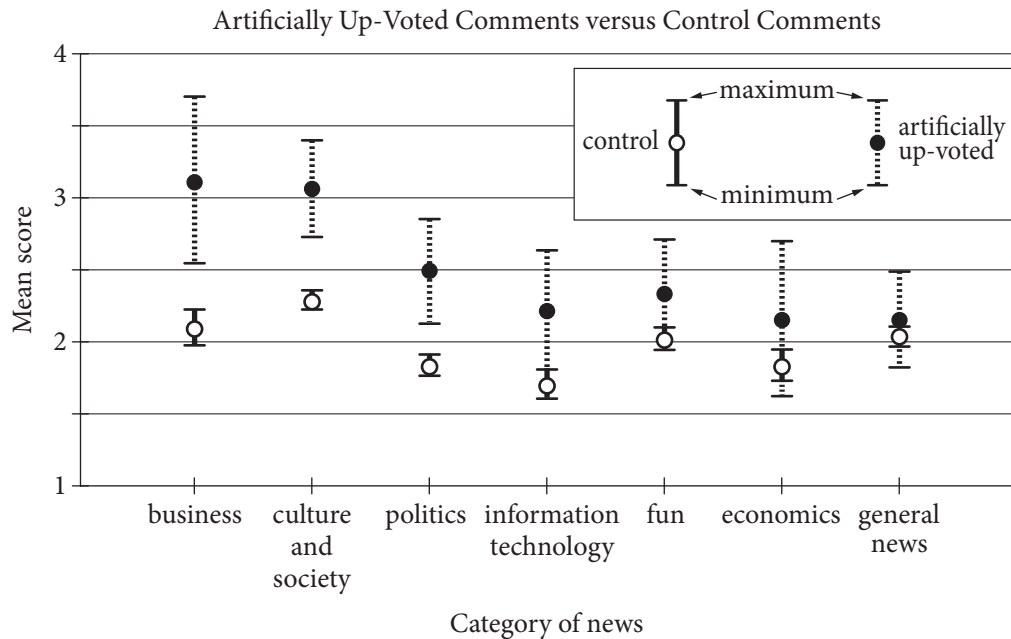
45 For five months, every comment submitted by a user randomly received an “up” vote (positive); a “down” vote (negative); or as a control, no vote at all. The team then observed how users rated those comments. The users generated more than  
 50 100,000 comments that were viewed more than 10 million times and rated more than 300,000 times by other users.

At least when it comes to comments on news sites, the crowd is more herdlike than wise.  
 55 Comments that received fake positive votes from the researchers were 32% more likely to receive more positive votes compared with a control, the team reports. And those comments were no more likely than the control to be down-voted by the next viewer  
 60 to see them. By the end of the study, positively manipulated comments got an overall boost of about 25%. However, the same did not hold true for negative manipulation. The ratings of comments that got a fake down vote were usually negated by an up  
 65 vote by the next user to see them.

“Our experiment does not reveal the psychology behind people’s decisions,” Aral says, “but an intuitive explanation is that people are more skeptical of negative social influence. They’re more  
 70 willing to go along with positive opinions from other people.”

Duncan Watts, a network scientist at Microsoft Research in New York City, agrees with that conclusion. “[But] one question is whether the  
 75 positive [herding] bias is specific to this site” or true in general, Watts says. He points out that the category of the news items in the experiment had a strong effect on how much people could be manipulated. “I would have thought that ‘business’ is  
 80 pretty similar to ‘economics,’ yet they find a much stronger effect (almost 50% stronger) for the former than the latter. What explains this difference? If we’re going to apply these findings in the real world, we’ll need to know the answers.”

85 Will companies be able to boost their products by manipulating online ratings on a massive scale? “That is easier said than done,” Watts says. If people detect—or learn—that comments on a website are being manipulated, the herd may spook and leave  
 90 entirely.



Mean score: mean of scores for the comments in each category, with the score for each comment being determined by the number of positive votes from website users minus the number of negative votes

Adapted from Lev Muchnik, Sinan Aral, and Sean J. Taylor, "Social Influence Bias: A Randomized Experiment." ©2013 by American Association for the Advancement of Science.

32

Over the course of the passage, the main focus shifts from a discussion of an experiment and its results to

- A) an explanation of the practical applications of the results.
- B) a consideration of the questions prompted by the results.
- C) an analysis of the defects undermining the results.
- D) a conversation with a scientist who disputes the results.

33

The author of the passage suggests that crowds may be more effective at

- A) creating controversy than examining an issue in depth.
- B) reinforcing members' ideas than challenging those ideas.
- C) arriving at accurate quantitative answers than producing valid qualitative judgments.
- D) ranking others' opinions than developing genuinely original positions.

34

Which choice provides the best evidence for the answer to the previous question?

- A) Line 9 (“Sometimes . . . you”)
- B) Lines 11-14 (“Your . . . number”)
- C) Lines 17-20 (“According . . . value”)
- D) Lines 25-28 (“To test . . . opinions”)

35

Which choice best supports the view of the “skeptics” (line 20)?

- A) Lines 55-58 (“Comments . . . reports”)
- B) Lines 58-60 (“And . . . them”)
- C) Lines 63-65 (“The ratings . . . them”)
- D) Lines 76-79 (“He . . . manipulated”)

36

Which action would best address a question Watts raises about the study?

- A) Providing fewer fake positive comments
- B) Using multiple websites to collect ratings
- C) Requiring users to register on the website before voting
- D) Informing users that voting data are being analyzed

37

As used in line 85, “boost” most nearly means

- A) increase.
- B) accelerate.
- C) promote.
- D) protect.

38

As used in line 86, “scale” most nearly means

- A) level.
- B) wage.
- C) interval.
- D) scheme.

39

In the figure, which category of news has an artificially up-voted mean score of 2.5?

- A) Business
- B) Politics
- C) Fun
- D) General news

40

According to the figure, which category of news showed the smallest difference in mean score between artificially up-voted comments and control comments?

- A) Culture and society
- B) Information technology
- C) Fun
- D) General news

41

Data presented in the figure most directly support which idea from the passage?

- A) The mean score of artificially down-voted comments is similar to that of the control.
- B) The patterns observed in the experiment suggest that people are suspicious of negative social influence.
- C) The positive bias observed in users of the news site may not apply to human behavior in other contexts.
- D) The type of story being commented on has an impact on the degree to which people can be influenced.



**Questions 42-52 are based on the following passage.**

This passage is adapted from Joshua Foer, *Moonwalking with Einstein: The Art and Science of Remembering Everything*. ©2011 by Joshua Foer.

In 2000, a neuroscientist at University College London named Eleanor Maguire wanted to find out what effect, if any, all that driving around the labyrinthine streets of London might have on  
 5 cabbies' brains. When she brought sixteen taxi drivers into her lab and examined their brains in an MRI scanner, she found one surprising and important difference. The right posterior hippocampus, a part of the brain known to be  
 10 involved in spatial navigation, was 7 percent larger than normal in the cabbies—a small but very significant difference. Maguire concluded that all of that way-finding around London had physically altered the gross structure of their brains. The more  
 15 years a cabbie had been on the road, the more pronounced the effect.

The brain is a mutable organ, capable—within limits—of reorganizing itself and readapting to new kinds of sensory input, a phenomenon known as  
 20 neuroplasticity. It had long been thought that the adult brain was incapable of spawning new neurons—that while learning caused synapses to rearrange themselves and new links between brain cells to form, the brain's basic anatomical structure  
 25 was more or less static. Maguire's study suggested the old inherited wisdom was simply not true.

After her groundbreaking study of London cabbies, Maguire decided to turn her attention to mental athletes. She teamed up with Elizabeth  
 30 Valentine and John Wilding, authors of the academic monograph *Superior Memory*, to study ten individuals who had finished near the top of the World Memory Championship. They wanted to find out if the memorizers' brains were—like the London  
 35 cabbies'—structurally different from the rest of ours, or if they were somehow just making better use of memory abilities that we all possess.

The researchers put both the mental athletes and a group of matched control subjects into MRI scanners  
 40 and asked them to memorize three-digit numbers, black-and-white photographs of people's faces, and magnified images of snowflakes, while their brains were being scanned. Maguire and her team thought it was possible that they might discover anatomical  
 45 differences in the brains of the memory champs,

evidence that their brains had somehow reorganized themselves in the process of doing all that intensive remembering. But when the researchers reviewed the imaging data, not a single significant structural  
 50 difference turned up. The brains of the mental athletes appeared to be indistinguishable from those of the control subjects. What's more, on every single test of general cognitive ability, the mental athletes' scores came back well within the normal range. The  
 55 memory champs weren't smarter, and they didn't have special brains.

But there was one telling difference between the brains of the mental athletes and the control subjects: When the researchers looked at which parts of the  
 60 brain were lighting up when the mental athletes were memorizing, they found that they were activating entirely different circuitry. According to the functional MRIs [fMRIs], regions of the brain that were less active in the control subjects seemed to be  
 65 working in overdrive for the mental athletes.

Surprisingly, when the mental athletes were learning new information, they were engaging several regions of the brain known to be involved in  
 70 two specific tasks: visual memory and spatial navigation, including the same right posterior hippocampal region that the London cabbies had enlarged with all their daily way-finding. At first glance, this wouldn't seem to make any sense. Why would mental athletes be conjuring images in  
 75 their mind's eye when they were trying to learn three-digit numbers? Why should they be navigating like London cabbies when they're supposed to be remembering the shapes of snowflakes?

Maguire and her team asked the mental athletes  
 80 to describe exactly what was going through their minds as they memorized. The mental athletes said they were consciously converting the information they were being asked to memorize into images, and distributing those images along familiar spatial  
 85 journeys. They weren't doing this automatically, or because it was an inborn talent they'd nurtured since childhood. Rather, the unexpected patterns of neural activity that Maguire's fMRIs turned up were the result of training and practice.

42

According to the passage, Maguire’s findings regarding taxi drivers are significant because they

- A) demonstrate the validity of a new method.
- B) provide evidence for a popular viewpoint.
- C) call into question an earlier consensus.
- D) challenge the authenticity of previous data.

43

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 8-12 (“The right . . . difference”)
- B) Lines 12-16 (“Maguire . . . effect”)
- C) Lines 17-20 (“The brain . . . neuroplasticity”)
- D) Lines 20-26 (“It had . . . true”)

44

As used in line 24, “basic” most nearly means

- A) initial.
- B) simple.
- C) necessary.
- D) fundamental.

45

Which question was Maguire’s study of mental athletes primarily intended to answer?

- A) Does the act of memorization make use of different brain structures than does the act of navigation?
- B) Do mental athletes inherit their unusual brain structures, or do the structures develop as a result of specific activities?
- C) Does heightened memorization ability reflect abnormal brain structure or an unusual use of normal brain structure?
- D) What is the relationship between general cognitive ability and the unusual brain structures of mental athletes?

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 27-29 (“After . . . athletes”)
- B) Lines 33-37 (“They . . . possess”)
- C) Lines 38-43 (“The researchers . . . scanned”)
- D) Lines 52-54 (“What’s . . . range”)

47

As used in line 39, “matched” most nearly means

- A) comparable.
- B) identical.
- C) distinguishable.
- D) competing.

48

The main purpose of the fifth paragraph (lines 57-65) is to

- A) relate Maguire’s study of mental athletes to her study of taxi drivers.
- B) speculate on the reason for Maguire’s unexpected results.
- C) identify an important finding of Maguire’s study of mental athletes.
- D) transition from a summary of Maguire’s findings to a description of her methods.

49

According to the passage, when compared to mental athletes, the individuals in the control group in Maguire’s second study

- A) showed less brain activity overall.
- B) demonstrated a wider range of cognitive ability.
- C) exhibited different patterns of brain activity.
- D) displayed noticeably smaller hippocampal regions.

50

The passage most strongly suggests that mental athletes are successful at memorization because they

- A) exploit parts of the brain not normally used in routine memorization.
- B) convert information they are trying to memorize into abstract symbols.
- C) organize information into numerical lists prior to memorization.
- D) exercise their brains regularly through puzzles and other mental challenges.

51

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 66-72 (“Surprisingly . . . way-finding”)
- B) Lines 72-73 (“At first . . . sense”)
- C) Lines 79-81 (“Maguire . . . memorized”)
- D) Lines 85-87 (“They . . . childhood”)

52

The questions in lines 74-78 primarily serve to

- A) raise doubts about the reliability of the conclusions reached by Maguire.
- B) emphasize and elaborate on an initially puzzling result of Maguire’s study of mental athletes.
- C) imply that Maguire’s findings undermine earlier studies of the same phenomenon.
- D) introduce and explain a connection between Maguire’s two studies and her earlier work.

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a “NO CHANGE” option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### Prehistoric Printing

Paleontologists are using modern technology to gain a greater understanding of the distant past. With the aid of computed tomography (CT) scanning and 3-D printing, researchers are able to create accurate models of prehistoric fossils. **1** These models have expanded

1

At this point, the writer is considering adding the following sentence.

Fossils provide paleontologists with a convenient way of estimating the age of the rock in which the fossils are found.

Should the writer make this addition here?

- A) Yes, because it supports the paragraph’s argument with an important detail.
- B) Yes, because it provides a logical transition from the preceding sentence.
- C) No, because it is not directly related to the main point of the paragraph.
- D) No, because it undermines the main claim of the paragraph.

researchers' knowledge of ancient species and **2** swear to advance the field of paleontology in the years to come.

CT scanners use X-rays to map the surface of a fossil in minute detail, recording as many as one million data points to create a digital blueprint. A 3-D printer then builds a polymer model based on this blueprint, much as a regular computer printer reproduces digital documents on paper. **3** Whereas the head of an ordinary computer printer moves back and forth while printing ink onto paper, the corresponding part of a 3-D printer moves in multiple dimensions while squirting out thin layers of melted polymer plastic. The plastic hardens quickly, **4** it allows the printer to build the layers of the final model. Compared with older ways of modeling fossils, scanning and printing in this way is extremely versatile.

2

- A) NO CHANGE
- B) subscribe
- C) vow
- D) promise

3

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it helps explain why X-rays are used in CT scanners.
- B) Kept, because it provides details to illustrate how a 3-D printer works.
- C) Deleted, because it contradicts the passage's information about digital blueprints.
- D) Deleted, because it creates confusion about how researchers gather data.

4

- A) NO CHANGE
- B) this
- C) which
- D) that

[1] One significant benefit of 3-D printing technology is its ability to create scale reproductions of fossils. [2] But now 3-D scale models can be rearranged with ease, which is a huge boon to scientists. [3] A team led by Drexel University professor Kenneth Lacovara is making models of dinosaur bones one-tenth the bones' original sizes **5** in order to learn how they fit together when the animals were alive. [4] In the past, such research was limited by the weight and bulk of the fossils as well as **6** its preciousness and fragility. [5] In many cases, scientists had to rearrange bones virtually, using artists' renderings. **7**

Because CT scanners can map objects that are impossible to excavate, CT scanning and 3-D printing can also be used to reproduce fossils that scientists cannot observe firsthand. **8** By contrast, researchers

5

- A) NO CHANGE
- B) in order for learning
- C) so that one is learning
- D) so to learn

6

- A) NO CHANGE
- B) it's
- C) their
- D) there

7

To make this paragraph most logical, sentence 2 should be placed

- A) where it is now.
- B) before sentence 1.
- C) after sentence 4.
- D) after sentence 5.

8

- A) NO CHANGE
- B) Nonetheless,
- C) Besides,
- D) For example,

from the National Museum of Brazil **9** has relied on this technique to study a fossilized skeleton that was discovered protruding from a rock at an old São Paulo railroad site. **10** The fossil was too delicate to be removed from the rock. Because of the fossil's delicate nature, the team dug up a block of stone around the fossil and brought it to their lab. With the aid of a CT scanner and a 3-D printer, they were able to produce a resin model of the fossil. Examining the model, the researchers determined that **11** one had found a new species, a 75-million-year-old crocodile. While not every discovery will be as dramatic as this one, paleontologists anticipate further expanding their knowledge of ancient life-forms as CT scanning and 3-D printing continue to make fossils more accessible.

9

- A) NO CHANGE
- B) relied
- C) will rely
- D) is relying

10

Which choice most effectively combines the underlined sentences?

- A) The fossil could not be removed from the rock on account of it being too delicate; moreover, the team dug up a block of stone around it and brought it to their lab.
- B) The team thought the fossil was too delicate to remove from the rock, and their next decision was to dig up a block of stone around the fossil and bring it to their lab.
- C) The fossil was too delicate to be removed from the rock, so the team dug up a block of stone around the fossil and brought it to their lab.
- D) In removing the fossil from the rock, the team found it was too delicate; then they dug up a block of stone around the fossil and brought it to their lab.

11

- A) NO CHANGE
- B) he or she
- C) they
- D) it



Questions 12-22 are based on the following passage.

### Thomas Nast, the Crusading Cartoonist

“Stop them pictures!” Legend has it that the corrupt politician William “Boss” Tweed once used those words when ordering someone to offer a bribe to Thomas Nast, an artist who had become famous for cartoons that called for reforms to end corruption. **12** As a result, Tweed’s attempt to silence the artist failed, and Nast’s cartoons, published in magazines like *Harper’s Weekly*, actually played a key role in bringing Boss Tweed and his cronies to justice.

**13** There were powerful political organizations in the 1860s and the 1870s. The organizations were known as “political machines” and started taking control of city governments. These political machines were able to pack legislatures and courts with hand-picked supporters by purchasing **14** votes, a form of election fraud involving the exchange of money or favors for votes. Once a political machine had control of enough important positions, its members were able to use public funds to enrich themselves and their friends. Boss Tweed’s Tammany Hall group, which controlled New York

**15** City in the 1860s—stole more than \$30 million,

**12**

- A) NO CHANGE
- B) Therefore,
- C) Furthermore,
- D) DELETE the underlined portion.

**13**

Which choice most effectively combines the underlined sentences?

- A) Powerful political organizations in the 1860s and the 1870s started taking control of city governments, and they were known as “political machines.”
- B) Known as “political machines,” in the 1860s and the 1870s, political organizations that were powerful started taking control of city governments.
- C) City governments were taken control of in the 1860s and the 1870s, and powerful political organizations known as “political machines” did so.
- D) In the 1860s and the 1870s, powerful political organizations known as “political machines” started taking control of city governments.

**14**

- A) NO CHANGE
- B) votes, being
- C) votes, that is
- D) votes, which it is

**15**

- A) NO CHANGE
- B) City in the 1860s,
- C) City, in the 1860s,
- D) City in the 1860s

the equivalent of more than \$365 million today.

**16** Tweed had been elected to a single two-year term in Congress in 1852. Tammany Hall was so powerful and

**17** corrupt that, the *New York Times*, commented “There is absolutely nothing . . . in the city which is beyond the reach of the insatiable gang.”

Given the extent of Tweed’s power, it is remarkable that a single cartoonist could have played such a significant role in bringing about his downfall. Nast’s cartoons depicted Tweed as a great big bloated thief. One of the artist’s most **18** famous images showed Tweed with a bag of money in place of his **19** head. Another featured Tweed leaning against a ballot box with the caption “As long as I count the votes, what are you going to do about it?” These cartoons were so effective in part because many of the citizens who supported Tweed were illiterate and thus could not read the newspaper accounts of his criminal activities. Nast’s cartoons, though, widely exposed the public to the injustice of Tweed’s political machine.

16

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it introduces the quote from the *New York Times* in the next sentence.
- B) Kept, because it adds a vital detail about Tweed that is necessary to understand his power.
- C) Deleted, because it blurs the focus of the paragraph by introducing loosely related information.
- D) Deleted, because it contains information that undermines the main claim of the passage.

17

- A) NO CHANGE
- B) corrupt, that the *New York Times* commented,
- C) corrupt that the *New York Times* commented,
- D) corrupt that the *New York Times*, commented

18

- A) NO CHANGE
- B) famous and well-known
- C) famous and commonly known
- D) famous, commonly known

19

Which choice adds the most relevant supporting information to the paragraph?

- A) head; like many other Nast cartoons, that one was published in *Harper’s Weekly*.
- B) head; Nast would later illustrate Tweed’s escape from prison.
- C) head, one depiction that omits Tweed’s signature hat.
- D) head, an image that perfectly captured Tweed’s greedy nature.

Nast's campaign to bring down Tweed and the Tammany Hall gang was ultimately successful. In the elections of 1871, the public voted against most of the Tammany Hall candidates, greatly weakening Tweed's power. Eventually, Tweed and his gang were **20** persecuted for a number of charges, including fraud and larceny, and many of them were sent to jail. In 1875 Tweed escaped from jail and fled to Spain and unwittingly **21** brought about one final **22** pinnacle for the power of political cartoons: A Spanish police officer recognized Tweed from one of Nast's cartoons. Consequently, Tweed was sent back to jail, and Nast was hailed as the man who toppled the great Tammany Hall machine.

20

- A) NO CHANGE
- B) persecuted on
- C) persecuted with
- D) prosecuted on

21

- A) NO CHANGE
- B) bringing
- C) brings
- D) has brought

22

- A) NO CHANGE
- B) triumph
- C) culmination
- D) apex

Questions 23-33 are based on the following passage and supplementary material.

### Rethinking Crowdfunding in the Arts

Crowdfunding is a popular way to raise money using the Internet. The process sounds simple: an artist, entrepreneur, or other innovator takes his or her ideas straight to the public via a crowdfunding website. The innovator creates a video about the project and offers, in exchange for donations, a series of “perks,” from acknowledgment on a social media site to a small piece of art. Many crowdfunding programs are all-or-nothing; in other words, the innovator must garner 100 percent funding for the project or the money is refunded to the donors. At **23** it’s best, the system can give creators direct access to millions of potential backers.

The home page of one leading crowdfunding site features a project to manufacture pinhole cameras on a 3-D printer. **24** The idea is obviously very attractive. An obscure method of photography may be made available to many with little expense. Within weeks, the project was 621 percent funded. In contrast, on the same page, a small Brooklyn performance venue is attempting to raise money for its current season. The venue features works of performance art showcased in a storefront window. Those who have seen the space consider it vital.

**25** However, that group may not be large enough; with just fourteen days to go in the fund-raising period, the campaign is only 46 percent funded.

23

- A) NO CHANGE
- B) its
- C) its’
- D) their

24

Which choice most effectively combines the underlined sentences?

- A) With the idea being obviously very attractive, an obscure method of photography may be made available to many at little expense.
- B) The idea is obviously very attractive: an obscure method of photography may be made available to many at little expense.
- C) An obscure method of photography may be made available to many at little expense, and the idea is obviously very attractive.
- D) An obscure method of photography, an idea that is obviously very attractive, may be made available to many at little expense.

25

- A) NO CHANGE
- B) Therefore,
- C) In effect,
- D) As a rule,

Artists such as these Brooklyn performers find that crowdfunding exacerbates problems that already exist.

**26** Work, that is easily understood and appreciated, is supported, while more complex work goes unnoticed.

**27** Time that could be used creating art is spent devising clever perks to draw the attention of potential contributors.

**28** In addition, audiences may contain many “free **29** riders,” they did not make contributions.

26

- A) NO CHANGE
- B) Work that is easily understood and appreciated is supported,
- C) Work that is easily understood, and appreciated is supported
- D) Work—that is easily understood and appreciated—is supported,

27

At this point, the writer is considering adding the following sentence.

Crowdfunding tends to attract contributors from a wide variety of professional fields.

Should the writer make this addition here?

- A) Yes, because it gives more information about the people who donate to crowdfunding campaigns.
- B) Yes, because it reinforces the writer’s point about the funding of artistic projects.
- C) No, because it fails to take into account project funding received from public institutions.
- D) No, because it blurs the focus of the paragraph by introducing a poorly integrated piece of information.

28

- A) NO CHANGE
- B) Conversely,
- C) However,
- D) Thus,

29

- A) NO CHANGE
- B) riders,” not making
- C) riders,” who did not make
- D) riders” to not make

Ironically, the success of crowdfunding may weaken overall funding for the arts if people begin to feel that paying for the art **30** loved by them is someone else's responsibility.

[1] One innovative playwright has woven the deficiencies of the system into her crowdfunding model. [2] Though the price for her tickets was higher than that of tickets for comparable shows, it was still affordable to most theatergoers—and reflected the real cost of the performance. [3] She presented the total cost for producing her play on a crowdfunding site. [4] Then she divided the total cost by the number of people she expected to attend the performance. [5] The result of the calculation was the minimum donor price, and only donors who paid at least the minimum ticket price were allowed to attend the performance. [6] By subverting the presumption that money used for her project is an altruistic donation, the playwright showed that **31** our work has monetary value to those who enjoy it. **32**

30

- A) NO CHANGE
- B) they love
- C) loved by him or her
- D) he or she loves

31

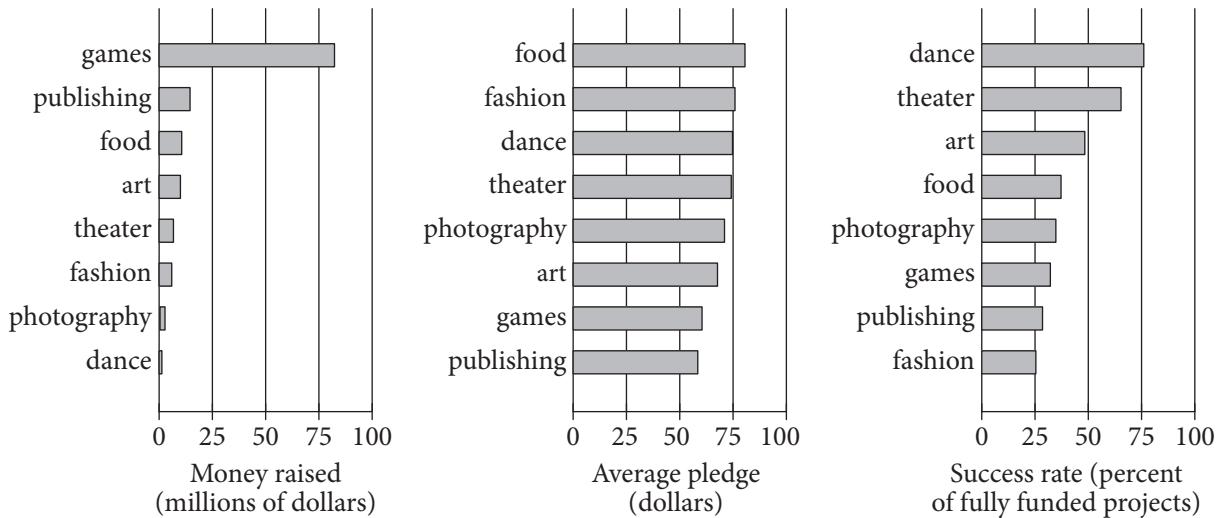
- A) NO CHANGE
- B) their
- C) her
- D) its

32

To make this paragraph most logical, sentence 2 should be placed

- A) where it is now.
- B) after sentence 3.
- C) after sentence 4.
- D) after sentence 5.

Crowdfunded Projects on Kickstarter in 2012



Adapted from "These Were the Most Successful Projects on Kickstarter Last Year." ©2013 by The Economist Newspaper Limited.

Question 33 asks about the graphic.

33

Which choice offers an accurate interpretation of the data in the graphs?

- A) The project category with the lowest amount of money raised was also the most successfully funded project category.
- B) The project category with the highest average pledge amount was also the most successfully funded project category.
- C) The project category with the lowest average pledge amount was also the project category that raised the most money.
- D) The project category with the highest average pledge amount was also the project category with the most money raised.

Questions 34-44 are based on the following passage.

### Investigative Journalism: An Evolving American Tradition

[1] The recent precipitous decline of print journalism as a viable profession has exacerbated long-held concerns about the state of investigative reporting in the United States. [2] Facing lower print circulation and diminished advertising revenue, many major newspapers have reduced or eliminated investigative resources. [3] Newspapers, the traditional nurturing ground for investigative journalism, have been hit especially hard by the widespread availability of free news online. [4] To survive, investigative journalism must continue to adapt to the digital age. **34**

It is not difficult to understand why a cash-strapped, understaffed publication might feel pressure to cut teams of investigative **35** reporter's—their work is expensive and time-consuming. **36** Taking on the public interest, investigative journalism involves original, often long-form reporting on such topics as **37** illegal activities, street crime, corporate wrongdoing, and political corruption. An investigative story involves one or more experienced journalists dedicating their full energy and the resources of the publisher to a piece for a prolonged period of time. Expensive legal battles may ensue. The results of this work, though costly, have

34

For the sake of the logic and cohesion of the paragraph, sentence 3 should be

- A) placed where it is now.
- B) placed before sentence 1.
- C) placed after sentence 1.
- D) DELETED from the paragraph.

35

- A) NO CHANGE
- B) reporters:
- C) reporters,
- D) reporter's;

36

- A) NO CHANGE
- B) Undertaken in
- C) Overtaking
- D) Taking off from

37

- A) NO CHANGE
- B) business scandals,
- C) abuse of government power,
- D) DELETE the underlined portion.



helped keep those in power accountable. The exposure by *Washington Post* reporters Bob Woodward and Carl Bernstein of government misconduct in the Watergate scandal resulted in the resignation of President Richard Nixon in 1974. More recently, Seymour Hersh, reporting for the *New Yorker* in 2004, helped publicize the mistreatment of Iraqi prisoners by US personnel at Abu Ghraib during the Iraq War. **38** In these and other cases, exposure from reporters has served as an important **39** blockade to or scolding of malfeasance.

38

At this point, the writer is considering adding the following sentence.

In 1954, Edward R. Murrow and Fred Friendly produced episodes of the CBS television show *See It Now* that contributed to the end of US senator Joseph McCarthy’s anticommunist “witch hunts.”

Should the writer make this addition here?

- A) Yes, because it helps clarify that the passage’s main focus is on investigations of political corruption.
- B) Yes, because it offers an important counterpoint to the other cases previously described in the paragraph.
- C) No, because it gives an example that is both chronologically and substantively out of place in the paragraph.
- D) No, because it provides an example that is inconsistent with the passage’s definition of investigative journalism.

39

- A) NO CHANGE
- B) interference to or condemnation of
- C) drag on or reproof of
- D) deterrent or rebuke to

While worrisome, the decline of traditional print media **40** could not entail the end of investigative journalism. **41** Although many newsrooms have reduced their staff, some still employ investigative reporters. Nonprofit **42** enterprises such as the Organized Crime and Corruption Reporting Project have begun to fill the void created by staff losses at newspapers and magazines. Enterprising freelance reporters, newly funded by nonprofits, make extensive use of social media,

40

Which choice most effectively suggests that the “end of investigative journalism” is a real possibility but one that can be prevented?

- A) NO CHANGE
- B) need
- C) will
- D) must

41

Which choice most effectively sets up the examples in the following sentences?

- A) NO CHANGE
- B) Investigative journalism also declined between the 1930s and 1950s, only to be revived in the 1960s.
- C) According to the Pew Research Center, more people get their national and international news from the Internet than from newspapers.
- D) Indeed, recent years have witnessed innovative adjustments to changing times.

42

- A) NO CHANGE
- B) enterprises: such as
- C) enterprises such as:
- D) enterprises, such as

including blogs and Twitter, to foster a public conversation about key issues. The Help Me Investigate project, **43** for example, solicited readers to submit tips and information related to ongoing stories to its website. Far from marking the end of investigative journalism, **44** cooperation among journalists and ordinary citizens has been facilitated by the advent of the digital age through an increase in the number of potential investigators.

43

- A) NO CHANGE
- B) therefore,
- C) however,
- D) in any case,

44

- A) NO CHANGE
- B) the number of potential investigators has increased since the advent of the digital age owing to the facilitation of cooperation among journalists and ordinary citizens.
- C) the advent of the digital age has increased the number of potential investigators by facilitating cooperation among journalists and ordinary citizens.
- D) by facilitating cooperation among journalists and ordinary citizens the advent of the digital age has increased the number of potential investigators.

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

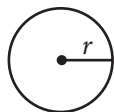
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

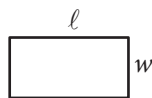
- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

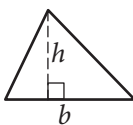


$$A = \pi r^2$$

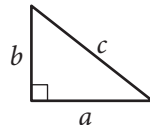
$$C = 2\pi r$$



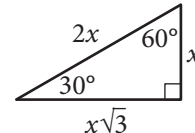
$$A = \ell w$$



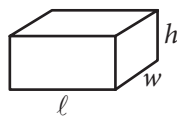
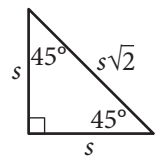
$$A = \frac{1}{2}bh$$



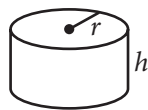
$$c^2 = a^2 + b^2$$



Special Right Triangles



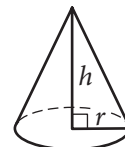
$$V = \ell wh$$



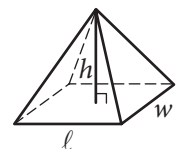
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

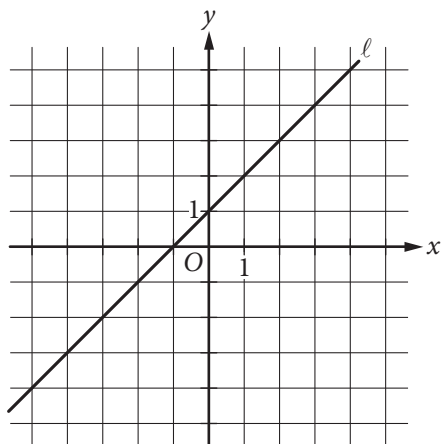
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



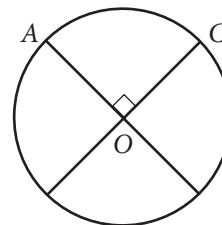
1



Which of the following is an equation of line  $l$  in the  $xy$ -plane above?

- A)  $x = 1$
- B)  $y = 1$
- C)  $y = x$
- D)  $y = x + 1$

2



The circle above with center  $O$  has a circumference of 36. What is the length of minor arc  $\widehat{AC}$  ?

- A) 9
- B) 12
- C) 18
- D) 36

3

What are the solutions of the quadratic equation  $4x^2 - 8x - 12 = 0$  ?

- A)  $x = -1$  and  $x = -3$
- B)  $x = -1$  and  $x = 3$
- C)  $x = 1$  and  $x = -3$
- D)  $x = 1$  and  $x = 3$



4

Which of the following is an example of a function whose graph in the  $xy$ -plane has no  $x$ -intercepts?

- A) A linear function whose rate of change is not zero
- B) A quadratic function with real zeros
- C) A quadratic function with no real zeros
- D) A cubic polynomial with at least one real zero

5

$$\sqrt{k+2} - x = 0$$

In the equation above,  $k$  is a constant. If  $x = 9$ , what is the value of  $k$  ?

- A) 1
- B) 7
- C) 16
- D) 79

6

Which of the following is equivalent to the sum of the expressions  $a^2 - 1$  and  $a + 1$  ?

- A)  $a^2 + a$
- B)  $a^3 - 1$
- C)  $2a^2$
- D)  $a^3$

7

Jackie has two summer jobs. She works as a tutor, which pays \$12 per hour, and she works as a lifeguard, which pays \$9.50 per hour. She can work no more than 20 hours per week, but she wants to earn at least \$220 per week. Which of the following systems of inequalities represents this situation in terms of  $x$  and  $y$ , where  $x$  is the number of hours she tutors and  $y$  is the number of hours she works as a lifeguard?

- A)  $12x + 9.5y \leq 220$   
 $x + y \geq 20$
- B)  $12x + 9.5y \leq 220$   
 $x + y \leq 20$
- C)  $12x + 9.5y \geq 220$   
 $x + y \leq 20$
- D)  $12x + 9.5y \geq 220$   
 $x + y \geq 20$



8

In air, the speed of sound  $S$ , in meters per second, is a linear function of the air temperature  $T$ , in degrees Celsius, and is given by  $S(T) = 0.6T + 331.4$ . Which of the following statements is the best interpretation of the number 331.4 in this context?

- A) The speed of sound, in meters per second, at  $0^\circ\text{C}$
- B) The speed of sound, in meters per second, at  $0.6^\circ\text{C}$
- C) The increase in the speed of sound, in meters per second, that corresponds to an increase of  $1^\circ\text{C}$
- D) The increase in the speed of sound, in meters per second, that corresponds to an increase of  $0.6^\circ\text{C}$

9

$$y = x^2$$
$$2y + 6 = 2(x + 3)$$

If  $(x, y)$  is a solution of the system of equations above and  $x > 0$ , what is the value of  $xy$  ?

- A) 1
- B) 2
- C) 3
- D) 9

10

If  $a^2 + b^2 = z$  and  $ab = y$ , which of the following is equivalent to  $4z + 8y$  ?

- A)  $(a + 2b)^2$
- B)  $(2a + 2b)^2$
- C)  $(4a + 4b)^2$
- D)  $(4a + 8b)^2$





11

The volume of right circular cylinder A is 22 cubic centimeters. What is the volume, in cubic centimeters, of a right circular cylinder with twice the radius and half the height of cylinder A?

- A) 11
- B) 22
- C) 44
- D) 66

12

Which of the following is equivalent to  $9^{\frac{3}{4}}$ ?

- A)  $\sqrt[3]{9}$
- B)  $\sqrt[4]{9}$
- C)  $\sqrt{3}$
- D)  $3\sqrt{3}$

13

At a restaurant,  $n$  cups of tea are made by adding  $t$  tea bags to hot water. If  $t = n + 2$ , how many additional tea bags are needed to make each additional cup of tea?

- A) None
- B) One
- C) Two
- D) Three

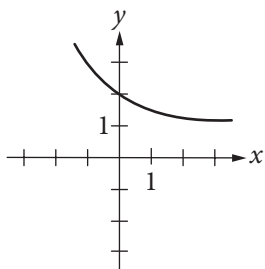


14

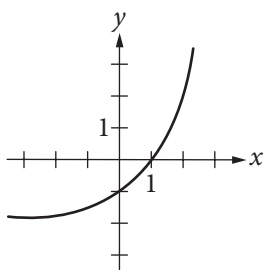
$$f(x) = 2^x + 1$$

The function  $f$  is defined by the equation above. Which of the following is the graph of  $y = -f(x)$  in the  $xy$ -plane?

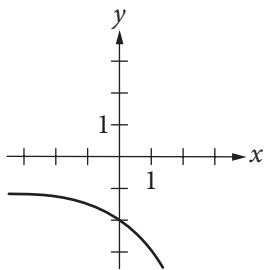
A)



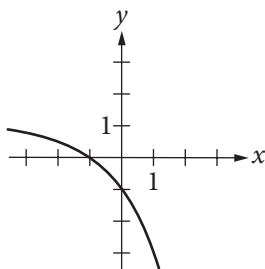
B)



C)



D)



15

Alan drives an average of 100 miles each week. His car can travel an average of 25 miles per gallon of gasoline. Alan would like to reduce his weekly expenditure on gasoline by \$5. Assuming gasoline costs \$4 per gallon, which equation can Alan use to determine how many fewer average miles,  $m$ , he should drive each week?

A)  $\frac{25}{4}m = 95$

B)  $\frac{25}{4}m = 5$

C)  $\frac{4}{25}m = 95$

D)  $\frac{4}{25}m = 5$



**DIRECTIONS**

For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
○	○	○	○

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

	7	/	1	2
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○
○	○	○	○	○

← Fraction line

Answer: 2.5

	2	.	5
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

.	6	6	6
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

.	6	6	7
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

Answer: 201 – either position is correct

	2	0	1
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

2	0	1	
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

Maria plans to rent a boat. The boat rental costs \$60 per hour, and she will also have to pay for a water safety course that costs \$10. Maria wants to spend no more than \$280 for the rental and the course. If the boat rental is available only for a whole number of hours, what is the maximum number of hours for which Maria can rent the boat?

17

$$2(p + 1) + 8(p - 1) = 5p$$

What value of  $p$  is the solution of the equation above?

18

$$\begin{aligned}\frac{1}{2}(2x + y) &= \frac{21}{2} \\ y &= 2x\end{aligned}$$

The system of equations above has solution  $(x, y)$ .  
What is the value of  $x$  ?



19

$$\frac{2x+6}{(x+2)^2} - \frac{2}{x+2}$$

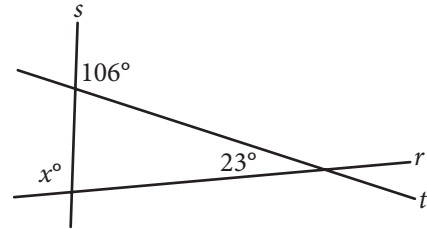
The expression above is equivalent to  $\frac{a}{(x+2)^2}$ ,

where  $a$  is a positive constant and  $x \neq -2$ .

What is the value of  $a$  ?

20

Intersecting lines  $r$ ,  $s$ , and  $t$  are shown below.



What is the value of  $x$  ?

# STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

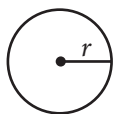
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

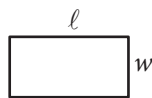
- The use of a calculator is permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

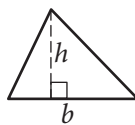


$$A = \pi r^2$$

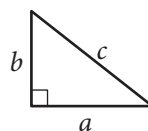
$$C = 2\pi r$$



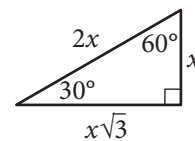
$$A = \ell w$$



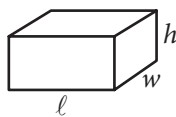
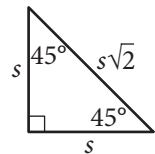
$$A = \frac{1}{2}bh$$



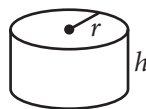
$$c^2 = a^2 + b^2$$



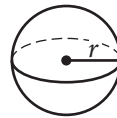
Special Right Triangles



$$V = \ell wh$$



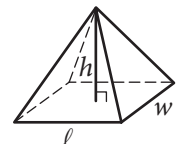
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

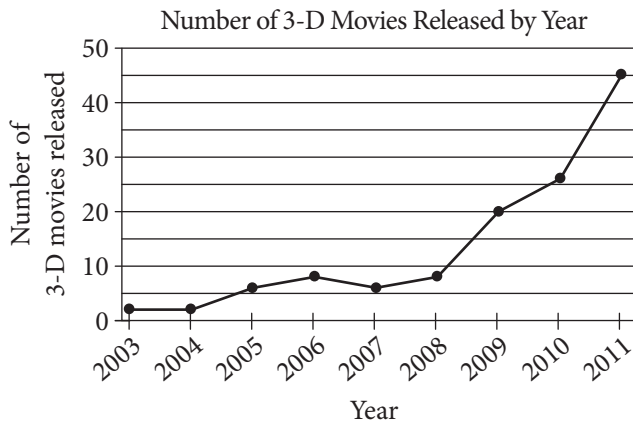
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1



According to the line graph above, between which two consecutive years was there the greatest change in the number of 3-D movies released?

- A) 2003–2004
- B) 2008–2009
- C) 2009–2010
- D) 2010–2011

2

$x$	$f(x)$
1	5
3	13
5	21

Some values of the linear function  $f$  are shown in the table above. Which of the following defines  $f$ ?

- A)  $f(x) = 2x + 3$
- B)  $f(x) = 3x + 2$
- C)  $f(x) = 4x + 1$
- D)  $f(x) = 5x$

3

To make a bakery's signature chocolate muffins, a baker needs 2.5 ounces of chocolate for each muffin. How many pounds of chocolate are needed to make 48 signature chocolate muffins?  
(1 pound = 16 ounces)

- A) 7.5
- B) 10
- C) 50.5
- D) 120





4

If  $3(c + d) = 5$ , what is the value of  $c + d$  ?

- A)  $\frac{3}{5}$
- B)  $\frac{5}{3}$
- C) 3
- D) 5

5

The weight of an object on Venus is approximately  $\frac{9}{10}$  of its weight on Earth. The weight of an object on Jupiter is approximately  $\frac{23}{10}$  of its weight on Earth. If an object weighs 100 pounds on Earth, approximately how many more pounds does it weigh on Jupiter than it weighs on Venus?

- A) 90
- B) 111
- C) 140
- D) 230

6

An online bookstore sells novels and magazines. Each novel sells for \$4, and each magazine sells for \$1. If Sadie purchased a total of 11 novels and magazines that have a combined selling price of \$20, how many novels did she purchase?

- A) 2
- B) 3
- C) 4
- D) 5



7

The Downtown Business Association (DBA) in a certain city plans to increase its membership by a total of  $n$  businesses per year. There were  $b$  businesses in the DBA at the beginning of this year. Which function best models the total number of businesses,  $y$ , the DBA plans to have as members  $x$  years from now?

- A)  $y = nx + b$
- B)  $y = nx - b$
- C)  $y = b(n)^x$
- D)  $y = n(b)^x$

8

Which of the following is an equivalent form of  $(1.5x - 2.4)^2 - (5.2x^2 - 6.4)$  ?

- A)  $-2.2x^2 + 1.6$
- B)  $-2.2x^2 + 11.2$
- C)  $-2.95x^2 - 7.2x + 12.16$
- D)  $-2.95x^2 - 7.2x + 0.64$

9

In the 1908 Olympic Games, the Olympic marathon was lengthened from 40 kilometers to approximately 42 kilometers. Of the following, which is closest to the increase in the distance of the Olympic marathon, in miles? (1 mile is approximately 1.6 kilometers.)

- A) 1.00
- B) 1.25
- C) 1.50
- D) 1.75



10

The density  $d$  of an object is found by dividing the mass  $m$  of the object by its volume  $V$ . Which of the following equations gives the mass  $m$  in terms of  $d$  and  $V$ ?

- A)  $m = dV$
- B)  $m = \frac{d}{V}$
- C)  $m = \frac{V}{d}$
- D)  $m = V + d$

11

$$-2x + 3y = 6$$

In the  $xy$ -plane, the graph of which of the following equations is perpendicular to the graph of the equation above?

- A)  $3x + 2y = 6$
- B)  $3x + 4y = 6$
- C)  $2x + 4y = 6$
- D)  $2x + 6y = 3$

12

$$\begin{aligned}\frac{1}{2}y &= 4 \\ x - \frac{1}{2}y &= 2\end{aligned}$$

The system of equations above has solution  $(x, y)$ . What is the value of  $x$ ?

- A) 3
- B)  $\frac{7}{2}$
- C) 4
- D) 6

13

$$\begin{aligned}y &\leq 3x + 1 \\ x - y &> 1\end{aligned}$$

Which of the following ordered pairs  $(x, y)$  satisfies the system of inequalities above?

- A)  $(-2, -1)$
- B)  $(-1, 3)$
- C)  $(1, 5)$
- D)  $(2, -1)$



14

Type of surgeon	Major professional activity		Total
	Teaching	Research	
General	258	156	414
Orthopedic	119	74	193
Total	377	230	607

In a survey, 607 general surgeons and orthopedic surgeons indicated their major professional activity. The results are summarized in the table above. If one of the surgeons is selected at random, which of the following is closest to the probability that the selected surgeon is an orthopedic surgeon whose indicated professional activity is research?

- A) 0.122
- B) 0.196
- C) 0.318
- D) 0.379



15

A polling agency recently surveyed 1,000 adults who were selected at random from a large city and asked each of the adults, “Are you satisfied with the quality of air in the city?” Of those surveyed, 78 percent responded that they were satisfied with the quality of air in the city. Based on the results of the survey, which of the following statements must be true?

- I. Of all adults in the city, 78 percent are satisfied with the quality of air in the city.
  - II. If another 1,000 adults selected at random from the city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.
  - III. If 1,000 adults selected at random from a different city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.
- A) None
  - B) II only
  - C) I and II only
  - D) I and III only

Questions 16-18 refer to the following information.

Species of tree	Growth factor
Red maple	4.5
River birch	3.5
Cottonwood	2.0
Black walnut	4.5
White birch	5.0
American elm	4.0
Pin oak	3.0
Shagbark hickory	7.5

One method of calculating the approximate age, in years, of a tree of a particular species is to multiply the diameter of the tree, in inches, by a constant called the growth factor for that species. The table above gives the growth factors for eight species of trees.

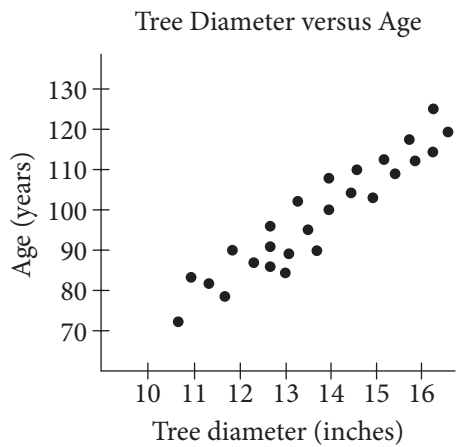
16

According to the information in the table, what is the approximate age of an American elm tree with a diameter of 12 inches?

- A) 24 years
- B) 36 years
- C) 40 years
- D) 48 years



17



The scatterplot above gives the tree diameter plotted against age for 26 trees of a single species. The growth factor of this species is closest to that of which of the following species of tree?

- A) Red maple
- B) Cottonwood
- C) White birch
- D) Shagbark hickory

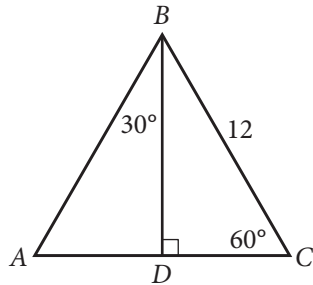
18

If a white birch tree and a pin oak tree each now have a diameter of 1 foot, which of the following will be closest to the difference, in inches, of their diameters 10 years from now? (1 foot = 12 inches)

- A) 1.0
- B) 1.2
- C) 1.3
- D) 1.4



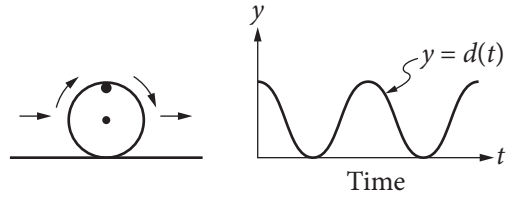
19



In  $\triangle ABC$  above, what is the length of  $\overline{AD}$  ?

- A) 4
- B) 6
- C)  $6\sqrt{2}$
- D)  $6\sqrt{3}$

20



The figure on the left above shows a wheel with a mark on its rim. The wheel is rolling on the ground at a constant rate along a level straight path from a starting point to an ending point. The graph of  $y = d(t)$  on the right could represent which of the following as a function of time from when the wheel began to roll?

- A) The speed at which the wheel is rolling
- B) The distance of the wheel from its starting point
- C) The distance of the mark on the rim from the center of the wheel
- D) The distance of the mark on the rim from the ground



21

$$\frac{a-b}{a} = c$$

In the equation above, if  $a$  is negative and  $b$  is positive, which of the following must be true?

- A)  $c > 1$
- B)  $c = 1$
- C)  $c = -1$
- D)  $c < -1$

22

In State X, Mr. Camp's eighth-grade class consisting of 26 students was surveyed and 34.6 percent of the students reported that they had at least two siblings. The average eighth-grade class size in the state is 26. If the students in Mr. Camp's class are representative of students in the state's eighth-grade classes and there are 1,800 eighth-grade classes in the state, which of the following best estimates the number of eighth-grade students in the state who have fewer than two siblings?

- A) 16,200
- B) 23,400
- C) 30,600
- D) 46,800





Questions 23 and 24 refer to the following information.

Townsend Realty Group Investments		
Property address	Purchase price (dollars)	Monthly rental price (dollars)
Clearwater Lane	128,000	950
Driftwood Drive	176,000	1,310
Edgemont Street	70,000	515
Glenview Street	140,000	1,040
Hamilton Circle	450,000	3,365

The Townsend Realty Group invested in the five different properties listed in the table above. The table shows the amount, in dollars, the company paid for each property and the corresponding monthly rental price, in dollars, the company charges for the property at each of the five locations.

23

The relationship between the monthly rental price  $r$ , in dollars, and the property's purchase price  $p$ , in thousands of dollars, can be represented by a linear function. Which of the following functions represents the relationship?

- A)  $r(p) = 2.5p - 870$
- B)  $r(p) = 5p + 165$
- C)  $r(p) = 6.5p + 440$
- D)  $r(p) = 7.5p - 10$

24

Townsend Realty purchased the Glenview Street property and received a 40% discount off the original price along with an additional 20% off the discounted price for purchasing the property in cash. Which of the following best approximates the original price, in dollars, of the Glenview Street property?

- A) \$350,000
- B) \$291,700
- C) \$233,300
- D) \$175,000



25

A psychologist set up an experiment to study the tendency of a person to select the first item when presented with a series of items. In the experiment, 300 people were presented with a set of five pictures arranged in random order. Each person was asked to choose the most appealing picture. Of the first 150 participants, 36 chose the first picture in the set. Among the remaining 150 participants,  $p$  people chose the first picture in the set. If more than 20% of all participants chose the first picture in the set, which of the following inequalities best describes the possible values of  $p$  ?

- A)  $p > 0.20(300 - 36)$ , where  $p \leq 150$
- B)  $p > 0.20(300 + 36)$ , where  $p \leq 150$
- C)  $p - 36 > 0.20(300)$ , where  $p \leq 150$
- D)  $p + 36 > 0.20(300)$ , where  $p \leq 150$

26

The surface area of a cube is  $6\left(\frac{a}{4}\right)^2$ , where  $a$  is a positive constant. Which of the following gives the perimeter of one face of the cube?

- A)  $\frac{a}{4}$
- B)  $a$
- C)  $4a$
- D)  $6a$

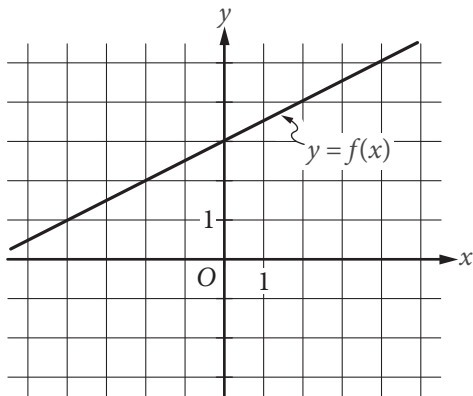
27

The mean score of 8 players in a basketball game was 14.5 points. If the highest individual score is removed, the mean score of the remaining 7 players becomes 12 points. What was the highest score?

- A) 20
- B) 24
- C) 32
- D) 36



28



The graph of the linear function  $f$  is shown in the  $xy$ -plane above. The slope of the graph of the linear function  $g$  is 4 times the slope of the graph of  $f$ . If the graph of  $g$  passes through the point  $(0, -4)$ , what is the value of  $g(9)$  ?

- A) 5
- B) 9
- C) 14
- D) 18

29

$$x^2 + 20x + y^2 + 16y = -20$$

The equation above defines a circle in the  $xy$ -plane. What are the coordinates of the center of the circle?

- A)  $(-20, -16)$
- B)  $(-10, -8)$
- C)  $(10, 8)$
- D)  $(20, 16)$

30

$$y = x^2 - a$$

In the equation above,  $a$  is a positive constant and the graph of the equation in the  $xy$ -plane is a parabola. Which of the following is an equivalent form of the equation?

- A)  $y = (x + a)(x - a)$
- B)  $y = (x + \sqrt{a})(x - \sqrt{a})$
- C)  $y = \left(x + \frac{a}{2}\right)\left(x - \frac{a}{2}\right)$
- D)  $y = (x + a)^2$

**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
•	•	•	•

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{7}{12}$

7	/	1	2
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

	2	.	5
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

	2	0	1
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

2	0	1	
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

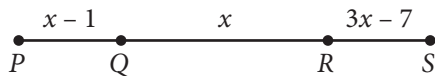
Horsepower and watts are units of measure of power. They are directly proportional such that 5 horsepower is equal to 3730 watts. How much power, in watts, is equal to 2 horsepower?

32

The painting *The Starry Night* by Vincent van Gogh is rectangular in shape with height 29 inches and width 36.25 inches. If a reproduction was made where each dimension is  $\frac{1}{3}$  the corresponding original dimension, what is the height of the reproduction, in inches?



33



Note: Figure not drawn to scale.

On  $\overline{PS}$  above,  $PQ = RS$ . What is the length of  $\overline{PS}$  ?

34

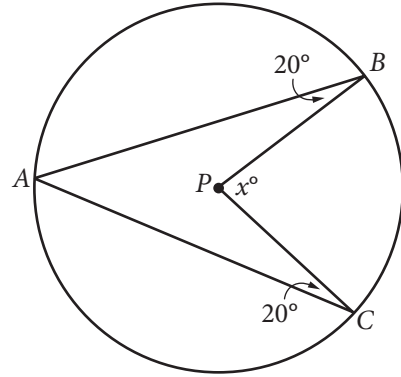
In the  $xy$ -plane, the point  $(2, 5)$  lies on the graph of the function  $f$ . If  $f(x) = k - x^2$ , where  $k$  is a constant, what is the value of  $k$  ?



35

A landscaper is designing a rectangular garden. The length of the garden is to be 5 feet longer than the width. If the area of the garden will be 104 square feet, what will be the length, in feet, of the garden?

36



Point  $P$  is the center of the circle in the figure above. What is the value of  $x$  ?



Questions 37 and 38 refer to the following information.

Ms. Simon's Workday Morning Drive

Segment of drive	Distance (miles)	Average driving speed with no traffic delay (mph)
From home to freeway entrance	0.6	25
From freeway entrance to freeway exit	15.4	50
From freeway exit to workplace	1.4	35

Ms. Simon drives her car from her home to her workplace every workday morning. The table above shows the distance, in miles, and her average driving speed, in miles per hour (mph), when there is no traffic delay, for each segment of her drive.

37

One morning, Ms. Simon drove directly from her home to her workplace in 24 minutes. What was her average speed, in miles per hour, during her drive that morning?

38

If Ms. Simon starts her drive at 6:30 a.m., she can drive at her average driving speed with no traffic delay for each segment of the drive. If she starts her drive at 7:00 a.m., the travel time from the freeway entrance to the freeway exit increases by 33% due to slower traffic, but the travel time for each of the other two segments of her drive does not change. Based on the table, how many more minutes does Ms. Simon take to arrive at her workplace if she starts her drive at 7:00 a.m. than if she starts her drive at 6:30 a.m.? (Round your answer to the nearest minute.)

# STOP

If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.



**No Test Material On This Page**

# Scoring Your SAT<sup>®</sup> Practice Test #5

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide more diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Sofia answered 29 of the 52 questions correctly on the SAT Reading Test and 19 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, she calculates that she received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. She adds 27 to 23 (gets 50) and then multiplies by 10 to determine her SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.

## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1; 7–8; 13; 15–18
- ▶ Math Test – Calculator: Questions 2; 4; 6; 11–13; 23–25; 28; 33

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 1; 3; 5; 7; 9; 14–18; 20; 22; 27; 31–32; 37–38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 3–6; 9–10; 12; 14; 19
- ▶ Math Test – Calculator: Questions 8; 10; 21; 26; 30; 34; 35

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1–3; 7–8; 10; 12–13; 16; 18–19; 22; 24–25; 27–28; 32–34; 37–39; 41; 43Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 4–6; 9; 11; 14–15; 17; 20–21; 23; 26; 29–31; 35–36; 40; 42; 44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 7; 10; 14–15; 22; 29; 37–38; 44; 47
  - ▶ Writing and Language Test: Questions 2; 10; 13; 18; 22; 24; 37; 39Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 5; 9; 12; 18; 30–31; 34; 39; 43; 46
  - ▶ Writing and Language Test: Questions 1; 3; 16; 19; 27; 33; 38; 41Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.

## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11–21; 32–41
- ▶ Writing and Language Test: Questions 12–13; 16; 18; 19; 22
- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 7; 9; 14–15; 23–25; 32

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 22–31; 42–52
- ▶ Writing and Language Test: Questions 1–3; 7–8; 10
- ▶ Math Test – No Calculator: Question 8
- ▶ Math Test – Calculator: Questions 5; 10; 16–18; 20; 31

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in Science cross-test score.

# SAT Practice Test #5: Worksheets

## ANSWER KEY

### Reading Test Answers

1 D	12 A	23 B	34 B	45 C
2 C	13 B	24 A	35 A	46 B
3 C	14 D	25 B	36 B	47 A
4 A	15 C	26 C	37 C	48 C
5 C	16 A	27 D	38 A	49 C
6 A	17 B	28 B	39 B	50 A
7 D	18 B	29 D	40 D	51 A
8 B	19 B	30 B	41 D	52 B
9 B	20 A	31 D	42 C	
10 B	21 D	32 B	43 D	
11 B	22 A	33 C	44 D	

READING TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Writing and Language Test Answers

1 C	12 D	23 B	34 C
2 D	13 D	24 B	35 B
3 B	14 A	25 A	36 B
4 C	15 B	26 B	37 D
5 A	16 C	27 D	38 C
6 C	17 C	28 A	39 D
7 D	18 A	29 C	40 B
8 D	19 D	30 B	41 D
9 B	20 D	31 C	42 A
10 C	21 A	32 D	43 A
11 C	22 B	33 A	44 C

WRITING AND  
LANGUAGE TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test No Calculator Answers

1 D	11 C
2 A	12 D
3 B	13 B
4 C	14 C
5 D	15 D
6 A	16 4
7 C	17 $6/5$ , 1.2
8 A	18 $21/4$ , 5.25
9 A	19 2
10 B	20 97

MATH TEST  
NO CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test Calculator Answers

1 D	11 A	21 A	31 1492
2 C	12 D	22 C	32 $29/3$ , 9.66, 9.67
3 A	13 D	23 D	33 7
4 B	14 A	24 B	34 9
5 C	15 A	25 D	35 13
6 B	16 D	26 B	36 80
7 A	17 D	27 C	37 43, 43.5, 44, $87/2$
8 C	18 C	28 C	38 6
9 B	19 B	29 B	
10 A	20 D	30 B	

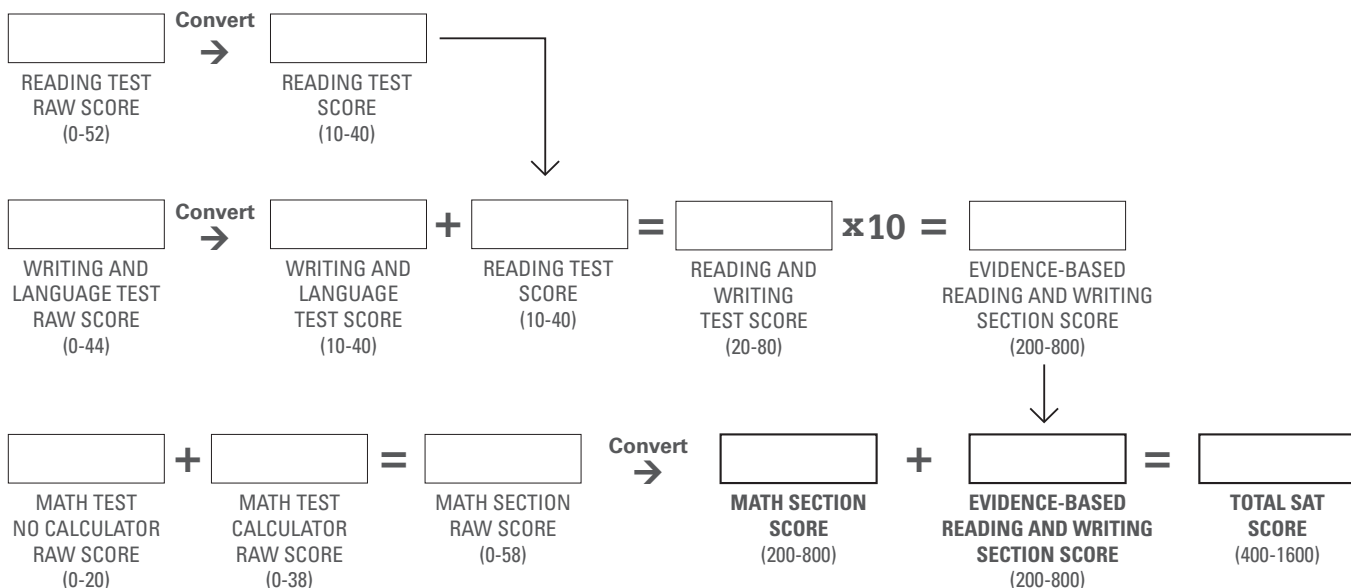
MATH TEST  
CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

# SAT Practice Test #5: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	540	26	30
1	200	10	10	31	540	27	30
2	210	10	10	32	550	28	31
3	230	10	10	33	560	28	32
4	250	11	11	34	570	29	32
5	260	11	12	35	580	29	33
6	270	12	13	36	590	29	34
7	290	13	13	37	600	30	34
8	300	14	14	38	600	30	35
9	320	14	15	39	610	31	36
10	330	15	16	40	620	31	37
11	340	16	16	41	630	32	38
12	360	16	17	42	640	32	39
13	370	17	18	43	650	33	40
14	390	17	18	44	660	33	40
15	400	18	19	45	660	34	
16	410	18	20	46	670	35	
17	420	19	20	47	680	35	
18	430	20	21	48	690	36	
19	440	20	22	49	700	37	
20	450	21	23	50	710	37	
21	460	21	23	51	710	39	
22	470	22	24	52	720	40	
23	480	23	25	53	730		
24	490	23	25	54	750		
25	500	24	26	55	760		
26	510	24	27	56	770		
27	510	25	28	57	790		
28	520	25	28	58	800		
29	530	26	29				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES



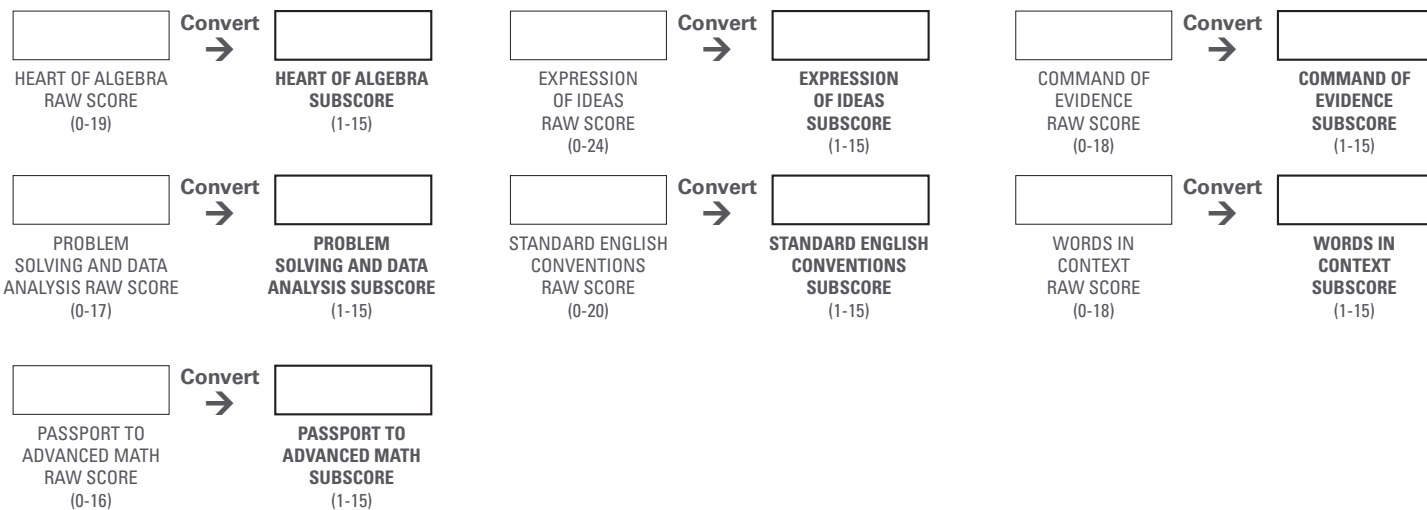


# SAT Practice Test #5: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	2	1	3	1	2
2	1	1	3	1	4	1	3
3	2	1	4	2	5	2	4
4	3	2	5	3	6	3	4
5	4	3	6	4	7	4	5
6	4	4	7	5	8	5	6
7	5	4	7	6	9	6	6
8	6	5	8	7	9	7	7
9	6	6	9	8	10	7	8
10	7	7	9	9	11	8	8
11	8	7	10	10	11	9	9
12	8	8	10	10	12	10	10
13	9	9	11	11	13	11	10
14	9	10	11	12	14	11	11
15	10	11	12	13	14	12	12
16	10	12	13	14	15	13	13
17	11	13	13	15		14	14
18	12	14	14			15	15
19	12	15	15				
20	13	15					
21	14						
22	14						
23	15						
24	15						

## CONVERSION EQUATION 2 SUBSCORES



# SAT Practice Test #5: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	26	26
1	10	10	19	27	26
2	10	12	20	27	27
3	11	13	21	28	28
4	13	14	22	29	28
5	14	15	23	29	29
6	15	16	24	30	30
7	16	17	25	30	30
8	17	18	26	31	31
9	18	19	27	32	31
10	19	20	28	33	32
11	20	21	29	33	33
12	21	21	30	34	34
13	22	22	31	35	34
14	23	23	32	36	35
15	24	24	33	37	36
16	24	24	34	38	38
17	25	25	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11–21; 32–41		22–31; 42–52	
Writing and Language Test	12–13; 16; 18–19; 22		1–3; 7–8; 10	
Math Test No Calculator	No Questions		8	
Math Test Calculator	7; 9; 14–15; 23–25; 32		5; 10; 16–18; 20; 31	
<b>Total</b>				



# Exam 9

# SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**TEST NUMBER**

**SECTION 1**

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○	27	A B C D	○ ○ ○ ○	40	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○	28	A B C D	○ ○ ○ ○	41	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	16	A B C D	○ ○ ○ ○	29	A B C D	○ ○ ○ ○	42	A B C D	○ ○ ○ ○
4	A B C D	○ ○ ○ ○	17	A B C D	○ ○ ○ ○	30	A B C D	○ ○ ○ ○	43	A B C D	○ ○ ○ ○
5	A B C D	○ ○ ○ ○	18	A B C D	○ ○ ○ ○	31	A B C D	○ ○ ○ ○	44	A B C D	○ ○ ○ ○
6	A B C D	○ ○ ○ ○	19	A B C D	○ ○ ○ ○	32	A B C D	○ ○ ○ ○	45	A B C D	○ ○ ○ ○
7	A B C D	○ ○ ○ ○	20	A B C D	○ ○ ○ ○	33	A B C D	○ ○ ○ ○	46	A B C D	○ ○ ○ ○
8	A B C D	○ ○ ○ ○	21	A B C D	○ ○ ○ ○	34	A B C D	○ ○ ○ ○	47	A B C D	○ ○ ○ ○
9	A B C D	○ ○ ○ ○	22	A B C D	○ ○ ○ ○	35	A B C D	○ ○ ○ ○	48	A B C D	○ ○ ○ ○
10	A B C D	○ ○ ○ ○	23	A B C D	○ ○ ○ ○	36	A B C D	○ ○ ○ ○	49	A B C D	○ ○ ○ ○
11	A B C D	○ ○ ○ ○	24	A B C D	○ ○ ○ ○	37	A B C D	○ ○ ○ ○	50	A B C D	○ ○ ○ ○
12	A B C D	○ ○ ○ ○	25	A B C D	○ ○ ○ ○	38	A B C D	○ ○ ○ ○	51	A B C D	○ ○ ○ ○
13	A B C D	○ ○ ○ ○	26	A B C D	○ ○ ○ ○	39	A B C D	○ ○ ○ ○	52	A B C D	○ ○ ○ ○



**SAT PRACTICE ANSWER SHEET**

**COMPLETE MARK** ●

**EXAMPLES OF INCOMPLETE MARKS**



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 2**

1	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○	37	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○	38	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○	39	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	31	A B C D ○ ○ ○ ○	40	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	32	A B C D ○ ○ ○ ○	41	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	33	A B C D ○ ○ ○ ○	42	A B C D ○ ○ ○ ○
7	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○	34	A B C D ○ ○ ○ ○	43	A B C D ○ ○ ○ ○
8	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○	35	A B C D ○ ○ ○ ○	44	A B C D ○ ○ ○ ○
9	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○	36	A B C D ○ ○ ○ ○		



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 3

1	A B C D	○ ○ ○ ○	4	A B C D	○ ○ ○ ○	7	A B C D	○ ○ ○ ○	10	A B C D	○ ○ ○ ○	13	A B C D	○ ○ ○ ○
2	A B C D	○ ○ ○ ○	5	A B C D	○ ○ ○ ○	8	A B C D	○ ○ ○ ○	11	A B C D	○ ○ ○ ○	14	A B C D	○ ○ ○ ○
3	A B C D	○ ○ ○ ○	6	A B C D	○ ○ ○ ○	9	A B C D	○ ○ ○ ○	12	A B C D	○ ○ ○ ○	15	A B C D	○ ○ ○ ○

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

16	□ □ □ □	/ ○ ○	17	□ □ □ □	/ ○ ○	18	□ □ □ □	/ ○ ○	19	□ □ □ □	/ ○ ○	20	□ □ □ □	/ ○ ○
.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	.	○ ○ ○ ○	
0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	0	○ ○ ○ ○	
1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	1	○ ○ ○ ○	
2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	2	○ ○ ○ ○	
3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	3	○ ○ ○ ○	
4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	4	○ ○ ○ ○	
5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	5	○ ○ ○ ○	
6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	6	○ ○ ○ ○	
7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	7	○ ○ ○ ○	
8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	8	○ ○ ○ ○	
9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	9	○ ○ ○ ○	

**NO CALCULATOR ALLOWED**



**SAT PRACTICE ANSWER SHEET**

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

**SECTION 4**

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR ALLOWED



### SAT PRACTICE ANSWER SHEET

**COMPLETE MARK** ● **EXAMPLES OF INCOMPLETE MARKS**

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

#### SECTION 4 (Continued)

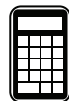
Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<p><b>31</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>32</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>33</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>34</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>35</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>
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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

<p><b>36</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>37</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>	<p><b>38</b></p> <div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> <p>/ ○ ○</p> <p>. ○ ○ ○ ○</p> <p>0 ○ ○ ○ ○</p> <p>1 ○ ○ ○ ○</p> <p>2 ○ ○ ○ ○</p> <p>3 ○ ○ ○ ○</p> <p>4 ○ ○ ○ ○</p> <p>5 ○ ○ ○ ○</p> <p>6 ○ ○ ○ ○</p> <p>7 ○ ○ ○ ○</p> <p>8 ○ ○ ○ ○</p> <p>9 ○ ○ ○ ○</p>
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**CALCULATOR ALLOWED**





**Test begins on the next page.**

# Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

### Questions 1-10 are based on the following passage.

This passage is adapted from Daniyal Mueenuddin, "Nawabdin Electrician." ©2009 by Daniyal Mueenuddin.

Another man might have thrown up his hands—but not Nawabdin. His twelve daughters acted as a spur to his genius, and he looked with  
 Line satisfaction in the mirror each morning at the face of  
 5 a warrior going out to do battle. Nawab of course knew that he must proliferate his sources of revenue—the salary he received from K. K. Harouni for tending the tube wells would not even begin to suffice. He set up a little one-room flour mill, run off  
 10 a condemned electric motor—condemned by him. He tried his hand at fish-farming in a little pond at the edge of his master’s fields. He bought broken radios, fixed them, and resold them. He did not demur even when asked to fix watches, though that  
 15 enterprise did spectacularly badly, and in fact earned him more kicks than kudos, for no watch he took apart ever kept time again.

K. K. Harouni rarely went to his farms, but lived mostly in Lahore. Whenever the old man visited,  
 20 Nawab would place himself night and day at the door leading from the servants’ sitting area into the walled grove of ancient banyan trees where the old farmhouse stood. Grizzled, his peculiar aviator

glasses bent and smudged, Nawab tended the  
 25 household machinery, the air conditioners, water heaters, refrigerators, and water pumps, like an engineer tending the boilers on a foundering steamer in an Atlantic gale. By his superhuman efforts he almost managed to maintain K. K. Harouni in the  
 30 same mechanical cocoon, cooled and bathed and lighted and fed, that the landowner enjoyed in Lahore.

Harouni of course became familiar with this ubiquitous man, who not only accompanied him on  
 35 his tours of inspection, but morning and night could be found standing on the master bed rewiring the light fixture or in the bathroom poking at the water heater. Finally, one evening at teatime, gauging the psychological moment, Nawab asked if he might say  
 40 a word. The landowner, who was cheerfully filing his nails in front of a crackling rosewood fire, told him to go ahead.

“Sir, as you know, your lands stretch from here to the Indus, and on these lands are fully seventeen tube  
 45 wells, and to tend these seventeen tube wells there is but one man, me, your servant. In your service I have earned these gray hairs”—here he bowed his head to show the gray—“and now I cannot fulfill my duties as I should. Enough, sir, enough. I beg you, forgive  
 50 me my weakness. Better a darkened house and proud hunger within than disgrace in the light of day. Release me, I ask you, I beg you.”

The old man, well accustomed to these sorts of speeches, though not usually this florid, filed away at  
 55 his nails and waited for the breeze to stop.

“What’s the matter, Nawabdin?”

“Matter, sir? O what could be the matter in your service. I’ve eaten your salt for all my years. But sir, on the bicycle now, with my old legs, and with the  
60 many injuries I’ve received when heavy machinery fell on me—I cannot any longer bicycle about like a bridegroom from farm to farm, as I could when I first had the good fortune to enter your employment. I beg you, sir, let me go.”

65 “And what’s the solution?” asked Harouni, seeing that they had come to the crux. He didn’t particularly care one way or the other, except that it touched on his comfort—a matter of great interest to him.

70 “Well, sir, if I had a motorcycle, then I could somehow limp along, at least until I train up some younger man.”

The crops that year had been good, Harouni felt expansive in front of the fire, and so, much to the disgust of the farm managers, Nawab received a  
75 brand-new motorcycle, a Honda 70. He even managed to extract an allowance for gasoline.

The motorcycle increased his status, gave him weight, so that people began calling him “Uncle,” and asking his opinion on world affairs, about which he  
80 knew absolutely nothing. He could now range further, doing a much wider business. Best of all, now he could spend every night with his wife, who had begged to live not on the farm but near her family in Firoza, where also they could educate at  
85 least the two eldest daughters. A long straight road ran from the canal headworks near Firoza all the way to the Indus, through the heart of the K. K. Harouni lands. Nawab would fly down this road on his new machine, with bags and cloths hanging from every  
90 knob and brace, so that the bike, when he hit a bump, seemed to be flapping numerous small vestigial wings; and with his grinning face, as he rolled up to whichever tube well needed servicing, with his ears almost blown off, he shone with the speed of his  
95 arrival.

1

The main purpose of the first paragraph is to

- A) characterize Nawab as a loving father.
- B) outline the schedule of a typical day in Nawab’s life.
- C) describe Nawab’s various moneymaking ventures.
- D) contrast Nawab’s and Harouni’s lifestyles.

2

As used in line 16, “kicks” most nearly means

- A) thrills.
- B) complaints.
- C) jolts.
- D) interests.

3

The author uses the image of an engineer at sea (lines 23-28) most likely to

- A) suggest that Nawab often dreams of having a more exciting profession.
- B) highlight the fact that Nawab’s primary job is to tend to Harouni’s tube wells.
- C) reinforce the idea that Nawab has had many different occupations in his life.
- D) emphasize how demanding Nawab’s work for Harouni is.

4

Which choice best supports the claim that Nawab performs his duties for Harouni well?

- A) Lines 28-32 (“By his . . . Lahore”)
- B) Lines 40-42 (“The landowner . . . ahead”)
- C) Lines 46-49 (“In your . . . should”)
- D) Line 58 (“I’ve . . . years”)

5

In the context of the conversation between Nawab and Harouni, Nawab’s comments in lines 43-52 (“Sir . . . beg you”) mainly serve to

- A) flatter Harouni by mentioning how vast his lands are.
- B) boast to Harouni about how competent and reliable Nawab is.
- C) emphasize Nawab’s diligence and loyalty to Harouni.
- D) notify Harouni that Nawab intends to quit his job tending the tube wells.

6

Nawab uses the word “bridegroom” (line 62) mainly to emphasize that he’s no longer

- A) in love.
- B) naive.
- C) busy.
- D) young.

7

It can reasonably be inferred from the passage that Harouni provides Nawab with a motorcycle mainly because

- A) Harouni appreciates that Nawab has to work hard to support his family.
- B) Harouni sees benefit to himself from giving Nawab a motorcycle.
- C) Nawab’s speech is the most eloquent that Harouni has ever heard.
- D) Nawab threatens to quit if Harouni doesn’t agree to give him a motorcycle.

8

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 65-66 (“And . . . crux”)
- B) Lines 66-68 (“He didn’t . . . him”)
- C) Lines 75-76 (“He even . . . gasoline”)
- D) Lines 80-81 (“He could . . . business”)

9

The passage states that the farm managers react to Nawab receiving a motorcycle with

- A) disgust.
- B) happiness.
- C) envy.
- D) indifference.

10

According to the passage, what does Nawab consider to be the best result of getting the motorcycle?

- A) People start calling him “Uncle.”
- B) He’s able to expand his business.
- C) He’s able to educate his daughters.
- D) He can spend more time with his wife.

**Questions 11-21 are based on the following passage and supplementary material.**

This passage is adapted from Stephen Coleman, Scott Anthony, and David E. Morrison, “Public Trust in the News.” ©2009 by Stephen Coleman.

The news is a form of public knowledge. Unlike personal or private knowledge (such as the health of one’s friends and family; the conduct of a private hobby; a secret liaison), public knowledge  
 Line 5 increases in value as it is shared by more people. The date of an election and the claims of rival candidates; the causes and consequences of an environmental disaster; a debate about how to frame a particular law; the latest reports from a war zone—these are all  
 10 examples of public knowledge that people are generally expected to know in order to be considered informed citizens. Thus, in contrast to personal or private knowledge, which is generally left to individuals to pursue or ignore, public knowledge is  
 15 promoted even to those who might not think it matters to them. In short, the circulation of public knowledge, including the news, is generally regarded as a public good which cannot be solely demand-driven.

20 The production, circulation, and reception of public knowledge is a complex process. It is generally accepted that public knowledge should be authoritative, but there is not always common agreement about what the public needs to  
 25 know, who is best placed to relate and explain it, and how authoritative reputations should be determined and evaluated. Historically, newspapers such as *The Times* and broadcasters such as the BBC were widely regarded as the trusted shapers of authoritative  
 30 agendas and conventional wisdom. They embodied the *Oxford English Dictionary’s* definition of authority as the “power over, or title to influence, the opinions of others.” As part of the general process of the transformation of authority whereby there has  
 35 been a reluctance to uncritically accept traditional sources of public knowledge, the demand has been for all authority to make explicit the frames of value which determine their decisions. Centres of news production, as our focus groups show, have not been  
 40 exempt from this process. Not surprisingly perhaps some news journalists feel uneasy about this renegotiation of their authority:

45 Editors are increasingly casting a glance at the “most read” lists on their own and other websites to work out which stories matter to readers and viewers. And now the audience—which used to know its place—is being asked to act as a kind of journalistic ombudsman, ruling on our credibility (broadcast journalist, 2008).

50 The result of democratising access to TV news could be political disengagement by the majority and a dumbing down through a popularity contest of stories (online news editor, 2007).

Despite the rhetorical bluster of these statements,  
 55 they amount to more than straightforward professional defensiveness. In their reference to an audience “which used to know its place” and conflation between democratisation and “dumbing down,” they are seeking to argue for a particular  
 60 mode of public knowledge: one which is shaped by experts, immune from populist pressures; and disseminated to attentive, but mainly passive recipients. It is a view of citizenship that closes down opportunities for popular involvement in the making  
 65 of public knowledge by reinforcing the professional claims of experts. The journalists quoted above are right to feel uneasy, for there is, at almost every institutional level in contemporary society, scepticism towards the epistemological authority of  
 70 expert elites. There is a growing feeling, as expressed by several of our focus group participants, that the news media should be “informative rather than authoritative”; the job of journalists should be to “give the news as raw as it is, without putting their  
 75 slant on it”; and people should be given “sufficient information” from which “we would be able to form opinions of our own.”

At stake here are two distinct conceptions of authority. The journalists we have quoted are  
 80 resistant to the democratisation of news: the supremacy of the clickstream (according to which editors raise or lower the profile of stories according to the number of readers clicking on them online); the parity of popular culture with “serious”  
 85 news; the demands of some audience members for raw news rather than constructed narratives.

Percentage of Respondents Seeing News Stories  
as Inaccurate or Favoring One Side

	1985	1992	2003	2007	2011
<i>News organizations...</i>					
• Get the facts straight	55	49	36	39	25
• Often have inaccurate stories	34	44	56	53	66
• Don't know	11	7	8	8	9
• Are pretty independent	37	35	23	23	15
• Are often influenced by powerful people and organizations	53	58	70	69	80
• Don't know	10	7	7	8	5
<i>On political and social issues, news organizations...</i>					
• Deal fairly with all sides	34	31	26	26	16
• Tend to favor one side	53	63	66	66	77
• Don't know	13	6	8	8	7

Adapted from "Pew Research Center for the People & the Press Report on Views of the News Media, 1985–2011." ©2011 by Pew Research Center.

11

The main purpose of the passage is to

- A) analyze the technological developments that have affected the production, circulation, and reception of news stories.
- B) discuss changes in the perception of the news media as a source of public knowledge.
- C) show how journalists' frames of value influence the production of news stories.
- D) challenge the conventional view that news is a form of public knowledge.

12

According to the passage, which expectation do traditional authorities now face?

- A) They should be uninfluenced by commercial considerations.
- B) They should be committed to bringing about positive social change.
- C) They should be respectful of the difference between public and private knowledge.
- D) They should be transparent about their beliefs and assumptions.

13

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 2-5 (“Unlike . . . people”)
- B) Lines 20-21 (“The production . . . process”)
- C) Lines 33-38 (“As part . . . decisions”)
- D) Lines 43-46 (“Editors . . . viewers”)

14

As used in line 24, “common” most nearly means

- A) numerous.
- B) familiar.
- C) widespread.
- D) ordinary.

15

The authors most likely include the extended quotations in lines 43-53 to

- A) present contradictory examples.
- B) cite representative opinions.
- C) criticize typical viewpoints.
- D) suggest viable alternatives.

16

The authors indicate that the public is coming to believe that journalists' reports should avoid

- A) personal judgments about the events reported.
- B) more information than is absolutely necessary.
- C) quotations from authorities on the subject matter.
- D) details that the subjects of news reports wish to keep private.



17

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 12-16 (“Thus . . . them”)
- B) Lines 30-33 (“They . . . others”)
- C) Lines 40-42 (“Not surprisingly . . . authority”)
- D) Lines 70-77 (“There . . . own”)

18

As used in line 74, “raw” most nearly means

- A) unfiltered.
- B) exposed.
- C) harsh.
- D) inexperienced.

19

Based on the table, in which year were people the most trusting of the news media?

- A) 1985
- B) 1992
- C) 2003
- D) 2011

20

Which statement is best supported by information presented in the table?

- A) Between 1985 and 2011, the proportion of inaccurate news stories rose dramatically.
- B) Between 1992 and 2003, the proportion of people who believed that news organizations were biased almost doubled.
- C) Between 2003 and 2007, people’s views of the accuracy, independence, and fairness of news organizations changed very little.
- D) Between 2007 and 2011, people’s perception that news organizations are accurate increased, but people’s perception that news organizations are fair diminished.

21

The 2011 data in the table best serve as evidence of

- A) “political disengagement by the majority” (line 51).
- B) “the professional claims of experts” (lines 65-66).
- C) “scepticism towards the epistemological authority of expert elites” (lines 69-70).
- D) “the supremacy of the clickstream” (line 81).

**Questions 22-32 are based on the following passage.**

This passage is adapted from Elsa Youngsteadt, “Decoding a Flower’s Message.” ©2012 by Sigma Xi, The Scientific Research Society.

Texas gourd vines unfurl their large, flared blossoms in the dim hours before sunrise. Until they close at noon, their yellow petals and mild, squashy  
 Line aroma attract bees that gather nectar and shuttle  
 5 pollen from flower to flower. But “when you advertise [to pollinators], you advertise in an open communication network,” says chemical ecologist Ian Baldwin of the Max Planck Institute for Chemical Ecology in Germany. “You attract not just  
 10 the good guys, but you also attract the bad guys.” For a Texas gourd plant, striped cucumber beetles are among the very bad guys. They chew up pollen and petals, defecate in the flowers and transmit the dreaded bacterial wilt disease, an infection that can  
 15 reduce an entire plant to a heap of collapsed tissue in mere days.

In one recent study, Nina Theis and Lynn Adler took on the specific problem of the Texas gourd—how to attract enough pollinators but not  
 20 too many beetles. The Texas gourd vine’s main pollinators are honey bees and specialized squash bees, which respond to its floral scent. The aroma includes 10 compounds, but the most abundant—and the only one that lures squash bees  
 25 into traps—is 1,4-dimethoxybenzene.

Intuition suggests that more of that aroma should be even more appealing to bees. “We have this assumption that a really fragrant flower is going to attract a lot of pollinators,” says Theis, a chemical  
 30 ecologist at Elms College in Chicopee, Massachusetts. But, she adds, that idea hasn’t really been tested—and extra scent could well call in more beetles, too. To find out, she and Adler planted  
 168 Texas gourd vines in an Iowa field and,  
 35 throughout the August flowering season, made half the plants more fragrant by tucking dimethoxybenzene-treated swabs deep inside their flowers. Each treated flower emitted about 45 times more fragrance than a normal one; the other half of  
 40 the plants got swabs without fragrance.

The researchers also wanted to know whether extra beetles would impose a double cost by both damaging flowers and deterring bees, which might not bother to visit (and pollinate) a flower laden with  
 45 other insects and their feces. So every half hour throughout the experiments, the team plucked all the beetles off of half the fragrance-enhanced flowers and half the control flowers, allowing bees to respond to the blossoms with and without interference by  
 50 beetles.

Finally, they pollinated by hand half of the female flowers in each of the four combinations of fragrance and beetles. Hand-pollinated flowers should develop into fruits with the maximum number of seeds,  
 55 providing a benchmark to see whether the fragrance-related activities of bees and beetles resulted in reduced pollination.

“It was very labor intensive,” says Theis. “We would be out there at four in the morning, three  
 60 in the morning, to try and set up before these flowers open.” As soon as they did, the team spent the next several hours walking from flower to flower, observing each for two-minute intervals “and writing down everything we saw.”

What they saw was double the normal number of  
 65 beetles on fragrance-enhanced blossoms. Pollinators, to their surprise, did not prefer the highly scented flowers. Squash bees were indifferent, and honey bees visited enhanced flowers less often  
 70 than normal ones. Theis thinks the bees were repelled not by the fragrance itself, but by the abundance of beetles: The data showed that the more beetles on a flower, the less likely a honey bee was to visit it.

That added up to less reproduction for  
 75 fragrance-enhanced flowers. Gourds that developed from those blossoms weighed 9 percent less and had, on average, 20 fewer seeds than those from normal flowers. Hand pollination didn’t rescue the seed set,  
 80 indicating that beetles damaged flowers directly—regardless of whether they also repelled pollinators. (Hand pollination did rescue fruit weight, a hard-to-interpret result that suggests that lost bee visits did somehow harm fruit development.)

85 The new results provide a reason that Texas gourd plants never evolved to produce a stronger scent: “If you really ramp up the odor, you don’t get more pollinators, but you can really get ripped apart by your enemies,” says Rob Raguso, a chemical ecologist  
90 at Cornell University who was not involved in the Texas gourd study.

22

The primary purpose of the passage is to

- A) discuss the assumptions and reasoning behind a theory.
- B) describe the aim, method, and results of an experiment.
- C) present and analyze conflicting data about a phenomenon.
- D) show the innovative nature of a procedure used in a study.

23

As presented in the passage, Theis and Adler’s research primarily relied on which type of evidence?

- A) Direct observation
- B) Historical data
- C) Expert testimony
- D) Random sampling

24

Which statement about striped cucumber beetles can most reasonably be inferred from the passage?

- A) They feed primarily on Texas gourd plants.
- B) They are less attracted to dimethoxybenzene than honey bees are.
- C) They experience only minor negative effects as a result of carrying bacterial wilt disease.
- D) They are attracted to the same compound in Texas gourd scent that squash bees are.

25

The author indicates that it seems initially plausible that Texas gourd plants could attract more pollinators if they

- A) did not have aromatic flowers.
- B) targeted insects other than bees.
- C) increased their floral scent.
- D) emitted more varied fragrant compounds.

26

As used in line 38, “treated” most nearly means

- A) altered.
- B) restored.
- C) provided.
- D) preserved.

27

What did Theis and Adler do as part of their study that most directly allowed Theis to reason that “bees were repelled not by the fragrance itself” (lines 70-71)?

- A) They observed the behavior of bees and beetles both before and after the flowers opened in the morning.
- B) They increased the presence of 1,4-dimethoxybenzene only during the August flowering season.
- C) They compared the gourds that developed from naturally pollinated flowers to the gourds that developed from hand-pollinated flowers.
- D) They gave bees a chance to choose between beetle-free enhanced flowers and beetle-free normal flowers.

28

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 45-50 (“So every . . . beetles”)
- B) Lines 51-53 (“Finally . . . beetles”)
- C) Lines 59-61 (“We would . . . open”)
- D) Lines 76-79 (“Gourds . . . flowers”)

29

The primary function of the seventh and eighth paragraphs (lines 65-84) is to

- A) summarize Theis and Adler’s findings.
- B) describe Theis and Adler’s hypotheses.
- C) illustrate Theis and Adler’s methods.
- D) explain Theis and Adler’s reasoning.

30

In describing squash bees as “indifferent” (line 68), the author most likely means that they

- A) could not distinguish enhanced flowers from normal flowers.
- B) visited enhanced flowers and normal flowers at an equal rate.
- C) largely preferred normal flowers to enhanced flowers.
- D) were as likely to visit beetle-infested enhanced flowers as to visit beetle-free enhanced flowers.

31

According to the passage, Theis and Adler’s research offers an answer to which of the following questions?

- A) How can Texas gourd plants increase the number of visits they receive from pollinators?
- B) Why is there an upper limit on the intensity of the aroma emitted by Texas gourd plants?
- C) Why does hand pollination rescue the fruit weight of beetle-infested Texas gourd plants?
- D) Why do Texas gourd plants stop producing fragrance attractive to pollinators when beetles are present?

32

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 17-20 (“In one . . . beetles”)
- B) Lines 22-25 (“The aroma . . . 1,4-dimethoxybenzene”)
- C) Lines 79-84 (“Hand . . . development”)
- D) Lines 85-86 (“The new . . . scent”)

**Questions 33-42 are based on the following passages.**

Passage 1 is adapted from Abraham Lincoln, "Address to the Young Men's Lyceum of Springfield, Illinois." Originally delivered in 1838. Passage 2 is from Henry David Thoreau, "Resistance to Civil Government." Originally published in 1849.

**Passage 1**

Let every American, every lover of liberty, every well wisher to his posterity, swear by the blood of the Revolution, never to violate in the least particular,  
 Line the laws of the country; and never to tolerate their  
 5 violation by others. As the patriots of seventy-six did to the support of the Declaration of Independence, so to the support of the Constitution and Laws, let every American pledge his life, his property, and his sacred honor;—let every man remember that to violate the  
 10 law, is to trample on the blood of his father, and to tear the character of his own, and his children's liberty. Let reverence for the laws, be breathed by every American mother, to the lisping babe, that prattles on her lap—let it be taught in schools, in  
 15 seminaries, and in colleges;—let it be written in Primers, spelling books, and in Almanacs;—let it be preached from the pulpit, proclaimed in legislative halls, and enforced in courts of justice. And, in short, let it become the *political religion* of the nation;  
 20 and let the old and the young, the rich and the poor, the grave and the gay, of all sexes and tongues, and colors and conditions, sacrifice unceasingly upon its altars. . . .

When I so pressingly urge a strict observance of  
 25 all the laws, let me not be understood as saying there are no bad laws, nor that grievances may not arise, for the redress of which, no legal provisions have been made. I mean to say no such thing. But I do mean to say, that, although bad laws, if they exist,  
 30 should be repealed as soon as possible, still while they continue in force, for the sake of example, they should be religiously observed. So also in unprovided cases. If such arise, let proper legal provisions be made for them with the least possible delay; but, till  
 35 then, let them if not too intolerable, be borne with.

There is no grievance that is a fit object of redress by mob law. In any case that arises, as for instance, the promulgation of abolitionism, one of two positions is necessarily true; that is, the thing is right  
 40 within itself, and therefore deserves the protection of all law and all good citizens; or, it is wrong, and therefore proper to be prohibited by legal enactments; and in neither case, is the interposition of mob law, either necessary, justifiable, or excusable.

**Passage 2**

Unjust laws exist; shall we be content to obey  
 45 them, or shall we endeavor to amend them, and obey them until we have succeeded, or shall we transgress them at once? Men generally, under such a government as this, think that they ought to wait  
 50 until they have persuaded the majority to alter them. They think that, if they should resist, the remedy would be worse than the evil. But it is the fault of the government itself that the remedy is worse than the evil. It makes it worse. Why is it not more apt to  
 55 anticipate and provide for reform? Why does it not cherish its wise minority? Why does it cry and resist before it is hurt? . . .

If the injustice is part of the necessary friction of the machine of government, let it go, let it go;  
 60 perchance it will wear smooth—certainly the machine will wear out. If the injustice has a spring, or a pulley, or a rope, or a crank, exclusively for itself, then perhaps you may consider whether the remedy will not be worse than the evil; but if it is of such a  
 65 nature that it requires you to be the agent of injustice to another, then, I say, break the law. Let your life be a counter friction to stop the machine. What I have to do is to see, at any rate, that I do not lend myself to the wrong which I condemn.

As for adopting the ways which the State has  
 70 provided for remedying the evil, I know not of such ways. They take too much time, and a man's life will be gone. I have other affairs to attend to. I came into this world, not chiefly to make this a good place to  
 75 live in, but to live in it, be it good or bad. A man has not everything to do, but something; and because he cannot do everything, it is not necessary that he should do something wrong. . . .

I do not hesitate to say, that those who call  
 80 themselves Abolitionists should at once effectually  
 withdraw their support, both in person and property,  
 from the government . . . and not wait till they  
 constitute a majority of one, before they suffer the  
 right to prevail through them. I think that it is  
 85 enough if they have God on their side, without  
 waiting for that other one. Moreover, any man more  
 right than his neighbors constitutes a majority of one  
 already.

33

In Passage 1, Lincoln contends that breaking the law has which consequence?

- A) It slows the repeal of bad laws.
- B) It undermines and repudiates the nation's values.
- C) It leads slowly but inexorably to rule by the mob.
- D) It creates divisions between social groups.

34

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 9-12 (“let every man . . . liberty”)
- B) Lines 20-23 (“and let . . . altars”)
- C) Lines 33-35 (“If such . . . borne with”)
- D) Lines 36-37 (“There . . . law”)

35

As used in line 24, “urge” most nearly means

- A) hasten.
- B) stimulate.
- C) require.
- D) advocate.

36

The sentence in lines 24-28 (“When . . . made”) primarily serves which function in Passage 1?

- A) It raises and refutes a potential counterargument to Lincoln's argument.
- B) It identifies and concedes a crucial shortcoming of Lincoln's argument.
- C) It acknowledges and substantiates a central assumption of Lincoln's argument.
- D) It anticipates and corrects a possible misinterpretation of Lincoln's argument.

37

As used in line 32, “observed” most nearly means

- A) followed.
- B) scrutinized.
- C) contemplated.
- D) noticed.

38

In Passage 2, Thoreau indicates that some unjust aspects of government are

- A) superficial and can be fixed easily.
- B) subtle and must be studied carefully.
- C) self-correcting and may be beneficial.
- D) inevitable and should be endured.

39

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 45-48 (“Unjust . . . once”)
- B) Lines 51-52 (“They . . . evil”)
- C) Lines 58-59 (“If the injustice . . . go”)
- D) Lines 75-78 (“A man . . . wrong”)



40

The primary purpose of each passage is to

- A) make an argument about the difference between legal duties and moral imperatives.
- B) discuss how laws ought to be enacted and changed in a democracy.
- C) advance a view regarding whether individuals should follow all of the country's laws.
- D) articulate standards by which laws can be evaluated as just or unjust.

41

Based on the passages, Lincoln would most likely describe the behavior that Thoreau recommends in lines 64-66 ("if it . . . law") as

- A) an excusable reaction to an intolerable situation.
- B) a rejection of the country's proper forms of remedy.
- C) an honorable response to an unjust law.
- D) a misapplication of a core principle of the Constitution.

42

Based on the passages, one commonality in the stances Lincoln and Thoreau take toward abolitionism is that

- A) both authors see the cause as warranting drastic action.
- B) both authors view the cause as central to their argument.
- C) neither author expects the cause to win widespread acceptance.
- D) neither author embraces the cause as his own.

**Questions 43-52 are based on the following passage and supplementary material.**

This passage is adapted from Kevin Bullis, “What Tech Is Next for the Solar Industry?” ©2013 by MIT Technology Review.

Solar panel installations continue to grow quickly, but the solar panel manufacturing industry is in the doldrums because supply far exceeds demand. The poor market may be slowing innovation, but advances continue; judging by the mood this week at the IEEE Photovoltaics Specialists Conference in Tampa, Florida, people in the industry remain optimistic about its long-term prospects.

The technology that’s surprised almost everyone is conventional crystalline silicon. A few years ago, silicon solar panels cost \$4 per watt, and Martin Green, professor at the University of New South Wales and one of the leading silicon solar panel researchers, declared that they’d never go below \$1 a watt. “Now it’s down to something like 50 cents a watt, and there’s talk of hitting 36 cents per watt,” he says.

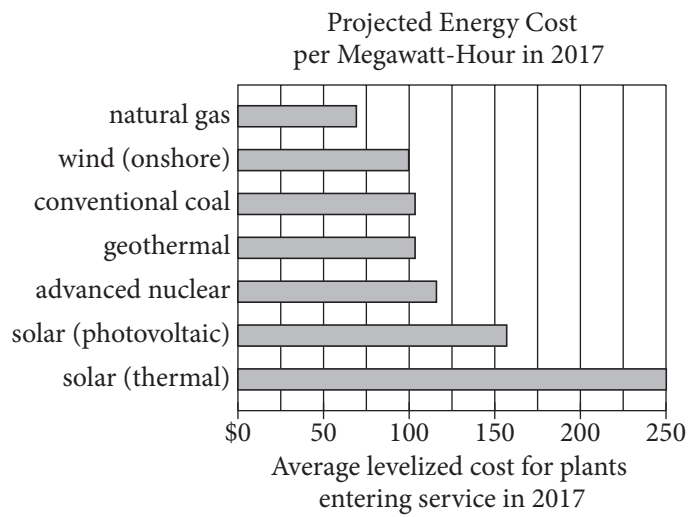
The U.S. Department of Energy has set a goal of reaching less than \$1 a watt—not just for the solar panels, but for complete, installed systems—by 2020. Green thinks the solar industry will hit that target even sooner than that. If so, that would bring the direct cost of solar power to six cents per kilowatt-hour, which is cheaper than the average cost expected for power from new natural gas power plants.

All parts of the silicon solar panel industry have been looking for ways to cut costs and improve the power output of solar panels, and that’s led to steady cost reductions. Green points to something as mundane as the pastes used to screen-print some of the features on solar panels. Green’s lab built a solar cell in the 1990s that set a record efficiency for silicon solar cells—a record that stands to this day. To achieve that record, he had to use expensive lithography techniques to make fine wires for collecting current from the solar cell. But gradual improvements have made it possible to use screen printing to produce ever-finer lines. Recent research suggests that screen-printing techniques can produce lines as thin as 30 micrometers—about the width of the lines Green used for his record solar cells, but at costs far lower than his lithography techniques.

Meanwhile, researchers at the National Renewable Energy Laboratory have made flexible solar cells on a new type of glass from Corning called Willow Glass, which is thin and can be rolled up. The type of solar cell they made is the only current challenger to silicon in terms of large-scale production—thin-film cadmium telluride. Flexible solar cells could lower the cost of installing solar cells, making solar power cheaper.

One of Green’s former students and colleagues, Jianhua Zhao, cofounder of solar panel manufacturer China Sunergy, announced this week that he is building a pilot manufacturing line for a two-sided solar cell that can absorb light from both the front and back. The basic idea, which isn’t new, is that during some parts of the day, sunlight falls on the land between rows of solar panels in a solar power plant. That light reflects onto the back of the panels and could be harvested to increase the power output. This works particularly well when the solar panels are built on sand, which is highly reflective. Where a one-sided solar panel might generate 340 watts, a two-sided one might generate up to 400 watts. He expects the panels to generate 10 to 20 percent more electricity over the course of a year.

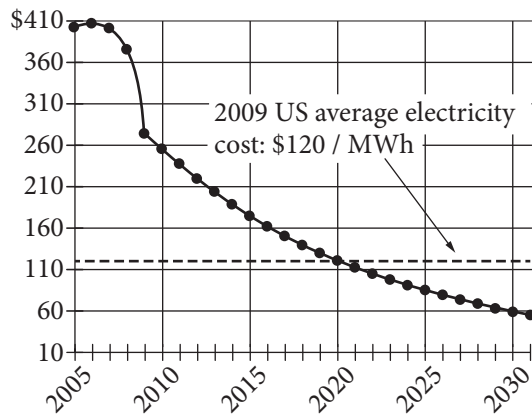
Even longer-term, Green is betting on silicon, aiming to take advantage of the huge reductions in cost already seen with the technology. He hopes to greatly increase the efficiency of silicon solar panels by combining silicon with one or two other semiconductors, each selected to efficiently convert a part of the solar spectrum that silicon doesn’t convert efficiently. Adding one semiconductor could boost efficiencies from the 20 to 25 percent range to around 40 percent. Adding another could make efficiencies as high as 50 percent feasible, which would cut in half the number of solar panels needed for a given installation. The challenge is to produce good connections between these semiconductors, something made challenging by the arrangement of silicon atoms in crystalline silicon.

**Figure 1**

Adapted from Peter Schwartz, "Abundant Natural Gas and Oil Are Putting the Kibosh on Clean Energy." ©2012 by Condé Nast.

**Figure 2**

Solar Photovoltaic Cost per Megawatt-Hour (MWh)  
(Projected beyond 2009. All data in 2009 dollars.)



Adapted from Ramez Naam, "Smaller, Cheaper, Faster: Does Moore's Law Apply to Solar Cells?" ©2011 by Scientific American.

43

The passage is written from the point of view of a

- A) consumer evaluating a variety of options.
- B) scientist comparing competing research methods.
- C) journalist enumerating changes in a field.
- D) hobbyist explaining the capabilities of new technology.

44

As used in line 4, “poor” most nearly means

- A) weak.
- B) humble.
- C) pitiable.
- D) obsolete.

45

It can most reasonably be inferred from the passage that many people in the solar panel industry believe that

- A) consumers don’t understand how solar panels work.
- B) two-sided cells have weaknesses that have not yet been discovered.
- C) the cost of solar panels is too high and their power output too low.
- D) Willow Glass is too inefficient to be marketable.

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-3 (“Solar . . . demand”)
- B) Lines 10-15 (“A few . . . a watt”)
- C) Lines 22-26 (“If so . . . plants”)
- D) Lines 27-30 (“All . . . reductions”)

47

According to the passage, two-sided solar panels will likely raise efficiency by

- A) requiring little energy to operate.
- B) absorbing reflected light.
- C) being reasonably inexpensive to manufacture.
- D) preventing light from reaching the ground.

48

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 58-61 (“The basic . . . plant”)
- B) Lines 61-62 (“That . . . output”)
- C) Lines 63-64 (“This . . . reflective”)
- D) Lines 64-66 (“Where . . . 400 watts”)

49

As used in line 69, “betting on” most nearly means

- A) dabbling in.
- B) gambling with.
- C) switching from.
- D) optimistic about.

50

The last sentence of the passage mainly serves to

- A) express concern about the limitations of a material.
- B) identify a hurdle that must be overcome.
- C) make a prediction about the effective use of certain devices.
- D) introduce a potential new area of study.

51

According to figure 1, in 2017, the cost of which of the following fuels is projected to be closest to the 2009 US average electricity cost shown in figure 2?

- A) Natural gas
- B) Wind (onshore)
- C) Conventional coal
- D) Advanced nuclear

52

According to figure 2, in what year is the average cost of solar photovoltaic power projected to be equal to the 2009 US average electricity cost?

- A) 2018
- B) 2020
- C) 2025
- D) 2027

# STOP

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

# Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

## DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

### A Necessary Resource for Science

In the winter of 1968, scientists David Schindler and Gregg Brunskill poured nitrates and phosphates into Lake **1** 227, this is one of the 58 freshwater bodies that compose Canada's remotely located Experimental Lakes Area. Schindler and Brunskill were contaminating the water not out of malice but in the name of research. While deliberately adding chemical compounds to a lake may seem **2** destructive and irresponsible, this method of experimenting is sometimes the most effective way to influence policy and save the environment from even more damaging pollution.

1

- A) NO CHANGE
- B) 227. Which is one
- C) 227. One
- D) 227, one

2

- A) NO CHANGE
- B) destructive, and irresponsible this method
- C) destructive and, irresponsible, this method
- D) destructive and irresponsible this method,

Schindler and Brunskill were investigating possible causes for the large blooms of blue-green algae, or cyanobacteria, that had been affecting bodies of water such as Lake Erie. **3** In addition to being unsightly and odorous, these algal blooms cause oxygen depletion. Oxygen depletion kills fish and other wildlife in the lakes. Just weeks after the scientists added the nitrates and phosphates, the water in Lake 227 turned bright **4** green. It was thick with: the same type of algal blooms that had plagued Lake Erie.

3

Which choice most effectively combines the underlined sentences?

- A) In addition to being unsightly and odorous, these algal blooms cause oxygen depletion: the result being that it kills fish and other wildlife in the lakes.
- B) In addition to being unsightly and odorous, these algal blooms cause oxygen depletion; the algal blooms cause oxygen depletion that kills fish and other wildlife in the lakes.
- C) In addition to being unsightly and odorous, these algal blooms cause oxygen depletion, and oxygen depletion caused by the algal blooms kills fish and other wildlife in the lakes.
- D) In addition to being unsightly and odorous, these algal blooms cause oxygen depletion, which kills fish and other wildlife in the lakes.

4

- A) NO CHANGE
- B) green: it was thick with
- C) green. It was thick with—
- D) green, it was thick with

5 One mission of the Experimental Lakes Area is to conduct research that helps people better understand threats to the environment. The scientists divided the lake in half by placing a nylon barrier through the narrowest part of its figure-eight shape. In one half of Lake 226, they added phosphates, nitrates, and a source of carbon; in the other, they added just nitrates 6 and a source of carbon was added. Schindler and Brunskill hypothesized that phosphates were responsible for the growth of cyanobacteria. The experiment confirmed their suspicions when the half of the lake containing the phosphates 7 was teeming with blue-green algae.

5

Which choice provides the best transition from the previous paragraph to this one?

- A) NO CHANGE
- B) The Experimental Lakes Area is located in a sparsely inhabited region that experiences few effects of human and industrial activity.
- C) To isolate the cause of the algae, Schindler and Brunskill performed another experiment, this time using Lake 226.
- D) The process by which water becomes enriched by dissolved nutrients, such as phosphates, is called eutrophication.

6

- A) NO CHANGE
- B) and a source of carbon.
- C) plus also a source of carbon.
- D) but also adding a source of carbon.

7

- A) NO CHANGE
- B) were teeming
- C) are teeming
- D) teems



Schindler and Brunskill's findings were **8** shown off by the journal *Science*. The research demonstrated a clear correlation between introducing phosphates and the growth of blue-green algae. **9** For example, legislators in Canada passed laws banning phosphates in laundry detergents, which had been entering the water supply. **10**

8

- A) NO CHANGE
- B) put in the spotlight of
- C) published in
- D) put into

9

- A) NO CHANGE
- B) Similarly,
- C) However,
- D) Subsequently,

10

At this point, the writer wants to add a second policy outcome of the research described. Which choice best accomplishes this goal?

- A) Lake 226 continued to develop blooms of blue-green algae for eight consecutive years after the experiment took place.
- B) In the United States, many individual states have also adopted legislation to eliminate, or at least reduce, phosphorous content in laundry detergents.
- C) In 1974, Schindler initiated a study of the effects of acid rain, using Lake 223 to examine how sulfuric acid altered aquatic ecosystems.
- D) Aerial photos of the lakes taken before and during algal blooms helped convey the effects of phosphates in water to the public.

Experiments like these can help people understand the unintended consequences of using certain household products. **11** Of course, regulating the use of certain chemical compounds can be a controversial issue.

Selectively establishing remote study locations, such as the Experimental Lakes Area, can provide scientists with opportunities to safely conduct controlled research. This research can generate evidence solid enough to persuade policy makers to take action in favor of protecting the larger environment.

11

Which choice most effectively anticipates and addresses a relevant counterargument to the argument in favor of the types of experiments described in the passage?

- A) NO CHANGE
- B) Many companies now offer phosphate-free alternatives for household cleaning products.
- C) Obviously, scientists should not be allowed to randomly perform experiments on just any body of water.
- D) Phosphates are sometimes used in agricultural fertilizers, in addition to being used in cleaning products.

Questions 12-22 are based on the following passage.

**A Little to the Left, but Not Too Much!**

Italy's Tower of Pisa has been leaning southward since the initial **12** stages of it's construction over 800 years ago. **13** Indeed, if the tower's construction had not taken two centuries and involved significant breaks due to war and civil unrest, which allowed the ground beneath the tower to settle, the tower would likely have collapsed before it was completed.

**12**

- A) NO CHANGE
- B) stage's of its'
- C) stage's of it's
- D) stages of its

**13**

- A) NO CHANGE
- B) Therefore,
- C) Nevertheless,
- D) However,

Luckily, the tower survived, and its tilt has made it an Italian **14** icon, it attracts visitors from all over who flock to Pisa to see one of the greatest architectural **15** weirdnesses in the world. **16** By the late twentieth century, the angle of the tower's tilt had reached an astonishing 5.5 degrees; in **17** 1990, Italy's government closed the tower to visitors and appointed a committee to find a way to save it.

14

- A) NO CHANGE
- B) icon, attracting
- C) icon, its attracting
- D) icon; attracting

15

- A) NO CHANGE
- B) deviations
- C) oddities
- D) abnormalities

16

At this point, the writer is considering adding the following sentence.

Unfortunately, the tower's tilt has steadily increased over the centuries, placing the structure in danger of collapse.

Should the writer make this addition here?

- A) Yes, because it provides an important restatement of the main claim in the previous sentence.
- B) Yes, because it establishes an important shift in emphasis in the paragraph's discussion about the tower's tilt.
- C) No, because it interrupts the paragraph's discussion with irrelevant information.
- D) No, because it repeats information that is already presented in the first paragraph.

17

- A) NO CHANGE
- B) 1990, Italy's government, closed
- C) 1990 Italy's government, closed,
- D) 1990: Italy's government closed

The committee was charged with saving the tower without ruining its aesthetic, **18** which no one had yet managed to achieve. The committee's first attempt to reduce the angle of the tower's tilt—placing 600 tons of iron ingots (molded pieces of metal) on the tower's north side to create a counterweight—was derided because the bulky weights ruined the tower's appearance. The attempt at a less visible solution—sinking anchors into the ground below the tower—almost caused the tower to fall.

18

Which choice best supports the main point of the paragraph?

- A) NO CHANGE
- B) although not everyone on the committee agreed completely about what that aesthetic was.
- C) which meant somehow preserving the tower's tilt while preventing that tilt from increasing and toppling the tower.
- D) which included the pristine white marble finish that has come to be widely associated with the tower's beauty.

[1] Enter committee member John Burland, **19** he is a geotechnical engineer from England who saved London’s clock tower Big Ben from collapse. [2] Burland began a years-long process of drilling out small amounts of soil from under the tower **20** that took several years to complete and then monitoring the tower’s resulting movement. [3] Twice daily, Burland evaluated these movements and made recommendations as to how much soil should be removed in the next drilling. [4] By 2001, almost 77 tons of soil had been removed, and the tower’s tilt had decreased by over 1.5 degrees; the ugly iron weights were removed, and the tower was reopened to visitors. [5] Burland **21** advocated using soil extraction: removing small amounts of soil from under the tower’s north side, opposite its tilt, to enable gravity to straighten the tower. **22**

The tower’s tilt has not increased since, and the committee is confident that the tower will be safe for another 200 years. Burland is now working on a more permanent solution for keeping the tower upright, but he is adamant that the tower never be completely straightened. In an interview with PBS’s *Nova*, Burland explained that it is very important “that we don’t really change the character of the monument. That would be quite wrong and quite inappropriate.”

19

- A) NO CHANGE
- B) Burland is
- C) his being
- D) DELETE the underlined portion.

20

- A) NO CHANGE
- B) —taking several years to complete—
- C) that took him several years to complete
- D) DELETE the underlined portion.

21

- A) NO CHANGE
- B) advocated to use
- C) advocated the using of
- D) advocating to use

22

To make this paragraph most logical, sentence 5 should be

- A) placed after sentence 1.
- B) placed after sentence 2.
- C) placed after sentence 3.
- D) DELETED from the paragraph.

Questions 23-33 are based on the following passage and supplementary material.

### The Physician Assistant Will See You Now

**23** The term “paramedics” refers to health care workers who provide routine and clinical services. While the pressures of an aging population, insurance reforms, and health epidemics have increased demand for care, the supply of physicians is not expected to **24** keep pace. The Association of American Medical Colleges predicts a shortage of over 90,000 physicians by 2020; by 2025, that number could climb to more than 130,000. In some parts of the country, shortages are already a sad fact of life. A 2009 report by the Bureau of Health Professions notes that although a fifth of the US population lives in rural areas, less than a tenth of US physicians serves that population. Because a traditionalist response to the crisis—**25** amping up medical-college enrollments and expanding physician training programs—is too slow and costly to address the near-term problem, alternatives are being explored. One promising avenue has been greater reliance on physician assistants (PAs).

23

Which choice is the best introduction to the paragraph?

- A) NO CHANGE
- B) For many Americans, finding a physician is likely to become a growing challenge.
- C) Getting treatment for an illness usually requires seeing either a general practitioner or a specialist.
- D) Worldwide the costs of health care are increasing at an alarming rate.

24

- A) NO CHANGE
- B) maintain the tempo.
- C) get in line.
- D) move along.

25

- A) NO CHANGE
- B) bolstering
- C) arousing
- D) revving up

26 By virtue of 27 there medical training, PAs can perform many of the jobs traditionally done by doctors, including treating chronic and acute conditions, performing minor 28 surgeries; and prescribing some medications. However, although well 29 compensated earning in 2012 a median annual salary of \$90,930, PAs cost health care providers less than do the physicians who

26

At this point, the writer is considering adding the following sentence.

Several factors argue in favor of such an expanded role.

Should the writer make this addition here?

- A) Yes, because it introduces a counterargument for balance.
- B) Yes, because it frames the points that the paragraph will examine.
- C) No, because it does not specify the education required to be a PA.
- D) No, because it presents information that is only tangential to the main argument.

27

- A) NO CHANGE
- B) they're
- C) their
- D) his or her

28

- A) NO CHANGE
- B) surgeries; and
- C) surgeries, and,
- D) surgeries, and

29

- A) NO CHANGE
- B) compensated (earning in 2012 a median annual salary of \$90,930),
- C) compensated, earning in 2012 a median annual salary of \$90,930
- D) compensated: earning in 2012 a median annual salary of \$90,930,



might otherwise undertake these tasks. Moreover, the training period for PAs is markedly shorter than

**30** those for physicians—two to three years versus the seven to eleven required for physicians.

Physician assistants already offer vital primary care in many locations. Some 90,000 PAs were employed nationwide in 2012. Over and above their value in partially compensating for the general physician shortage has been their extraordinary contribution to rural health care. A recent review of the scholarly literature by Texas researchers found that PAs lend cost-efficient, widely appreciated services in underserved areas.

**31** In addition, rural-based PAs often provide a broader spectrum of such services than do their urban and suburban counterparts, possibly as a consequence of the limited pool of rural-based physicians.

30

- A) NO CHANGE
- B) that compared with
- C) that for
- D) DELETE the underlined portion.

31

- A) NO CHANGE
- B) Thus,
- C) Despite this,
- D) On the other hand,

Increasingly, PAs and other such medical practitioners have become a critical complement to physicians. A 2013 RAND Corporation report estimates that while the number of primary care physicians will increase slowly from 2010 to 2025, the number of physician assistants and nurse-practitioners in primary care will grow at much faster rates. **32** Both by merit and from necessity, PAs are likely to greet more **33** patience than ever before.

Supply of Physicians, Physician Assistants,  
and Nurse-Practitioners in Primary Care  
Clinical Practice in 2010 and 2025

Provider type	2010		2025 (predicted)	
	Number	Percent of total	Number	Percent of total
Physicians	210,000	71	216,000	60
Physician assistants	30,000	10	42,000	12
Nurse-practitioners	56,000	19	103,000	28
Total	296,000	100	361,000	100

Adapted from David I. Auerbach et al., "Nurse-Managed Health Centers and Patient-Centered Medical Homes Could Mitigate Expected Primary Care Physician Shortage." ©2013 by Project HOPE: The People-to-People Health Foundation, Inc.

32

At this point, the writer is considering adding the following sentence.

In fact, according to the data presented in the table, physician assistants will likely outnumber physicians by 2025.

Should the writer make this addition here?

- A) Yes, because it provides additional support for the main point of the paragraph.
- B) Yes, because it addresses a possible counterargument to the writer's main claim.
- C) No, because it is not an accurate interpretation of the data.
- D) No, because it introduces irrelevant information that interrupts the flow of the passage.

33

- A) NO CHANGE
- B) patience, than
- C) patients then
- D) patients than

Questions 34-44 are based on the following passage.

**Gold into Silver: The “Reverse Alchemy” of Superhero Comics History**

**34** Popular film franchises are often “rebooted” in an effort to make their characters and stories fresh and relevant for new audiences. Superhero comic books are periodically reworked to try to increase their appeal to contemporary readers. This practice is almost as **35** elderly as the medium itself and has in large part established the “ages” that compose comic book history. The shift from the Golden to the Silver Age is probably the most successful **36** example: of publishers responding to changing times and tastes.

34

Which choice most effectively combines the underlined sentences?

- A) In an effort to make their characters and stories fresh and relevant for new audiences, popular film franchises, which are often “rebooted,” are similar to superhero comic books, which are periodically reworked to try to increase their appeal to contemporary readers.
- B) Just as popular film franchises are often “rebooted” in an effort to make their characters and stories fresh and relevant for new audiences, superhero comic books are periodically reworked to try to increase their appeal to contemporary readers.
- C) Superhero comic books are periodically reworked to try to increase their appeal to contemporary readers, while popular film franchises are often “rebooted” in an effort to make their characters and stories fresh and relevant for new audiences.
- D) Superhero comic books are much like popular film franchises in being often “rebooted” in an effort to make their characters and stories fresh and relevant for new audiences and periodically reworked to try to increase their appeal to contemporary readers.

35

- A) NO CHANGE
- B) old
- C) mature
- D) geriatric

36

- A) NO CHANGE
- B) example, of publishers
- C) example of publishers,
- D) example of publishers

The start of the first (“Golden”) age of comic books is often dated to 1938 with the debut of Superman in *Action Comics* #1. Besides beginning the age, Superman in many respects defined it, becoming the model on which many later superheroes were based. His characterization, as established in *Superman* #1 (1939), was relatively simple. He could “hurdle skyscrapers” and “leap an eighth of a mile”; “run faster than a streamline train”; withstand anything less than a “bursting shell”; and **37** lift a car over his head. Sent to Earth from the “doomed planet” Krypton, he was raised by human foster parents, whose love helped infuse him with an unapologetic desire to “benefit mankind.” Admirable but aloof, the Golden Age Superman was arguably more paragon than character, a problem only partially solved by giving him a human alter ego. Other Golden Age superheroes were similarly archetypal: Batman was a crime-fighting millionaire, Wonder Woman a warrior princess from a mythical island.

37

Which choice is most consistent with the previous examples in the sentence?

- A) NO CHANGE
- B) hold down a regular job as a newspaper reporter.
- C) wear a bright blue costume with a flowing red cape.
- D) live in the big city of Metropolis instead of the small town where he grew up.

By contrast, the second (“Silver”) age of comics was marked by characters that, though somewhat simplistic by today’s standards, **38** were provided with origin stories often involving scientific experiments gone wrong. In addition to super villains, the new, soon-to-be-iconic characters of the **39** age: Spider-Man, the Fantastic Four, and the Hulk among them—had to cope with mundane, real-life problems, including paying the rent, dealing with family squabbles, and facing anger, loneliness, and ostracism. Their interior lives were richer and their motivations more complex. Although sales remained strong for Golden Age stalwarts Superman and, to a lesser extent, Batman, **40** subsequent decades would show the enduring appeal of these characters.

38

Which choice most effectively sets up the main idea of the following two sentences?

- A) NO CHANGE
- B) reflected the increasing conservatism of the United States in the 1950s.
- C) engaged in bizarre adventures frequently inspired by science fiction.
- D) were more “realistic” than their Golden Age counterparts.

39

- A) NO CHANGE
- B) age;
- C) age,
- D) age—

40

The writer wants a conclusion to the sentence and paragraph that logically completes the discussion of the Silver Age and provides an effective transition into the next paragraph. Which choice best accomplishes these goals?

- A) NO CHANGE
- B) the distinctions between later stages of comic book history are less well defined than the one between the Golden and Silver Ages.
- C) readers increasingly gravitated to the upstarts as the 1960s and the Silver Age drew to a close.
- D) these characters themselves underwent significant changes over the course of the Silver Age.

More transformations would take place in the medium as the Silver Age gave way to the Bronze and Modern (and possibly Postmodern) Ages. Such efforts **41** have yielded diminishing returns, as even the complete relaunch of DC **42** Comics' superhero's, line in 2011 has failed to arrest the steep two-decade decline of comic book sales. For both commercial and, arguably, creative reasons, **43** then, no transition was more successful than **44** those from the Golden to Silver Age.

41

- A) NO CHANGE
- B) would have yielded
- C) were yielding
- D) will yield

42

- A) NO CHANGE
- B) Comic's superhero's
- C) Comics superhero's
- D) Comics' superhero

43

- A) NO CHANGE
- B) however,
- C) nevertheless,
- D) yet,

44

- A) NO CHANGE
- B) these
- C) that
- D) DELETE the underlined portion.

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**



# Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

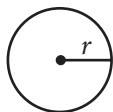
## DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

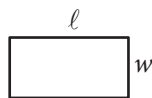
- The use of a calculator **is not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

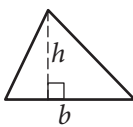


$$A = \pi r^2$$

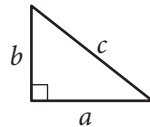
$$C = 2\pi r$$



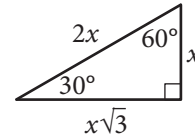
$$A = \ell w$$



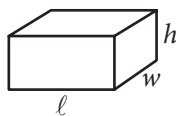
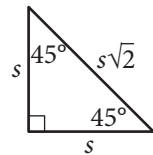
$$A = \frac{1}{2}bh$$



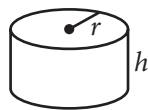
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



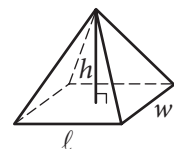
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.





1

Salim wants to purchase tickets from a vendor to watch a tennis match. The vendor charges a one-time service fee for processing the purchase of the tickets. The equation  $T = 15n + 12$  represents the total amount  $T$ , in dollars, Salim will pay for  $n$  tickets. What does 12 represent in the equation?

- A) The price of one ticket, in dollars
- B) The amount of the service fee, in dollars
- C) The total amount, in dollars, Salim will pay for one ticket
- D) The total amount, in dollars, Salim will pay for any number of tickets

2

A gardener buys two kinds of fertilizer. Fertilizer A contains 60% filler materials by weight and Fertilizer B contains 40% filler materials by weight. Together, the fertilizers bought by the gardener contain a total of 240 pounds of filler materials. Which equation models this relationship, where  $x$  is the number of pounds of Fertilizer A and  $y$  is the number of pounds of Fertilizer B?

- A)  $0.4x + 0.6y = 240$
- B)  $0.6x + 0.4y = 240$
- C)  $40x + 60y = 240$
- D)  $60x + 40y = 240$

3

What is the sum of the complex numbers  $2 + 3i$  and  $4 + 8i$ , where  $i = \sqrt{-1}$  ?

- A) 17
- B)  $17i$
- C)  $6 + 11i$
- D)  $8 + 24i$

4

$$4x^2 - 9 = (px + t)(px - t)$$

In the equation above,  $p$  and  $t$  are constants. Which of the following could be the value of  $p$  ?

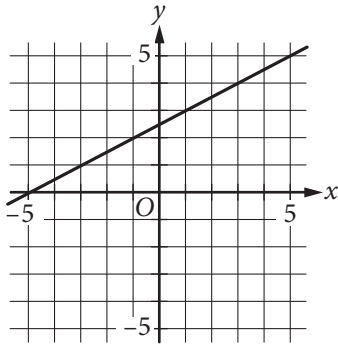
- A) 2
- B) 3
- C) 4
- D) 9



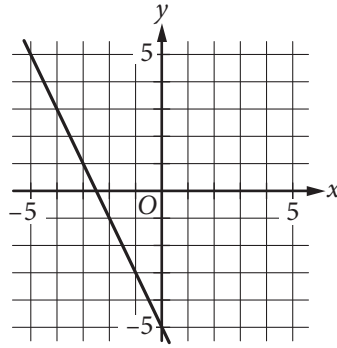
5

Which of the following is the graph of the equation  $y = 2x - 5$  in the  $xy$ -plane?

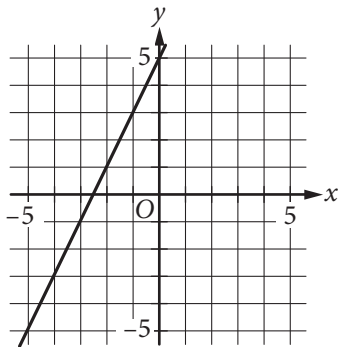
A)



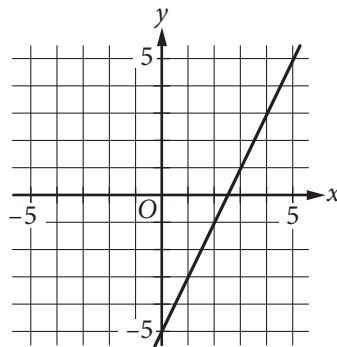
B)



C)



D)





6

If  $x = \frac{2}{3}y$  and  $y = 18$ , what is the value of  $2x - 3$  ?

- A) 21
- B) 15
- C) 12
- D) 10

7

A bricklayer uses the formula  $n = 7\ell h$  to estimate the number of bricks,  $n$ , needed to build a wall that is  $\ell$  feet long and  $h$  feet high. Which of the following correctly expresses  $\ell$  in terms of  $n$  and  $h$  ?

- A)  $\ell = \frac{7}{nh}$
- B)  $\ell = \frac{h}{7n}$
- C)  $\ell = \frac{n}{7h}$
- D)  $\ell = \frac{n}{7+h}$

8

$x$	$w(x)$	$t(x)$
1	-1	-3
2	3	-1
3	4	1
4	3	3
5	-1	5

The table above shows some values of the functions  $w$  and  $t$ . For which value of  $x$  is  $w(x) + t(x) = x$  ?

- A) 1
- B) 2
- C) 3
- D) 4

9

If  $\sqrt{x} + \sqrt{9} = \sqrt{64}$ , what is the value of  $x$  ?

- A)  $\sqrt{5}$
- B) 5
- C) 25
- D) 55

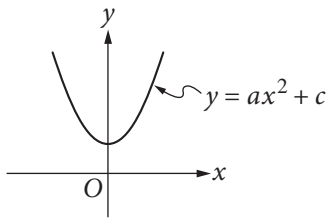


10

Jaime is preparing for a bicycle race. His goal is to bicycle an average of at least 280 miles per week for 4 weeks. He bicycled 240 miles the first week, 310 miles the second week, and 320 miles the third week. Which inequality can be used to represent the number of miles,  $x$ , Jaime could bicycle on the 4th week to meet his goal?

- A)  $\frac{240 + 310 + 320}{3} + x \geq 280$
- B)  $240 + 310 + 320 \geq x(280)$
- C)  $\frac{240}{4} + \frac{310}{4} + \frac{320}{4} + x \geq 280$
- D)  $240 + 310 + 320 + x \geq 4(280)$

11



The vertex of the parabola in the  $xy$ -plane above is  $(0, c)$ . Which of the following is true about the parabola with the equation  $y = -a(x - b)^2 + c$ ?

- A) The vertex is  $(b, c)$  and the graph opens upward.
- B) The vertex is  $(b, c)$  and the graph opens downward.
- C) The vertex is  $(-b, c)$  and the graph opens upward.
- D) The vertex is  $(-b, c)$  and the graph opens downward.

12

Which of the following is equivalent to  $\frac{4x^2 + 6x}{4x + 2}$ ?

- A)  $x$
- B)  $x + 4$
- C)  $x - \frac{2}{4x + 2}$
- D)  $x + 1 - \frac{2}{4x + 2}$

13

$$2x^2 - 4x = t$$

In the equation above,  $t$  is a constant. If the equation has no real solutions, which of the following could be the value of  $t$ ?

- A)  $-3$
- B)  $-1$
- C)  $1$
- D)  $3$



14

A laundry service is buying detergent and fabric softener from its supplier. The supplier will deliver no more than 300 pounds in a shipment. Each container of detergent weighs 7.35 pounds, and each container of fabric softener weighs 6.2 pounds. The service wants to buy at least twice as many containers of detergent as containers of fabric softener. Let  $d$  represent the number of containers of detergent, and let  $s$  represent the number of containers of fabric softener, where  $d$  and  $s$  are nonnegative integers. Which of the following systems of inequalities best represents this situation?

- A)  $7.35d + 6.2s \leq 300$   
 $d \geq 2s$
- B)  $7.35d + 6.2s \leq 300$   
 $2d \geq s$
- C)  $14.7d + 6.2s \leq 300$   
 $d \geq 2s$
- D)  $14.7d + 6.2s \leq 300$   
 $2d \geq s$

15

Which of the following is equivalent to  $\left(a + \frac{b}{2}\right)^2$ ?

- A)  $a^2 + \frac{b^2}{2}$
- B)  $a^2 + \frac{b^2}{4}$
- C)  $a^2 + \frac{ab}{2} + \frac{b^2}{2}$
- D)  $a^2 + ab + \frac{b^2}{4}$



**DIRECTIONS**

For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
○	○	○	○

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

	7	/	1	2
○	○	○	○	○
○	0	0	0	0
①	①	●	①	①
②	②	②	●	②
③	③	③	③	③
④	④	④	④	④
⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨

Write answer in boxes. →

← Fraction line

Grid in result.

Answer: 2.5

	2	.	5
○	○	○	○
○	0	0	0
①	①	①	①
②	●	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	●
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
○	○	○	○
○	0	0	0
①	①	①	①
②	●	②	②
③	③	③	●
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	6
○	○	○	○
○	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	●	●	●
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	7
○	○	○	○
○	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	●	●	⑥
⑦	⑦	⑦	●
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 201 – either position is correct

	2	0	1
○	○	○	○
○	0	0	0
①	①	①	●
②	●	②	②
③	③	③	③

2	0	1	
○	○	○	○
○	0	0	0
①	①	●	①
②	●	②	②
③	③	③	③

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

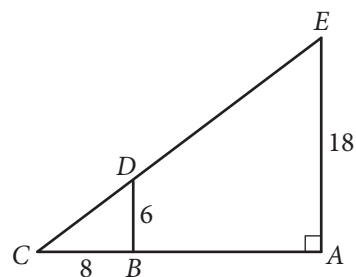
If  $a^{\frac{b}{4}} = 16$  for positive integers  $a$  and  $b$ , what is one possible value of  $b$  ?

17

$$\frac{2}{3}t = \frac{5}{2}$$

What value of  $t$  is the solution of the equation above?

18



In the figure above,  $\overline{BD}$  is parallel to  $\overline{AE}$ . What is the length of  $\overline{CE}$  ?



19

How many liters of a 25% saline solution must be added to 3 liters of a 10% saline solution to obtain a 15% saline solution?

20

Points  $A$  and  $B$  lie on a circle with radius 1, and arc  $\widehat{AB}$  has length  $\frac{\pi}{3}$ . What fraction of the circumference of the circle is the length of arc  $\widehat{AB}$  ?

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



**No Test Material On This Page**



# Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

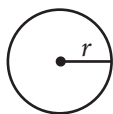
## DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

## NOTES

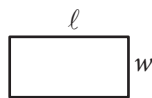
- The use of a calculator is permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function  $f$  is the set of all real numbers  $x$  for which  $f(x)$  is a real number.

## REFERENCE

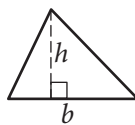


$$A = \pi r^2$$

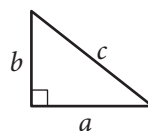
$$C = 2\pi r$$



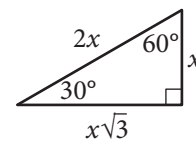
$$A = \ell w$$



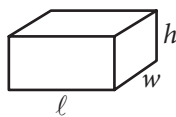
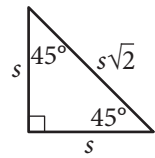
$$A = \frac{1}{2}bh$$



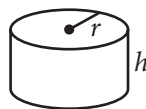
$$c^2 = a^2 + b^2$$



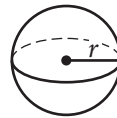
Special Right Triangles



$$V = \ell wh$$



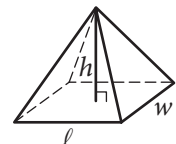
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

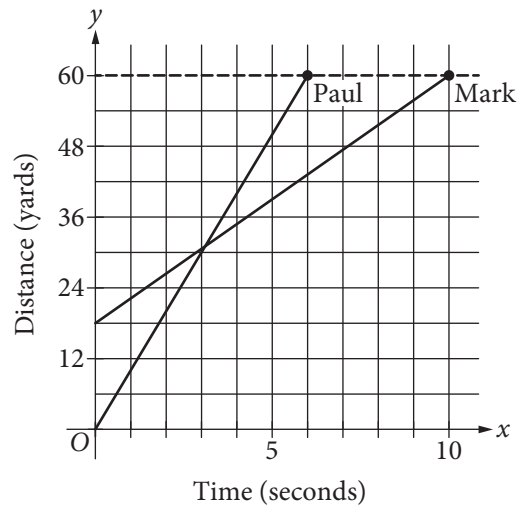


1

Which expression is equivalent to  $(2x^2 - 4) - (-3x^2 + 2x - 7)$  ?

- A)  $5x^2 - 2x + 3$
- B)  $5x^2 + 2x - 3$
- C)  $-x^2 - 2x - 11$
- D)  $-x^2 + 2x - 11$

2



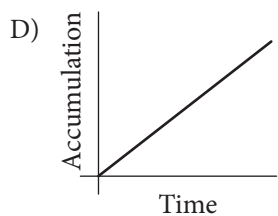
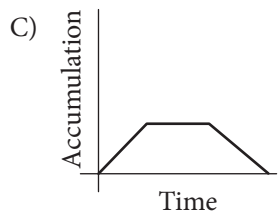
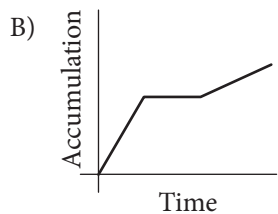
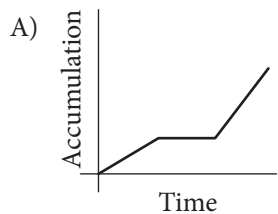
The graph above shows the positions of Paul and Mark during a race. Paul and Mark each ran at a constant rate, and Mark was given a head start to shorten the distance he needed to run. Paul finished the race in 6 seconds, and Mark finished the race in 10 seconds. According to the graph, Mark was given a head start of how many yards?

- A) 3
- B) 12
- C) 18
- D) 24



3

Snow fell and then stopped for a time. When the snow began to fall again, it fell at a faster rate than it had initially. Assuming that none of the snow melted during the time indicated, which of the following graphs could model the total accumulation of snow versus time?



4

A website-hosting service charges businesses a onetime setup fee of \$350 plus  $d$  dollars for each month. If a business owner paid \$1,010 for the first 12 months, including the setup fee, what is the value of  $d$  ?

- A) 25
- B) 35
- C) 45
- D) 55

5

$$6x - 9y > 12$$

Which of the following inequalities is equivalent to the inequality above?

- A)  $x - y > 2$
- B)  $2x - 3y > 4$
- C)  $3x - 2y > 4$
- D)  $3y - 2x > 2$



6

Where Do People Get Most of Their Medical Information?

Source	Percent of those surveyed
Doctor	63%
Internet	13%
Magazines/brochures	9%
Pharmacy	6%
Television	2%
Other/none of the above	7%

The table above shows a summary of 1,200 responses to a survey question. Based on the table, how many of those surveyed get most of their medical information from either a doctor or the Internet?

- A) 865
- B) 887
- C) 912
- D) 926

7

The members of a city council wanted to assess the opinions of all city residents about converting an open field into a dog park. The council surveyed a sample of 500 city residents who own dogs. The survey showed that the majority of those sampled were in favor of the dog park. Which of the following is true about the city council's survey?

- A) It shows that the majority of city residents are in favor of the dog park.
- B) The survey sample should have included more residents who are dog owners.
- C) The survey sample should have consisted entirely of residents who do not own dogs.
- D) The survey sample is biased because it is not representative of all city residents.



8

Ice Cream and Topping Selections

		Flavor	
		Vanilla	Chocolate
Topping	Hot fudge	8	6
	Caramel	5	6

The table above shows the flavors of ice cream and the toppings chosen by the people at a party. Each person chose one flavor of ice cream and one topping. Of the people who chose vanilla ice cream, what fraction chose hot fudge as a topping?

- A)  $\frac{8}{25}$   
 B)  $\frac{5}{13}$   
 C)  $\frac{13}{25}$   
 D)  $\frac{8}{13}$

9

The total area of a coastal city is 92.1 square miles, of which 11.3 square miles is water. If the city had a population of 621,000 people in the year 2010, which of the following is closest to the population density, in people per square mile of land area, of the city at that time?

- A) 6,740  
 B) 7,690  
 C) 55,000  
 D) 76,000



10

Between 1497 and 1500, Amerigo Vespucci embarked on two voyages to the New World. According to Vespucci's letters, the first voyage lasted 43 days longer than the second voyage, and the two voyages combined lasted a total of 1,003 days. How many days did the second voyage last?

- A) 460
- B) 480
- C) 520
- D) 540

11

$$7x + 3y = 8$$

$$6x - 3y = 5$$

For the solution  $(x, y)$  to the system of equations above, what is the value of  $x - y$  ?

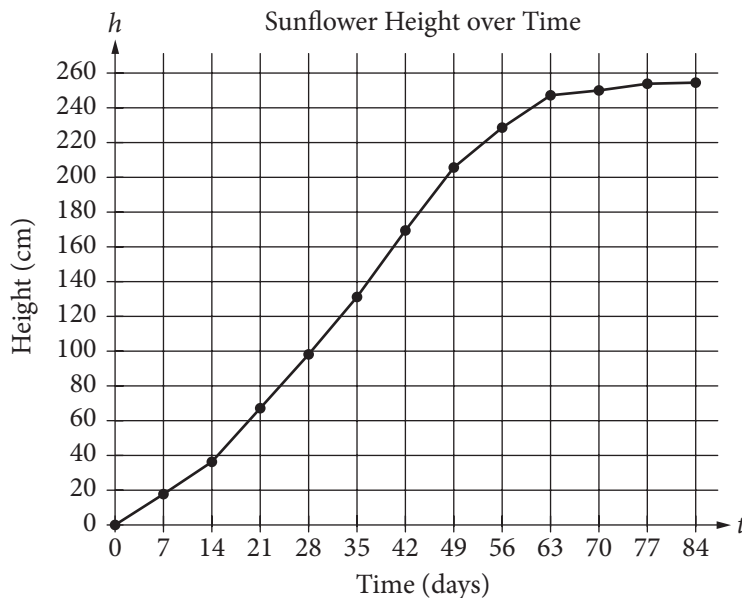
- A)  $-\frac{4}{3}$
- B)  $\frac{2}{3}$
- C)  $\frac{4}{3}$
- D)  $\frac{22}{3}$



Questions 12-14 refer to the following information.

Sunflower Growth

Day	Height (cm)
0	0.00
7	17.93
14	36.36
21	67.76
28	98.10
35	131.00
42	169.50
49	205.50
56	228.30
63	247.10
70	250.50
77	253.80
84	254.50



In 1919, H. S. Reed and R. H. Holland published a paper on the growth of sunflowers. Included in the paper were the table and graph above, which show the height  $h$ , in centimeters, of a sunflower  $t$  days after the sunflower begins to grow.

12

Over which of the following time periods is the average growth rate of the sunflower least?

- A) Day 0 to Day 21
- B) Day 21 to Day 42
- C) Day 42 to Day 63
- D) Day 63 to Day 84

13

The function  $h$ , defined by  $h(t) = at + b$ , where  $a$  and  $b$  are constants, models the height, in centimeters, of the sunflower after  $t$  days of growth during a time period in which the growth is approximately linear. What does  $a$  represent?

- A) The predicted number of centimeters the sunflower grows each day during the period
- B) The predicted height, in centimeters, of the sunflower at the beginning of the period
- C) The predicted height, in centimeters, of the sunflower at the end of the period
- D) The predicted total increase in the height of the sunflower, in centimeters, during the period





14

The growth rate of the sunflower from day 14 to day 35 is nearly constant. On this interval, which of the following equations best models the height  $h$ , in centimeters, of the sunflower  $t$  days after it begins to grow?

- A)  $h = 2.1t - 15$   
 B)  $h = 4.5t - 27$   
 C)  $h = 6.8t - 12$   
 D)  $h = 13.2t - 18$

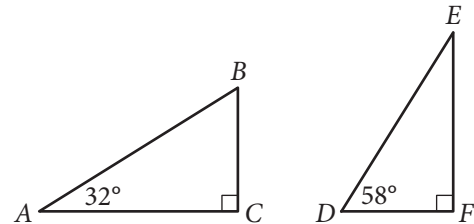
15

$x$	1	2	3	4	5
$y$	$\frac{11}{4}$	$\frac{25}{4}$	$\frac{39}{4}$	$\frac{53}{4}$	$\frac{67}{4}$

Which of the following equations relates  $y$  to  $x$  for the values in the table above?

- A)  $y = \frac{1}{2} \cdot \left(\frac{5}{2}\right)^x$   
 B)  $y = 2 \cdot \left(\frac{3}{4}\right)^x$   
 C)  $y = \frac{3}{4}x + 2$   
 D)  $y = \frac{7}{2}x - \frac{3}{4}$

16

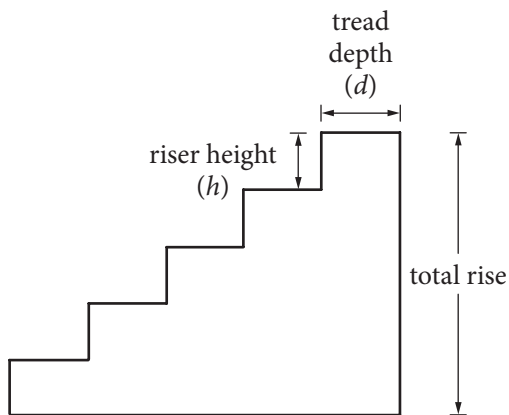


Triangles  $ABC$  and  $DEF$  are shown above. Which of the following is equal to the ratio  $\frac{BC}{AB}$  ?

- A)  $\frac{DE}{DF}$   
 B)  $\frac{DF}{DE}$   
 C)  $\frac{DF}{EF}$   
 D)  $\frac{EF}{DE}$



Questions 17-19 refer to the following information.



Note: Figure not drawn to scale.

When designing a stairway, an architect can use the riser-tread formula  $2h + d = 25$ , where  $h$  is the riser height, in inches, and  $d$  is the tread depth, in inches. For any given stairway, the riser heights are the same and the tread depths are the same for all steps in that stairway.

The number of steps in a stairway is the number of its risers. For example, there are 5 steps in the stairway in the figure above. The total rise of a stairway is the sum of the riser heights as shown in the figure.

17

Which of the following expresses the riser height in terms of the tread depth?

- A)  $h = \frac{1}{2}(25 + d)$
- B)  $h = \frac{1}{2}(25 - d)$
- C)  $h = -\frac{1}{2}(25 + d)$
- D)  $h = -\frac{1}{2}(25 - d)$

18

Some building codes require that, for indoor stairways, the tread depth must be at least 9 inches and the riser height must be at least 5 inches. According to the riser-tread formula, which of the following inequalities represents the set of all possible values for the riser height that meets this code requirement?

- A)  $0 \leq h \leq 5$
- B)  $h \geq 5$
- C)  $5 \leq h \leq 8$
- D)  $8 \leq h \leq 16$

19

An architect wants to use the riser-tread formula to design a stairway with a total rise of 9 feet, a riser height between 7 and 8 inches, and an odd number of steps. With the architect's constraints, which of the following must be the tread depth, in inches, of the stairway? (1 foot = 12 inches)

- A) 7.2
- B) 9.5
- C) 10.6
- D) 15



20

What is the sum of the solutions to  $(x - 6)(x + 0.7) = 0$  ?

- A) -6.7
- B) -5.3
- C) 5.3
- D) 6.7

21

A study was done on the weights of different types of fish in a pond. A random sample of fish were caught and marked in order to ensure that none were weighed more than once. The sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds. Which of the following conclusions is best supported by the sample data?

- A) The majority of all fish in the pond weigh less than 2 pounds.
- B) The average weight of all fish in the pond is approximately 2 pounds.
- C) Approximately 30% of all fish in the pond weigh more than 2 pounds.
- D) Approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

22

Number of States with 10 or More Electoral Votes in 2008

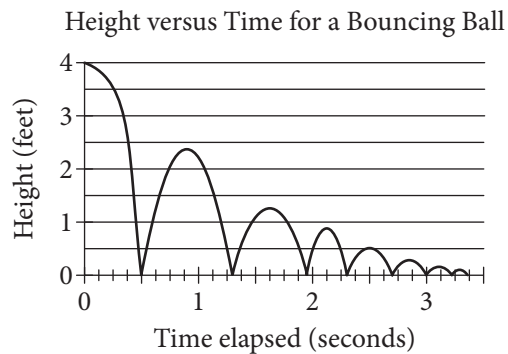
Electoral votes	Frequency
10	4
11	4
12	1
13	1
15	3
17	1
20	1
21	2
27	1
31	1
34	1
55	1

In 2008, there were 21 states with 10 or more electoral votes, as shown in the table above. Based on the table, what was the median number of electoral votes for the 21 states?

- A) 13
- B) 15
- C) 17
- D) 20



23



As part of an experiment, a ball was dropped and allowed to bounce repeatedly off the ground until it came to rest. The graph above represents the relationship between the time elapsed after the ball was dropped and the height of the ball above the ground. After it was dropped, how many times was the ball at a height of 2 feet?

- A) One
- B) Two
- C) Three
- D) Four

24

A customer's monthly water bill was \$75.74. Due to a rate increase, her monthly bill is now \$79.86. To the nearest tenth of a percent, by what percent did the amount of the customer's water bill increase?

- A) 4.1%
- B) 5.1%
- C) 5.2%
- D) 5.4%

25

$x$	$f(x)$
0	-2
2	4
6	16

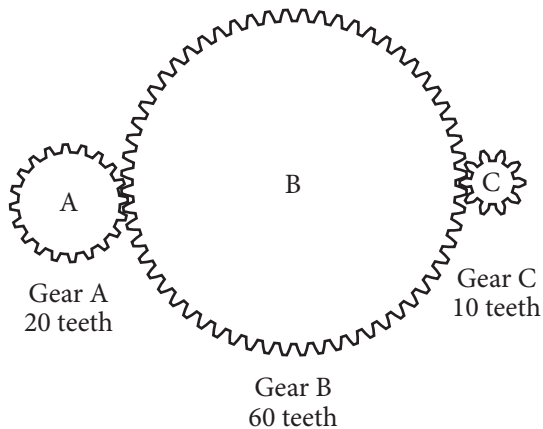
Some values of the linear function  $f$  are shown in the table above. What is the value of  $f(3)$  ?

- A) 6
- B) 7
- C) 8
- D) 9



26

A gear ratio  $r:s$  is the ratio of the number of teeth of two connected gears. The ratio of the number of revolutions per minute (rpm) of two gear wheels is  $s:r$ . In the diagram below, Gear A is turned by a motor. The turning of Gear A causes Gears B and C to turn as well.



If Gear A is rotated by the motor at a rate of 100 rpm, what is the number of revolutions per minute for Gear C?

- A) 50
- B) 110
- C) 200
- D) 1,000

27

In the  $xy$ -plane, the graph of  $2x^2 - 6x + 2y^2 + 2y = 45$  is a circle. What is the radius of the circle?

- A) 5
- B) 6.5
- C)  $\sqrt{40}$
- D)  $\sqrt{50}$

28

Two different points on a number line are both 3 units from the point with coordinate  $-4$ . The solution to which of the following equations gives the coordinates of both points?

- A)  $|x + 4| = 3$
- B)  $|x - 4| = 3$
- C)  $|x + 3| = 4$
- D)  $|x - 3| = 4$



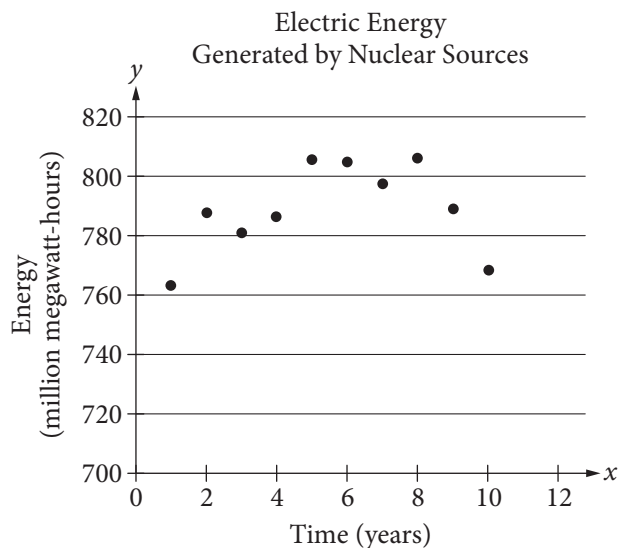
29

A motor powers a model car so that after starting from rest, the car travels  $s$  inches in  $t$  seconds, where  $s = 16t\sqrt{t}$ . Which of the following gives the average speed of the car, in inches per second, over the first  $t$  seconds after it starts?

- A)  $4\sqrt{t}$
- B)  $16\sqrt{t}$
- C)  $\frac{16}{\sqrt{t}}$
- D)  $16t$

30

The scatterplot below shows the amount of electric energy generated, in millions of megawatt-hours, by nuclear sources over a 10-year period.



Of the following equations, which best models the data in the scatterplot?

- A)  $y = 1.674x^2 + 19.76x - 745.73$
- B)  $y = -1.674x^2 - 19.76x - 745.73$
- C)  $y = 1.674x^2 + 19.76x + 745.73$
- D)  $y = -1.674x^2 + 19.76x + 745.73$

**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $7/2$ . (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & \bullet & \bullet \\ \hline \end{array}$  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Grid in result.

Answer:  $\frac{7}{12}$

	7	/	1	2
•	•	•	•	•
	0	0	0	0
①	①	•	①	
②	②	②	•	
③	③	③	③	
④	④	④	④	
⑤	⑤	⑤	⑤	
⑥	⑥	⑥	⑥	
•	⑦	⑦	⑦	
⑧	⑧	⑧	⑧	
⑨	⑨	⑨	⑨	

← Fraction line

Answer: 2.5

	2	.	5
•	•	•	•
	0	0	0
①	①	①	①
②	•	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	•
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
•	•	•	•
	0	0	0
①	①	①	①
②	•	②	②
③	③	③	•
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	6
•	•	•	•
	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	•	•	•
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	7
•	•	•	•
	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	•	•	⑥
⑦	⑦	⑦	•
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 201 – either position is correct

	2	0	1
•	•	•	•
	0	•	0
①	①	①	•
②	•	②	②
③	③	③	③

2	0	1	
•	•	•	•
	•	0	0
①	①	•	①
•	②	②	②
③	③	③	③

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

A group of friends decided to divide the \$800 cost of a trip equally among themselves. When two of the friends decided not to go on the trip, those remaining still divided the \$800 cost equally, but each friend's share of the cost increased by \$20. How many friends were in the group originally?

32

$$2(5x - 20) - (15 + 8x) = 7$$

What value of  $x$  satisfies the equation above?





33

A laboratory supply company produces graduated cylinders, each with an internal radius of 2 inches and an internal height between 7.75 inches and 8 inches. What is one possible volume, rounded to the nearest cubic inch, of a graduated cylinder produced by this company?

34

In the  $xy$ -plane, the graph of  $y = 3x^2 - 14x$  intersects the graph of  $y = x$  at the points  $(0, 0)$  and  $(a, a)$ . What is the value of  $a$  ?



35

The line with the equation  $\frac{4}{5}x + \frac{1}{3}y = 1$  is graphed in the  $xy$ -plane. What is the  $x$ -coordinate of the  $x$ -intercept of the line?

36

	Masses (kilograms)					
Andrew	2.4	2.5	3.6	3.1	2.5	2.7
Maria	$x$	3.1	2.7	2.9	3.3	2.8

Andrew and Maria each collected six rocks, and the masses of the rocks are shown in the table above. The mean of the masses of the rocks Maria collected is 0.1 kilogram greater than the mean of the masses of the rocks Andrew collected. What is the value of  $x$  ?



37

Jeremy deposited  $x$  dollars in his investment account on January 1, 2001. The amount of money in the account doubled each year until Jeremy had 480 dollars in his investment account on January 1, 2005. What is the value of  $x$  ?

38

A school district is forming a committee to discuss plans for the construction of a new high school. Of those invited to join the committee, 15% are parents of students, 45% are teachers from the current high school, 25% are school and district administrators, and the remaining 6 individuals are students. How many more teachers were invited to join the committee than school and district administrators?

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**

**No Test Material On This Page**

# Scoring Your SAT<sup>®</sup> Practice Test #6

Congratulations on completing an SAT<sup>®</sup> practice test. To score your test, use these instructions and the conversion tables and answer key at the end of this document.

## Scores Overview

The redesigned SAT will provide more information about your learning by reporting more scores than ever before. Each of the redesigned assessments (SAT, PSAT/NMSQT<sup>®</sup>, PSAT<sup>™</sup> 10, and PSAT<sup>™</sup> 8/9) will report test scores and cross-test scores on a common scale. Additionally, subscores will be reported to provide more diagnostic information to students, educators, and parents. For more details about scores, visit [collegereadiness.collegeboard.org/sat/scores](https://collegereadiness.collegeboard.org/sat/scores).

The practice test you completed was written by the College Board's Assessment Design & Development team using the same processes and review standards used when writing the actual SAT. Everything from the layout of the page to the construction of the questions accurately reflects what you'll see on test day.

## How to Calculate Your Practice Test Scores

### GET SET UP

- 1 You'll need the answer sheet that you bubbled in while taking the practice test. You'll also need the conversion tables and answer key at the end of this document.
- 2 Using the answer key, count up your total correct answers for each section. You may want to write the number of correct answers for each section at the bottom of that section in the answer key.
- 3 Using your marked-up answer key and the conversion tables, follow the directions to get all of your scores.

## GET SECTION AND TOTAL SCORES

Your total score on the SAT practice test is the sum of your Evidence-Based Reading and Writing Section score and your Math Section score. To get your total score, you will convert what we call the “raw score” for each section — the number of questions you got right in that section — into the “scaled score” for that section, then calculate the total score.

### GET YOUR EVIDENCE-BASED READING AND WRITING SECTION SCORE

Calculate your SAT Evidence-Based Reading and Writing Section score (it’s on a scale of 200–800) by first determining your Reading Test score and your Writing and Language Test score. Here’s how:

- 1 Count the number of correct answers you got on Section 1 (the Reading Test). There is no penalty for wrong answers. The number of correct answers is your raw score.
- 2 Go to Raw Score Conversion Table 1: Section and Test Scores on page 7. Look in the “Raw Score” column for your raw score, and match it to the number in the “Reading Test Score” column.
- 3 Do the same with Section 2 to determine your Writing and Language Test score.
- 4 Add your Reading Test score to your Writing and Language Test score.
- 5 Multiply that number by 10. This is your Evidence-Based Reading and Writing Section score.

**EXAMPLE:** *Sofia answered 29 of the 52 questions correctly on the SAT Reading Test and 19 of the 44 questions correctly on the SAT Writing and Language Test. Using the table on page 7, she calculates that she received an SAT Reading Test score of 27 and an SAT Writing and Language Test score of 23. She adds 27 to 23 (gets 50) and then multiplies by 10 to determine her SAT Evidence-Based Reading and Writing Section score of 500.*

### GET YOUR MATH SECTION SCORE

Calculate your SAT Math Section score (it’s on a scale of 200–800).

- 1 Count the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator). There is no penalty for wrong answers.
- 2 Add the number of correct answers you got on Section 3 (Math Test — No Calculator) and Section 4 (Math Test — Calculator).
- 3 Use Raw Score Conversion Table 1: Section and Test Scores to turn your raw score into your Math Section score.

### GET YOUR TOTAL SCORE

Add your Evidence-Based Reading and Writing Section score to your Math Section score. The result is your total score on the SAT Practice Test, on a scale of 400–1600.

## GET SUBSCORES

Subscores provide more detailed information about your strengths in specific areas within literacy and math. They are reported on a scale of 1–15.

### HEART OF ALGEBRA

The Heart of Algebra subscore is based on questions from the Math Test that focus on linear equations and inequalities.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 1–2; 5–6; 10; 14; 17; 19
- ▶ Math Test – Calculator: Questions 4; 10–11; 13–14; 18–19; 25; 28; 32; 35

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores on page 8 to determine your Heart of Algebra subscore.

### PROBLEM SOLVING AND DATA ANALYSIS

The Problem Solving and Data Analysis subscore is based on questions from the Math Test that focus on quantitative reasoning, the interpretation and synthesis of data, and solving problems in rich and varied contexts.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 2–3; 6–9; 12; 15; 21–24; 26; 30; 36–38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Problem Solving and Data Analysis subscore.

### PASSPORT TO ADVANCED MATH

The Passport to Advanced Math subscore is based on questions from the Math Test that focus on topics central to the ability of students to progress to more advanced mathematics, such as understanding the structure of expressions, reasoning with more complex equations, and interpreting and building functions.

1 Add up your total correct answers from the following set of questions:

- ▶ Math Test – No Calculator: Questions 4; 7–9; 11–13; 15–16
- ▶ Math Test – Calculator: Questions 1; 5; 17; 20; 29; 31; 34

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 2: Subscores to determine your Passport to Advanced Math subscore.

## EXPRESSION OF IDEAS

The Expression of Ideas subscore is based on questions from the Writing and Language Test that focus on topic development, organization, and rhetorically effective use of language.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 3; 5; 8–11; 13; 15–16; 18; 20; 22–26; 31–32; 34–35; 37–38; 40; 43Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Expression of Ideas subscore.

## STANDARD ENGLISH CONVENTIONS

The Standard English Conventions subscore is based on questions from the Writing and Language Test that focus on sentence structure, usage, and punctuation.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Writing and Language Test: Questions 1–2; 4; 6–7; 12; 14; 17; 19; 21; 27–30; 33; 36; 39; 41–42; 44Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Standard English Conventions subscore.

## WORDS IN CONTEXT

The Words in Context subscore is based on questions from both the Reading Test and the Writing and Language Test that address word/phrase meaning in context and rhetorical word choice.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 2; 6; 14; 18; 26; 30; 35; 37; 44; 49
  - ▶ Writing and Language Test: Questions 3; 8; 15; 20; 24–25; 34–35Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Words in Context subscore.

## COMMAND OF EVIDENCE

The Command of Evidence subscore is based on questions from both the Reading Test and the Writing and Language Test that ask you to interpret and use evidence found in a wide range of passages and informational graphics, such as graphs, tables, and charts.

- 1 Add up your total correct answers from the following set of questions:
  - ▶ Reading Test: Questions 4; 8; 20–21; 23; 28; 34; 39; 46; 52
  - ▶ Writing and Language Test: Questions 10–11; 16; 18; 26; 32; 37–38Your total correct answers from all of these questions is your raw score.
- 2 Use Raw Score Conversion Table 2: Subscores to determine your Command of Evidence subscore.



## GET CROSS-TEST SCORES

The new SAT also reports two cross-test scores: Analysis in History/Social Studies and Analysis in Science. These scores are based on questions in the Reading, Writing and Language, and Math Tests that ask students to think analytically about texts and questions in these subject areas. Cross-test scores are reported on a scale of 10–40.

### ANALYSIS IN HISTORY/SOCIAL STUDIES

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 11–21; 33–42
- ▶ Writing and Language Test: Questions 13; 15–16; 18; 20; 22
- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 4; 6–7; 9–11; 22; 37–38

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in History/Social Studies cross-test score.

### ANALYSIS IN SCIENCE

1 Add up your total correct answers from the following set of questions:

- ▶ Reading Test: Questions 22–32; 43–52
- ▶ Writing and Language Test: Questions 3; 5; 8–11
- ▶ Math Test – No Calculator: No Questions
- ▶ Math Test – Calculator: Questions 2; 12–14; 21; 23; 26; 29

Your total correct answers from all of these questions is your raw score.

2 Use Raw Score Conversion Table 3: Cross-Test Scores on page 9 to determine your Analysis in Science cross-test score.

# SAT Practice Test #6: Worksheets

## ANSWER KEY

### Reading Test Answers

1 C	12 D	23 A	34 A	45 C
2 B	13 C	24 D	35 D	46 D
3 D	14 C	25 C	36 D	47 B
4 A	15 B	26 A	37 A	48 B
5 C	16 A	27 D	38 D	49 D
6 D	17 D	28 A	39 C	50 B
7 B	18 A	29 A	40 C	51 D
8 B	19 A	30 B	41 B	52 B
9 A	20 C	31 B	42 D	
10 D	21 C	32 D	43 C	
11 B	22 B	33 B	44 A	

READING TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Writing and Language Test Answers

1 D	12 D	23 B	34 B
2 A	13 A	24 A	35 B
3 D	14 B	25 B	36 D
4 B	15 C	26 B	37 A
5 C	16 B	27 C	38 D
6 B	17 A	28 D	39 D
7 A	18 C	29 B	40 C
8 C	19 D	30 C	41 A
9 D	20 D	31 A	42 D
10 B	21 A	32 C	43 A
11 C	22 A	33 D	44 C

WRITING AND  
LANGUAGE TEST  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test No Calculator Answers

1 B	11 B
2 B	12 D
3 C	13 A
4 A	14 A
5 D	15 D
6 A	16 1, 2, 4, 8, 16
7 C	17 $15/4$ , 3.75
8 B	18 30
9 C	19 $3/2$ , 1.5
10 D	20 $1/6$ , .166, .167

MATH TEST  
NO CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

### Math Test Calculator Answers

1 A	11 B	21 D	31 10
2 C	12 D	22 B	32 31
3 A	13 A	23 C	33 97, 98, 99, 100, 101
4 D	14 B	24 D	34 5
5 B	15 D	25 B	35 1.25, $5/4$
6 C	16 B	26 C	36 2.6, $13/5$
7 D	17 B	27 A	37 30
8 D	18 C	28 A	38 8
9 B	19 C	29 B	
10 B	20 C	30 D	

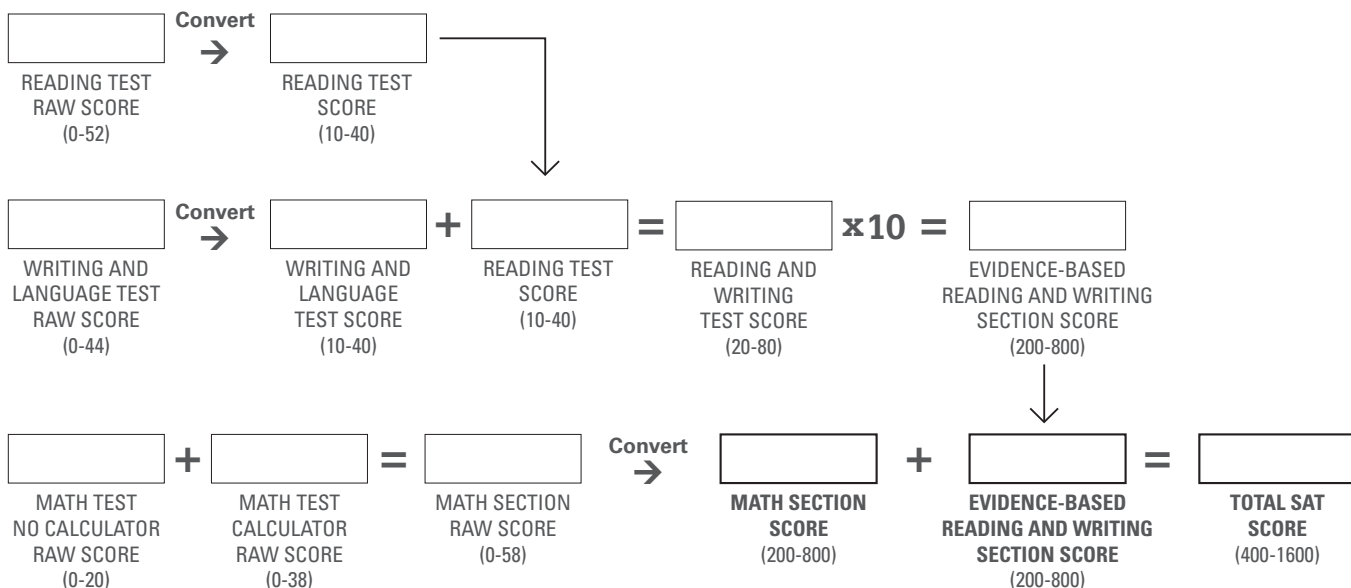
MATH TEST  
CALCULATOR  
RAW SCORE  
(NUMBER OF  
CORRECT ANSWERS)

# SAT Practice Test #6: Worksheets

## RAW SCORE CONVERSION TABLE 1 SECTION AND TEST SCORES

Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score	Raw Score (# of correct answers)	Math Section Score	Reading Test Score	Writing and Language Test Score
0	200	10	10	30	530	26	30
1	200	10	10	31	540	27	30
2	210	10	10	32	550	27	31
3	230	10	11	33	560	28	31
4	250	11	11	34	570	28	32
5	260	12	12	35	580	29	33
6	280	13	13	36	590	29	34
7	290	14	14	37	590	30	34
8	310	15	15	38	600	30	35
9	320	15	16	39	610	31	36
10	330	16	16	40	620	31	36
11	340	17	17	41	630	32	38
12	350	17	18	42	640	33	39
13	360	18	18	43	650	33	39
14	380	18	19	44	660	34	40
15	390	19	20	45	670	35	
16	400	19	20	46	670	36	
17	410	20	21	47	680	37	
18	420	20	22	48	690	37	
19	430	21	23	49	700	38	
20	440	21	23	50	710	39	
21	450	22	24	51	720	40	
22	460	22	25	52	730	40	
23	470	23	25	53	740		
24	490	23	26	54	760		
25	500	24	27	55	770		
26	510	24	27	56	780		
27	510	25	28	57	790		
28	520	25	28	58	800		
29	530	26	29				

## CONVERSION EQUATION 1 SECTION AND TEST SCORES

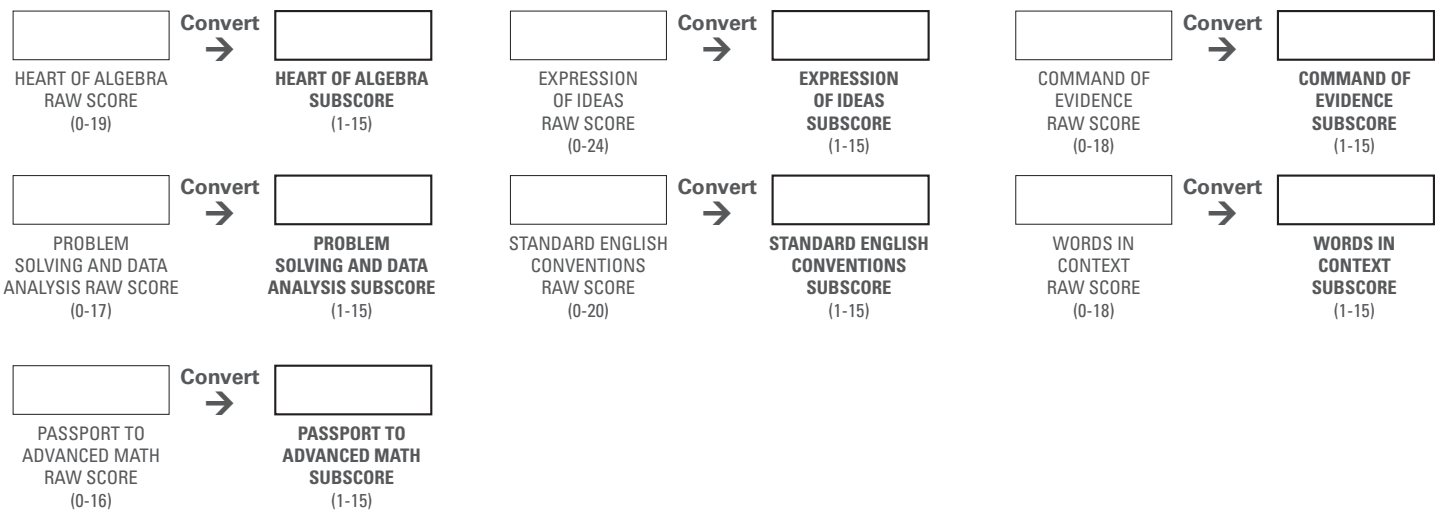


# SAT Practice Test #6: Worksheets

## RAW SCORE CONVERSION TABLE 2 SUBSCORES

Raw Score (# of correct answers)	Expression of Ideas	Standard English Conventions	Heart of Algebra	Problem Solving and Data Analysis	Passport to Advanced Math	Words in Context	Command of Evidence
0	1	1	1	1	1	1	1
1	1	1	2	1	2	1	2
2	2	1	3	2	3	1	3
3	3	1	4	3	4	2	4
4	3	2	5	4	5	3	5
5	4	3	6	5	6	4	5
6	5	3	6	6	7	5	6
7	6	4	7	7	7	6	7
8	7	5	8	8	8	6	8
9	7	6	9	9	9	7	8
10	8	6	9	9	10	8	9
11	8	7	10	10	11	8	9
12	9	8	10	11	11	9	10
13	9	8	11	11	12	10	11
14	10	9	12	12	14	10	12
15	11	10	12	13	14	11	12
16	11	11	13	14	15	12	13
17	12	11	14	15		13	14
18	12	12	15			15	15
19	13	14	15				
20	13	15					
21	14						
22	15						
23	15						
24	15						

## CONVERSION EQUATION 2 SUBSCORES



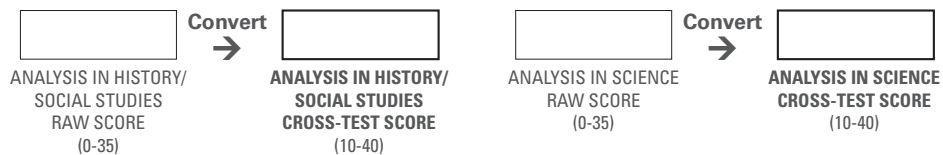
# SAT Practice Test #6: Worksheets

## RAW SCORE CONVERSION TABLE 3 CROSS-TEST SCORES

Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score	Raw Score (# of correct answers)	Analysis in History/ Social Studies Cross-Test Score	Analysis in Science Cross-Test Score
0	10	10	18	26	25
1	10	10	19	27	26
2	11	12	20	27	26
3	12	13	21	28	27
4	13	14	22	29	28
5	15	15	23	29	28
6	16	16	24	30	29
7	17	17	25	31	30
8	18	18	26	31	31
9	19	19	27	32	31
10	20	19	28	33	32
11	21	20	29	34	33
12	22	21	30	35	34
13	22	22	31	36	35
14	23	22	32	37	36
15	24	23	33	38	37
16	25	24	34	39	39
17	25	24	35	40	40

## CONVERSION EQUATION 3 CROSS-TEST SCORES

Test	Analysis in History/Social Studies		Analysis in Science	
	Questions	Raw Score	Questions	Raw Score
Reading Test	11–21; 33–42		22–32; 43–52	
Writing and Language Test	13; 15–16; 18; 20; 22		3; 5; 8–11	
Math Test No Calculator	No Questions		No Questions	
Math Test Calculator	4; 6–7; 9–10; 22; 37; 38		2; 12–14; 21; 23; 26; 29	
Total				



# University Admissions Guidance

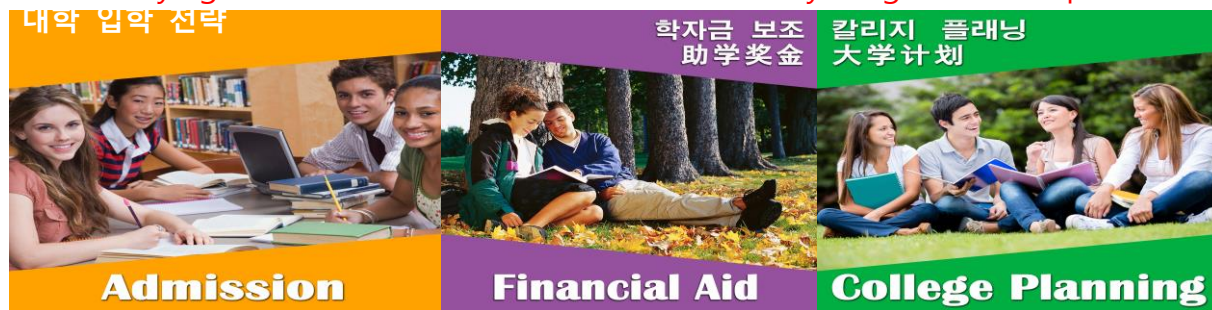
## Don't Just Get into College, Plan Your Future

### Don't Just Get into College, Plan Your Future

Few milestones in life will affect your future as much as being accepted by a university. The university you go to will impact more than just your career and future earning potential, it will shape who you become as a person and will be the stage where the next chapter in your life plays out. Getting in to a university can be a daunting process. Even if you have a stellar GPA, a fantastic SAT/ACT score, and plenty of extra-curricular activities, tasks like filling out college application forms, gathering transcripts, and writing personal essays can be a real challenge, especially if you are applying to several schools. The most important part of the process, however, comes before you submit a single application; finding the schools that are right for YOU! You can get into the best Ivy League University, but if that school is not a good fit for your goals, your values, and your learning style, you may find yourself regretting the choice to accept an offer from even the most prestigious university. Even if you are fortunate enough to be accepted to the perfect school, you will still need to figure out how to pay for it. Finding the best scholarships and choosing the right financial aid options can make the difference between pursuing your dreams or being saddled with years of student loan debt and having to pass up an opportunity to attend the university you want. Let our advisement guide you to a brighter future.

We are a college admissions advisor and certified college counselor

Identifying the universities that are the best fit for your goals and aspirations



**Admission Strategy** - Assistance filling out college applications - Assistance writing Essays  
**Guidance on where to get scholarships and Financial Aid.** CSS profile, FAFSA, Student Loan  
**Guidance, Extra-curricular activity guidance**

## GPA/ ACT/ SAT Coaching

All USA High school student, Transfer student / International Student / Undocumented Student

## Standard Advisement Package: Contact College Planning Co.

University Admissions Advisement (All USA and Korea, China, Mongo online/remote/ In person sessions)

College Planning Co. 1301 S. Wolf Rd. # 402 Prospect Heights IL. 60070. [www.collegepco.org](http://www.collegepco.org)

Tel: 847-450-8001

Fax: 847-947-8213

E Mail: [cpc@collegepco.com](mailto:cpc@collegepco.com)

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## **College Planning Corp.**

**847-450-8001**

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