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Answer Explanation Test #1

Answer Explanations

SAT Practice Test #1

Section 1: Reading Test

QUESTION 1

Choice B is the best answer. In the passage, Lady Carlotta is approached by the "imposingly attired lady" Mrs. Quabarl while standing at a train station (lines 32-35). Mrs. Quabarl assumes Lady Carlotta is her new nanny, Miss Hope: "You must be Miss Hope, the governess I've come to meet" (lines 36-37). Lady Carlotta does not correct Mrs. Quabarl's mistake and replies, "Very well, if I must I must" (line 39).

Choices A, C, and D are incorrect because the passage is not about a woman weighing a job choice, seeking revenge on an acquaintance, or disliking her new employer.

QUESTION 2

Choice C is the best answer. In lines 1-3, the narrator states that 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" in order to "kill time." In this context, Lady Carlotta was taking a "turn," or a short walk, along the platform while waiting for the train to leave the station.

Choices A, B, and D are incorrect because in this context "turn" does not mean slight movement, change in rotation, or course correction. While Lady Carlotta may have had to rotate her body while moving across the station, "took a turn" implies that Lady Carlotta took a short walk along the platform's length.

QUESTION 3

Choice A is the best answer. In lines 10-14, the narrator states that some of Lady Carlotta's acquaintances would often admonish, or criticize, Lady Carlotta for meddling in or openly expressing her opinion on other people's affairs.

Choices B, C, and D are incorrect because the narrator does not suggest that other people viewed Lady Carlotta as tactful, ambitious, or unfriendly.

QUESTION 4

Choice A is the best answer. In lines 10-14, the narrator states that people often criticized Lady Carlotta and suggested that she not interfere in other people's affairs, which were "none of her business." The fact that people often were critical of Lady Carlotta's behavior provides evidence that Lady Carlotta was outspoken.

Choices B, C, and D do not provide the best evidence that Lady Carlotta was outspoken. Choices B, C, and D mention Lady Carlotta, but do not specify how others view her.

QUESTION 5

Choice C is the best answer. Lines 4-10 establish that Lady Carlotta intervened on the part of a struggling horse, the kind of behavior for which, lines 10-14 indicate, she received "plentiful admonition" from "certain of her acquaintances," who believed that she should mind her own business. Lines 14-22 indicate that Lady Carlotta had "only once . . . put the doctrine of non-interference into practice," and that was 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 blithely ignored the other woman's hypocritical pleas for interference. This incident provides insight into Lady Carlotta's character and also evokes humor through language choice (e.g., the droll understatement of "it is to be feared that [Lady Carlotta] lost the friendship of the ultimately rescued lady"; lines 22-23) and the sense that, narratively speaking, justice has been served.

Choice A is incorrect because nothing about the incident suggests deception on Lady Carlotta's part. Choice B is incorrect because there is nothing subtle about Lady Carlotta leaving another woman stuck in a tree for nearly three hours. Moreover, the passage does not suggest that this was an act of cruelty on Lady Carlotta's part; rather, the passage suggests that Lady Carlotta was justified in giving the woman stuck in a tree exactly what the woman had so often asked for: noninterference. Choice D is incorrect because the passage indicates that Lady Carlotta was acting consistently with her beliefs and only invoked the doctrine to teach a hypocritical person a lesson.

QUESTION 6

Choice A is the best answer. The narrator explains that Mrs. Quabarl told Lady Carlotta about the "nature of the charge" when she gave Lady Carlotta details about the Quabarl children (line 53-61). Since Lady Carlotta is pretending to be a governess, the term "charge" refers to her responsibilities, or job duties, when caring for the Quabarl children.

Choices B, C, and D are incorrect because in this context "charge" does not mean attack, fee, or expense.

QUESTION 7

Choice A is the best answer. Lady Carlotta learns about Mrs. Quabarl's children Claude, Wilfrid, and Irene (lines 53-58). The narrator then describes Mrs. Quabarl's child Viola as "something or other else of a mould equally commonplace among children of that class and type in the twentieth century" (lines 58-61). This statement about Viola implies that all of the Quabarl children have skills typical, or "of a mould equally commonplace," to other peers in their social class.

Choices B, C, and D are incorrect because the narrator does not indicate that all of the Quabarl children are unusually creative and intelligent, hostile to the idea of having a governess, or more educated than their peers.

QUESTION 8

Choice B is the best answer. In lines 62-69, Mrs. Quabarl explains to Lady Carlotta that she wants her children to actively participate in their education, and that Lady Carlotta should not create lessons that require her children to simply memorize historical figures and dates. Mrs. Quabarl emphasizes an education centered on active engagement when she states that her children should "not only be TAUGHT . . . but INTERESTED in what they learn."

Choices A, C, and D are incorrect because the narrator does not suggest that Mrs. Quabarl favors an education that emphasizes traditional values, artistic experimentation, or factual retention.

QUESTION 9

Choice B is the best answer. In lines 77-82, the narrator describes Mrs. Quabarl as appearing "magnificent and autocratic," or outwardly domineering, but easily "cowed and apologetic" when someone challenges, or defies, her authority.

Choices A, C, and D are incorrect because the narrator does not describe Mrs. Quabarl as selfish, bitter, or frequently imprudent.

QUESTION 10

Choice D is the best answer. In lines 77-82, the narrator provides evidence that Mrs. Quabarl appears imposing, or autocratic, but is easily defied, or opposed: "She was one of those imperfectly self-assured individuals who are magnificent and autocratic as long as they are not seriously opposed. The least show of unexpected resistance goes a long way towards rendering them cowed and apologetic."

Choices A, B, and C do not provide the best evidence that Mrs. Quabarl appears imposing but is easily defied. Choices A and B are incorrect because they present Mrs. Quabarl's opinions on railway companies and education, and choice C is incorrect because it focuses on Lady Carlotta, not Mrs. Quabarl.

QUESTION 11

Choice A is the best answer. While the author predominantly supports the use of public transportation, in the third paragraph he recognizes some limitations to the public transportation system: it is a "depressing experience" (lines 25-26) and "underfunded, ill-maintained, and ill-planned" (line 31).

Choices B, C, and D are incorrect because the third paragraph does not expand upon an argument made in the first two paragraphs, provide an overview of a problem, or advocate ending the use of public transportation.

QUESTION 12

Choice C is the best answer. The author notes that in North America "hopping in a car almost always gets you to your destination more quickly" (lines 32-34). This statement suggests that speed is one advantage to driving in North America.

Choices A, B, and D are incorrect because the author does not cite environmental impact, convenience, or cost as advantages of driving in North America.

QUESTION 13

Choice D is the best answer. In lines 32-34, the author provides evidence that speed is one advantage to driving in North America, because driving "almost always gets you to your destination more quickly."

Choices A, B, and C do not provide the best evidence that speed is one advantage to driving in North America. Choices A and B are incorrect because they offer general information about using public transportation. Choice C is incorrect because although these lines mention North America, they focus on the disadvantages of public transportation.

QUESTION 14

Choice B is the best answer. The author argues in the fourth paragraph that public transportation "can be faster, more comfortable, and cheaper than the private automobile" (lines 36-37) and provides examples of fast and convenient public transportation systems.

Choices A, C, and D are incorrect because they focus on points made in the fourth paragraph rather than the paragraph's central idea.

QUESTION 15

Choice B is the best answer. In lines 35-37, the author provides evidence that some public transportation systems are superior to driving, because public transportation "can be faster, more comfortable, and cheaper than the private automobile."

Choices A, C, and D do not provide the best evidence that some public transportation systems are superior to driving, as they highlight points made in the fourth paragraph rather than the paragraph's central idea.

QUESTION 16

Choice C is the best answer. In the last paragraph, the author explains the trend that people who became adults around the end of the twentieth century are more willing to use public transportation than people from older generations. The author notes, "If you credit the demographers, this transit trend has legs" (lines 58-59). In this context, "credit" means to believe the demographers' claims about the trend.

Choices A, B, and D are incorrect because in this context, "credit" does not mean endow, attribute, or honor.

QUESTION 17

Choice B is the best answer. In lines 59-63, the author explains the trend of people who became adults around the end of the twentieth century "tend[ing] to favor cities over suburbs." In this context, these adults "favor," or prefer, cities over suburbs.

Choices A, C, and D are incorrect because in this context "favor" does not mean indulge, resemble, or serve.

QUESTION 18

Choice B is the best answer. In lines 63-67, the author explains that while riding on public transportation, people can use personal electronic devices, such as "iPads, MP3 players, Kindles, and smartphones."

Choices A, C, and D are incorrect because they do not show that public transportation is compatible with the use of personal electronic devices.

QUESTION 19

Choice A is the best answer. Figure 1 shows that 10.7% of public transportation passengers are students and 6.7% of public transportation passengers are retirees. Thus, more students than retirees use public transportation.

Choices B and C are incorrect because figure 1 shows that more employed than unemployed people use public transportation and that more employed people than homemakers use public transportation.

Choice D is incorrect because figure 1 does not explain how frequently passengers use public transportation; it only identifies public transportation passengers by their primary occupation.

QUESTION 20

Choice A is the best answer. Figure 1 shows that 72% of public transportation passengers are "employed outside the home," and figure 2 indicates that 59.1% of public transportation trips are for "work." It can be inferred from these figures that many public transportation passengers take public transportation to their place of employment.

Choices B, C, and D are incorrect because figure 1 and figure 2 do not indicate that public transportation passengers primarily use the system to run errands, use their own car on weekends, or are planning to purchase a car.

QUESTION 21

Choice D is the best answer. The author explains that Ken Dial created an experiment to study the evolution of flight by observing how baby Chukars learn to fly. During the experiment, Dial noticed the unusual way Chukars use their "'wings and legs cooperatively'" to scale hay bales (lines 38-43), and he created "a series of ingenious experiments" (line 46) to study this observation. After his additional experiments, Dial determined that these baby birds angle "their wings differently from birds in flight" (lines 49-50).

Choices A, B, and C are incorrect because they do not accurately reflect the sequence of events in the passage.

QUESTION 22

Choice A is the best answer. In lines 6-9, the author explains that Dial was "challenged," or dared, by graduate students to develop "new data" on a long-standing scientific debate (the "ground-up-tree-down" theory).

Choices B, C, and D are incorrect because in this context "challenged" does not mean required, disputed with, or competed with.

QUESTION 23

Choice A is the best answer. The author explains that Dial created his initial experiment to try and create "new data on the age-old ground-up-tree-down debate," and that he looked for "clues" in "how baby game birds learned to fly" (lines 8-11). The note at the beginning of

the passage explains the "age-old ground-up-tree down debate" and offers two different theories on how birds evolved to fly. Finally, the last paragraph of the passage discusses WAIR in an evolutionary context.

Choices B, C, and D are incorrect because they do not identify Dial's central assumption in setting up his research.

QUESTION 24

Choice B is the best answer. In lines 6-11, the author provides evidence that Dial's central assumption in setting up his research is that the acquisition of flight in young birds is linked to the acquisition of flight in their ancestors. The author notes that Dial created a project to "come up with new data on the age-old ground-up-tree-down debate."

Choices A, C, and D do not provide the best evidence that Dial's central assumption in setting up his research is that the acquisition of flight in young birds is linked to the acquisition of flight in their ancestors. Choices A, C, and D are incorrect because they focus on Dial's experiment and his observations on ground birds.

QUESTION 25

Choice C is the best answer. When a rancher observed Dial's laboratory setup, he was "incredulous" that the Chukars were living on the ground, and he advised Dial to give the birds "something to climb on" (lines 16-23). This "key piece of advice" (line 14) led Dial to add hay bales to his laboratory. Dial later noticed that the Chukars were using their legs and wings to scale the hay bales, and this observation became the focal point of his research.

Choices A, B, and D are incorrect because the incident with the local rancher did not serve to reveal Dial's motivation for creating the project, emphasize differences in laboratory and field research, or introduce a contributor to a scientific theory.

QUESTION 26

Choice C is the best answer. The author explains that Dial's "aha moment" came when he determined the Chukars used "their legs and wings cooperatively" to scale the hay bales (lines 40-42). Dial then created additional experiments to study how the birds dealt with gradually steeper inclines: "[he filmed] the birds as they raced up textured ramps tilted at increasing angles" (lines 46-48).

Choices A, B, and D are incorrect because Dial's "aha moment" was not followed by Dial teaching the birds to fly, studying videos to find out why the birds no longer hopped, or consulting with other researchers.

QUESTION 27

Choice B is the best answer. Dial observed that as the Chukars raced up steep ramps, they "began to flap" and "aimed their flapping down and backward, using the force . . . to keep their feet firmly pressed against the ramp" (lines 49-53). Dial determined that the position of their flapping wings facilitated the baby Chukars' traction on the steep ramps.

Choices A, C, and D are incorrect because the passage does not indicate that the Chukars' speed, alternation of wing and foot movement, or continual hopping motions facilitated their traction on steep ramps.

QUESTION 28

Choice B is the best answer. In lines 61-63, the author explains that Dial named his scientific finding "WAIR, for wing-assisted incline running, and went on to document it in a wide range of species." In this context, Dial "documented," or recorded, the existence of WAIR in numerous bird species.

Choices A, C, and D are incorrect because in this context, "document" does not mean to portray, publish, or process.

QUESTION 29

Choice D is the best answer. In lines 70-74, the author explains that gliding animals do not use a "flapping flight stroke," or WAIR, wing-assisted incline running. Since Chukars, a ground bird, use WAIR to help scale steep inclines, it can be reasonably inferred that gliding animals do not use WAIR to aid in climbing slopes.

Choices A, B, and C are incorrect because the passage does not include information on gliding animals' offspring, their method of locomotion, or their feeding habits.

QUESTION 30

Choice D is the best answer. In lines 73-75, the author provides evidence that "the flapping flight stroke" is "something gliding animals don't do."

Choices A, B, and C do not provide the best evidence that gliding animals do not use a flapping stroke to aid in climbing slopes. These choices do not contain information about gliding animals.

QUESTION 31

Choice B is the best answer. In lines 21-24, the authors of Passage 1 state society's "common happiness" is dependent on women never becoming involved in politics. In this context, the authors of Passage 1 are suggesting that all members of society can have a "common," or shared, happiness.

Choices A, C, and D are incorrect because in this context, "common" does not mean average, coarse, or similar.

QUESTION 32

Choice C is the best answer. In lines 25-30, the authors of Passage 1 state that women should seek "gentle occupations and the cares of the home" so they can avoid performing difficult, or "strenuous," and unpleasant, or "onerous," tasks.

Choices A, B, and D are incorrect because the authors of Passage 1 do not suggest that running a household and raising children are rewarding for both sexes, yield less value for society, or require professional or political skills.

QUESTION 33

Choice C is the best answer. In lines 25-30, the authors of Passage 1 provide evidence that women should run households and raise children because these roles do not require "strenuous habits and onerous duties."

Choices A, B, and D do not provide the best evidence that running a household and raising children entail very few activities that are difficult or unpleasant; rather, these lines offer general information about the differences between the sexes.

QUESTION 34

Choice D is the best answer. In lines 41-46, Wollstonecraft argues that if women do not receive an education "to become the companion of man," or one that is comparable to men's education, then society will not progress in "knowledge and virtue."

Choices A, B, and C are incorrect because Wollstonecraft does not suggest that society can progress only if women have happiness and financial security, follow societal rules, or replace men as figures of power.

QUESTION 35

Choice C is the best answer. Wollstonecraft argues that women should be granted an education comparable to men's so that truth is "common to all" (lines 41-46). Wollstonecraft states that education will "strengthen [women's] reason till she comprehend her duty" (lines 49-50). In this context, Wollstonecraft is arguing that education will improve women's "reason," or intellect, and allow women to consider their role in society.

Choices A, B, and D are incorrect because in this context "reason" does not mean motive, sanity, or explanation.

QUESTION 36

Choice A is the best answer. In lines 72-78, Wollstonecraft argues that the laws passed by society's leaders allow men to "contend for their freedom" but serve to "subjugate women." In this context, "subjugate" means to control. Wollstonecraft is arguing that society's leaders grant men freedoms that are denied to women.

Choices B, C, and D are incorrect because Wollstonecraft does not claim that society's leaders have granted freedoms that created a general reduction in individual virtue, caused arguments about happiness, or ensured equality for all people.

QUESTION 37

Choice D is the best answer. In lines 72-75, Wollstonecraft provides evidence that society's leaders grant freedoms that privilege men. She argues that while society's leaders believe they "are acting in the manner best calculated to promote [women's] happiness," their decisions don't allow women to "contend for their freedom."

Choices A, B, and C do not provide the best evidence that society's leaders grant freedoms that privilege men over women.

QUESTION 38

Choice C is the best answer. Wollstonecraft cites the statement made by the authors of Passage 1 that excluding women from political participation is "according to abstract principles . . . impossible to explain" (lines 61-65). Wollstonecraft then states that if the authors of Passage 1 can discuss "the abstract rights of man" they should be able to discuss the abstract rights of women (lines 66-69). In these lines, Wollstonecraft is developing her argument by highlighting a flaw in the reasoning presented by the authors of Passage 1.

Choices A, B, and D are incorrect because Wollstonecraft does not refer to the statement made in Passage 1 to call into question the authors' qualifications, dispute the assertion that women are excluded by their own government (sentence one of Passage 1), or validate the authors' conclusions on gender roles.

QUESTION 39

Choice A is the best answer. The authors of Passage 1 argue that while restricting women's freedoms may be "impossible to explain" (line 7), this restriction is necessary for society's overall happiness (lines 13-17). Wollstonecraft, however, strongly challenges this argument, asking the authors of Passage 1, "Who made man the exclusive judge" of which freedoms are granted to women, and likening society's male leaders to tyrants as they deny women their "civil and political rights" and leave them "groping in the dark" (lines 78-88).

Choices B, C, and D are incorrect because they do not characterize the overall relationship between Passage 1 and Passage 2.

QUESTION 40

Choice D is the best answer. The authors of Passage 1 admit that women are "excluded by the other half [men] from any participation in government" (lines 1-2), and Wollstonecraft states that society's male leaders create laws that deny women "civil and political rights" (line 86).

Choices A, B, and C are incorrect because the authors of both passages would not agree that women had the same preferences as men, required a good education, or were as happy as men.

QUESTION 41

Choice A is the best answer. Wollstonecraft argues in the final paragraph of Passage 2 that society's male leaders are like "tyrants" that deny women "civil and political rights" (lines 81-88). The authors of Passage 1 would most likely argue that allowing women these rights would be "a reversal of [society's] primary destinies" as society's leaders should only seek women's interests as they pertain to the "wishes of nature," such as women's role as mothers (lines 18-30). The authors of Passage 1 clarify that "nature" created two sexes for a particular reason, so while men can exercise civil and political rights, women are not naturally suited to these activities (lines 30-36).

Choices B and C are incorrect because they are not supported by information in Passage 1. Choice D is incorrect because the authors of Passage 1 do not mention "natural law," only the "wishes of nature."

QUESTION 42

Choice C is the best answer. When discussing problems with bee colonies, the authors use phrases like "we suspect" (line 19) and "we postulate" (line 21) to show they are hypothesizing reasons for bee colonies' susceptibility to mite infestations. The use of "can," "may," and "could" creates a tentative tone and provides further evidence that the authors believe, but are not certain, that their hypothesis is correct.

Choices A, B, and D are incorrect because the authors' use of "can," "may," and "could" does not create an optimistic, dubious, or critical tone.

QUESTION 43

Choice C is the best answer. In lines 24-28, the authors hypothesize that bee colonies will be susceptible to mite infestations if they do not occasionally feed on pyrethrum producing plants. In lines 42-46, they suggest creating a trial where a "small number of commercial honey bee colonies are offered a number of pyrethrum producing plants" to test their hypothesis.

Choices A, B, and D are incorrect because the authors do not hypothesize that honeybees' exposure to both pyrethrums and mites will cause the honeybees to develop secondary infections, that beekeepers should increase their use of insecticides, or that humans are more susceptible to varroa mites.

QUESTION 44

Choice D is the best answer. In lines 24-28, the authors provide evidence that a bee colony may be more resistant to mite infections if the bees eat pyrethrums because this diet may help prevent bees from becoming "immunocompromised or nutritionally deficient." In lines 42-50, the authors suggest testing this hypothesis in a trial on honeybees.

Choices A, B, and C do not describe any of the authors' hypotheses.

QUESTION 45

Choice D is the best answer. The authors explain that when beekeepers use commercially produced insecticides to fight mite infections, they may "further weaken" bees that are "immunocompromised or nutritionally deficient" (lines 31-35).

Choices A, B, and C are incorrect because the authors do not suggest that beekeepers' use of commercially produced insecticides increases mite populations, kills bacteria, or destroys bees' primary food source.

QUESTION 46

Choice C is the best answer. In lines 31-35, the authors provide evidence that beekeepers' use of commercially produced insecticides may cause further harm to "immunocompromised or nutritionally deficient bees."

Choices A, B, and D are incorrect because they do not provide the best evidence that beekeepers' use of commercially produced insecticides may be harmful to bees; choices A, B, and D focus on mite infestations' impact on honeybees.

QUESTION 47

Choice B is the best answer. In lines 31-35, the authors argue that beekeepers' use of insecticides to control mite infestations may be harmful to some bees. The authors then state, "We further postulate that the proper dosage necessary to prevent mite infestation may be better left to the bees" (lines 35-37). In this context, the authors "postulate," or put forth the idea that the bees may naturally control mite infestations better than insecticides.

Choices A, C, and D are incorrect because in this context, "postulate" does not mean to make an unfounded assumption, question a belief or theory, or conclude based on firm evidence.

QUESTION 48

Choice B is the best answer. In the fourth paragraph the authors propose a trial to study if honeybees' consumption of pyrethrum producing plants helps the honeybees defend against mite infestations. In the experiment, the authors plan to offer honey bee colonies both pyrethrum producing plants and "a typical bee food source such as clover" to determine if these different diets affect the bees' susceptibility to mite infestations.

Choices A, C, and D are incorrect because the main purpose of the fourth paragraph is not to summarize the results of an experiment, provide a comparative nutritional analysis, or predict an outcome of an unfinished experiment.

QUESTION 49

Choice A is the best answer. In lines 43-45, the authors propose a scientific trial in which honeybees are "offered a number of pyrethrum producing plants, as well as a typical bee food source such as clover." Since the authors contrast the "pyrethrum producing plants" with clover, a "typical bee food source," it can be assumed that clover does not produce pyrethrums.

Choice B is incorrect because it is stated in the passage. Choices C and D are incorrect because they are not assumptions made by the authors.

QUESTION 50

Choice B is the best answer. The table shows that 77 percent of the honeybee colonies with colony collapse disorder were infected by all four pathogens.

Choices A, C, and D are incorrect because they do not identify the percent of honeybee colonies with colony collapse disorder that were infected by all four pathogens as based on data in the table.

QUESTION 51

Choice D is the best answer. The table shows that 81 percent of colonies without colony collapse disorder were affected by the pathogen *Nosema ceranae*.

Choices A, B, and C are incorrect because they do not identify the pathogen that infected the highest percentage of honeybee colonies without colony collapse disorder as based on data in the table.

QUESTION 52

Choice D is the best answer. The table discusses pathogen occurrence in honeybee colonies, but it includes no information as to whether these honeybees were infected with mites. Because the table does not

suggest mites infested the honeybee colonies, no conclusions can be made as to whether mites increased the honeybees' "susceptibility to secondary infection with fungi, bacteria or viruses" (lines 4-5).

Choices A, B, and C are incorrect because the table provides no information about whether these honeybees were infected with mites.

Section 2: Writing and Language Test

QUESTION 1

Choice A is the best answer because by providing the comparative adjective "healthier" and the word "more" to make "productive" comparative, it creates a parallel structure within the list that begins with "happier."

Choices B, C, and D are incorrect because none creates a parallel structure within the list of qualities.

QUESTION 2

Choice B is the best answer. The ways in which exposure to natural light affects employees is the main subject of the passage.

Choices A, C, and D are incorrect because none introduces the topic discussed in the remainder of the passage.

QUESTION 3

Choice C is the best answer. It accurately notes that the proposed sentence would be placed directly between the first mention of circadian rhythms and the explanation of the term.

Choices A, B, and D are incorrect because each misinterprets the relationship between the proposed additional text and the ideas in the paragraph.

QUESTION 4

Choice C is the best answer. It provides the correct possessive construction for "body," which must be a singular noun when discussed in general terms as in this sentence. Choice C also provides the correct plural construction for "clocks."

Choices A, B, and D are incorrect because each applies either a possessive or a plural construction in a place where it doesn't belong.

QUESTION 5

Choice A is the best answer. The singular verb "is" agrees with the singular noun "absenteeism."

Choices B, C, and D are incorrect because each provides a verb that either fails to agree with the singular subject "absenteeism" or introduces redundancy.

QUESTION 6

Choice B is the best answer. It contains a direct reference to productivity, the topic introduced in the previous sentence.

Choices A, C, and D are incorrect because none directly addresses employee productivity, the primary subject of the previous sentence.

QUESTION 7

Choice A is the best answer. It opens with a reference to lowered worker productivity, creating a transition from the previous paragraph, and clearly positions the high energy costs of artificial light sources as an additional disadvantage.

Choices B, C, and D are incorrect because none of the choices offers an adequate transition from the previous paragraph: Each awkwardly inserts the issue of lower worker productivity into a statement about the high energy costs of artificial light sources.

QUESTION 8

Choice D is the best answer. The word "annual" is adequate to communicate that the savings occurred every year.

Choices A, B, and C are incorrect because each proposes an option that would result in a redundancy with "annual."

QUESTION 9

Choice C is the best answer. It provides a transitional adverb that accurately communicates that this sentence describes an option that companies could choose ("light tubes") instead of the option described in the previous sentence ("full-pane windows").

Choices A, B, and D are incorrect because each proposes a transitional adverb that does not accurately reflect the relationship between this sentence and the one preceding it.

QUESTION 10

Choice C is the best answer. It provides the correct relative pronoun to correspond with the plural referent "light tubes" and the correct verb to introduce the definition that follows.

Choices A, B, and D are incorrect because each offers a pronoun inappropriate for opening a dependent clause defining "light tubes."

QUESTION 11

Choice B is the best answer. The preposition "of" idiomatically follows the noun "means," particularly as a way to connect it to another noun or verb.

Choices A, C, and D are incorrect because each results in nonstandard phrasing with "means."

QUESTION 12

Choice A is the best answer. The plural reflexive pronoun "themselves" corresponds with the plural noun "settlers."

Choices B, C, and D are incorrect because each provides either a nonstandard phrase or a singular pronoun that does not correspond with "settlers."

QUESTION 13

Choice C is the best answer. It creates a transition from the poor food quality mentioned in the previous sentence to the information about Harvey in the remainder of the sentence.

Choices A, B, and D are incorrect because none offers a transition from the previous sentence or a detail that corresponds precisely with the information in the remainder of the sentence.

QUESTION 14

Choice D is the best answer. It correctly provides a comma to close the modifying clause "an English-born entrepreneur," which opens with a comma.

Choices A, B, and C are incorrect because each proposes punctuation that creates an inappropriately strong separation between the subject "Fred Harvey" and the verb "decided."

QUESTION 15

Choice B is the best answer. It provides the plural verb and plural possessive pronoun that grammatically correspond to the plural referent "Harvey Houses."

Choices A, C, and D are incorrect because each either fails to provide a verb that corresponds with the plural referent "Harvey Houses" or fails to provide the appropriate possessive pronoun.

QUESTION 16

Choice C is the best answer. It accurately echoes an earlier characterization of the food as being of "terrible quality," while maintaining the established tone of the passage.

Choices A, B, and D are incorrect either because the word is less formal than the established tone of the passage ("icky") or because it illogically attributes agency to food ("sinister," "surly").

QUESTION 17

Choice C is the best answer. It accurately interprets "not content to follow conventional business practices" as logically introducing the new practice of "employing women" described in the following sentences.

Choices A, B, and D are incorrect because none recognizes why the sentence is relevant to this particular location in the passage.

QUESTION 18

Choice B is the best answer. It is concise and free of redundancies.

Choices A, C, and D are incorrect because each pairs "overwhelming" and "tremendous," adjectives so close in meaning that together they present a redundancy.

QUESTION 19

Choice D is the best answer. It contains the pronoun "they," a necessary reference to "such regulations" in the previous clause.

Choices A, B, and C are incorrect because each lacks a necessary subject, such as a pronoun or noun.

QUESTION 20

Choice C is the best answer. It refers directly to benefits for the restaurants' female employees, the subject of the previous sentence.

Choices A, B, and D are incorrect because none logically builds upon the sentence that precedes it.

QUESTION 21

Choice D is the best answer. It provides punctuation that indicates that the opening dependent clause modifies the subject "Harvey Girls."

Choices A, B, and C are incorrect because each uses the punctuation for a dependent clause ("Living independently and demonstrating an intense work ethic") as if it were an independent clause.

QUESTION 22

Choice A is the best answer. It recognizes that the new information supports the previous sentence's claim that "the Harvey Girls became known as a transformative force."

Choices B, C, and D are incorrect because each misinterprets the relationship between the proposed text and the passage.

QUESTION 23

Choice A is the best answer. It opens with a clause that identifies how 1-MCP affects apples, which focuses the sentence on 1-MCP as the subject and allows the ideas in the sentence to progress logically.

Choices B, C, and D are incorrect because each displays awkward or flawed modification and progression of ideas or creates redundancy.

QUESTION 24

Choice D is the best answer. Only the comma is necessary to separate "ethylene" from the appositive noun phrase that defines it.

Choices A, B, and C are incorrect because each creates a comma splice and/or adds unnecessary words.

QUESTION 25

Choice B is the best answer. It offers an adjective that accurately describes fresh apples.

Choices A, C, and D are incorrect because each proposes an adjective that does not describe a plausible fruit texture.

QUESTION 26

Choice A is the best answer. The plural possessive pronoun "their" corresponds with the plural referent "apples."

Choices B, C, and D are incorrect because none provides a pronoun that is both possessive and plural.

QUESTION 27

Choice D is the best answer. It provides the pronoun "who," which accurately identifies the referent "consumers" as people and appropriately begins the relative clause.

Choices A, B, and C are incorrect because each contains a pronoun that either does not correspond with the human referent "consumers" or does not correctly begin the relative clause.

QUESTION 28

Choice B is the best answer. It provides the present tense verb "do," which corresponds to the present tense established earlier in the sentence.

Choices A, C, and D are incorrect because each contains a verb that deviates from the simple present tense established in the sentence.

QUESTION 29

Choice B is the best answer. It provides a colon to appropriately introduce the clause that follows, an elaboration on the preceding claim that Bartlett pears are an example of fruit that "do not respond as well to 1-MCP treatment."

Choices A, C, and D are incorrect because each either creates a comma splice or uses a transitional phrase ("For instance") illogically.

QUESTION 30

Choice B is the best answer. Sentence 4 begins with "But," indicating a contrast with a previous idea, and goes on to mention that 1-MCP can have negative effects. Sentence 1 continues the discussion of benefits of 1-MCP, and sentence 2 names the adverse effect of limiting scent production, so the most logical spot for sentence 4 is between these sentences.

Choices A, C, and D are incorrect because each proposes placing the sentence at a point where it would compromise the logical development of ideas in the paragraph.

QUESTION 31

Choice D is the best answer. It most accurately reflects the data in the graph, which shows a steep decrease in percentage of flesh browning when untreated apples are left in the open air for three weeks rather than placed immediately into a controlled atmosphere.

Choices A, B, and C are incorrect because each presents an inaccurate interpretation of the data in the graph.

QUESTION 32

Choice B is the best answer. It accurately interprets the data as indicating that "roughly half of their flesh turns brown" when apples are treated with 1-MCP: both bars representing 1-MCP treatment are near the 50% line.

Choices A, C, and D are incorrect because each proposes an inaccurate interpretation of the data.

QUESTION 33

Choice C is the best answer. It describes an action, weighing the relative values, that fruit sellers must take as a result of 1-MCP's limitations.

Choices A, B, and D are incorrect because none specifically connects the shortcomings of 1-MCP with any action on the part of fruit sellers.

QUESTION 34

Choice D is the best answer. It clearly communicates that the preceding dependent clause modifies "works by human artists."

Choices A, B, and C are incorrect because each fails to link the preceding dependent clause to an independent clause, resulting in an incomplete sentence.

QUESTION 35

Choice B is the best answer. It provides the necessary em dash to close the aside about artist C.M. Coolidge, which opens with an em dash.

Choices A, C, and D are incorrect because each provides closing punctuation for the aside that does not correspond with the opening punctuation.

QUESTION 36

Choice C is the best answer. The plural verb "portray" corresponds with the plural noun "works of art."

Choices A, B, and D are incorrect because none provides the plural verb in the present tense that the sentence requires.

QUESTION 37

Choice D is the best answer. It names a "museum in Russia," which is the subject of the next paragraph.

Choices A, B, and C are incorrect because each provides an overly general phrase that does not specifically link to the paragraph that follows.

QUESTION 38

Choice C is the best answer. It creates parallelism with the verb "could damage" that appears earlier in the clause ("rodents that could damage . . . [and could] scare off visitors").

Choices A, B, and D are incorrect because each presents a verb tense that is inconsistent with the sentence's other present tense verb ("could damage") that shares "mice, rats, and other rodents" as its subject.

QUESTION 39

Choice C is the best answer. Sentence 5, which discusses Peter the Great's daughter continuing his tradition, most logically follows the sentence about Peter the Great.

Choices A, B, and D are incorrect because each presents a placement that would compromise the logical development of the paragraph.

QUESTION 40

Choice B is the best answer. "Commissioned" describes the act of hiring an artist to create a specific work.

Choices A, C, and D are incorrect because each provides a word that does not correspond logically with the context.

QUESTION 41

Choice D is the best answer. It provides punctuation that clearly places the noun phrase "digital artist Eldar Zakirov" as an appositive identifying the person mentioned in the previous phrase, "The person chosen for this task."

Choices A, B, and C are incorrect because each fails to open and close the uninterrupted appositive noun phrase "digital artist Eldar Zakirov" with commas.

QUESTION 42

Choice A is the best answer. The phrase "noble individuals" corresponds with the subsequent examples of portraits where the cats are depicted as "aristocratic," "stately," and like a "trusted royal advisor."

Choices B, C, and D are incorrect because each provides a statement that does not logically connect to the examples that follow.

QUESTION 43

Choice D is the best answer. It accurately states that the information in the proposed additional sentence is not related to formal portraits of cats, the main topic of the paragraph.

Choices A, B, and C are incorrect because each fails to recognize that the proposed sentence interrupts the logical development of the paragraph.

QUESTION 44

Choice D is the best answer. The tone corresponds with that established in the passage, and the phrasing appropriately focuses on the cats' contribution to protecting artwork rather than on simply killing rodents.

Choices A, B, and C are incorrect because none makes explicit the link between the cats' hunting activities and the service to the museum.

Section 3: Math Test – No Calculator

QUESTION 1

Choice C is correct. The painter's fee is given by $nK\ell h$, where n is the number of walls, K is a constant with units of dollars per square foot, ℓ is the length of each wall in feet, and h is the height of each wall in feet. Examining this equation shows that ℓ and h will be used to determine the area of each wall. The variable n is the number of walls, so n times the area of each wall will give the amount of area that will need to be painted. The only remaining variable is K, which represents

the cost per square foot and is determined by the painter's time and the price of paint. Therefore, K is the only factor that will change if the customer asks for a more expensive brand of paint.

Choice A is incorrect because a more expensive brand of paint would not cause the height of each wall to change. Choice B is incorrect because a more expensive brand of paint would not cause the length of each wall to change. Choice D is incorrect because a more expensive brand of paint would not cause the number of walls to change.

QUESTION 2

Choice D is correct. Dividing each side of the equation $3r = 18$ by 3 gives $r = 6$. Substituting 6 for r in the expression $6r + 3$ gives $6(6) + 3 = 39$.

Alternatively, the expression $6r + 3$ can be rewritten as $2(3r) + 3$. Substituting 18 for $3r$ in the expression $2(3r) + 3$ yields $2(18) + 3$, or $36 + 3 = 39$.

Choice A is incorrect because 6 is the value of r; however, the question asks for the value of the expression $6r + 3$. Choices B and C are incorrect because if $6r + 3$ were equal to either of these values, then it would not be possible for $3r$ to be equal to 18, as stated in the question.

QUESTION 3

Choice D is correct. By definition, $a^{\frac{m}{n}} = \sqrt[n]{a^m}$ for any positive integers m and n. It follows, therefore, that $a^{\frac{2}{3}} = \sqrt[3]{a^2}$.

Choice A is incorrect. By definition, $a^{\frac{1}{n}} = \sqrt[n]{a}$ for any positive integer n. Applying this definition as well as the power property of exponents to the expression $\sqrt{a^{\frac{1}{3}}}$ yields $\sqrt{a^{\frac{1}{3}}} = \left(a^{\frac{1}{3}}\right)^{\frac{1}{2}} = a^{\frac{1}{6}}$. Because $a^{\frac{1}{6}} \neq a^{\frac{2}{3}}$, $\sqrt{a^{\frac{1}{3}}}$ is not the correct answer. Choice B is incorrect. By definition, $a^{\frac{1}{n}} = \sqrt[n]{a}$ for any positive integer n. Applying this definition as well as the power property of exponents to the expression $\sqrt{a^3}$ yields $\sqrt{a^3} = (a^3)^{\frac{1}{2}} = a^{\frac{3}{2}}$. Because $a^{\frac{3}{2}} \neq a^{\frac{2}{3}}$, $\sqrt{a^3}$ is not the correct answer. Choice C is incorrect. By definition, $a^{\frac{1}{n}} = \sqrt[n]{a}$ for any positive integer n. Applying this definition as well as the power property of exponents to the expression $\sqrt[3]{a^{\frac{1}{2}}}$ yields $\sqrt[3]{a^{\frac{1}{2}}} = \left(a^{\frac{1}{2}}\right)^{\frac{1}{3}} = a^{\frac{1}{6}}$. Because $a^{\frac{1}{6}} \neq a^{\frac{2}{3}}$, $\sqrt[3]{a^{\frac{1}{2}}}$ is not the correct answer.

QUESTION 4

Choice B is correct. To fit the scenario described, 30 must be twice as large as x. This can be written as $2x = 30$.

Choices A, C, and D are incorrect. These equations do not correctly relate the numbers and variables described in the stem. For example, the expression in choice C states that 30 is half as large as x, not twice as large as x.

QUESTION 5

Choice C is correct. Multiplying each side of $\frac{5}{x} = \frac{15}{x + 20}$ by $x(x + 20)$ gives $5(x + 20) = 15x$. Using the distributive property to eliminate the parentheses yields $5x + 100 = 15x$, and then subtracting $5x$ from each side of the equation $5x + 100 = 15x$ gives $100 = 10x$. Finally, dividing both sides of the equation $100 = 10x$ by 10 gives $10 = x$. Therefore, the value of $\frac{x}{5}$ is $\frac{10}{5} = 2$.

Choice A is incorrect because it is the value of x, not $\frac{x}{5}$. Choices B and D are incorrect and may be the result of errors in arithmetic operations on the given equation.

QUESTION 6

Choice C is correct. Multiplying each side of the equation $2x - 3y = -14$ by 3 gives $6x - 9y = -42$. Multiplying each side of the equation $3x - 2y = -6$ by 2 gives $6x - 4y = -12$. Then, subtracting the sides of $6x - 4y = -12$ from the corresponding sides of $6x - 9y = -42$ gives $-5y = -30$. Dividing each side of the equation $-5y = -30$ by -5 gives $y = 6$. Finally, substituting 6 for y in $2x - 3y = -14$ gives $2x - 3(6) = -14$, or $x = 2$. Therefore, the value of $x - y$ is $2 - 6 = -4$.

Alternatively, adding the corresponding sides of $2x - 3y = -14$ and $3x - 2y = -6$ gives $5x - 5y = -20$, from which it follows that $x - y = -4$.

Choices A and B are incorrect and may be the result of an arithmetic error when solving the system of equations. Choice D is incorrect and may be the result of finding $x + y$ instead of $x - y$.

QUESTION 7

Choice C is correct. If $x - b$ is a factor of $f(x)$, then $f(b)$ must equal 0. Based on the table, $f(4) = 0$. Therefore, $x - 4$ must be a factor of $f(x)$.

Choice A is incorrect because $f(2) \neq 0$. Choice B is incorrect because no information is given about the value of $f(3)$, so $x - 3$ may or may not be a factor of $f(x)$. Choice D is incorrect because $f(5) \neq 0$.

QUESTION 8

Choice A is correct. The linear equation $y = kx + 4$ is in slope-intercept form, and so the slope of the line is k. Since the line contains the point (c, d), the coordinates of this point satisfy the equation $y = kx + 4$; therefore, $d = kc + 4$. Solving this equation for the slope, k, gives $k = \frac{d - 4}{c}$.

Choices B, C, and D are incorrect and may be the result of errors in substituting the coordinates of (c, d) in $y = kx + 4$ or of errors in solving for k in the resulting equation.

QUESTION 9

Choice A is correct. If a system of two linear equations has no solution, then the lines represented by the equations in the coordinate plane are parallel. The equation $kx - 3y = 4$ can be rewritten as $y = \frac{k}{3}x - \frac{4}{3}$, where $\frac{k}{3}$ is the slope of the line, and the equation $4x - 5y = 7$ can be rewritten as $y = \frac{4}{5}x - \frac{7}{5}$, where $\frac{4}{5}$ is the slope of the line. If two lines are parallel, then the slopes of the line are equal. Therefore, $\frac{4}{5} = \frac{k}{3}$, or $k = \frac{12}{5}$. (Since the y-intercepts of the lines represented by the equations are $-\frac{4}{3}$ and $-\frac{7}{5}$, the lines are parallel, not identical.)

Choices B, C, and D are incorrect and may be the result of a computational error when rewriting the equations or solving the equation representing the equality of the slopes for k.

QUESTION 10

Choice A is correct. Substituting 25 for y in the equation $y = (x - 11)^2$ gives $25 = (x - 11)^2$. It follows that $x - 11 = 5$ or $x - 11 = -5$, so the x-coordinates of the two points of intersection are $x = 16$ and $x = 6$, respectively. Since both points of intersection have a y-coordinate of 25, it follows that the two points are (16, 25) and (6, 25). Since these points lie on the horizontal line $y = 25$, the distance between these points is the positive difference of the x-coordinates: $16 - 6 = 10$.

Alternatively, since a translation is a rigid motion, the distance between points A and B would be the same as the distance between the points of intersection of the line $y = 25$ and the parabola $y = x^2$. Since those graphs intersect at (0, 5) and (0, −5), the distance between the two points, and thus the distance between A and B, is 10.

Choices B, C, and D are incorrect and may be the result of an error in solving the quadratic equation that results when substituting 25 for y in the given quadratic equation.

QUESTION 11

Choice B is correct. Since the angles marked $y°$ and $u°$ are vertical angles, $y = u$. Substituting y for u in the equation $x + y = u + w$ gives $x = w$. Since the angles marked $w°$ and $z°$ are vertical angles, $w = z$. Therefore, by the transitive property, $x = z$, and so I must be true.

The equation in II need not be true. For example, if $x = w = z = t = 70$ and $y = u = 40$, then all three pairs of vertical angles in the figure have equal measure and the given condition $x + y = u + w$ holds. But it is not true in this case that y is equal to w. Therefore, II need not be true.

Since the top three angles in the figure form a straight angle, it follows that $x + y + z = 180$. Similarly, $w + u + t = 180$, and so $x + y + z = w + u + t$. Subtracting the sides of the given equation $x + y = u + w$ from the corresponding sides of $x + y + z = w + u + t$ gives $z = t$. Therefore, III must be true. Since only I and III must be true, the correct answer is choice B.

Choices A, C, and D are incorrect because each of these choices includes II, which need not be true.

QUESTION 12

Choice A is correct. The parabola with equation $y = a(x - 2)(x + 4)$ crosses the x-axis at the points $(-4, 0)$ and $(2, 0)$. By symmetry, the x-coordinate of the vertex of the parabola is halfway between the x-coordinates of $(-4, 0)$ and $(2, 0)$. Thus, the x-coordinate of the vertex is $\frac{-4 + 2}{2} = -1$. This is the value of c. To find the y-coordinate of the vertex, substitute -1 for x in $y = a(x - 2)(x + 4)$:

$$y = a(x - 2)(x + 4) = a(-1 - 2)(-1 + 4) = a(-3)(3) = -9a$$

Therefore, the value of d is $-9a$.

Choice B is incorrect because the value of the constant term in the equation is not the y-coordinate of the vertex, unless there were no linear terms in the quadratic. Choice C is incorrect and may be the result of a sign error in finding the x-coordinate of the vertex. Choice D is incorrect because the negative of the coefficient of the linear term in the quadratic equation is not the y-coordinate of the vertex.

QUESTION 13

Choice B is correct. Since $24x^2 + 25x - 47$ divided by $ax - 2$ is equal to $-8x - 3$ with remainder -53, it is true that $(-8x - 3)(ax - 2) - 53 = 24x^2 + 25x - 47$. (This can be seen by multiplying each side of the given equation by $ax - 2$). This can be rewritten as $-8ax^2 + 16x - 3ax + 6 - 53 = 24x^2 + 25x - 47$. Since the coefficients of the x^2-term have to be equal on both sides of the equation, $-8a = 24$, or $a = -3$.

Choices A, C, and D are incorrect and may be the result of either a conceptual misunderstanding or a computational error when trying to solve for the value of a.

QUESTION 14

Choice A is correct. Dividing each side of the given equation by 3 gives the equivalent equation $x^2 + 4x + 2 = 0$. Then using the quadratic formula, $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ with $a = 1$, $b = 4$, and $c = 2$, gives the solutions $x = -2 \pm \sqrt{2}$.

Choices B, C, and D are incorrect and may be the result of errors when applying the quadratic formula.

QUESTION 15

Choice D is correct. If C is graphed against F, the slope of the line is equal to $\frac{5}{9}$ degrees Celsius/degrees Fahrenheit, which means that for an increase of 1 degree Fahrenheit, the increase is $\frac{5}{9}$ of 1 degree Celsius. Thus, statement I is true. This is the equivalent to saying that an increase of 1 degree Celsius is equal to an increase of $\frac{9}{5}$ degrees Fahrenheit.

Since $\frac{9}{5} = 1.8$, statement II is true. On the other hand, statement III is not true, since a temperature increase of $\frac{9}{5}$ degrees Fahrenheit, not $\frac{5}{9}$ degree Fahrenheit, is equal to a temperature increase of 1 degree Celsius.

Choices A, B, and C are incorrect because each of these choices omits a true statement or includes a false statement.

QUESTION 16

The correct answer is either 1 or 2. The given equation can be rewritten as $x^5 - 5x^3 + 4x = 0$. Since the polynomial expression on the left has no constant term, it has x as a factor: $x(x^4 - 5x^2 + 4) = 0$. The expression in parentheses is a quadratic equation in x^2 that can be factored, giving $x(x^2 - 1)(x^2 - 4) = 0$. This further factors as $x(x - 1)(x + 1)(x - 2)(x + 2) = 0$. The solutions for x are $x = 0$, $x = 1$, $x = -1$, $x = 2$, and $x = -2$. Since it is given that $x > 0$, the possible values of x are $x = 1$ and $x = 2$. Either 1 or 2 may be gridded as the correct answer.

QUESTION 17

The correct answer is 2. First, clear the fractions from the given equation by multiplying each side of the equation by 36 (the least common multiple of 4, 9, and 12). The equation becomes $28x - 16x = 9 + 15$. Combining like terms on each side of the equation yields $12x = 24$. Finally, dividing both sides of the equation by 12 yields $x = 2$.

Alternatively, since $\frac{7}{9}x - \frac{4}{9}x = \frac{3}{9}x = \frac{1}{3}x$ and $\frac{1}{4} + \frac{5}{12} = \frac{3}{12} + \frac{5}{12} = \frac{8}{12} = \frac{2}{3}$, the given equation simplifies to $\frac{1}{3}x = \frac{2}{3}$. Multiplying each side of $\frac{1}{3}x = \frac{2}{3}$ by 3 yields $x = 2$.

QUESTION 18

The correct answer is 105. Since $180 - z = 2y$ and $y = 75$, it follows that $180 - z = 150$, and so $z = 30$. Thus, each of the base angles of the isosceles triangle on the right has measure $\frac{180° - 30°}{2} = 75°$. Therefore, the measure of the angle marked $x°$ is $180° - 75° = 105°$, and so the value of x is 105.

QUESTION 19

The correct answer is 370. A system of equations can be used where h represents the number of calories in a hamburger and f represents the number of calories in an order of fries. The equation $2h + 3f = 1700$ represents the fact that 2 hamburgers and 3 orders of fries contain a total of 1700 calories, and the equation $h = f + 50$ represents the fact

that one hamburger contains 50 more calories than an order of fries. Substituting $f + 50$ for h in $2h + 3f = 1700$ gives $2(f + 50) + 3f = 1700$. This equation can be solved as follows:

$$2f + 100 + 3f = 1700$$
$$5f + 100 = 1700$$
$$5f = 1600$$
$$f = 320$$

The number of calories in an order of fries is 320, so the number of calories in a hamburger is 50 more than 320, or 370.

QUESTION 20

The correct answer is $\frac{3}{5}$ or .6. Triangle ABC is a right triangle with its right angle at B. Thus, $\overline{AC}$ is the hypotenuse of right triangle ABC, and $\overline{AB}$ and $\overline{BC}$ are the legs of right triangle ABC. By the Pythagorean theorem, $AB = \sqrt{20^2 - 16^2} = \sqrt{400 - 256} = \sqrt{144} = 12$. Since triangle DEF is similar to triangle ABC, with vertex F corresponding to vertex C, the measure of angle F equals the measure of angle C. Thus, $\sin F = \sin C$. From the side lengths of triangle ABC, $\sin C = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{AB}{AC} = \frac{12}{20} = \frac{3}{5}$. Therefore, $\sin F = \frac{3}{5}$. Either 3/5 or its decimal equivalent, .6, may be gridded as the correct answer.

Section 4: Math Test – Calculator

QUESTION 1

Choice C is correct. Marilyn's distance from her campsite remained the same during the time she ate lunch. This is represented by a horizontal segment in the graph. The only horizontal segment in the graph starts at a time of about 1:10 P.M. and ends at about 1:40 P.M. Therefore, Marilyn finished her lunch and continued her hike at about 1:40 P.M.

Choices A, B, and D are incorrect and may be the result of a misinterpretation of the graph. For example, choice B is the time Marilyn started her lunch, and choice D is the time Marilyn was at the maximum distance from her campsite.

QUESTION 2

Choice B is correct. Of the 25 people who entered the contest, there are 8 females under age 40 and 2 males age 40 or older. Because there is no overlap in the categories, the probability that the contest winner will be either a female under age 40 or a male age 40 or older is $\frac{8}{25} + \frac{2}{25} = \frac{10}{25}$.

Choice A is incorrect and may be the result of dividing 8 by 2, instead of adding 8 to 2, to find the probability. Choice C is incorrect; it is the probability that the contest winner will be either a female under

age 40 or a female age 40 or older. Choice D is incorrect and may be the result of multiplying 8 and 2, instead of adding 8 and 2, to find the probability.

QUESTION 3

Choice C is correct. Based on the graph, sales increased in the first 3 years since 1997, which is until year 2000, and then generally decreased thereafter.

Choices A, B, and D are incorrect; each of these choices contains inaccuracies in describing the general trend of music album sales from 1997 through 2009.

QUESTION 4

Choice C is correct. The graph of $y = f(n)$ in the coordinate plane is a line that passes through each of the points given in the table. From the table, one can see that an increase of 1 unit in n results in an increase of 3 units in $f(n)$; for example, $f\ 2) - f(1) = 1 - (-2) = 3$. Therefore, the graph of $y = f(n)$ in the coordinate plane is a line with slope 3. Only choice C is a line with slope 3. The y-intercept of the line is the value of $f(0)$. Since an increase of 1 unit in n results in an increase of 3 units in $f(n)$, it follows that $f\ 1) - f(0) = 3$. Since $f(1) = -2$, it follows that $f(0) = f(1) - 3 = -5$. Therefore, the y-intercept of the graph of $f(n)$ is -5, and the equation in slope-intercept form that defined f is $f(n) = 3n - 5$.

Choices A, B, and D are incorrect because each equation has the incorrect slope of the line (the y-intercept in each equation is also incorrect).

QUESTION 5

Choice B is correct. Since 7 percent of the 562 juniors is 0.07(562) and 5 percent of the 602 seniors is 0.05(602), the expression 0.07(562) + 0.05(602) can be evaluated to determine the total number of juniors and seniors inducted into the National Honor Society. Of the given choices, 69 is closest to the value of the expression.

Choice A is incorrect and may be the result of adding the number of juniors and seniors and the percentages given and then using the expression (0.07 + 0.05)(562 + 602). Choices C and D are incorrect and may be the result of finding either only the number of juniors inducted or only the number of seniors inducted.

QUESTION 6

Choice A is correct. The sum of the two polynomials is $(3x^2 - 5x + 2) + (5x^2 - 2x - 6)$. This can be rewritten by combining like terms:

$$(3x^2 - 5x + 2) + (5x^2 - 2x - 6 = (3x^2 + 5x^2) + -5x - 2x) + (2 - 6) = 8x^2 - 7x - 4$$

Choice B is incorrect and may be the result of a sign error when combining the coefficients of the x-term. Choice C is incorrect and may be the result of adding the exponents, as well as the coefficients, of like terms. Choice D is incorrect and may be the result of a combination of the errors described in choice B and choice C.

QUESTION 7

Choice D is correct. To solve the equation for w, multiply both sides of the equation by the reciprocal of $\frac{3}{5}$, which is $\frac{5}{3}$. This gives $\left(\frac{5}{3}\right) \cdot \frac{3}{5} w = \frac{4}{3} \cdot \left(\frac{5}{3}\right)$, which simplifies to $w = \frac{20}{9}$.

Choices A, B, and C are incorrect and may be the result of errors in arithmetic when simplifying the given equation.

QUESTION 8

Choice C is correct. In the equation $y = 0.56x + 27.2$, the value of x increases by 1 for each year that passes. Each time x increases by 1, y increases by 0.56 since 0.56 is the slope of the graph of this equation. Since y represents the average number of students per classroom in the year represented by x, it follows that, according to the model, the estimated increase each year in the average number of students per classroom at Central High School is 0.56.

Choice A is incorrect because the total number of students in the school in 2000 is the product of the average number of students per classroom and the total number of classrooms, which would appropriately be approximated by the y-intercept (27.2) times the total number of classrooms, which is not given. Choice B is incorrect because the average number of students per classroom in 2000 is given by the y-intercept of the graph of the equation, but the question is asking for the meaning of the number 0.56, which is the slope. Choice D is incorrect because 0.56 represents the estimated yearly change in the average number of students per classroom. The estimated difference between the average number of students per classroom in 2010 and 2000 is 0.56 times the number of years that have passed between 2000 and 2010, that is, $0.56 \times 10 = 5.6$.

QUESTION 9

Choice B is correct. Because Nate walks 25 meters in 13.7 seconds, and 4 minutes is equal to 240 seconds, the proportion $\frac{25 \text{ meters}}{13.7 \text{ sec}} = \frac{x \text{ meters}}{240 \text{ sec}}$ can be used to find out how many meters, x, Nate walks in 4 minutes. The proportion can be simplified to $\frac{25}{13.7} = \frac{x}{240}$, because the units of meters per second cancel, and then each side of the equation can be multiplied by 240, giving $\frac{(240)(25)}{13.7} = x \approx 438$. Therefore, of the given options, 450 meters is closest to the distance Nate will walk in 4 minutes.

Choice A is incorrect and may be the result of setting up the proportion as $\frac{13.7 \text{ sec}}{25 \text{ meters}} = \frac{x \text{ meters}}{240 \text{ sec}}$ and finding that $x \approx 132$, which is close to 150. Choices C and D are incorrect and may be the result of errors in calculation.

QUESTION 10

Choice D is correct. On Mercury, the acceleration due to gravity is 3.6 m/sec^2. Substituting 3.6 for g and 90 for m in the formula $W = mg$ gives $W = 90(3.6) = 324$ newtons.

Choice A is incorrect and may be the result of dividing 90 by 3.6. Choice B is incorrect and may be the result of subtracting 3.6 from 90 and rounding to the nearest whole number. Choice C is incorrect because an object with a weight of 101 newtons on Mercury would have a mass of about 28 kilograms, not 90 kilograms.

QUESTION 11

Choice B is correct. On Earth, the acceleration due to gravity is 9.8 m/sec^2. Thus, for an object with a weight of 150 newtons, the formula $W = mg$ becomes $150 = m(9.8)$, which shows that the mass of an object with a weight of 150 newtons on Earth is about 15.3 kilograms. Substituting this mass into the formula $W = mg$ and now using the weight of 170 newtons gives $170 = 15.3g$, which shows that the second planet's acceleration due to gravity is about 11.1 m/sec^2. According to the table, this value for the acceleration due to gravity holds on Saturn.

Choices A, C, and D are incorrect. Using the formula $W = mg$ and the values for g in the table shows that an object with a weight of 170 newtons on these planets would not have the same mass as an object with a weight of 150 newtons on Earth.

QUESTION 12

Choice D is correct. A zero of a function corresponds to an x-intercept of the graph of the function in the xy-plane. Therefore, the complete graph of the function f, which has five distinct zeros, must have five x-intercepts. Only the graph in choice D has five x-intercepts, and therefore, this is the only one of the given graphs that could be the complete graph of f in the xy-plane.

Choices A, B, and C are incorrect. The number of x-intercepts of each of these graphs is not equal to five; therefore, none of these graphs could be the complete graph of f, which has five distinct zeros.

QUESTION 13

Choice D is correct. Starting with the original equation, $h = -16t^2 + vt + k$, in order to get v in terms of the other variables, $-16t^2$ and k need to be subtracted from each side. This yields $vt = h + 16t^2 - k$, which when

divided by t will give v in terms of the other variables. However, the equation $v = \frac{h + 16t^2 - k}{t}$ is not one of the options, so the right side needs to be further simplified. Another way to write the previous equation is $v = \frac{h - k}{t} + \frac{16t^2}{t}$, which can be simplified to $v = \frac{h - k}{t} + 16t$.

Choices A, B, and C are incorrect and may be the result of arithmetic errors when rewriting the original equation to express v in terms of h, t, and k.

QUESTION 14

Choice A is correct. The hotel charges \$0.20 per minute to use the meeting-room phone. This per-minute rate can be converted to the hourly rate using the conversion 1 hour = 60 minutes, as shown below.

$$\frac{\$0.20}{\text{minute}} \times \frac{60 \text{ minutes}}{1 \text{ hour}} = \frac{\$(0.20 \times 60)}{\text{hour}}$$

Thus, the hotel charges \$(0.20 × 60) per hour to use the meeting-room phone. Therefore, the cost c, in dollars, for h hours of use is $c = (0.20 \times 60)h$, which is equivalent to $c = 0.20(60h)$.

Choice B is incorrect because in this expression the per-minute rate is multiplied by h, the number of hours of phone use. Furthermore, the equation indicates that there is a flat fee of \$60 in addition to the per-minute or per-hour rate. This is not the case. Choice C is incorrect because the expression indicates that the hotel charges $\$\left(\frac{60}{0.20}\right)$ per hour for use of the meeting-room phone, not \$0.20(60) per hour. Choice D is incorrect because the expression indicates that the hourly rate is $\frac{1}{60}$ times the per-minute rate, not 60 times the per-minute rate.

QUESTION 15

Choice A is the correct answer. Experimental research is a method used to study a small group of people and generalize the results to a larger population. However, in order to make a generalization involving cause and effect:

- The population must be well defined.
- The participants must be selected at random.
- The participants must be randomly assigned to treatment groups.

When these conditions are met, the results of the study can be generalized to the population with a conclusion about cause and effect. In this study, all conditions are met and the population from which the participants were selected are people with poor eyesight. Therefore, a general conclusion can be drawn about the effect of Treatment X on the population of people with poor eyesight.

Choice B is incorrect. The study did not include all available treatments, so no conclusion can be made about the relative effectiveness of all available treatments. Choice C is incorrect. The participants were selected at random from a large population of people with poor eyesight. Therefore, the results can be generalized only to that population and not to anyone in general. Also, the conclusion is too strong: an experimental study might show that people are likely to be helped by a treatment, but it cannot show that anyone who takes the treatment will be helped. Choice D is incorrect. This conclusion is too strong. The study shows that Treatment X is likely to improve the eyesight of people with poor eyesight, but it cannot show that the treatment definitely will cause improvement in eyesight for every person. Furthermore, since the people undergoing the treatment in the study were selected from people with poor eyesight, the results can be generalized only to this population, not to all people.

QUESTION 16

Choice B is correct. The graphs of $y = f(x)$ and $y = g(x)$ are given. In order for $f(x) + g(x)$ to be 0, there must be one or more values of x for which the y-coordinates of the graphs are opposites. Looking at the graphs, one can see that this occurs at $x = -2$: the point $(-2, -2)$ lies on the graph of f, and the point $(-2, 2)$ lies on the graph of g. Thus, at $x = -2$, the value of $f(x) + g(x$ is $-2 + 2 = 0$.

Choices A, C, and D are incorrect because none of these x-values satisfies the given equation, $f(x) + g(x) = 0$.

QUESTION 17

Choice B is correct. The quantity of the product supplied to the market is given by the function $S(P) = \frac{1}{2}P + 40$. If the price P of the product increases by \$10, the effect on the quantity of the product supplied can be determined by substituting $P + 10$ for P in the function $S(P) = \frac{1}{2}P + 40$. This gives $S(P + 10) = \frac{1}{2}(P + 10) + 40 = \frac{1}{2}P + 45$, which shows that $S(P + 10) = S(P) + 5$. Therefore, the quantity supplied to the market will increase by 5 units when the price of the product is increased by \$10.

Alternatively, look at the coefficient of P in the linear function S. This is the slope of the graph of the function, where P is on the horizontal axis and $S(P)$ is on the vertical axis. Since the slope is $\frac{1}{2}$, for every increase of 1 in P, there will be an increase of $\frac{1}{2}$ in $S(P)$, and therefore, an increase of 10 in P will yield an increase of 5 in $S(P)$.

Choice A is incorrect. If the quantity supplied decreases as the price of the product increases, the function $S(P)$ would be decreasing, but $S(P) = \frac{1}{2}P + 40$ is an increasing function. Choice C is incorrect and may be the result of assuming the slope of the graph of $S(P)$ is

equal to 1. Choice D is incorrect and may be the result of confusing the *y*-intercept of the graph of $S(P)$ with the slope, and then adding 10 to the *y*-intercept.

QUESTION 18

Choice B is correct. The quantity of the product supplied to the market will equal the quantity of the product demanded by the market if $S(P)$ is equal to $D(P)$, that is, if $\frac{1}{2}P + 40 = 220 - P$. Solving this equation gives $P = 120$, and so \$120 is the price at which the quantity of the product supplied will equal the quantity of the product demanded.

Choices A, C, and D are incorrect. At these dollar amounts, the quantities given by $S(P)$ and $D(P)$ are not equal.

QUESTION 19

Choice C is correct. It is given that 1 ounce of graphene covers 7 football fields. Therefore, 48 ounces can cover $7 \times 48 = 336$ football fields. If each football field has an area of $1\frac{1}{3}$ acres, then 336 football fields have a total area of $336 \times 1\frac{1}{3} = 448$ acres. Therefore, of the choices given, 450 acres is closest to the number of acres 48 ounces of graphene could cover.

Choice A is incorrect and may be the result of dividing, instead of multiplying, the number of football fields by $1\frac{1}{3}$. Choice B is incorrect and may be the result of finding the number of football fields, not the number of acres, that can be covered by 48 ounces of graphene. Choice D is incorrect and may be the result of setting up the expression $\frac{7 \times 48 \times 4}{3}$ and then finding only the numerator of the fraction.

QUESTION 20

Choice B is correct. To answer this question, find the point in the graph that represents Michael's 34-minute swim and then compare the actual heart rate for that swim with the expected heart rate as defined by the line of best fit. To find the point that represents Michael's swim that took 34 minutes, look along the vertical line of the graph that is marked "34" on the horizontal axis. That vertical line intersects only one point in the scatterplot, at 148 beats per minute. On the other hand, the line of best fit intersects the vertical line representing 34 minutes at 150 beats per minute. Therefore, for the swim that took 34 minutes, Michael's actual heart rate was $150 - 148 = 2$ beats per minute less than predicted by the line of best fit.

Choices A, C, and D are incorrect and may be the result of misreading the graph.

QUESTION 21

Choice C is correct. Linear growth is characterized by an increase of a quantity at a constant rate. Exponential growth is characterized by an increase of a quantity at a relative rate; that is, an increase by the same factor over equal increments of time. In choice C, the value of the account increases by 1% each year; that is, the value is multiplied by the same factor, 1.01, each year. Therefore, the value described in choice C grows exponentially.

Choices A and B are incorrect because the rate depends only on the initial value, and thus the value increases by the same amount each year. Both options A and B describe linear growth. Choice D is incorrect; it is is also a description of linear growth, as the increase is constant each year.

QUESTION 22

Choice B is correct. One of the three numbers is x; let the other two numbers be y and z. Since the sum of three numbers is 855, the equation $x + y + z = 855$ is true. The statement that x is 50% more than the sum of the other two numbers can be represented as $x = 1.5(y + z)$, or $x = \frac{3}{2}(y + z)$. Multiplying both sides of the equation $x = \frac{3}{2}(y + z)$ by $\frac{2}{3}$ gives $\frac{2}{3}x = y + z$. Substituting $\frac{2}{3}x$ in $x + y + z = 855$ gives $x + \frac{2}{3}x = 855$, or $\frac{5x}{3} = 855$. Therefore, x equals $\frac{3}{5} \times 855 = 513$.

Choices A, C, and D are incorrect and may be the result of computational errors.

QUESTION 23

Choice C is correct. Since the angles are acute and $\sin(a°) = \cos(b°)$, it follows from the complementary angle property of sines and cosines that $a + b = 90$. Substituting $4k - 22$ for a and $6k - 13$ for b gives $(4k - 22) + (6k - 13) = 90$, which simplifies to $10k - 35 = 90$. Therefore, $10k = 125$, and $k = 12.5$.

Choice A is incorrect and may be the result of mistakenly assuming that $a = b$ and making a sign error. Choices B and D are incorrect because they result in values for a and b such that $\sin(a°) \neq \cos(b°)$.

QUESTION 24

Choice D is correct. Let c be the number of students in Mr. Kohl's class. The conditions described in the question can be represented by the equations $n = 3c + 5$ and $n + 21 = 4c$. Substituting $3c + 5$ for n in the second equation gives $3c + 5 + 21 = 4c$, which can be solved to find $c = 26$.

Choices A, B, and C are incorrect because the values given for the number of students in the class cannot fulfill both conditions given in the question. For example, if there were 16 students in the class, then the first condition would imply that there are $3(16) + 5 = 53$ milliliters

of solution in the beaker, but the second condition would imply that there are 4(16) − 21 = 43 milliliters of solution in the beaker. This contradiction shows that there cannot be 16 students in the class.

QUESTION 25

Choice D is correct. The volume of the grain silo can be found by adding the volumes of all the solids of which it is composed. The silo is made up of a cylinder with height 10 feet (ft) and base radius 5 ft and two cones, each having height 5 ft and base radius 5 ft. The formulas $V_{\text{cylinder}} = \pi r^2 h$ and $V_{\text{cone}} = \frac{1}{3}\pi r^2 h$ can be used to determine the total volume of the silo. Since the two cones have identical dimensions, the total volume, in cubic feet, of the silo is given by $V_{\text{silo}} = \pi(5)^2(10) + (2)\left(\frac{1}{3}\right)\pi(5)^2(5) = \left(\frac{4}{3}\right)(250)\pi$, which is approximately equal to 1,047.2 cubic feet.

Choice A is incorrect because this is the volume of only the two cones. Choice B is incorrect because this is the volume of only the cylinder. Choice C is incorrect because this is the volume of only one of the cones plus the cylinder.

QUESTION 26

Choice C is correct. The line passes through the origin, (2, k), and (k, 32). Any two of these points can be used to find the slope of the line. Since the line passes through (0, 0) and (2, k), the slope of the line is equal to $\frac{k-0}{2-0} = \frac{k}{2}$. Similarly, since the line passes through (0, 0) and (k, 32), the slope of the line is equal to $\frac{32-0}{k-0} = \frac{32}{k}$. Since each expression gives the slope of the same line, it must be true that $\frac{k}{2} = \frac{32}{k}$. Multiplying each side of $\frac{k}{2} = \frac{32}{k}$ by $2k$ gives $k^2 = 64$, from which it follows that $k = 8$ or $k = -8$. Therefore, of the given choices, only 8 could be the value of k.

Choices A, B, and D are incorrect and may be the result of computational errors.

QUESTION 27

Choice C is correct. Let ℓ and w be the length and width, respectively, of the original rectangle. The area of the original rectangle is $A = \ell w$. The rectangle is altered by increasing its length by 10 percent and decreasing its width by p percent; thus, the length of the altered rectangle is 1.1ℓ, and the width of the altered rectangle is $\left(1 - \frac{p}{100}\right)w$. The alterations decrease the area by 12 percent, so the area of the altered rectangle is $(1 - 0.12)A = 0.88A$. The area of the altered rectangle is the product of its length and width, so $0.88A = (1.1\ell)\left(1 - \frac{p}{100}\right)w$. Since $A = \ell w$, this last equation can

be rewritten as $0.88A = (1.1)\left(1 - \frac{p}{100}\right)\ell w = (1.1)\left(1 - \frac{p}{100}\right)A$, from which it follows that $0.88 = (1.1)\left(1 - \frac{p}{100}\right)$, or $0.8 = \left(1 - \frac{p}{100}\right)$. Therefore, $\frac{p}{100} = 0.2$, and so the value of p is 20.

Choice A is incorrect and may be the result of confusing the 12 percent decrease in area with the percent decrease in width. Choice B is incorrect because decreasing the width by 15 percent results in a 6.5 percent decrease in area, not a 12 percent decrease. Choice D is incorrect and may be the result of adding the percents given in the question (10 + 12).

QUESTION 28

Choice D is correct. For the present population to decrease by 10 percent, it must be multiplied by the factor 0.9. Since the engineer estimates that the population will decrease by 10 percent every 20 years, the present population, 50,000, must be multiplied by $(0.9)^n$, where n is the number of 20-year periods that will have elapsed t years from now. After t years, the number of 20-year periods that have elapsed is $\frac{t}{20}$. Therefore, $50{,}000(0.9)^{\frac{t}{20}}$ represents the engineer's estimate of the population of the city t years from now.

Choices A, B, and C are incorrect because each of these choices either confuses the percent decrease with the multiplicative factor that represents the percent decrease or mistakenly multiplies t by 20 to find the number of 20-year periods that will have elapsed in t years.

QUESTION 29

Choice A is correct. Let x be the number of left-handed female students and let y be the number of left-handed male students. Then the number of right-handed female students will be $5x$ and the number of right-handed male students will be $9y$. Since the total number of left-handed students is 18 and the total number of right-handed students is 122, the system of equations below must be satisfied.

$$\begin{cases} x + y = 18 \\ 5x + 9y = 122 \end{cases}$$

Solving this system gives $x = 10$ and $y = 8$. Thus, 50 of the 122 right-handed students are female. Therefore, the probability that a right-handed student selected at random is female is $\frac{50}{122}$, which to the nearest thousandth is 0.410.

Choices B, C, and D are incorrect and may be the result of incorrectly calculating the missing values in the table.

QUESTION 30

Choice A is correct. Subtracting the sides of $3y + c = 5y - 7$ from the corresponding sides of $3x + b = 5x - 7$ gives $(3x - 3y) + (b - c) = (5x - 5y + (-7 - (-7))$. Since $b = c - \frac{1}{2}$, or $b - c = -\frac{1}{2}$, it follows that $(3x - 3y) + \left(-\frac{1}{2}\right) = (5x - 5y)$. Solving this equation for x in terms of y gives $x = y - \frac{1}{4}$. Therefore, x is y minus $\frac{1}{4}$.

Choices B, C, and D are incorrect and may be the result of making a computational error when solving the equations for x in terms of y.

QUESTION 31

The correct answer is either 4 or 5. Because each student ticket costs \$2 and each adult ticket costs \$3, the total amount, in dollars, that Chris spends on x student tickets and 1 adult ticket is $2(x) + 3(1)$. Because Chris spends at least \$11 but no more than \$14 on the tickets, one can write the compound inequality $2x + 3 \geq 11$ and $2x + 3 \leq 14$. Subtracting 3 from each side of both inequalities and then dividing each side of both inequalities by 2 yields $x \geq 4$ and $x \leq 5.5$. Thus, the value of x must be an integer that is both greater than or equal to 4 and less than or equal to 5.5. Therefore, $x = 4$ or $x = 5$. Either 4 or 5 may be gridded as the correct answer.

QUESTION 32

The correct answer is 58.6. The mean of a data set is determined by calculating the sum of the values and dividing by the number of values in the data set. The sum of the ages, in years, in the data set is 703, and the number of values in the data set is 12. Thus, the mean of the ages, in years, of the first 12 United States presidents at the beginning of their terms is $\frac{703}{12}$. The question asks for an answer rounded to the nearest tenth, so the decimal equivalent, rounded to the nearest tenth, is the correct answer. This rounded decimal equivalent is 58.6.

QUESTION 33

The correct answer is 9. To rewrite the difference $(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$ in the form $ax^2 + bx + c$, the expression can be simplified by using the distributive property and combining like terms as follows:

$$-3x^2 + 5x - 2) - (2x^2 - 4x - 2)$$

$$-3x^2 - 2x^2) + (5x - (-4x + (-2 - (-2))$$

$$-5x^2 + 9x + 0$$

The coefficient of x is the value of b, which is 9.

Alternatively, since b is the coefficient of x in the difference $-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$, one need only compute the x-term in the difference. The x-term is $5x - 2(-2x) = 5x + 4x = 9x$, so the value of b is 9.

QUESTION 34

The correct answer is $\frac{5}{8}$ or .625. A complete rotation around a point is 360° or 2π radians. Since the central angle AOB has measure $\frac{5\pi}{4}$ radians, it represents $\frac{\frac{5\pi}{4}}{2\pi} = \frac{5}{8}$ of a complete rotation around point O. Therefore, the sector formed by central angle AOB has area equal to $\frac{5}{8}$ the area of the entire circle. Either the fraction 5/8 or its decimal equivalent, .625, may be gridded as the correct answer.

QUESTION 35

The correct answer is 50. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The mean of 75 is obtained by finding the sum of the first 10 ratings and dividing by 10. Thus, the sum of the first 10 ratings was 750. In order for the mean of the first 20 ratings to be at least 85, the sum of the first 20 ratings must be at least (85)(20) = 1700. Therefore, the sum of the next 10 ratings must be at least 1700 − 750 = 950. The maximum rating is 100, so the maximum possible value of the sum of the 12th through 20th ratings is 9 × 100 = 900. Therefore, for the store to be able to have an average of at least 85 for the first 20 ratings, the least possible value for the 11th rating is 950 − 900 = 50.

QUESTION 36

The correct answer is 750. The inequalities $y \leq -15x + 3000$ and $y \leq 5x$ can be graphed in the xy-plane. They are represented by the lower half-planes with the boundary lines $y = -15x + 3000$ and $y = 5x$, respectively. The solution set of the system of inequalities will be the intersection of these half-planes, including the boundary lines, and the solution (a, b) with the greatest possible value of b will be the point of intersection of the boundary lines. The intersection of boundary lines of these inequalities can be found by substituting $5x$ for y in the equation for the first line: $5x = -15x + 3000$, which has solution $x = 150$. Thus, the x-coordinate of the point of intersection is 150. Therefore, the y-coordinate of the point of intersection of the boundary lines is $5(150) = -15(150) + 3000 = 750$. This is the maximum possible value of b for a point (a, b) that is in the solution set of the system of inequalities.

QUESTION 37

The correct answer is 7. The average number of shoppers, N, in the checkout line at any time is $N = rt$, where r is the number of shoppers entering the checkout line per minute and T is the average number of minutes each shopper spends in the checkout line. Since 84 shoppers per hour make a purchase, 84 shoppers per hour enter the checkout line. This needs to be converted to the number of

shoppers per minute. Since there are 60 minutes in one hour, the rate is $\frac{84 \text{ shoppers}}{60 \text{ minutes}} = 1.4$ shoppers per minute. Using the given formula with $r = 1.4$ and $t = 5$ yields $N = rt = (1.4)(5) = 7$. Therefore, the average number of shoppers, N, in the checkout line at any time during business hours is 7.

QUESTION 38

The correct answer is 60. The estimated average number of shoppers in the original store at any time is 45. In the new store, the manager estimates that an average of 90 shoppers per hour enter the store, which is equivalent to 1.5 shoppers per minute. The manager also estimates that each shopper stays in the store for an average of 12 minutes. Thus, by Little's law, there are, on average, $N = rt = (1.5)(12) = 18$ shoppers in the new store at any time. This is $\frac{45 - 18}{45} \times 100 = 60$ percent less than the average number of shoppers in the original store at any time.

Answer Explanations Test #2

Answer Explanations

SAT Practice Test # 2

Section 1: Reading Test

QUESTION 1

Choice C is the best answer. In the first paragraph the reader is introduced to Nawab, a father of twelve daughters who feels compelled to make more money to care for his family: "he must proliferate his sources of revenue" (lines 6-7). The remainder of the paragraph focuses on the way Nawab attempts to "proliferate" those income sources by identifying some of the moneymaking schemes Nawab undertakes, including setting up a flour mill and a fish farm and attempting to fix both radios and watches.

Choice A is incorrect because even if the first paragraph does indicate that Nawab is willing to work hard to take care of his family, it does not specifically address how he interacts with his daughters emotionally. Choice B is incorrect because the first paragraph describes some of Nawab's activities but not the specifics of his schedule. Choice D is incorrect because the first paragraph introduces Harouni as Nawab's employer but does not describe his lifestyle.

QUESTION 2

Choice B is the best answer. The passage states that Nawab earned "more kicks than kudos" (line 16) for his failed attempts at fixing watches. In the context of not doing a job well, this means Nawab was not given compliments ("kudos") for his efforts but complaints ("kicks") about them.

Choices A and D are incorrect because the passage clearly states that Nawab was not successful fixing watches, which earned him a negative response ("kicks," or complaints). In this context it would be illogical to suggest that Nawab's unsuccessful efforts at fixing watches would result in the sort of positive response implied by choice A ("thrills") or choice D ("interests"). Choice C is incorrect because even though "jolts" might be unpleasant, they're not the kind of negative response one would get instead of compliments.

QUESTION 3

Choice D is the best answer. The passage states that Nawab works "like an engineer tending the boilers on a foundering steamer in an Atlantic gale" (lines 26-28) in his attempts to keep his employer comfortable. The author likely uses this image because it highlights the challenging nature of Nawab's work—work that is described in the next sentence as requiring "superhuman efforts" (line 28).

Choices A, B, and C are incorrect because the author's use of the image of an engineer working hard on a "foundering steamer" describes the effort Nawab is making in keeping his employer comfortable, not what Nawab might be dreaming about, anything to do with tube wells (which are not mentioned in the second paragraph), or that Nawab has had many different jobs in his life.

QUESTION 4

Choice A is the best answer because lines 28-32 show that Nawab is an efficient employee, stating that due to his "superhuman efforts," Nawab is able to keep his employer comfortable, or in almost "the same mechanical cocoon . . . that the landowner enjoyed in Lahore."

Choice B is incorrect because lines 40-42 describe the actions of Nawab's employer only and do not address the employer's feelings about Nawab's work. Choice C is incorrect because lines 46-49 show Nawab characterizing himself as an old and ineffective employee, not one who performs his job well. Choice D is incorrect because line 58 addresses the fact Nawab had always lived in his employer's household but not his effectiveness as an employee.

QUESTION 5

Choice C is the best answer. The main purpose of Nawab's comments in lines 43-52 is to highlight the labor and service he has provided for Harouni over the years. Nawab says "there is but one man, me, your servant" to take care of the tube wells on all Harouni's vast lands and that the extensive work has resulted in Nawab earning gray hairs on his employer's behalf.

Choice A is incorrect because even though lines 43-52 initially highlight the vastness of Harouni's lands, those lines primarily focus on Nawab's dedication and service to Harouni. Choice B is incorrect because lines 43-52 emphasize not that Nawab is competent and reliable but that Nawab feels he is no longer able to adequately fulfill his duties. Choice D is incorrect because in lines 43-52, Nawab doesn't say he intends to quit his job, asking instead only for help doing it.

QUESTION 6

Choice D is the best answer. In lines 61-62, Nawab says to his employer that he "cannot any longer bicycle about like a bridegroom from farm to farm." In this context, Nawab uses the word "bridegroom" to imply he is no longer a young man who can easily travel such great distances on his bike.

Choices A, B, and C are incorrect because in the context of Nawab not being able to bike so far, he uses the word "bridegroom" to imply that he is no longer young, not that he is no longer in love (choice A), naive (choice B), or busy (choice C).

QUESTION 7

Choice B is the best answer. Harouni's reaction to Nawab's request for a new motorcycle can be found in lines 66-68, where the employer is said not to "particularly care one way or the other, except that it touched on his comfort—a matter of great interest to him." For Harouni, in other words, the issue of Nawab getting a new motorcycle came down to what was best for Harouni, not what was best for Nawab.

Choice A is incorrect because in the passage Harouni is said not to be particularly impressed with how hard Nawab works; he cares about the issue of the motorcycle only in regard to its effect on his own comfort. Choice C is incorrect because Harouni is said to find Nawab's speech not eloquent but "florid" (line 54), meaning flamboyant or ostentatious. Choice D is incorrect because Nawab does not threaten to quit his job but politely asks his employer to "let me go" (line 64).

QUESTION 8

Choice B is the best answer. The previous question asks why Harouni purchases his employee Nawab a new motorcycle, with the correct answer (that Harouni did so because it was in his own best interest) supported in lines 66-68: "He didn't particularly care one way or the other, except that it touched on his comfort—a matter of great interest to him."

Choices A, C, and D are incorrect because the lines cited do not support the answer to the previous question about why Harouni buys Nawab a new motorcycle. Instead, they simply identify the issue (choice A), note that Harouni also gave Nawab money for gas (choice C), and show how the motorcycle affects Nawab's side businesses (choice D).

QUESTION 9

Choice A is the best answer. The passage states that Nawab's new motorcycle leads to the "disgust of the farm managers" (line 74).

Choices B, C, and D are incorrect because the passage specifically says Nawab's new motorcycle leads to the "disgust of the farm managers," not their happiness (choice B), envy (choice C), or indifference (choice D).

QUESTION 10

Choice D is the best answer. The passage specifically states what Nawab considers the greatest part of his getting a new motorcycle: "Best of all, now he could spend every night with his wife" (lines 81-82).

Choices A, B, and C are incorrect because the passage explicitly states that Nawab believes the best thing about his new motorcycle is that he can "spend every night with his wife," not that people start calling him "Uncle" (choice A), that he is able to expand his business (choice B), or that he is able to educate his daughters (choice C).

QUESTION 11

Choice B is the best answer. The passage states that historically, "newspapers such as *The Times* and broadcasters such as the BBC were widely regarded as the trusted shapers of authoritative agendas and conventional wisdom" (lines 27-30). But it goes on to say that "there is a growing feeling . . . that the news media should be 'informative rather than authoritative'" (lines 70-73). Together these lines indicate the main purpose of the passage, which is to discuss how people's perception of the news media is changing from its being an authoritative voice to simply an informative one.

Choice A is incorrect because the passage deals with changes in the way news is perceived but does not primarily focus on the technological changes that may have resulted in those or other changes. Choice C is incorrect because even if the passage implies that viewers might increasingly believe a journalist's values can affect the news stories being produced, it does not provide specific examples of that happening. Choice D is incorrect because the passage begins with the simple sentence "The news is a form of public knowledge" (line 1) and makes no attempt to refute that claim.

QUESTION 12

Choice D is the best answer. Although the passage initially states that traditional news authorities were once implicitly "trusted" (line 29) regarding the content they produced, it goes on to note that "as part of the general process of the transformation of authority . . . the demand has been for all authority to make explicit the frames of value which determine their decisions" (lines 33-38). The modern audience, in other words, wants to hear not only the stories a news organization produces but also the values that form the foundation of that organization's beliefs.

Choices A, B, and C are incorrect because lines 33-38 make clear that the expectation traditional authorities now face is the need to "make explicit the frames of value which determine their decisions," not that they shouldn't be affected by commercial interests (choice A), that they should work for the common good (choice B), or that they should consider the context of public versus private knowledge (choice C).

QUESTION 13

Choice C is the best answer. The previous question asks what expectation traditional authorities now face, with the answer being that they must make their perspectives or beliefs clear to the audience. This is supported in lines 33-38: "As part of the general process of the transformation of authority . . . the demand has been for all authority to make explicit the frames of value which determine their decisions."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about what expectation traditional authorities now face, instead contrasting private and public knowledge (choice A), explaining the complexity of news dissemination (choice B), and providing one way news has changed in modern times (choice D).

QUESTION 14

Choice C is the best answer. In lines 23-25, the passage states that "there is not always common agreement about what the public needs to know." In this context, a "common" agreement is a widespread one shared by many people.

Choices A, B, and D are incorrect because in the context of something shared by many people, the word "common" implies that it is widespread, not that it is plentiful or abundant (choice A), recognizable to others (choice B), or normal (choice D).

QUESTION 15

Choice B is the best answer. Two quotes are provided in lines 43-53, one highlighting the way editors work differently in modern times due to the demands of the audience and one offering an opinion about the perceived negative effects of that new reality of news. Those extended quotations were added by the authors most likely because they provide concrete examples of how some journalists feel about modern news dissemination.

Choice A is incorrect because the two quotations provided in lines 43-53 are not contradictory: the first offers a description of how news editors work differently in modern times, and the second describes how certain changes might affect news stories or the audience. Choices C and D are incorrect because the two quotations illustrate how some feel about the way the dissemination of news might be changing and are not used to either criticize or make suggestions.

QUESTION 16

Choice A is the best answer. The passage explains that although the major news organizations were once considered "trusted shapers" (line 29) of public knowledge, that perception is changing due to the "growing feeling . . . 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 slant on it'; and people should be given 'sufficient information' from which 'we would be able to form opinions of our own'" (lines 70-77). In other words, the audience now wants raw facts about the world, not facts constructed in support of a certain opinion.

Choice B is incorrect because the passage presents the public as wanting information without any slant on it, not as wanting only a limited amount of information. Choices C and D are incorrect because the passage does not specifically identify the public's feelings about including quotations from authorities in news stories or how they would want journalists to handle private details that the subjects of news stories do not want revealed.

QUESTION 17

Choice D is the best answer. The previous question asks what the public is beginning to believe should be avoided in news stories, with the answer being the personal opinions or feelings of journalists. This is supported in lines 70-77: "There is a growing feeling . . . 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 slant on it'; and people should be given 'sufficient information' from which 'we would be able to form opinions of our own.'"

Choices A, B, and C are incorrect because the lines cited do not support the answer that the modern public wants journalists to avoid personal judgments when telling news stories, instead contrasting personal or private knowledge with public knowledge (choice A), characterizing how trusted broadcasters were once viewed (choice B), and explaining how some professional journalists feel about the new reality of the news (choice C).

QUESTION 18

Choice A is the best answer. In lines 73-75, the passage states the modern belief that "the job of journalists should be to 'give the news as raw as it is, without putting their slant on it.'" In this context, the word "raw" means unfiltered or in its most basic state.

Choices B, C, and D are incorrect because in the context of news without any "slant on it," the word "raw" implies something unfiltered, not something unprotected or uncovered (choice B), severe (choice C), or untried or unproven (choice D).

QUESTION 19

Choice A is the best answer. The table shows that in 1985, 55% of respondents believed news organizations "get the facts straight," which was the highest percentage for that choice for any of the years provided.

Choices B, C, and D are incorrect because the table shows that the percentage of respondents who believed news organizations "get the facts straight" was smaller in 1992 (49%), 2003 (36%), and 2011 (25%) than in 1985 (55%).

QUESTION 20

Choice C is the best answer. The table shows that from 2003 to 2007, the percentage of people who believed news organizations "get the facts straight" rose only minimally, from 36 to 39%, while their perception of the independence and fairness of those organizations changed not at all, remaining at 23% and 26%, respectively.

Choice A is incorrect because the table indicates viewers' perceptions of the accuracy of news organizations but does not identify how many inaccurate news stories there were in any of the years listed. Choice B is incorrect because the number of people who believe news organizations "tend to favor one side" did not double between 1992 and 2003, rising only from 63% to 66%. Choice D is incorrect because the table shows that between 2007 and 2011, people's perception of the accuracy of news organizations decreased rather than increased, dropping from 39% to 25%.

QUESTION 21

Choice C is the best answer. The 2011 data in the table indicate that only 25% of respondents believed news organizations were accurate, 15% believed they were independent, and 16% believed they were fair. Combined, these data support the idea put forth in lines 69-70 that modern audiences are becoming skeptical of the authority of experts.

Choices A, B, and D are incorrect because the 2011 data in the table show the public's lack of faith in the accuracy, independence, and fairness of news organizations but do not indicate how politically involved that public was (choice A), demonstrate the claims of experts (choice B), or reveal the importance of viewer mouse clicks in modern news (choice D).

QUESTION 22

Choice B is the best answer. The first paragraph of the passage identifies and describes "Texas gourd vines" (line 1), but the primary focus of the passage is introduced in the first sentence of the second paragraph: "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 too many beetles" (lines 17-20). The remainder of the passage focuses on describing the purpose, process, and results of the recent research done on those Texas gourd vines.

Choice A is incorrect because the passage doesn't focus on the assumptions behind a theory but rather on the way in which that theory was tested. Choice C is incorrect because the passage does not present much conflicting data; most of it supports the idea there can be too much fragrance for the Texas gourd vine. Choice D is incorrect because the passage explains the procedures used in a study were "'very labor intensive'" (line 58) but does not present them as particularly innovative.

QUESTION 23

Choice A is the best answer. The passage says that to test their hypothesis, the scientists "planted 168 Texas gourd vines in an Iowa field" (lines 33-34) and then ultimately walked "from flower to flower, observing each for two-minute intervals" (lines 62-63). Because they gathered data by looking at and studying the plants in question, the scientists' research is best characterized as relying on direct observation.

Choices B, C, and D are incorrect because lines 62-63 make clear that the research emphasized direct observation, not historical data (choice B), expert testimony (choice C), or random sampling (choice D).

QUESTION 24

Choice D is the best answer. The passage states that by using the smell of their nectar to lure pollinators like bees, Texas gourd vines are employing an "'open communication network'" that attracts "'not just the good guys, but . . . also . . . the bad guys'" (lines 7-10). Because cucumber beetles are then identified as some of "the very bad guys" (line 12) as far as the Texas gourd plant is concerned, it can be inferred that both the beetles and the bees are attracted to the same scent.

Choices A and C are incorrect because they are not supported by the text; the passage states that cucumber beetles "chew up pollen and petals" (lines 12-13) from the Texas gourd vines but not that those vines are their "primary" food source, and the passage does not address any effects, positive or negative, that cucumber beetles experience as a result of carrying bacterial wilt disease. Choice B is incorrect because the passage states that treating the Texas gourd vines with dimethoxybenzene led to "double the normal number of beetles" (lines 65-66) but that pollinators like bees "did not prefer" (line 67) the treated flowers, which implies that cucumber beetles are not less attracted but more attracted to dimethoxybenzene than honey bees are.

QUESTION 25

Choice C is the best answer. The author indicates that it is reasonable to think that the Texas gourd plants might lure more pollinators if their smell was stronger. This is clear from lines 26-27, which state that "intuition suggests that more of that aroma should be even more appealing to bees."

Choices A and D are incorrect because lines 26-27 support the idea that it was initially thought that Texas gourd vines could lure more pollinators through "more of that aroma," not by lacking an aroma (choice A) or giving off a more varied aroma (choice D). Choice B is incorrect because bees are the only pollinators specifically discussed in the passage, and there is no suggestion that targeting other insects would attract more bees.

QUESTION 26

Choice A is the best answer. The passage explains that as part of their research the scientists "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" (lines 35-39). In this context, a flower that was "treated" would be one that was changed or altered.

Choices B, C, and D are incorrect because in the context of a flower having a compound like dimethoxybenzene added to it, the word "treated" means changed or altered, not returned to normal (choice B), given (choice C), or kept for future use (choice D).

QUESTION 27

Choice D is the best answer. In the passage Theis surmises that honey bees were likely repelled not by the enhanced fragrance of the dimethoxybenzene-treated flowers but "by the abundance of beetles" (lines 71-72) found on them. She was able to make that assumption because the honey bees were able to choose between both normal flowers and fragrance-enhanced flowers without any beetles on them, because one of the parameters of the research was that "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 beetles" (lines 45-50).

Choice A is incorrect because the passage states only that the scientists observed the bees and beetles on the flowers as soon as they opened (lines 59-61), not both before and after they opened. Choice B is

incorrect because although the passage does state that the experiment only took place during the "August flowering season" (line 35), it doesn't state that this was a variable in the experiment or had any effect on it. Choice C is incorrect because comparing gourds based on the type of pollination is not related to the issue of what repelled bees from the fragrance-enhanced plants.

QUESTION 28

Choice A is the best answer. The previous question asks what Theis and Adler did to allow Theis to theorize that the bees were repelled not by the enhanced fragrance of certain flowers but by the excessive number of beetles on them, with the answer (they give the bees the chance to visit both normal and fragrance-enhanced flowers that did not have beetles on them) being supported in lines 45-50: "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 beetles."

Choices B, C, and D are incorrect because the lines cited do not support the answer to the previous question about what allowed Theis and Adler to theorize that the bees were repelled not by fragrance but by insects, instead highlighting a variable that didn't directly address the effect of fragrance on bees (choice B), describing the timing of one of the steps undertaken in the experiment (choice C), and discussing an aspect of gourd growth that was not related to the question of why bees may or may not have wanted to visit fragrance-enhanced flowers (choice D).

QUESTION 29

Choice A is the best answer. The first six paragraphs (lines 1-64) of the passage introduce a plant (the Texas gourd vine) and its problem (luring enough insects to pollinate it but not too many of those that will harm it) and then describe a study undertaken to deal with "the specific problem of the Texas gourd—how to attract enough pollinators but not too many beetles" (lines 18-20). After the specifics of that experiment are described in detail, the results are explained and summarized in the seventh and eighth paragraphs (lines 65-84): "What they saw was double the normal number of beetles. . . . Squash bees were indifferent, and honey bees visited enhanced flowers less often. . . . That added up to less reproduction for fragrance-enhanced flowers" (lines 65-76).

Choice B is incorrect because Theis and Adler's hypothesis (that more fragrance would make the flowers "even more appealing to bees," line 27) is found in the third paragraph (lines 26-40). Choice C is incorrect because Theis and Adler's methods are described in the third through sixth paragraphs (lines 26-64), not the seventh and eighth (lines 65-84). Choice D is incorrect because the seventh and eighth paragraphs detail the results in an experiment but do not focus on the researchers' reasoning.

QUESTION 30

Choice B is the best answer. To be "indifferent" is to be apathetic, or without care or concern. In the context of an experiment that tested whether or not insects preferred normally scented flowers or ones

with enhanced fragrance, describing the squash bees as “indifferent” implies they did not care about the scents and were equally drawn to both types of flowers.

Choice A is incorrect because “indifference” suggests the amount of concern one has about something but not anything to do with physical capabilities (such as being able to distinguish between the flowers). Choice C is incorrect because “indifference” suggests that one has no preference. Choice D is incorrect because the squash bees are said to be “indifferent” to certain flowers based on their fragrance, not on the number of beetles that may or may not be on them.

QUESTION 31

Choice B is the best answer. Theis and Adler’s research clearly provided an answer to the question of why there is an upper limit on the intensity of the aroma emitted by Texas gourd plants, as their experiment was described as being able to “provide a reason that Texas gourd plants never evolved to produce a stronger scent” (lines 85-86).

Choice A is incorrect because Theis and Adler’s research was not able to show how to increase pollinator visits to the Texas gourd vine, as the results of their experiment showed that “pollinators, to their surprise, did not prefer the highly scented flowers” (lines 67-68). Choice C is incorrect because Theis and Adler’s research was not able to explain how hand pollination rescued fruit weight, a finding the passage describes as “a hard-to-interpret result” (line 83). Choice D is incorrect because the passage never indicates that the flowers stop producing fragrance when beetles are present.

QUESTION 32

Choice D is the best answer. The previous question asks what question from among the answer choices Theis and Adler’s research was able to answer regarding Texas gourd vines. The answer (they determined why there was an upper limit to the amount of fragrance produced) is supported in lines 85-86: “The new results provide a reason that Texas gourd plants never evolved to produce a stronger scent.”

Choices A, B, and C are incorrect because the lines cited do not support the answer to the previous question about what Theis and Adler’s research revealed about Texas gourd vines, instead explaining the goal of the experiment undertaken (choice A), identifying some of the fragrance compounds found in the plant’s aroma (choice B), and describing results related to hand pollination rather than fragrance (choice C).

QUESTION 33

Choice B is the best answer. In Passage 1, Lincoln asserts that citizens of the United States should never break the laws of their land, for any reason, because to do so undermines the nation’s values. This is clearly demonstrated when he says, “let every man remember that to violate the law, is to trample on the blood of his father, and to tear the character of his own, and his children’s liberty” (lines 9-12).

Choice A is incorrect because Lincoln says that bad laws "should be repealed as soon as possible" (line 30), not that breaking the law would slow their repeals. Choice C is incorrect because Lincoln says that "there is no grievance that is a fit object of redress by mob law" (lines 36-37) but doesn't argue that breaking the law will lead to mob rule. Choice D is incorrect because in his speech Lincoln doesn't discuss divisions between social groups.

QUESTION 34

Choice A is the best answer. The previous question asks what Lincoln believes is the result of breaking the laws, with the answer being that such actions undermine a nation's values. This is supported in lines 9-12: "let every man remember that to violate the law, is to trample on the blood of his father, and to tear the character of his own, and his children's liberty."

Choices B, C, and D are incorrect because the lines cited do not support the answer to the previous question regarding what Lincoln contends happens when citizens break the law, instead explaining exactly which groups Lincoln believes should vow to follow the laws (choice B), illustrating how Lincoln believes unjust laws should be dealt with (choice C), and stating Lincoln's belief that no law is ever improved through mob rule (choice D).

QUESTION 35

Choice D is the best answer. In lines 24-25, Lincoln says, "I so pressingly urge a strict observance of all the laws." In this context, the word "urge" most nearly means advocate, because when Lincoln urges people to obey the laws, he is pleading in favor of them doing so.

Choices A and C are incorrect because in the context of lines 24-25 ("I so pressingly urge a strict observance of all the laws"), to urge that laws be followed is to advocate for them to be obeyed, not to speed up such adherence (choice A) or make such adherence necessary (choice C). Choice B is incorrect because Lincoln is asking people to follow the laws but not directly causing people to obey them.

QUESTION 36

Choice D is the best answer. After advocating for citizens "never to violate in the least particular, the laws of the country" (lines 3-4), Lincoln begins the second paragraph by making another point: "When I so pressingly urge a strict observance of 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" (lines 24-28). This sentence is an attempt on Lincoln's part to make clear what could be a misunderstanding of his position ("let me not be understood") and to correct that possible misunderstanding. Lincoln doesn't want people to believe he is saying all laws are always good, but rather that those laws need to be followed as long as they are on the books.

Choices A and B are incorrect because the sentence in lines 24-28 does not raise and refute a possible counterargument to Lincoln's argument or identify a shortcoming of his argument, but rather it is an attempt on Lincoln's part to make sure he is not misunderstood. Choice C is incorrect because that sentence does not acknowledge and provide support for a central assumption of Lincoln's argument but looks at a different aspect of the issue.

QUESTION 37

Choice A is the best answer. In the passage Lincoln states his belief that any laws that "continue in force, for the sake of example, they should be religiously observed" (lines 31-32). In this context, "observed" most nearly means followed, as Lincoln is urging citizens to heed or follow the country's laws.

Choices B, C, and D are incorrect because in the context of Lincoln advocating that laws be religiously "observed," he means those laws should be followed, not that they should be studied closely (choice B), considered at length (choice C), or merely recognized (choice D).

QUESTION 38

Choice D is the best answer. Passage 2 begins with Thoreau's statement that "unjust laws exist" (line 45). His philosophy regarding how to deal with those unjust laws is evident in lines 58-59: "If the injustice is part of the necessary friction of the machine of government, let it go, let it go." Thoreau believes, in other words, that some injustices are an unfortunate part of normal governance and just need to be endured ("let it go, let it go").

Choice A is incorrect because Thoreau does not say some unjust aspects of government can be fixed easily or that they are merely superficial. Choice B is incorrect because Thoreau does not argue that such injustices are subtle and should be studied, but rather that in certain cases it is best to "let it go, let it go" (line 59), while in other cases one should act or "break the law" (line 66). Choice C is incorrect because Thoreau does not say that any such unjust aspects of government are beneficial or helpful.

QUESTION 39

Choice C is the best answer. The previous question asks what Thoreau feels about some unjust aspects of government, with the answer being that he finds them inevitable and something that needs to be endured. This is supported in lines 58-59: "If the injustice is part of the necessary friction of the machine of government, let it go, let it go."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about Thoreau's thoughts regarding certain injustices in government, instead asking a theoretical question about how one should respond to unjust laws (choice A), providing an observation about how some view acting out against unjust laws (choice B), and acknowledging that in some questions of conscience, one may or may not choose to act (choice D).

QUESTION 40

Choice C is the best answer. In Passage 1, Lincoln makes clear his belief that individuals should always heed the laws: "Let every American . . . swear . . . never to violate in the least particular, the laws of the country" (lines 1-4). Even bad laws, he states, "while they continue in force, for the sake of example, they should be religiously observed" (lines 30-32). In Passage 2, Thoreau is less rigid in his beliefs regarding the need for individuals to heed the laws of the country, arguing at times that some laws should be broken: "but if it is of such a nature that it requires you to be the agent of injustice to another, then, I say, break the law" (lines 64-66). While Lincoln and Thoreau can therefore be said to disagree about the moral imperative to follow existing laws, both passages advance an opinion regarding the need to follow or not follow all of the country's laws.

Choice A is incorrect because the passages are not making arguments about differences between legal duties and moral imperatives but rather are addressing the need to follow (or not) the laws of a land. Choice B is incorrect. Both passages address the question of changing existing laws in the United States, but that is only a minor part of what is a greater debate about the need to follow or not follow existing laws. Choice D is incorrect because neither passage addresses the standards for determining whether or not laws are just, only whether laws should be heeded or not.

QUESTION 41

Choice B is the best answer. In Passage 2, Thoreau says that if a law "is of such a nature that it requires you to be the agent of injustice to another, then, I say, break the law" (lines 64-66). It is clear from Passage 1 that Lincoln would reject this stance, as he says individuals should never break the law ("Let every American . . . swear . . . never to violate in the least particular, the laws of the country," lines 1-4) and should wait for a bad law to be repealed ("bad laws, if they exist, should be repealed . . . still while they continue . . . they should be religiously observed," lines 29-32).

Choices A and C are incorrect because in Passage 1, Lincoln is absolutely clear that all laws "should be religiously observed" (line 32); he does not describe anyone's suggestion to break the law as either excusable (choice A) or honorable (choice C). Choice D is incorrect because it is not supported by the passage, as Lincoln does not discuss the core principles of the Constitution in Passage 1.

QUESTION 42

Choice D is the best answer. In Passage 1, Lincoln uses abolitionism solely as an example to illustrate the argument he is making about heeding the law: "In any case that arises, as for instance, the promulgation of abolitionism, one of two positions is necessarily true" (lines 37-39). In Passage 2, Thoreau does the same thing by noting that "those who call themselves Abolitionists should at once effectually withdraw their support . . . from the government" (lines 79-82). Although Lincoln and Thoreau use the cause of abolitionism to argue different points, a commonality they share is that neither embraces the cause personally in the passage; Lincoln simply uses it as an example ("as for instance") while Thoreau specifically talks of *other people* "who call themselves Abolitionists."

Choice A is incorrect because in Passage 1, Lincoln argues against drastic action, saying that even in the case of abolitionism, such a response is not "necessary, justifiable, or excusable" (line 44). Choice B is incorrect because it's not accurate to say abolitionism was central to the arguments, only that each used that subject as an example. Choice C is incorrect because neither Lincoln nor Thoreau offers an opinion about whether or not abolitionism will gain widespread acceptance, instead they incorporate it only as an example in their discussions of just and unjust laws.

QUESTION 43

Choice C is the best answer. In lines 10-17, the passage illustrates how the cost of solar energy has dropped in recent years: "A few years ago, silicon solar panels cost $4 per watt. . . . 'Now it's down to something like 50 cents a watt, and there's talk of hitting 36 cents per watt.'" In lines 44-47, the passage describes some of the new technology that exists in the field: "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." Overall, the passage can be regarded as an objective overview of the solar panel industry delivered by a journalist covering the field.

Choices A and D are incorrect because the author does not present himself as either a consumer who plans to buy solar panels or a hobbyist with a personal interest in solar panel technology. Rather, the author focuses on developments in solar technology. Choice B is incorrect because the passage does not discuss research methods used in the solar panel field but rather the technologies that exist in the field.

QUESTION 44

Choice A is the best answer. In the context of describing the solar panel manufacturing industry as being "in the doldrums because supply far exceeds demand" (lines 2-3), saying it is currently a "poor" market implies it is a weak, or slow, market.

Choices B, C, and D are incorrect because in the context of describing the solar panel manufacturing industry as being "in the doldrums," saying it is a poor market implies it is a weak market, not a modest one (choice B), a pathetic one (choice C), or an outdated one (choice D).

QUESTION 45

Choice C is the best answer. It can reasonably be inferred that much of the solar panel industry believes current solar technology is too expensive and inefficient because the passage states that the industry has been working to improve those two things: "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" (lines 27-30).

Choice A is incorrect because the passage explains how solar panels work but never states or implies that consumers do not understand the technology. Choice B is incorrect because while the passage explains how two-sided solar cells can increase solar electric output, it does not suggest that they have

any existing or possible weaknesses. Choice D is incorrect because the passage characterizes Willow Glass as entirely promising and doesn't imply that it is not efficient enough to be marketed.

QUESTION 46

Choice D is the best answer. The previous question asks what can be inferred from the passage about beliefs in the solar panel industry, with the answer being that many in the industry believe current solar technology is too expensive and too inefficient. This is supported in lines 27-30: "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."

Choices A, B, and C are incorrect because the lines cited do not support the answer to the previous question, which is that much of the solar panel industry believes current solar technology is too expensive and inefficient. Choice A highlights the industry's current limited sales. Choice B addresses the high cost of solar panels but not their inefficiency. Choice C addresses a potential decrease in the cost of solar panels and does not mention efficiency.

QUESTION 47

Choice B is the best answer. The passage clearly states how two-sided solar panels will increase the efficiency of solar electricity units, explaining that they will be able to absorb excess reflected light, especially if those panels are built on sand: "That light reflects onto the back of the panels and could be harvested to increase the power output" (lines 61-62).

Choices A, C, and D are incorrect because the passage explains only that two-sided solar panels can raise efficiency by harvesting reflected light, not that they can raise efficiency because they take little energy to operate (choice A), are cost-effective (choice C), or keep sunlight from reaching the ground (choice D).

QUESTION 48

Choice B is the best answer. The previous question asks how two-sided solar panels can raise the efficiency of solar electricity units, with the answer being they can increase solar power input by catching excess reflected light. This is supported in lines 61-62: "That light reflects onto the back of the panels and could be harvested to increase the power output."

Choices A, C, and D are incorrect because the lines cited do not support the answer to the previous question about how two-sided solar panels can raise the efficiency of solar electricity units, instead highlighting that some sunlight is missed by current units (choice A), explaining why two-sided solar panels work well in sand (choice C), and projecting how much more effective those two-sided solar panels could be (choice D).

QUESTION 49

Choice D is the best answer. In lines 69-71, the passage states that "even longer-term, Green is betting on silicon, aiming to take advantage of the huge reductions in cost already seen with the technology." In this context, the phrase "betting on" most nearly means "optimistic about," as the sentence implies that Green has positive expectations for silicon use now and in the future.

Choice A is incorrect because "dabbling in" a subject implies being only minimally involved with it, but in lines 69-71, Green is shown to be committed to silicon use. Choice B is incorrect because in this context the phrase "betting on" is figurative and implies believing in something, not actually being involved with games of chance. Choice C is incorrect because Green is said to want to "take advantage" of silicon use, meaning he does not intend to switch from it.

QUESTION 50

Choice B is the best answer. The passage concludes by stating that "the challenge is to produce good connections between these semiconductors, something made challenging by the arrangement of silicon atoms in crystalline silicon" (lines 81-84). As this last sentence identifies an issue the solar panel industry still faces, and describes it as a "challenging" one at that, it mainly serves to identify a problem or hurdle that must be dealt with by the industry.

Choices A, C, and D are incorrect because the main point of the passage's last sentence is that there is a "challenge" or hurdle that the solar panel industry has to deal with; it doesn't express concerns about what a material won't be able to do (choice A), make predictions (choice C), or introduce a new idea for study (choice D).

QUESTION 51

Choice D is the best answer. Figure 2 shows that in 2009, the US average electricity cost per megawatt-hour (MWh) was $120. Of the projected 2017 energy costs for fuels listed in figure 1, the one closest to the 2009 US average electricity cost 120 dollars per megawatt-hour is the projected cost of advanced nuclear energy, estimated at just below 125 dollars per megawatt-hour.

Choices A, B, and C are incorrect because figure 1 shows the projected energy costs of natural gas, wind (onshore), and conventional coal as just below 75 dollars per megawatt-hour, 100 dollars per megawatt-hour, and approximately 105 dollars per megawatt-hour, respectively. None of these costs is as close to the 2009 US average electricity cost of 120 dollars per megawatt-hour as the projected 2017 cost of advanced nuclear energy, which is just below 125 dollars per megawatt-hour.

QUESTION 52

Choice B is the best answer. Figure 2 shows that the dropping cost of solar photovoltaic power per megawatt-hour is projected to intersect with the 2009 US average electricity cost of 120 dollars per megawatt-hour in the year 2020.

Choice A is incorrect because figure 2 projects that the solar photovoltaic cost per megawatt-hour in 2018 will be approximately $140, which is more than the 2009 US average electricity cost of 120 dollars per megawatt-hour. Choices C and D are incorrect because figure 2 projects that the solar photovoltaic cost per megawatt-hour will be around $90 in 2025 and $70 in 2027, both of which are less than the 2009 US average electricity cost of 120 dollars per megawatt-hour.

Section 2: Writing Test

QUESTION 1

Choice D is the best answer because a comma is needed to separate the main independent clause ("In the winter . . . Lake 227") from the dependent clause that describes the lake. The pronoun "one" is used correctly to refer to its antecedent "Lake 227."

Choice A is incorrect because it creates a comma splice (two independent clauses joined by only a comma). Choices B and C are incorrect because in both choices the information that follows the period is not in the form of a complete sentence.

QUESTION 2

Choice A is the best answer because the comma is used correctly to separate the introductory dependent clause ("While . . . irresponsible") from the independent clause that follows it.

Choices B, C, and D are incorrect because the comma in each is misplaced. Choices B and D lack a comma where one is needed after the dependent clause ("While . . . irresponsible"). In choice C, while a comma is provided after "irresponsible," there is an unnecessary comma after "and."

QUESTION 3

Choice D is the best answer because it most clearly and concisely combines the sentences using the correct punctuation. This choice eliminates unnecessary words, and the commas are placed correctly between the clauses.

Choice A is incorrect because the phrase "the result being that it" is wordy and could be replaced with the single word "which." Choice B is incorrect because the words "algal blooms cause oxygen depletion" need not be repeated. Choice C is incorrect because there is unnecessary repetition of the words "oxygen depletion" and "algal blooms."

QUESTION 4

Choice B is the best answer because the colon is used properly to introduce an independent clause ("it was . . . Erie") that explains or elaborates on the information that came before in the sentence.

Choice A is incorrect because the colon is misplaced. It should be placed after the word "green," not after "with." Choice C is incorrect because the dash is not placed correctly. If it were placed after the word "green," it could be used. Choice D is incorrect because the comma creates a comma splice. A comma cannot be used without a conjunction to join two independent clauses.

QUESTION 5

Choice C is the best answer because it contains the best transition between the two paragraphs. The previous paragraphs describe an experiment that Schindler and Brunskill conducted in Lake 227. This paragraph is about an experiment they performed in Lake 226. Only choice C provides a transition that introduces the new experiment performed in Lake 226.

Choice A is incorrect because it contains no specific reference to the previous paragraph and is too general to be tied to this paragraph. Choices B and D are incorrect because they contain unnecessary details that do not connect the ideas in the paragraphs.

QUESTION 6

Choice B is the best answer because it is concise. It does not repeat the idea of addition.

Choices A, C, and D are incorrect because they are repetitive. The conjunction "and" is sufficient after "they added just nitrates" to indicate that "a source of carbon" was also added. Choice A needlessly contains "was added." In choice C "plus also" and in choice D "also adding" are similarly repetitive.

QUESTION 7

Choice A is the best answer because the singular past tense verb "was teeming" agrees in number with the singular subject "half" and is consistent with the other past tense verbs in the paragraph.

Choices B and C are incorrect because they contain plural verbs instead of the singular one that is needed to agree with the singular subject "half." Choice D is incorrect because it contains a present tense verb that is inconsistent with the past tense verbs in the paragraph.

QUESTION 8

Choice C is the best answer because the verb “published” most effectively indicates the relationship between research findings and a journal, *Science*. Scientific research is published in scientific journals.

Choices A, B, and D are incorrect because they don’t feature the specific vocabulary required, and the tone of the answer choices is too informal for the content of the passage.

QUESTION 9

Choice D is the best answer because “subsequently” logically indicates that after the research demonstrated a clear correlation between the growth of blue-green algae and the introduction of phosphates into the water, Canadian legislators passed laws banning phosphates in laundry detergent.

Choices A, B, and C are incorrect because the transitional phrase “for example” and the conjunctive adverbs “similarly” and “however” do not indicate a logical relationship between what the research demonstrated and what the Canadian legislators did with that knowledge.

QUESTION 10

Choice B is the best answer because it deals with a “policy outcome” related to the research. The adoption of legislation to reduce or eliminate phosphates in detergents is a policy outcome (a change in official policy concerning detergents) that was clearly informed by Schindler and Brunskill’s research.

Choices A, C, and D are incorrect because they do not mention legislation or policies that were adopted as a result of Schindler and Brunskill’s research on the effects of phosphates in laundry detergents.

QUESTION 11

Choice C is the best answer because it offers a counterargument to the previous sentence’s claim in favor of “experiments like these.” Acknowledging that “scientists should not be allowed to randomly perform experiments on just any body of water” shows that the writer is aware of the potential problems with these experiments.

Choices A, B, and D are incorrect because none of them offers a counterargument. They all make factual statements.

QUESTION 12

Choice D is the best answer because it correctly provides the plural noun “stages” and the singular possessive pronoun “its” (no apostrophe).

Choices A and C are incorrect because a possessive pronoun is needed to replace the proper noun “Tower of Pisa,” not the contraction “it’s.” Choices B and C are incorrect because there is no reason to make “stage” possessive; nothing belongs to it.

QUESTION 13

Choice A is the best answer because the conjunctive adverb “indeed” appropriately points back to and elaborates on the fact provided in the previous sentence (that the Tower has been leaning from the very beginning).

Choices B, C, and D are incorrect because they do not accurately present the relationship between the first and second sentences. Choice B, “therefore,” indicates that what follows is a consequence of what came before. Choice C, “nevertheless,” and choice D, “however,” suggest that what follows contrasts with what was stated previously.

QUESTION 14

Choice B is the best answer because the participle “attracting” introduces a dependent clause (“attracting . . . world”) that appropriately modifies the noun “icon.”

Choice A is incorrect because it creates a comma splice. A comma cannot be used without a conjunction to separate two independent clauses. Choice C is incorrect because the possessive pronoun “its” makes no sense in the context of the sentence. Choice D is incorrect because a semicolon is used to join two independent clauses, not an independent and a dependent clause.

QUESTION 15

Choice C is the best answer because it would be appropriate to characterize a famous and unusual building like the Tower of Pisa as “one of the greatest architectural oddities in the world.”

Choices A, B, and D are incorrect. The words “weirdnesses,” “deviations,” and “abnormalities” would all result in inappropriate characterizations. The Tower is a beloved icon and tourist magnet; as such, it is more fitting to describe it as an architectural oddity than as an architectural weirdness, architectural deviation, or architectural abnormality.

QUESTION 16

Choice B is the best answer because it confirms that the sentence should be added and provides the appropriate reason: it establishes a key shift in the passage between the introduction of the tower and the discussion of recent attempts to save it.

Choice A is incorrect because the suggested sentence does not repeat a previous idea. Choices C and D are incorrect because the sentence should be added. The suggested sentence does not contain irrelevant information that interrupts the flow of the paragraph, nor does it repeat information.

QUESTION 17

Choice A is the best answer because the comma is used correctly after the prepositional phrase "in 1990" to introduce the independent clause "Italy's government closed the tower. . . ."

Choices B and C are incorrect because each places a comma between the subject "government" and the verb "closed." Choice D is incorrect because a comma can be used, but not a colon, after an introductory prepositional phrase.

QUESTION 18

Choice C is the best answer because it supports the main point of the paragraph. The paragraph suggests that the committee's goal was to maintain the tower's "aesthetic" by reducing (but not eliminating) the tilt without ruining the tower's appearance or causing it to fall.

Choices A, B, and D are incorrect because none of the choices supports the main point of the paragraph—the need to both keep the tower from falling and maintain its charming appearance. Choice A repeats an idea from earlier in the passage. Choices B and D provide information that is only loosely related to the paragraph's discussion of efforts to save the tower.

QUESTION 19

Choice D is the best answer because deleting "he is" eliminates the comma splice that exists in the original sentence. Two independent clauses cannot be joined by only a comma.

Choice A is incorrect because two independent clauses cannot be joined by only a comma. Choice B is incorrect because it creates a comma splice and also needlessly repeats Burland's name. Choice C is incorrect because "his being" is unnecessary and unidiomatic in this context.

QUESTION 20

Choice D is the best answer because the earlier phrase “a years-long process” is sufficient to indicate that Burland’s work spanned several years.

Choices A, B, and C are incorrect because they all repeat information provided in the earlier phrase “a years-long process.”

QUESTION 21

Choice A is the best answer because the verb “advocated” and the participle “using” are appropriate in this context: “advocated” functions as the main verb and “using” introduces the clause that tells what Burland advocated.

Choices B and C are incorrect because they are unidiomatic. Choice D doesn’t provide a main verb necessary to create an independent clause before the semicolon.

QUESTION 22

Choice A is the best answer because sentence 5 introduces Burland’s plan for using gravity to straighten the tower—a plan that is presented in detail in the subsequent sentences 2, 3, and 4.

Choices B and C are incorrect because if sentence 5 were to be placed after either sentence 2 or sentence 3, the sequencing and logic of the paragraph would be impaired. Choice D is incorrect because if sentence 5 were to be deleted, a key aspect of the plan—its use of gravity to straighten the tower—would never be mentioned. The reader would then have to infer what Burland was doing by “drilling out small amounts of soil from under the tower.”

QUESTION 23

Choice B is the best answer because the main point of the paragraph is that the supply of physicians in the United States is not expected to keep up with the demand or need for them in the future. Choice B introduces the idea that it may become increasingly difficult for Americans to find a physician.

Choice A is not correct because it discusses “paramedics,” health care workers who are not mentioned elsewhere in the paragraph. Choice C is incorrect because it does not introduce the doctor shortage problem that is the main topic of the paragraph. Choice D is incorrect because the paragraph is not focused on the costs of health care.

QUESTION 24

Choice A is the best answer because “keep pace” is an appropriate idiomatic expression that clearly indicates the writer’s concern that the supply of doctors won’t be able to match the growing demand for them.

Choices B, C, and D are incorrect because they are unidiomatic in the context of the sentence. The sentence discusses the mismatch between the "increased demand for care" and the limited "supply of physicians." The writer is concerned with the extent to which supply can grow to meet the growth in demand—or, in other words, "keep pace" with increased demand. The phrases "maintain the tempo," "get in line," and "move along" are inappropriate to convey this idea.

QUESTION 25

Choice B is the best answer because "bolstering" means supporting, which is appropriate in the context of "medical-college enrollments." It makes sense in a discussion of a doctor shortage to mention the idea of providing support for enrollments—that is, maintaining and perhaps increasing the numbers of students enrolled in medical colleges.

Choices A and D are incorrect because they are excessively casual and unclear in context: it is not clear what it would mean for "medical-college enrollments" (the numbers of students enrolled in medical colleges) to be amped or revved up. Choice C is incorrect because it would be inappropriate to describe enrollments as being aroused.

QUESTION 26

Choice B is the best answer because it provides an appropriate reason for adding the sentence. In context, the sentence sets up the "several factors" that follow in the paragraph: the services that a PA can provide, the monetary advantages associated with employing a PA, and the short training period required for becoming a PA.

Choice A is incorrect because the sentence does not introduce a counterargument; rather, it supports the claim made in the previous sentence. Choices C and D are incorrect because the sentence should be added.

QUESTION 27

Choice C is the best answer because the plural possessive pronoun "their" correctly refers to its plural antecedent "PAs."

Choice A is incorrect because the word "there" does not show possession and does not make sense in the context of the sentence. Choice B is incorrect because the contraction "they're" does not show possession and does not make sense in the context of the sentence. Choice D is incorrect because the singular pronoun phrase "his or her" does not agree in number with the plural antecedent "PAs."

QUESTION 28

Choice D is the best answer because the comma is used correctly to separate the items in the list of jobs that PAs can perform.

Choice A is incorrect because a colon should not be used to separate items in a list. Choice B is incorrect because, while semicolons may be used to separate items in a list, they must be used consistently (that is, after "conditions" as well as after "surgeries"). Choice C is incorrect because a comma should not be used after the conjunction "and" in a list of items.

QUESTION 29

Choice B is the best answer because the parentheses are used correctly to enclose information that is interesting but not essential to the sentence. If the parenthetical information were to be deleted, the sentence would still make sense.

Choice A is incorrect because a comma or other punctuation is necessary to separate "well compensated" from the nonessential clause "earning in 2012 a median annual salary of $90,930." Choice C is incorrect because a comma is necessary after "$90,930" to set off the clause from the rest of the sentence. Choice D is incorrect because a colon is typically preceded by an independent clause and because a nonessential clause should be set off from the sentence by matching punctuation, such as two commas or parentheses.

QUESTION 30

Choice C is the best answer because "that for" agrees with the singular antecedent "period" and compares two similar things: the training period for PAs and that (the training period) for physicians.

Choice A is incorrect because the plural pronoun "those" doesn't agree with the singular antecedent "period." Choice B is incorrect because "compared with" repeats the idea of comparison already provided in the word "shorter." Choice D is incorrect because the underlined portion cannot be deleted without eliminating a necessary element in the comparison. A "training period" can't be compared to "physicians."

QUESTION 31

Choice A is the best answer because the transitional phrase "in addition" correctly introduces another example of PAs' "extraordinary contribution to rural health care."

Choices B, C, and D are incorrect because they do not convey the appropriate relationship between ideas. In choice B, "Thus" does not make sense because the claim that PAs "provide a broader spectrum of such services" is not a result or consequence of the claim that they provide "cost-efficient, widely appreciated services." Choices C and D, "despite this" and "on the other

hand," incorrectly indicate that the claim about the "broader spectrum of such services" is in contrast to the previous claim rather than in addition to it.

QUESTION 32

Choice C is the best answer because it gives an appropriate explanation for why the sentence should not be added. While relevant, the sentence does not accurately interpret the data in the table, which indicates that the number of physicians in 2025 will be 216,000 and the number of physician assistants will be 42,000.

Choices A and B are incorrect because the sentence incorrectly interprets the data in the table and should not be added. Choice D is incorrect because the sentence contains false information, not irrelevant information.

QUESTION 33

Choice D is the best answer because the word "patients" correctly identifies the people served by PAs. Additionally, the comparative conjunction "than" is used correctly in the comparison introduced by the adverb "more."

Choices A and B are incorrect because the noun "patience" refers to a human quality of tolerance or perseverance. It cannot be used to refer to people served by PAs. Choice C is incorrect because the word "then" refers to a time sequence or tells when something happened.

QUESTION 34

Choice B is the best answer because it most effectively combines the underlined sentences. The introductory dependent clause clearly and concisely sets up the comparison between the "rebooting" of films and the reworking of comic books. It also provides a clear and logical referent for the phrase "This practice" in the second sentence.

Choices A, C, and D are incorrect because the combinations do not connect the two sentences logically and concisely to demonstrate the comparison between the "rebooting" of films and the reworking of comic books. In addition, none provides a clear and logical referent for the phrase "This practice" in the second sentence.

QUESTION 35

Choice B is the best answer because the adjective "old" is used appropriately to describe a longstanding practice.

Choices A and D, “elderly” and “geriatric,” are incorrect in this context because they are generally used to refer to people, not to a practice. Choice C, “mature,” is incorrect because it does not fit the context of the sentence, which is about a longstanding practice, not a fully developed one.

QUESTION 36

Choice D is the best answer because no punctuation is needed to set off the prepositional phrase “of publishers.”

Choices A and B are incorrect because neither a colon nor a comma is needed to separate the noun “example” from the prepositional phrase that describes it. Choice C is incorrect because no comma is needed to separate the noun “publishers” from the participle “responding” that describes it.

QUESTION 37

Choice A is the best answer because the phrase “lift a car over his head” is consistent with the other examples of Superman’s superhuman physical abilities: “hurdle skyscrapers,” “leap an eighth of a mile,” etc.

Choices B, C, and D are incorrect because they are inconsistent with the other examples in the sentence of Superman’s superhuman physical abilities. Holding a job, wearing a costume, and living in a city describe the original Superman but do not characterize his physical abilities.

QUESTION 38

Choice D is the best answer because it most effectively sets up the following sentences, which describe the “realistic” nature of superheroes in the Silver Age. According to these sentences, Silver Age superheroes dealt with everyday problems and had richer interior lives and more complex motivations than their Golden Age counterparts.

Choices A, B, and C are incorrect because neither “scientific experiments gone wrong,” conservatism in the United States in the 1950s, nor the influence of science fiction on comics is addressed in the following two sentences.

QUESTION 39

Choice D is the best answer because it uses punctuation correctly. Because there is a dash between “them” and the verb “had,” another dash is required before “Spider-Man” to set off the nonessential clause “Spider-Man, the Fantastic Four, and the Hulk among them.” A

nonessential clause should be set off from the sentence by matching punctuation, such as two dashes or commas.

Choice A is incorrect because a colon needs to be preceded by an independent clause. Choice B is incorrect because, when used in this way, a semicolon needs to be preceded and followed by independent clauses. Choice C is incorrect because a comma and a dash cannot be used to enclose a nonessential clause. Two dashes or two commas should be used instead.

QUESTION 40

Choice C is the best answer because, as the only choice that focuses on Silver Age characters ("the upstarts"), it most logically completes the discussion of the Silver Age. It also provides an effective transition to the next paragraph: by indicating that "the Silver Age drew to a close," it sets up the next paragraph's discussion of the Bronze and other ages.

Choices A and D are incorrect because each focuses on Golden Age characters and thus fails to logically complete the discussion of the Silver Age. Choice B is incorrect because it prematurely discusses a topic that would be better addressed in the next paragraph.

QUESTION 41

Choice A is the best answer because the present perfect verb "have yielded" is used correctly to indicate that the action of the sentence began in the past and is ongoing in the present. In this case, the transformation of comics from the Silver Age to subsequent ages began in the past and continues today.

Choice B is incorrect because the verb "would have yielded" indicates that an action was possible but never happened. Choice C is incorrect because the past tense verb "were yielding" indicates that the action happened and ended in the past. Choice D is incorrect because the verb "will yield" means that the action will happen in the future, which is not necessarily true.

QUESTION 42

Choice D is the best answer because the possessive plural noun "Comics'" and adjective "superhero" appropriately indicate that the "superhero line" is a feature of the comics.

Choices A, B, and C are incorrect because the possessive singular noun "superhero's" is not correctly used in the sentence. Nothing belongs to a singular "superhero" in the sentence. Furthermore, in choice B, the singular possessive noun "Comic's" is used incorrectly since more than one comic is being referred to. In choice C, "Comics" is plural, but it needs to be possessive, too.

QUESTION 43

Choice A is the best answer because the conjunctive adverb “then” correctly shows that given previously stated information, the conclusion that can be drawn is that the transition between the Golden and Silver Ages of comic books was more successful than others.

Choices B, C, and D are incorrect because they do not indicate the correct relationship between the information presented earlier and conclusions that can be drawn from the information. “However,” “nevertheless,” and “yet” are ordinarily used to indicate that in spite of some action, a different or unexpected result occurs.

QUESTION 44

Choice C is the best answer because the singular pronoun “that” agrees in number with its singular antecedent “transition.”

Choices A and B are incorrect because the plural pronouns “those” and “these” do not agree with the singular antecedent “transition.” Additionally, choice B is incorrect because “these” implies that whatever is being referred to is at hand, not in the past. Choice D is incorrect because a pronoun is needed to complete the comparison of transitions between comic book ages.

Section 3: Math Test - No Calculator

QUESTION 1

Choice B is correct. The total amount T, in dollars, Salim will pay for n tickets is given by $T = 15n + 12$, which consists of both a per-ticket charge and a one-time service fee. Since n represents the number of tickets that Salim purchases, it follows that $15n$ represents the price, in dollars, of n tickets. Therefore, 15 must represent the per-ticket charge. At the same time, no matter how many tickets Salim purchases, he will be charged the $12 fee only once. Therefore, 12 must represent the amount of the service fee, in dollars.

Choice A is incorrect. Since n represents the total number of tickets that Salim purchases, it follows that $15n$ represents the price, in dollars, of n tickets, excluding the service fee. Therefore, 15, not 12, must represent the price of 1 ticket. Choice C is incorrect. If Salim purchases only 1 ticket, the total amount, in dollars, Salim will pay can be found by substituting $n = 1$ into the equation for T. If $n = 1$, $T = 15(1) + 12 = 27$. Therefore, the total amount Salim will pay for one ticket is $27, not $12. Choice D is incorrect. The total amount, in dollars, Salim will

pay for n tickets is given by $15n + 12$. The value 12 represents only a portion of this total amount. Therefore, the value 12 does not represent the total amount, in dollars, for any number of tickets.

QUESTION 2

Choice B is correct. Since Fertilizer A contains 60% filler materials by weight, it follows that x pounds of Fertilizer A consists of $0.6x$ pounds of filler materials. Similarly, y pounds of Fertilizer B consists of $0.4y$ pounds of filler materials. When x pounds of Fertilizer A and y pounds of Fertilizer B are combined, the result is 240 pounds of filler materials. Therefore, the total amount, in pounds, of filler materials in a mixture of x pounds of Fertilizer A and y pounds of Fertilizer B can be expressed as $0.6x + 0.4y = 240$.

Choice A is incorrect. This choice transposes the percentages of filler materials for Fertilizer A and Fertilizer B. Fertilizer A consists of $0.6x$ pounds of filler materials and Fertilizer B consists of $0.4y$ pounds of filler materials. Therefore, $0.6x + 0.4y$ is equal to 240, not $0.4x + 0.6y$. Choice C is incorrect. This choice incorrectly represents how to take the percentage of a value mathematically. Fertilizer A consists of $0.6x$ pounds of filler materials, not $60x$ pounds of filler materials, and Fertilizer B consists of $0.4y$ pounds of filler materials, not $40y$ pounds of filler materials. Choice D is incorrect. This choice transposes the percentages of filler materials for Fertilizer A and Fertilizer B and incorrectly represents how to take the percentage of a value mathematically.

QUESTION 3

Choice C is correct. For a complex number written in the form $a + bi$, a is called the real part of the complex number and b is called the imaginary part. The sum of two complex numbers, $a + bi$ and $c + di$, is found by adding real parts and imaginary parts, respectively; that is, $(a + bi) + (c + di) = (a + c) + (b + d)i$. Therefore, the sum of $2 + 3i$ and $4 + 8i$ is $(2 + 4) + (3 + 8)i = 6 + 11i$.

Choice A is incorrect and is the result of disregarding i and adding all parts of the two complex numbers together, $2 + 3 + 4 + 8 = 17$. Choice B is incorrect and is the result of adding all parts of the two complex numbers together and multiplying the sum by i. Choice D is incorrect and is the result of multiplying the real parts and imaginary parts of the two complex numbers, $(2)(4) = 8$ and $(3)(8) = 24$, instead of adding those parts together.

QUESTION 4

Choice A is correct. The right side of the equation can be multiplied using the distributive property: $(px + t)(px - t) = p^2x^2 - ptx + ptx - t^2$. Combining like terms gives $p^2x^2 - t^2$. Substituting this expression for the right side of the equation gives $4x^2 - 9 = p^2x^2 - t^2$, where p and t are

constants. This equation is true for all values of x only when $4 = p^2$ and $9 = t^2$. If $4 = p^2$, then $p = 2$ or $p = -2$. Therefore, of the given answer choices, only 2 could be the value of p.

Choices B, C, and D are incorrect. For the equation to be true for all values of x, the coefficients of x^2 on both sides of the equation must be equal; that is, $4 = p^2$. Therefore, the value of p cannot be 3, 4, or 9.

QUESTION 5

Choice D is correct. In the xy-plane, the graph of the equation $y = mx + b$, where m and b are constants, is a line with slope m and y-intercept $(0, b)$. Therefore, the graph of $y = 2x - 5$ in the xy-plane is a line with slope 2 and a y-intercept $(0, -5)$. Having a slope of 2 means that for each increase in x by 1, the value of y increases by 2. Only the graph in choice D has a slope of 2 and crosses the y-axis at $(0, -5)$. Therefore, the graph shown in choice D must be the correct answer.

Choices A, B, and C are incorrect. The graph of $y = 2x - 5$ in the xy-plane is a line with slope 2 and a y-intercept at $(0, -5)$. The graph in choice A crosses the y-axis at the point $(0, 2.5)$, not $(0, -5)$, and it has a slope of $\frac{1}{2}$, not 2. The graph in choice B crosses the y-axis at $(0, -5)$; however, the slope of this line is -2, not 2. The graph in choice C has a slope of 2; however, the graph crosses the y-axis at $(0, 5)$, not $(0, -5)$.

QUESTION 6

Choice A is correct. Substituting the given value of $y = 18$ into the equation $x = \frac{2}{3}y$ yields $x = \left(\frac{2}{3}\right)(18)$, or $x = 12$. The value of the expression $2x - 3$ when $x = 12$ is $2(12) - 3 = 21$.

Choice B is incorrect. If $2x - 3 = 15$, then adding 3 to both sides of the equation and then dividing both sides of the equation by 2 yields $x = 9$. Substituting 9 for x and 18 for y into the equation $x = \frac{2}{3}y$ yields $9 = \frac{2}{3}18 = 12$, which is false. Therefore, the value of $2x - 3$ cannot be 15. Choices C and D are also incorrect. As with choice B, assuming the value of $2x - 3$ is 12 or 10 will lead to a false statement.

QUESTION 7

Choice C is correct. By properties of multiplication, the formula $n = 7\ell h$ can be rewritten as $n = (7h)\ell$. To solve for ℓ in terms of *n* and *h*, divide both sides of the equation by the factor 7*h*. Solving this equation for ℓ gives $\ell = \frac{n}{7h}$.

Choices A, B, and D are incorrect and may result from algebraic errors when rewriting the given equation.

QUESTION 8

Choice B is correct. This question can be answered by making a connection between the table and the algebraic equation. Each row of the table gives a value of *x* and its corresponding values in both *w*(*x*) and *t*(*x*). For instance, the first row gives *x* = 1 and the corresponding values *w*(1) = −1 and *t*(1) = −3. The row in the table where *x* = 2 is the only row that has the property *x* = *w*(*x*) + *t*(*x*): 2 = 3 + (−1). Therefore, choice B is the correct answer.

Choice A is incorrect because when *x* = 1, the equation *w*(*x*) + *t*(*x*) = *x* is not true. According to the table, *w*(1) = −1 and *t*(1) = −3. Substituting the values of each term when *x* = 1 gives −1 + (−3) = 1, an equation that is not true. Choice C is incorrect because when *x* = 3, the equation *w*(*x*) + *t*(*x*) = *x* is not true. According to the table, *w*(3) = 4 and *t*(3) = 1. Substituting the values of each term when *x* = 3 gives 4 + 1 = 3, an equation that is not true. Choice D is incorrect because when *x* = 4, the equation *w*(*x*) + *t*(*x*) = *x* is not true. According to the table, *w*(4) = 3 and *t*(4) = 3. Substituting the values of each term when *x* = 4 gives 3 + 3 = 4, an equation that is not true.

QUESTION 9

Choice C is correct. The two numerical expressions in the given equation can be simplified as $\sqrt{9} = 3$ and $\sqrt{64} = 8$, so the equation can be rewritten as $\sqrt{x}$ + 3 = 8, or $\sqrt{x}$ = 5. Squaring both sides of the equation gives *x* = 25.

Choice A is incorrect and may result from a misconception about how to square both sides of $\sqrt{x}$ = 5 to determine the value of *x*. Choice B is incorrect. The value of $\sqrt{x}$, not *x*, is 5. Choice D is incorrect and represents a misconception about the properties of radicals. While it is true that 55 + 9 = 64, it is not true that $\sqrt{55} + \sqrt{9} = \sqrt{64}$.

QUESTION 10

Choice D is correct. Jaime's goal is to average at least 280 miles per week for 4 weeks. If *T* is the total number of miles Jamie will bicycle for 4 weeks, then his goal can be represented symbolically by the inequality: $\frac{T}{4} \geq 280$, or equivalently *T* ≥ 4(280). The total number of miles

Jamie will bicycle during this time is the sum of the distances he has completed and has yet to complete. Thus $T = 240 + 310 + 320 + x$. Substituting this expression into the inequality $T \geq 4(280)$ gives $240 + 310 + 320 + x \geq 4(280)$. Therefore, choice D is the correct answer.

Choices A, B, and C are incorrect because they do not correctly capture the relationships between the total number of miles Jaime will ride his bicycle ($240 + 310 + 320 + x$) and the minimum number of miles he is attempting to bicycle for the four weeks ($280 + 280 + 280 + 280$).

QUESTION 11

Choice B is correct. Since the shown parabola opens upward, the coefficient of x^2 in the equation $y = ax^2 + c$ must be positive. Given that a is positive, $-a$ is negative, and therefore the graph of the equation $y = -a(x - b)^2 + c$ will be a parabola that opens downward. The vertex of this parabola is (b, c), because the maximum value of y, c, is reached when $x = b$. Therefore, the answer must be choice B.

Choices A and C are incorrect. The coefficient of x^2 in the equation $y = -a(x - b)^2 + c$ is negative. Therefore, the parabola with this equation opens downward, not upward. Choice D is incorrect because the vertex of this parabola is (b, c), not $(-b, c)$, because the maximum value of y, c, is reached when $x = b$.

QUESTION 12

Choice D is correct. Dividing $4x^2 + 6x$ by $4x + 2$ gives:

$$\begin{array}{r} x\ +1 \\ 4x+2\overline{)\,4x^2+6x} \\ -(4x\ +2x) \\ \hline 4x \\ -(4x+2) \\ \hline -2 \end{array}$$

Therefore, the expression $\frac{4x^2 + 6x}{4x + 2}$ is equivalent to $x + 1 - \frac{2}{4x + 2}$.

Alternate approach: The numerator of the given expression, $4x^2 + 6x$, can be rewritten in terms of the denominator, $4x + 2$, as follows: $4x^2 + 2x + 4x + 2 - 2$, or $x(4x + 2) + (4x + 2) - 2$. So the given expression can be rewritten as

$$\frac{x(4x+2)+(4x+2)-2}{4x+2} = x+1-\frac{2}{4x+2}.$$

Choices A and B are incorrect and may result from incorrectly factoring the numerator and denominator of the expression $\frac{4x^2 + 6x}{4x + 2}$ and then incorrectly identifying common factors in the two factored expressions. Choice C is incorrect and may result from a variety of mistakes made when performing long division.

QUESTION 13

Choice A is correct. The number of solutions to any quadratic equation in the form $ax^2 + bx + c = 0$, where a, b, and c are constants, can be found by evaluating the expression $b^2 - 4ac$, which is called the discriminant. If the value of $b^2 - 4ac$ is a positive number, then there will be exactly two real solutions to the equation. If the value of $b^2 - 4ac$ is zero, then there will be exactly one real solution to the equation. Finally, if the value of $b^2 - 4ac$ is negative, then there will be no real solutions to the equation.

The given equation $2x^2 - 4x = t$ is a quadratic equation in one variable, where t is a constant. Subtracting t from both sides of the equation gives $2x^2 - 4x - t = 0$. In this form, $a = 2$, $b = -4$, and $c = -t$. The values of t for which the equation has no real solutions are the same values of t for which the discriminant of this equation is a negative value. The discriminant is equal to $(-4)^2 - 4(2)(-t)$; therefore, $(-4)^2 - 4(2)(-t) < 0$. Simplifying the left side of the inequality gives $16 + 8t < 0$. Subtracting 16 from both sides of the inequality and then dividing both sides by 8 gives $t < -2$. Of the values given in the options, -3 is the only value that is less than -2. Therefore, choice A must be the correct answer.

Choices B, C, and D are incorrect and may result from a misconception about how to use the discriminant to determine the number of solutions of a quadratic equation in one variable.

QUESTION 14

Choice A is correct. The number of containers in a shipment must have a weight less than 300 pounds. The total weight, in pounds, of detergent and fabric softener that the supplier delivers can be expressed as the weight of each container multiplied by the number of each type of container, which is $7.35d$ for detergent and $6.2s$ for fabric softener. Since this total cannot exceed 300 pounds, it follows that $7.35d + 6.2s \leq 300$. Also, since the laundry service wants to buy at least twice as many containers of detergent as containers of fabric softener, the number of containers of detergent should be greater than or equal to two times the number of containers of fabric softener. This can be expressed by the inequality $d \geq 2s$.

Choice B is incorrect because it misrepresents the relationship between the numbers of each container that the laundry service wants to buy. Choice C is incorrect because the first inequality of the system incorrectly doubles the weight per container of detergent. The weight

of each container of detergent is 7.35, not 14.7 pounds. Choice D is incorrect because it doubles the weight per container of detergent and transposes the relationship between the numbers of containers.

QUESTION 15

Choice D is correct. The expression can be rewritten as $\left(a+\frac{b}{2}\right)\left(a+\frac{b}{2}\right)$. Using the distributive property, the expression yields $\left(a+\frac{b}{2}\right)\left(a+\frac{b}{2}\right)=a^2+\frac{ab}{2}+\frac{ab}{2}+\frac{b^2}{4}$. Combining like terms gives $a^2+ab+\frac{b^2}{4}$.

Choices A, B, and C are incorrect and may result from errors using the distributive property on the given expression or combining like terms.

QUESTION 16

The correct answers are 1, 2, 4, 8, or 16. Number 16 can be written in exponential form $a^{\frac{b}{4}}$, where *a* and *b* are positive integers as follows: 2^4, 4^2, 16^1, $\left(16^2\right)^{\frac{1}{2}}$, $\left(16^4\right)^{\frac{1}{4}}$. Hence, if $a^{\frac{b}{4}}=16$, where *a* and *b* are positive integers, then $\frac{b}{4}$ can be 4, 2, 1, $\frac{1}{2}$, or $\frac{1}{4}$. So the value of *b* can be 16, 8, 4, 2, or 1. Any of these values may be gridded as the correct answer.

QUESTION 17

The correct answer is $\frac{15}{4}$ or 3.75. Multiplying both sides of the equation $\frac{2}{3}t=\frac{5}{2}$ by $\frac{3}{2}$ results in $t=\frac{15}{4}$, or t = 3.75.

QUESTION 18

The correct answer is 30. In the figure given, since $\overline{BD}$ is parallel to $\overline{AE}$ and both segments are intersected by $\overline{CE}$, then angle *BDC* and angle *AEC* are corresponding angles and therefore congruent. Angle *BCD* and angle *ACE* are also congruent because they are the same angle. Triangle *BCD* and triangle *ACE* are similar because if two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. Since triangle *BCD* and triangle *ACE* are similar, their corresponding sides are proportional. So in triangle *BCD* and triangle *ACE*, $\overline{BD}$ corresponds to $\overline{AE}$ and $\overline{CD}$ corresponds to $\overline{CE}$. Therefore, $\frac{BD}{CD}=\frac{AE}{CE}$. Since triangle *BCD* is a right triangle, the Pythagorean theorem can be used to give the value of *CD*: $6^2 + 8^2 = CD^2$. Taking the square root of each side gives *CD* = 10. Substituting the values in the proportion $\frac{BD}{CD}=\frac{AE}{CE}$ yields

$\frac{6}{10} = \frac{18}{CE}$. Multiplying each side by *CE,* and then multiplying by $\frac{10}{6}$ yields *CE* = 30. Therefore, the length of $\overline{CE}$ is 30.

QUESTION 19

The correct answer is 1.5 or $\frac{3}{2}$. The total amount, in liters, of a saline solution can be expressed as the liters of each type of saline solution multiplied by the percent of the saline solution. This gives 3(0.10), *x*(0.25), and (*x* + 3)(0.15), where *x* is the amount, in liters, of a 25% saline solution and 10%, 15%, and 25% are represented as 0.10, 0.15, and 0.25, respectively. Thus, the equation 3(0.10) + 0.25*x* = 0.15(*x* + 3) must be true. Multiplying 3 by 0.10 and distributing 0.15 to (*x* + 3) yields 0.30 + 0.25*x* = 0.15*x* + 0.45. Subtracting 0.15*x* and 0.30 from each side of the equation gives 0.10*x* = 0.15. Dividing each side of the equation by 0.10 yields *x* = 1.5, or *x* = $\frac{3}{2}$.

QUESTION 20

The correct answer is $\frac{1}{6}$, .166, or .167. The circumference, *C*, of a circle is $C = 2\pi r$, where *r* is the radius of the circle. For the given circle with a radius of 1, the circumference is $C = 2(\pi)(1)$, or $C = 2\pi$. To find what fraction of the circumference the length of arc *AB* is, divide the length of the arc by the circumference, which gives $\frac{\pi}{3} \div 2\pi$. This division can be represented by $\frac{\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{6}$. The fraction $\frac{1}{6}$ can also be rewritten as .166 or .167.

Section 4: Math Test - Calculator

QUESTION 1

Choice A is correct. The given expression $(2x^2 - 4) - (-3x^2 + 2x - 7)$ can be rewritten as $2x^2 - 4 + 3x^2 - 2x + 7$. Combining like terms yields $5x^2 - 2x + 3$.

Choices B, C, and D are incorrect because they are the result of errors when applying the distributive property.

QUESTION 2

Choice C is correct. The lines shown on the graph give the positions of Paul and Mark during the race. At the start of the race, 0 seconds have elapsed, so the *y*-intercept of the line that represents Mark's position during the race represents the number of yards Mark was from Paul's position (at 0 yards) at the start of the race. Because the *y*-intercept of the line that

represents Mark's position is at the grid line that is halfway between 12 and 24, Mark had a head start of 18 yards.

Choices A, B, and D are incorrect. The *y*-intercept of the line that represents Mark's position shows that he was 18 yards from Paul's position at the start of the race, so he did not have a head start of 3, 12, or 24 yards.

QUESTION 3

Choice A is correct. The leftmost segment in choice A, which represents the first time period, shows that the snow accumulated at a certain rate; the middle segment, which represents the second time period, is horizontal, showing that the snow stopped accumulating; and the rightmost segment, which represents the third time period, is steeper than the first segment, indicating that the snow accumulated at a faster rate than it did during the first time period.

Choice B is incorrect. This graph shows snow accumulating faster during the first time period than during the third time period; however, the question says that the rate of snow accumulation in the third time period is higher than in the first time period. Choice C is incorrect. This graph shows snow accumulation increasing during the first time period, not accumulating during the second time period, and then decreasing during the third time period; however, the question says that no snow melted (accumulation did not decrease) during this time. Choice D is incorrect. This graph shows snow accumulating at a constant rate, not stopping for a period of time or accumulating at a faster rate during a third time period.

QUESTION 4

Choice D is correct. The equation $12d + 350 = 1{,}010$ can be used to determine d, the number of dollars charged per month. Subtracting 350 from both sides of this equation yields $12d = 660$, and then dividing both sides of the equation by 12 yields $d = 55$.

Choice A is incorrect. If d were equal to 25, the first 12 months would cost $350 + (12)(25) = 650$ dollars, not \$1,010. Choice B is incorrect. If d were equal to 35, the first 12 months would cost $350 + (12)(35) = 770$ dollars, not \$1,010. Choice C is incorrect. If d were equal to 45, the first 12 months would cost $350 + (12)(45) = 890$ dollars, not \$1,010.

QUESTION 5

Choice B is correct. Both sides of the given inequality can be divided by 3 to yield $2x - 3y > 4$.

Choices A, C, and D are incorrect because they are not equivalent to (do not have the same solution set as) the given inequality. For example, the ordered pair $(0, -1.5)$ is a solution to the given inequality, but it is not a solution to any of the inequalities in choices A, C, or D.

QUESTION 6

Choice C is correct. According to the table, 63% of survey respondents get most of their medical information from a doctor and 13% get most of their medical information from the Internet. Therefore, 76% of the 1,200 survey respondents get their information from either a doctor or the Internet, and 76% of 1,200 is 912.

Choices A, B, and D are incorrect. According to the table, 76% of survey respondents get their information from either a doctor or the Internet. Choice A is incorrect because 865 is about 72% (the percent of survey respondents who get most of their medical information from a doctor or from magazines/brochures), not 76%, of 1,200. Choice B is incorrect because 887 is about 74%, not 76%, of 1,200. Choice D is incorrect because 926 is about 77%, not 76%, of 1,200.

QUESTION 7

Choice D is correct. The members of the city council wanted to assess opinions of all city residents. To gather an unbiased sample, the council should have used a random sampling design to select subjects from all city residents. The given survey introduced a sampling bias because the 500 city residents surveyed were all dog owners. This sample is not representative of all city residents.

Choice A is incorrect because when the sampling method isn't random, there is no guarantee that the survey results will be reliable; hence, they cannot be generalized to the entire population. Choice B is incorrect because a larger sample size would not correct the sampling bias. Choice C is incorrect because a survey sample of non–dog owners would likely have a biased opinion, just as a sample of dog owners would likely have a biased opinion.

QUESTION 8

Choice D is correct. According to the table, 13 people chose vanilla ice cream. Of those people, 8 chose hot fudge as a topping. Therefore, of the people who chose vanilla ice cream, the fraction who chose hot fudge as a topping is $\frac{8}{13}$.

Choice A is incorrect because it represents the fraction of people at the party who chose hot fudge as a topping. Choice B is incorrect because it represents the fraction of people who chose vanilla ice cream with caramel as a topping. Choice C is incorrect because it represents the fraction of people at the party who chose vanilla ice cream.

QUESTION 9

Choice B is correct. The land area of the coastal city can be found by subtracting the area of the water from the total area of the coastal city; that is, 92.1 − 11.3 = 80.8 square miles. The population density is the population divided by the land area, or $\frac{621,000}{80.8} = 7,685$, which is closest to 7,690 people per square mile.

Choice A is incorrect and may be the result of dividing the population by the total area, instead of the land area. Choice C is incorrect and may be the result of dividing the population by the area of water. Choice D is incorrect and may be the result of making a computational error with the decimal place.

QUESTION 10

Choice B is correct. Let *x* represent the number of days the second voyage lasted. The number of days the first voyage lasted is then *x* + 43. Since the two voyages combined lasted a total of 1,003 days, the equation *x* + (*x* + 43) = 1,003 must hold. Combining like terms yields 2*x* + 43 = 1,003, and solving for *x* gives *x* = 480.

Choice A is incorrect because 460 + (460 + 43) = 963, not 1,003 days. Choice C is incorrect because 520 + (520 + 43) = 1,083, not 1,003 days. Choice D is incorrect because 540 + (540 + 43) = 1,123, not 1,003 days.

QUESTION 11

Choice B is correct. Adding the equations side-by-side eliminates *y*, as shown below.

$$\begin{aligned} 7x + 3y &= 8 \\ \underline{6x - 3y} &\underline{= 5} \\ 13x + 0 &= 13 \end{aligned}$$

Solving the obtained equation for *x* gives *x* = 1. Substituting 1 for *x* in the first equation gives 7(1) + 3*y* = 8. Subtracting 7 from both sides of the equation yields 3*y* = 1, so *y* = $\frac{1}{3}$. Therefore, the value of *x* − *y* is 1 − $\frac{1}{3}$, or $\frac{2}{3}$.

Choice C is incorrect because $1 + \frac{1}{3} = \frac{4}{3}$ is the value of *x* + *y*, not *x* − *y*. Choices A and D are incorrect and may be the result of some computational errors.

QUESTION 12

Choice D is correct. The average growth rate of the sunflower over a certain time period is the increase in height of the sunflower over the period divided by the time. Symbolically, this rate is $\frac{h(b)-h(a)}{b-a}$, where *a* and *b* are the first and the last day of the time period, respectively. Since the time period for each option is the same (21 days), the total growth over the period can be used to evaluate in which time period the sunflower grew the least. According to the graph, the sunflower grew the least over the period from day 63 to day 84. Therefore, the sunflower's average growth rate was the least from day 63 to day 84.

Alternate approach: The average growth rate of the sunflower over a certain time period is the slope of the line segment that joins the point on the graph at the beginning of the time period with the point on the graph at the end of the time period. Based on the graph, of the four time periods, the slope of the line segment is least between the sunflower's height on day 63 and its height on day 84.

Choices A, B, and C are incorrect. On the graph, the line segment from day 63 to 84 is less steep than each of the three other line segments representing other periods. Therefore, the average growth rate of the sunflower is the least from day 63 to 84.

QUESTION 13

Choice A is correct. Based on the definition and contextual interpretation of the function *h*, when the value of *t* increases by 1, the height of the sunflower increases by *a* centimeters. Therefore, *a* represents the predicted amount, in centimeters, by which the sunflower grows each day during the period the function models.

Choice B is incorrect. In the given model, the beginning of the period corresponds to $t = 0$, and since $h(0) = b$, the predicted height, in centimeters, of the sunflower at the beginning of the period is represented by *b*, not by *a*. Choice C is incorrect. If the period of time modeled by the function is *c* days long, then the predicted height, in centimeters, of the sunflower at the end of the period is represented by $ac + b$, not by *a*. Choice D is incorrect. If the period of time modeled by the function is *c* days long, the predicted total increase in the height of the sunflower, in centimeters, during that period is represented by the difference $h(c) - h(0) = (ac + b) - (a \cdot 0 + b)$, which is equivalent to *ac*, not *a*.

QUESTION 14

Choice B is correct. According to the table, the height of the sunflower is 36.36 cm on day 14 and 131.00 cm on day 35. Since the height of the sunflower between day 14 and day 35 changes at a nearly constant rate, the height of the sunflower increases by approximately

$\frac{131.00-36.36}{35-14} \approx 4.5$ cm per day. Therefore, the equation that models the height of the sunflower *t* days after it begins to grow is of the form *h* = 4.5*t* + *b*. Any ordered pair (*t*, *h*) from the table between day 14 and day 35 can be used to estimate the value of *b*. For example, substituting the ordered pair (14, 36.36) for (*t*, *h*) into the equation *h* = 4.5*t* + *b* gives 36.36 = 4.5(14) + *b*. Solving this for *b* yields *b* = −26.64. Therefore, of the given choices, the equation *h* = 4.5*t* − 27 best models the height *h*, in centimeters, of the sunflower *t* days after it begins to grow.

Choices A, C, and D are incorrect because the growth rates of the sunflower from day 14 to day 35 in these choices are significantly higher or lower than the true growth rate of the sunflower as shown in the graph or the table. These choices may result from considering time periods different from the period indicated in the question or from calculation errors.

QUESTION 15

Choice D is correct. According to the table, the value of *y* increases by $\frac{14}{4}=\frac{7}{2}$ every time the value of *x* increases by 1. It follows that the simplest equation relating *y* to *x* is linear and of the form $y=\frac{7}{2}x+b$ for some constant *b*. Furthermore, the ordered pair $\left(1,\frac{11}{4}\right)$ from the table must satisfy this equation. Substituting 1 for *x* and $\frac{11}{4}$ for *y* in the equation $y=\frac{7}{2}x+b$ gives $\frac{11}{4}=\frac{7}{2}(1)+b$. Solving this equation for *b* gives $b=-\frac{3}{4}$. Therefore, the equation in choice D correctly relates *y* to *x*.

Choices A and B are incorrect. The relationship between *x* and *y* cannot be exponential because the differences, not the ratios, of *y*-values are the same every time the *x*-values change by the same amount. Choice C is incorrect because the ordered pair $\left(2,\frac{25}{4}\right)$ is not a solution to the equation $y=\frac{3}{4}x+2$. Substituting 2 for *x* and $\frac{25}{4}$ for *y* in this equation gives $\frac{25}{4}=\frac{3}{2}+2$, which is false.

QUESTION 16

Choice B is correct. In right triangle *ABC*, the measure of angle *B* must be 58° because the sum of the measure of angle *A*, which is 32°, and the measure of angle *B* is 90°. Angle *D* in the right triangle *DEF* has measure 58°. Hence, triangles *ABC* and *DEF* are similar. Since *BC* is the side

opposite to the angle with measure 32° and *AB* is the hypotenuse in right triangle *ABC*, the ratio $\frac{BC}{AB}$ is equal to $\frac{DF}{DE}$.

Alternate approach: The trigonometric ratios can be used to answer this question. In right triangle *ABC*, the ratio $\frac{BC}{AB} = \sin(32°)$. The angle *E* in triangle *DEF* has measure 32° because $\text{m}(\angle D) + \text{m}(\angle E) = 90°$. In triangle *DEF*, the ratio $\frac{DF}{DE} = \sin(32°)$. Therefore, $\frac{DF}{DE} = \frac{BC}{AB}$.

Choice A is incorrect because $\frac{DE}{DF}$ is the inverse of the ratio $\frac{BC}{AB}$. Choice C is incorrect because $\frac{DF}{EF} = \frac{BC}{AC}$, not $\frac{BC}{AB}$. Choice D is incorrect because $\frac{EF}{DE} = \frac{AC}{AB}$, not $\frac{BC}{AB}$.

QUESTION 17

Choice B is correct. Isolating the term that contains the riser height, *h*, in the formula 2*h* + *d* = 25 gives 2*h* = 25 − *d*. Dividing both sides of this equation by 2 yields $h = \frac{25 - d}{2}$, or $h = \frac{1}{2}(25 - d)$.

Choices A, C, and D are incorrect and may result from incorrect transformations of the riser-tread formula 2*h* + *d* = 25 when expressing *h* in terms of *d*.

QUESTION 18

Choice C is correct. Since the tread depth, *d*, must be at least 9 inches, and the riser height, *h*, must be at least 5 inches, it follows that *d* ≥ 9 and *h* ≥ 5, respectively. Solving for *d* in the riser-tread formula 2*h* + *d* = 25 gives *d* = 25 − 2*h*. Thus the first inequality, *d* ≥ 9, is equivalent to 25 − 2*h* ≥ 9. This inequality can be solved for *h* as follows:

$$-2h \geq 9 - 25$$

$$2h \leq 25 - 9$$

$$2h \leq 16$$

$$h \leq 8$$

Therefore, the inequality $5 \le h \le 8$, derived from combining the inequalities $h \ge 5$ and $h \le 8$, represents the set of all possible values for the riser height that meets the code requirement.

Choice A is incorrect because the riser height, *h*, cannot be less than 5 inches. Choices B and D are incorrect because the riser height, *h*, cannot be greater than 8. For example, if $h = 10$, then according to the riser-tread formula $2h + d = 25$, it follows that $d = 5$ inches. However, *d* must be at least 9 inches according to the building codes, so *h* cannot be 10.

QUESTION 19

Choice C is correct. Let *h* be the riser height, in inches, and *n* be the number of the steps in the stairway. According to the architect's design, the total rise of the stairway is 9 feet, or $9 \times 12 = 108$ inches. Hence, $nh = 108$, and solving for *n* gives $n = \frac{108}{h}$. It is given that $7 < h < 8$. It follows that $\frac{108}{8} < \frac{108}{h} < \frac{108}{7}$, or equivalently, $\frac{108}{8} < n < \frac{108}{7}$. Since $\frac{108}{8} < 14$ and $\frac{108}{7} > 15$ and *n* is an integer, it follows that $14 \le n \le 15$. Since *n* can be an odd number, *n* can only be 15; therefore, $h = \frac{108}{15} = 7.2$ inches. Substituting 7.2 for *h* in the riser-tread formula $2h + d = 25$ gives $14.4 + d = 25$. Solving for *d* gives $d = 10.6$ inches.

Choice A is incorrect because 7.2 inches is the riser height, not the tread depth of the stairs. Choice B is incorrect and may be the result of calculation errors. Choice D is incorrect because 15 is the number of steps, not the tread depth of the stairs.

QUESTION 20

Choice C is correct. Since the product of $x - 6$ and $x + 0.7$ equals 0, by the zero product property either $x - 6 = 0$ or $x + 0.7 = 0$. Therefore, the solutions to the equation are 6 and −0.7. The sum of 6 and −0.7 is 5.3.

Choice A is incorrect and is the result of subtracting 6 from −0.7 instead of adding. Choice B is incorrect and may be the result of erroneously calculating the sum of −6 and 0.7 instead of 6 and −0.7. Choice D is incorrect and is the sum of 6 and 0.7, not 6 and −0.7.

QUESTION 21

Choice D is correct. The sample of 150 largemouth bass was selected at random from all the largemouth bass in the pond, and since 30% of them weighed more than 2 pounds, it can be concluded that approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

Choices A, B, and C are incorrect. Since the sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds, the largest population to which this result can be generalized is the population of the largemouth bass in the pond.

QUESTION 22

Choice B is correct. The median of a list of numbers is the middle value when the numbers are listed in order from least to greatest. For the electoral votes shown in the table, their frequency should also be taken into account. Since there are 21 states represented in the table, the middle number will be the eleventh number in the ordered list. Counting the frequencies from the top of the table (4 + 4 + 1 + 1 + 3 = 13) shows that the median number of electoral votes for the 21 states is 15.

Choice A is incorrect. If the electoral votes are ordered from least to greatest taking into account the frequency, 13 will be in the tenth position, not the middle. Choice C is incorrect because 17 is in the fourteenth position, not in the middle, of the ordered list. D is incorrect because 20 is in the fifteenth position, not in the middle, of the ordered list.

QUESTION 23

Choice C is correct. Since the graph shows the height of the ball above the ground after it was dropped, the number of times the ball was at a height of 2 feet is equal to the number of times the graph crosses the horizontal grid line that corresponds to a height of 2 feet. The graph crosses this grid line three times.

Choices A, B, and D are incorrect. According to the graph, the ball was at a height of 2 feet three times, not one, two, or four times.

QUESTION 24

Choice D is correct. To find the percent increase of the customer's water bill, the absolute increase of the bill, in dollars, is divided by the original amount of the bill, and the result is multiplied by 100%, as follows: $\frac{79.86 - 75.74}{75.74} \approx 0.054$; $0.054 \times 100\% = 5.4\%$.

Choice A is incorrect. This choice is the difference 79.86 − 75.74 rounded to the nearest tenth, which is the (absolute) increase of the bill's amount, not its percent increase. Choice B is incorrect and may be the result of some calculation errors. Choice C is incorrect and is the result of dividing the difference between the two bill amounts by the new bill amount instead of the original bill amount.

QUESTION 25

Choice B is correct. A linear function has a constant rate of change, and any two rows of the shown table can be used to calculate this rate. From the first row to the second, the value of x is increased by 2 and the value of $f(x)$ is increased by $6 = 4 - (-2)$. So the values of $f(x)$ increase by 3 for every increase by 1 in the value of x. Since $f(2) = 4$, it follows that $f(2 + 1) = 4 + 3 = 7$. Therefore, $f(3) = 7$.

Choice A is incorrect. This is the third x-value in the table, not $f(3)$. Choices C and D are incorrect and may result from errors when calculating the function's rate of change.

QUESTION 26

Choice C is correct. Since Gear A has 20 teeth and Gear B has 60 teeth, the gear ratio for Gears A and B is 20:60. Thus the ratio of the number of revolutions per minute (rpm) for the two gears is 60:20, or 3:1. That is, when Gear A turns at 3 rpm, Gear B turns at 1 rpm. Similarly, since Gear B has 60 teeth and Gear C has 10 teeth, the gear ratio for Gears B and C is 60:10, and the ratio of the rpms for the two gears is 10:60. That is, when Gear B turns at 1 rpm, Gear C turns at 6 rpm. Therefore, if Gear A turns at 100 rpm, then Gear B turns at $\frac{100}{3}$ rpm, and Gear C turns at $\frac{100}{3} \times 6 = 200$ rpm.

Alternate approach: Gear A and Gear C can be considered as directly connected since their "contact" speeds are the same. Gear A has twice as many teeth as Gear C, and since the ratios of the number of teeth are equal to the reverse of the ratios of rotation speeds, in rpm, Gear C would be rotated at a rate that is twice the rate of Gear A. Therefore, Gear C will be rotated at a rate of 200 rpm since Gear A is rotated at 100 rpm.

Choice A is incorrect and may result from using the gear ratio instead of the ratio of the rpm when calculating the rotational speed of Gear C. Choice B is incorrect and may result from comparing the rpm of the gears using addition instead of multiplication. Choice D is incorrect and may be the result of multiplying the 100 rpm for Gear A by the number of teeth in Gear C.

QUESTION 27

Choice A is correct. One way to find the radius of the circle is to put the given equation in standard form, $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center of the circle and the radius of the circle is r. To do this, divide the original equation, $2x^2 - 6x + 2y^2 + 2y = 45$, by 2 to make the leading coefficients of x^2 and y^2 each equal to 1: $x^2 - 3x + y^2 + y = 22.5$. Then complete the square to put the equation in standard form. To do so, first rewrite $x^2 - 3x + y^2 + y = 22.5$ as $(x^2 - 3x + 2.25) - 2.25 + (y^2 + y + 0.25) - 0.25 = 22.5$. Second, add 2.25 and 0.25 to both sides of the equation: $(x^2 - 3x + 2.25) + (y^2 + y + 0.25) = 25$. Since $x^2 - 3x + 2.25 = (x - 1.5)^2$, $y^2 - x + 0.25 = (y$

$-0.5)^2$, and $25 = 5^2$, it follows that $(x - 1.5)^2 + (y - 0.5)^2 = 5^2$. Therefore, the radius of the circle is 5.

Choices B, C, and D are incorrect and may be the result of errors in manipulating the equation or of a misconception about the standard form of the equation of a circle in the *xy*-plane.

QUESTION 28

Choice A is correct. The coordinates of the points at a distance *d* units from the point with coordinate *a* on the number line are the solutions to the equation $|x - a| = d$. Therefore, the coordinates of the points at a distance of 3 units from the point with coordinate −4 on the number line are the solutions to the equation $|x - (-4)| = 3$, which is equivalent to $|x + 4| = 3$.

Choice B is incorrect. The solutions of $|x - 4| = 3$ are the coordinates of the points on the number line at a distance of 3 units from the point with coordinate 4. Choice C is incorrect. The solutions of $|x + 3| = 4$ are the coordinates of the points on the number line at a distance of 4 units from the point with coordinate −3. Choice D is incorrect. The solutions of $|x - 3| = 4$ are the coordinates of the points on the number line at a distance of 4 units from the point with coordinate 3.

QUESTION 29

Choice B is correct. The average speed of the model car is found by dividing the total distance traveled by the car by the total time the car traveled. In the first *t* seconds after the car starts, the time changes from 0 to *t* seconds. So the total distance the car traveled is the distance it traveled at *t* seconds minus the distance it traveled at 0 seconds. At 0 seconds, the car has traveled $16(0)\sqrt{0}$ inches, which is equal to 0 inches. According to the equation given, after *t* seconds, the car has traveled $16t\sqrt{t}$ inches. In other words, after the car starts, it travels a total of $16t\sqrt{t}$ inches in *t* seconds. Dividing this total distance traveled by the total time shows the car's average speed: $\frac{16t\sqrt{t}}{t} = 16\sqrt{t}$ inches per second.

Choices A, C, and D are incorrect and may result from misconceptions about how average speed is calculated.

QUESTION 30

Choice D is correct. The data in the scatterplot roughly fall in the shape of a downward-opening parabola; therefore, the coefficient for the x^2 term must be negative. Based on the location of

the data points, the *y*-intercept of the parabola should be somewhere between 740 and 760. Therefore, of the equations given, the best model is $y = -1.674x^2 + 19.76x + 745.73$.

Choices A and C are incorrect. The positive coefficient of the x^2 term means that these these equations each define upward-opening parabolas, whereas a parabola that fits the data in the scatterplot must open downward. Choice B is incorrect because it defines a parabola with a *y*-intercept that has a negative *y*-coordinate, whereas a parabola that fits the data in the scatterplot must have a *y*-intercept with a positive *y*-coordinate.

QUESTION 31

The correct answer is 10. Let n be the number of friends originally in the group. Since the cost of the trip was \$800, the share, in dollars, for each friend was originally $\frac{800}{n}$. When two friends decided not to go on the trip, the number of friends who split the \$800 cost became $n - 2$, and each friend's cost became $\frac{800}{n-2}$. Since this share represented a \$20 increase over the original share, the equation $\frac{800}{n} + 20 = \frac{800}{n-2}$ must be true. Multiplying each side of $\frac{800}{n} + 20 = \frac{800}{n-2}$ by $n(n - 2)$ to clear all the denominators gives

$$800(n - 2) + 20n(n - 2) = 800n$$

This is a quadratic equation and can be rewritten in the standard form by expanding, simplifying, and then collecting like terms on one side, as shown below:

$$800n - 1600 + 20n^2 - 40n = 800n$$

$$40n - 80 + n^2 - 2n = 40n$$

$$n^2 - 2n - 80 = 0$$

After factoring, this becomes $(n + 8)(n - 10) = 0$.

The solutions of this equation are −8 and 10. Since a negative solution makes no sense for the number of people in a group, the number of friends originally in the group was 10.

QUESTION 32

The correct answer is 31. The equation can be solved using the steps shown below.

$2(5x - 20) - 15 - 8x = 7$

$2(5x) - 2(20) - 15 - 8x = 7$ (Apply the distributive property.)

$10x - 40 - 15 - 8x = 7$ (Multiply.)

$2x - 55 = 7$ (Combine like terms.)

$2x = 62$ (Add 55 to both sides of the equation.)

$x = 31$ (Divide both sides of the equation by 2.)

QUESTION 33

The possible correct answers are 97, 98, 99, 100, and 101. The volume of a cylinder can be found by using the formula $V = \pi r^2 h$, where r is the radius of the circular base and h is the height of the cylinder. The smallest possible volume, in cubic inches, of a graduated cylinder produced by the laboratory supply company can be found by substituting 2 for r and 7.75 for h, giving $V = \pi(2^2)(7.75)$. This gives a volume of approximately 97.39 cubic inches, which rounds to 97 cubic inches. The largest possible volume, in cubic inches, can be found by substituting 2 for r and 8 for h, giving $V = \pi(2^2)(8)$. This gives a volume of approximately 100.53 cubic inches, which rounds to 101 cubic inches. Therefore, the possible volumes are all the integers greater than or equal to 97 and less than or equal to 101, which are 97, 98, 99, 100, and 101. Any of these numbers may be gridded as the correct answer.

QUESTION 34

The correct answer is 5. The intersection points of the graphs of $y = 3x^2 - 14x$ and $y = x$ can be found by solving the system consisting of these two equations. To solve the system, substitute x for y in the first equation. This gives $x = 3x^2 - 14x$. Subtracting x from both sides of the equation gives $0 = 3x^2 - 15x$. Factoring $3x$ out of each term on the left-hand side of the equation gives $0 = 3x(x - 5)$. Therefore, the possible values for x are 0 and 5. Since $y = x$, the two intersection points are (0, 0) and (5, 5). Therefore, $a = 5$.

QUESTION 35

The correct answer is 1.25 or $\frac{5}{4}$. The y-coordinate of the x-intercept is 0, so 0 can be substituted for y, giving $\frac{4}{5}x + \frac{1}{3}(0) = 1$. This simplifies to $\frac{4}{5}x = 1$. Multiplying both sides of $\frac{4}{5}x$

= 1 by 5 gives $4x = 5$. Dividing both sides of $4x = 5$ by 4 gives $x = \frac{5}{4}$, which is equivalent to 1.25. Either 5/4 or 1.25 may be gridded as the correct answer.

QUESTION 36

The correct answer is 2.6 or $\frac{13}{5}$. Since the mean of a set of numbers can be found by adding the numbers together and dividing by how many numbers there are in the set, the mean mass, in kilograms, of the rocks Andrew collected is $\frac{2.4+2.5+3.6+3.1+2.5+2.7}{6} = \frac{16.8}{6} = 2.8$. Since the mean mass of the rocks Maria collected is 0.1 kilogram greater than the mean mass of rocks Andrew collected, the mean mass of the rocks Maria collected is 2.8 + 0.1 = 2.9 kilograms. The value of x can be found by using the algorithm for finding the mean: $\frac{x+3.1+2.7+2.9+3.3+2.8}{6} = 2.9$. Solving this equation gives $x = 2.6$, which is equivalent to $\frac{13}{5}$. Either 2.6 or 13/5 may be gridded as the correct answer.

QUESTION 37

The correct answer is 30. The situation can be represented by the equation $x(2^4) = 480$, where the 2 represents the fact that the amount of money in the account doubled each year and the 4 represents the fact that there are 4 years between January 1, 2001, and January 1, 2005. Simplifying $x(2^4) = 480$ gives $16x = 480$. Therefore, $x = 30$.

QUESTION 38

The correct answer is 8. The 6 students represent (100 − 15 − 45 − 25)% = 15% of those invited to join the committee. If x people were invited to join the committee, then $0.15x = 6$. Thus, there were $\frac{6}{0.15}$ = 40 people invited to join the committee. It follows that there were 0.45(40) = 18 teachers and 0.25(40) = 10 school and district administrators invited to join the committee. Therefore, there were 8 more teachers than school and district administrators invited to join the committee.

Answer Explanations Test #3

Answer Explanations

SAT Practice Test #3

Section 1: Reading Test

QUESTION 1.

Choice D is the best answer. The final sentence of the first paragraph makes clear that before adopting his daughter, the weaver Silas was greedy for gold and chained to his work, "deafened and blinded more and more to all things except the monotony of his loom." But after adopting Eppie, Silas became more interested in life outside his job: "Eppie called him away from his weaving, and made him think all its pauses a holiday, reawakening his senses with her fresh life." A major theme of the passage can be seen in this transformation, as it represents how loving a child can improve or change a parent's life.

Choice A is incorrect because even if the passage implies that Silas was too materialistic before his daughter's arrival in his life, his greediness was a personal characteristic only, not a societal one; whether the society Silas lives in is overly materialistic is never addressed. Choice B is incorrect because even if the passage represents the "moral purity" of children, it does so only indirectly and not as a major theme. Choice C is incorrect because the passage addresses childhood enthusiasm and curiosity more than "naïveté" and never discusses the length or "brevity" of that naïveté.

QUESTION 2.

Choice A is the best answer. The first sentence of the first paragraph notes that "Unlike the gold . . . Eppie was a creature of endless claims and ever-growing desires, seeking and loving sunshine, and living sounds, and living movements; making trial of everything, with trust in new joy, and stirring the human kindness in all eyes that looked on her." These lines make clear that in contrast to Silas's gold, his new daughter is vibrant and alive.

Choices B, C, and D are incorrect because the lines from the first paragraph cited above reveal Eppie's interest in "living sounds" and "living movements" and thus characterize her vitality in comparison to the gold, rather than her durability, protection, or self-sufficiency.

QUESTION 3.

Choice A is the best answer. In the first paragraph, the narrator describes Silas as having been so obsessed as to have felt required to worship the gold "in close-locked solitude," with "his thoughts in an ever-repeated circle" centered on his hoard. Moreover, this obsession compelled him to "sit weaving longer and longer, deafened and blinded more and more to all things except the monotony of his loom and the repetition of his web." These lines convey the extent to which Silas's behaviors were determined by his obsession.

Choice B is incorrect because the narrator does not make it seem as if Silas's gold could reproduce on its own, with the first paragraph suggesting that his hoard was a consequence of hard work, his being "deafened and blinded more and more to all things except the monotony of his loom and the repetition of his web." Choice C is incorrect because even if the first paragraph mentions that, after Eppie's arrival, Silas thinks about "the ties and charities that bound together the families of his neighbors," the passage never addresses how Silas interacted with those neighbors previously. Choice D is incorrect because the third paragraph makes clear that Silas is not only able to recall life before Eppie, but that with her in his life, "his mind was growing into memory."

QUESTION 4.

Choice B is the best answer. The first paragraph of the passage describes Eppie as "a creature of endless claims and ever-growing desires," one who is "making trial of everything." In this context, her "making trial of everything" can be read as her acting on her curiosity by striving to experience the world around her.

Choices A, C, and D are incorrect because in the context of her "making trial of everything," Eppie can be seen as curious, not friendly (choice A), disobedient (choice C), or judgmental (choice D).

QUESTION 5.

Choice D is the best answer. In the first paragraph, the narrator indicates that with the arrival of Eppie, Silas's thoughts turn from his work and his gold toward Eppie's future and his life with her: "Eppie was an object compacted of changes and hopes that forced his thoughts onward, and carried them far away from their old eager pacing towards the same blank limit — carried them away to the new things that would come with the coming years." By influencing Silas to think "onward" and of "the coming years," Eppie prompts Silas to envision a far different future than he would experience otherwise.

Choice A is incorrect because although the passage implies that Silas is less obsessed with money than before, there is no indication that he has actually renounced his desire for it. Choice B is incorrect because although the passage explains that Silas spends time outdoors after the arrival of Eppie, there is no indication that her presence has

necessarily changed his understanding of his place in nature. Choice C is incorrect because at no point in the passage is Silas shown accepting help from anyone.

QUESTION 6.

Choice B is the best answer. The previous question asks what consequence Silas has experienced as a result of adopting Eppie. The answer, that he begins to imagine a new future for himself and her, is supported in the first paragraph: "but Eppie was an object compacted of changes and hopes that forced his thoughts onward, and carried them far away from their old eager pacing towards the same blank limit — carried them away to the new things that would come with the coming years."

Choices A, C, and D are incorrect because the lines cited do not support the answer to the previous question about the consequence of Silas's adoption of Eppie, instead describing Silas's life before Eppie entered it (choice A), how he occasionally acts in her presence (choice C), and the changes in Eppie's perception of the world as she ages (choice D).

QUESTION 7.

Choice C is the best answer. In the second paragraph, the description of Silas and Eppie's interaction outdoors conveys the extent to which he has changed since her arrival: where he once worked all day at his loom to earn more and more money, he now "might be seen in the sunny mid-day" strolling with her, accepting the flowers she brings him, or listening to birdcalls with her. With these experiences also come "crowding remembrances" of his early life — the life he led before amassing his hoard of gold. In its entirety, the paragraph can therefore be seen as illustrating the profound change into a more sociable being that Silas has undergone as a result of parenting Eppie.

Choice A is incorrect because the second paragraph does not present a particular moment when Silas realizes that Eppie has changed him but instead describes a pattern of behavior indicative of that change. Choice B is incorrect because the second paragraph shows the benefits Silas derives from Eppie's presence, rather than any sacrifices he has made for her. Choice D is incorrect because the second paragraph dramatizes a change in Silas's life overall, rather than showing a change in the dynamic that has arisen between Silas and Eppie.

QUESTION 8.

Choice B is the best answer. The third paragraph of the passage shows that as Eppie learns more and more, Silas reengages with life: "As the child's mind was growing into knowledge, his mind was growing into memory: as her life unfolded, his soul, long stupefied in a cold narrow prison, was unfolding too, and trembling gradually into full consciousness." As Eppie grows into a world that is new to her, Silas recovers a world he'd largely forgotten.

Choice A is incorrect because the narrator portrays Eppie as being curious and eager, not physically vulnerable, and also implies that Silas is becoming ever more emotionally robust, not psychologically fragile. Choice C is incorrect because the only connection the narrator makes regarding Silas's former greed and Eppie's presence in his life is that she has brought an end to his obsessive pursuit of wealth. Choice D is incorrect because the narrator does not address Silas's mortality in any way but rather shows him becoming more and more alive through Eppie's love.

QUESTION 9.

Choice D is the best answer. The previous question asks what connection the narrator draws between Eppie and Silas. The answer, that as she learns more about the world, he becomes more involved in it, is supported in the third paragraph: "As the child's mind was growing into knowledge, his mind was growing into memory: as her life unfolded, his soul, long stupefied in a cold narrow prison, was unfolding too, and trembling gradually into full consciousness."

Choices A, B, and C are incorrect because the lines cited do not support the answer to the previous question about the connection between Eppie and Silas, instead contrasting Silas's fixation on his gold with Eppie's curiosity (choice A) and describing Silas's habitual behavior when accompanying Eppie outdoors (choices B and C).

QUESTION 10.

Choice D is the best answer. In the last paragraph, the narrator states, "Also, by the time Eppie was three years old, she developed a fine capacity for mischief, and for devising ingenious ways of being troublesome." In this context, the word "fine" most nearly means keen, or acute.

Choices A, B, and C are incorrect because in the context of a description in which Eppie was said to have a "fine capacity for mischief," the word "fine" most nearly means keen, or acute, not acceptable (choice A), delicate (choice B), or ornate (choice C).

QUESTION 11.

Choice D is the best answer. The first paragraph of the passage explains the theory of two MIT business scholars who believe that technological advances in the workplace could lead to fewer jobs for human workers, explaining that they "foresee dismal prospects for many types of jobs as these powerful new technologies are increasingly adopted not only in manufacturing, clerical, and retail work but in professions such as law, financial services, education, and medicine." The fifth paragraph of the passage, however, offers a contrasting view, citing a Harvard economist who "says that no historical pattern shows these shifts leading to a net decrease in

jobs over an extended period." Combined, these different opinions indicate the main purpose of the passage, which is to assess how new technologies in the workplace might affect job growth as a whole.

Choice A is incorrect because the passage does not examine how workers' lives have been affected by technology during the last century. Choices B and C are incorrect because the passage does not advocate or argue for a course of action; instead, the passage considers both sides of an issue, taking no position of its own.

QUESTION 12.

Choice A is the best answer. In the first paragraph of the passage, Brynjolfsson and McAfee clearly state that technological advances since the year 2000 have led to low job growth in the United States: "MIT business scholars Erik Brynjolfsson and Andrew McAfee have argued that impressive advances in computer technology — from improved industrial robotics to automated translation services — are largely behind the sluggish employment growth of the last 10 to 15 years."

Choice B is incorrect because although Brynjolfsson and McAfee assert that certain "changes" have occurred in the workplace as a result of technological advancement, they offer only tentative speculation that those changes may be reflected globally. Choice C is incorrect because the passage notes a decrease, rather than an increase, in skilled laborers. Choice D is incorrect because the passage makes no mention of the global creation of new jobs, even speculating that jobs may have been negatively impacted in technologically advanced nations.

QUESTION 13.

Choice A is the best answer. The previous question asks what Brynjolfsson and McAfee say has resulted in the workplace from advances in technology since the year 2000. The answer, that low job growth has resulted from these advances, is supported in the first sentence of the first paragraph: "MIT business scholars Erik Brynjolfsson and Andrew McAfee have argued that impressive advances in computer technology — from improved industrial robotics to automated translation services — are largely behind the sluggish employment growth of the last 10 to 15 years."

Choices B, C, and D are incorrect because the lines cited do not support the answer to the previous question about what Brynjolfsson and McAfee say has resulted in the workplace from advances in technology since the year 2000; instead they point to industries not under specific consideration by Brynjolfsson and McAfee (choice B), speculate as to whether changes might also be happening in other countries (choice C), and explain the importance of productivity in the marketplace in the decades following World War II. (choice D).

QUESTION 14.

Choice D is the best answer. The second sentence of the third paragraph reads, "In economics, productivity — the amount of economic value created for a given unit of input, such as an hour of labor — is a crucial indicator of growth and wealth creation." In this context, the primary purpose of the appositive ("the amount of economic value . . . such as an hour of labor") is to define "productivity."

Choices A, B, and C are incorrect because in the context of the third paragraph, the appositive ("the amount of economic value . . . such as an hour of labor") is clearly provided to help explain the term "productivity," not to describe a process (choice A), highlight a dilemma (choice B), or clarify a claim (choice C).

QUESTION 15.

Choice D is the best answer. The third paragraph states that "the pattern is clear: as businesses generated more value from their workers, the country as a whole became richer." In this context, the word "clear" most nearly means obvious, or unmistakable.

Choices A, B, and C are incorrect because in the context of the third paragraph, the word "clear" can be seen to mean obvious, or unmistakable, not pure (choice A), keen (choice B), or untroubled (choice C).

QUESTION 16.

Choice C is the best answer. Katz doesn't necessarily agree with Brynjolfsson and McAfee that new technologies will lead to sluggish job growth, saying in the fifth paragraph that "no historical pattern shows these shifts leading to a net decrease in jobs over an extended period." However, he's not sure that will remain true, explaining in the sixth paragraph that no one can be certain what is going to happen to the workplace as a result of these new technologies: "If technology disrupts enough, who knows what will happen?"

Choices A, B, and D are incorrect because it would not be accurate to characterize Katz as being alarmed (choice A), unconcerned (choice B), or optimistic (choice D) about today's digital technologies. Rather, it's clear from the conclusion of the sixth paragraph that Katz isn't sure how technological advancement will affect the workplace: "If technology disrupts enough, who knows what will happen?"

QUESTION 17.

Choice D is the best answer. The previous question asks how Katz's attitude toward "today's digital technologies" can best be characterized. The answer, that he is uncertain about their possible effects, is supported in the final sentence of the sixth paragraph: "If technology disrupts enough, who knows what will happen?"

Choices A, B, and C are incorrect because the lines cited do not support the answer to the previous question Katz's attitude toward "today's digital technologies"; instead, they describe some of his earlier research (choice A) and provide insight only into his initial thoughts but not his final conclusion on the matter (choices B and C).

QUESTION 18.

Choice B is the best answer. The sixth paragraph of the passage states that "Katz doesn't dismiss the notion that there is something different about today's digital technologies — something that could affect an even broader range of work." In the context of this sentence, the "range" of work being discussed means the scope of work or all the various kinds of work.

Choices A, C, and D are incorrect because in the context of the sentence, the "range" of work being discussed means the array or scope of work, not a physical delineation like a region (choice A) or distance (choice C), or the professional position of those who perform particular jobs (choice D).

QUESTION 19.

Choice D is the best answer. Figure 1 shows the highest gap between the percentages of productivity and employment in relation to 1947 levels occurring in 2013, when there was a difference of approximately 150 percentage points between 2013 employment (under 400%) and 2013 productivity (well over 500%).

Choices A, B, and C are incorrect because Figure 1 shows a gap of well over 100 percentage points between 2013 employment and 2013 productivity in relation to 1947 levels, while 1987 (choice A) and 1997 (choice B) show a difference of about 30 percentage points or less between employment and productivity, and 2007 (choice C) indicates a difference of approximately 100 percentage points.

QUESTION 20.

Choice C is the best answer. Figure 2 clearly shows an increase of worker output in all three countries between 1960 and 2011, with workers in each country producing on average less than 50 units of output in 1960 but more than 100 units by 2011.

Choice A is incorrect because figure 2 shows that Japan saw greater growth in output between 1960 and 1990 than Germany saw. Choice B is incorrect because figure 2 shows that Japan experienced its greatest increase in output from 2000 to 2011, not its smallest. Choice D is incorrect because figure 2 shows that the United States had the greatest output of all three countries only in 2011, not in each of the years shown.

QUESTION 21.

Choice B is the best answer. In the fourth paragraph, Brynjolfsson asserts, "Productivity is at record levels, innovation has never been faster, and yet at the same time, we have a falling median income and we have fewer jobs." In order to evaluate his statement that today "we have fewer jobs," figure 2 would need to include accurate information about the number of jobs held by people employed in factories from 1960 to 2011. Without knowing those numbers, it's not possible to determine whether Brynjolfsson's statement is correct.

Choice A is incorrect because a comparison of the median income of all three nations' factory workers within a single year would not aid in the evaluation of Brynjolfsson's statement regarding changes in worker productivity over a span of 10 to 15 years. Choices C and D are incorrect because knowing either the types of organizations where those outputs were measured or which specific manufacturing jobs might have been lost to new technologies would not be helpful in evaluating Brynjolfsson's statement about how median incomes have fallen and job growth has reduced over time.

QUESTION 22.

Choice C is the best answer. The main purpose of the passage is conveyed by the first sentence: "Anyone watching the autumn sky knows that migrating birds fly in a V formation, but scientists have long debated why." The first paragraph continues by focusing on new research that might answer the question of why birds fly in that formation ("presumably to catch the preceding bird's updraft — and save energy during flight"). As a whole, the passage can therefore be seen as a discussion of the biological motivation behind migrating birds' reliance on the V formation.

Choice A is incorrect because the squadrons of planes mentioned in the second paragraph are used as an example to discuss migrating birds but are not themselves the main subject of this passage. Choice B is incorrect because although the fourth paragraph does discuss the role of downdrafts in V-formation flight, this discussion is brief and does not constitute a main purpose. Choice D is incorrect because the passage does not illustrate how birds sense air currents through their feathers; instead, the seventh paragraph suggests in passing that such sensation may play a role in maintaining the V formation: "Scientists do not know how the birds find that aerodynamic sweet spot, but they suspect that the animals align themselves either by sight or by sensing air currents through their feathers."

QUESTION 23.

Choice A is the best answer. In the second paragraph of the passage, the quotation "Air gets pretty unpredictable behind a flapping wing" immediately follows the statement that "currents created by airplanes are far more stable than the oscillating eddies coming off of a bird."

The inclusion of the above quotation can therefore be seen as a way to explain that the current created by a bird's flapping wings is different from the current coming off the fixed wing of an airplane.

Choice B is incorrect because the quotation's explanation that air is "unpredictable" behind a bird's wing stresses the bird's lack of control over the air current. Choice C is incorrect because the quotation attributes the unpredictability of the current "behind a flapping wind" to the action of the wing rather than to wind, and in fact the passage makes no mention of wind. Choice D is incorrect because the quotation characterizes the flapping of the bird's wings in terms of the unpredictability of its effects, not of its comparative strength.

QUESTION 24.

Choice D is the best answer. The reason Usherwood used northern bald ibises as the subjects of his study is clearly stated at the beginning of the third paragraph: "The study, published in *Nature*, took advantage of an existing project to reintroduce endangered northern bald ibises (*Geronticus eremita*) to Europe." Because the project reintroducing those birds was already underway, it was therefore easy for Usherwood and his team to join it.

Choice A is incorrect because it would not be accurate to say that ibises were well acquainted with their migration route, as the third paragraph explains that scientists needed to "show hand-raised birds their ancestral migration route." Choice B is incorrect because the third paragraph states that the ibises wore "data loggers specially built by Usherwood and his lab" but never indicates that they had worn any such device before or undertaken migration previously. Choice C is incorrect because the passage never claims that ibises' body shape is similar to the design of a modern airplane, instead comparing only a V formation of birds to an airplane in the fourth paragraph.

QUESTION 25.

Choice C is the best answer. The previous question asks why Usherwood used northern bald ibises as the subject of his study. The answer, that he had easy access to them because they were being used in another scientific study, is supported at the beginning of the passage's third paragraph: "The study, published in *Nature*, took advantage of an existing project to reintroduce endangered northern bald ibises (*Geronticus eremita*) to Europe."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question as to why Usherwood chose northern bald ibises as the subject of his study; instead, they describe the results of the study (choice A), compare birds and planes in flight (choice B), and describe one element of the actual study (choice D) but not the reason ibises were chosen.

QUESTION 26.

Choice A is the best answer. At the end of the third paragraph the author notes that the GPS tracking devices attached to the birds "determined each bird's flight position to within 30 cm." This detail, along with the author's mention in the same sentence of another device that measured the timing of the wing flaps, provides evidence for the inference that the author likely specified 30 cm to underscore Usherwood's use of precise data-collection methods.

Choice B is incorrect because the passage does not state that the distance an ibis flies between wing flaps was something that could be ascertained by Usherwood's study. Choice C is incorrect because the passage does not discuss the wingspan length of juvenile ibises or suggest that this length could be determined from Usherwood's tracking data. Choice D is incorrect because the passage does not discuss the distance maintained between the plane and the ibises in flight.

QUESTION 27.

Choice C is the best answer. At the beginning of the fifth paragraph the passage states that "the findings likely apply to other long-winged birds, such as pelicans, storks, and geese, Usherwood says. Smaller birds create more complex wakes that would make drafting too difficult." In these lines the author therefore implies that unlike smaller birds, pelicans, storks, and geese flying in a V formation likely create a similar wake to that of ibises.

Choice A is incorrect because the passage focuses entirely on bird flight, not bird communication. Choices B and D are incorrect because the passage discusses pelicans, storks, and geese only with respect to their drafting behavior, not in terms of their migration routes or how much energy they might expend when flying.

QUESTION 28.

Choice B is the best answer. The previous question asks what the author implies about pelicans, storks, and geese flying in a V formation. The answer, that they produce a similar wake to ibises, is supported at the beginning of the fifth paragraph: "Smaller birds create more complex wakes that would make drafting too difficult." This sentence, in conjunction with the preceding sentence's assertion of the probable applicability of Usherwood's findings to pelicans, storks, and geese, underscores that the point of probable similarity between ibises and those other species is in their wake and the drafting it makes possible.

Choices A, C, and D are incorrect because the lines cited do not support the answer to the previous question regarding what the author implies about pelicans, storks, and geese flying in a V formation. Instead, they explain one finding in the ibis study, with no reference to other long-winged species (choice A); highlight the findings of a previous study of energy use in bird flight, with no reference to the relationship between ibises and other species (choice C); and offer a theory about ibises in flight, again with no reference to other species (choice D).

QUESTION 29.

Choice C is the best answer. The seventh paragraph speculates that further research may provide insight into how and why birds fly in formation: "In future studies, the researchers will switch to more common birds, such as pigeons or geese. They plan to investigate how the animals decide who sets the course and the pace." In sum, the seventh paragraph can therefore be seen as recognizing that more research is needed to explain the phenomenon of flight formation more completely.

Choice A is incorrect because neither the seventh paragraph nor the passage as a whole is concerned with bird hierarchies; the decision as to which bird sets the "course" or "pace" is mentioned only as another aspect of bird flight that scientists have yet to explain fully. Choice B is incorrect because the seventh paragraph only briefly mentions mistakes in V-formation flight, and this subject is not a central focus of the paragraph. Choice D is incorrect because although the seventh paragraph mentions the sighting of a lead bird or "leader" as a possible factor in the V formation, this factor is mentioned briefly and in conjunction with other factors, so that to describe it as a main idea would misrepresent the paragraph as a whole.

QUESTION 30.

Choice D is the best answer. In describing the way that long-winged birds like ibises fly in a V formation by drafting off each other, the seventh paragraph begins by stating, "scientists do not know how the birds find that aerodynamic sweet spot." In context, the phrase "aerodynamic sweet spot" characterizes the particular spatial relationship among birds in the formation that affords the least amount of wind resistance and is thus beneficial for flock members to maintain.

Choice A is incorrect because the author uses the phrase "aerodynamic sweet spot" in relation to bird flight, not plane flight. Choice B is incorrect because the phrase is not meant to imply the joy of flight so much as the optimum efficiency that can be found by flying in a certain position. Choice C is incorrect because the phrase is not used to discuss synchronized wing movement among birds, nor is synchronization addressed anywhere in the seventh paragraph.

QUESTION 31.

Choice B is the best answer. In the seventh paragraph, the passage explains that one aspect of bird flight that awaits further study by scientists is the question of whether "a mistake made by the leader can ripple through the rest of the flock to cause traffic jams." In this context, to say that a mistake might "ripple" through the flock most nearly means that it might progressively spread through the flock.

Choices A, C, and D are incorrect because in the context of the seventh paragraph, to "ripple" through the flock means to spread through it progressively, not to fluctuate (choice A), to wave, or move in the pattern of the ebb and flow of waves (choice C), or to undulate, or move in a manner that creates a textured, undulating appearance (choice D).

QUESTION 32.

Choice D is the best answer. In the first paragraph of Passage 1, Tocqueville predicts that "the social changes which bring nearer to the same level the father and son, the master and servant, and superiors and inferiors generally speaking, will raise woman and make her more and more the equal of man." In this context, to "raise" women to a higher social position most nearly means to elevate, or lift, them.

Choices A, B, and C are incorrect because in the context of Tocqueville's prediction that women will attain a higher social position, the word "raise" most nearly means elevate, not increase (choice A), cultivate, or support (choice B), or nurture (choice C).

QUESTION 33.

Choice B is the best answer. In Passage 1, Tocqueville expresses concern that treating men and women as identical would likely harm both genders, rather than benefit them. This sentiment can be seen most clearly in the second paragraph, when he writes that "it may readily be conceived, that by thus attempting to make one sex equal to the other, both are degraded."

Choice A is incorrect because Tocqueville says treating men and women as identical in nature would result in the degradation of both genders, a condition closer to oppression than to freedom from oppression. Choice C is incorrect because Tocqueville does not address the issue of whether men might ultimately try to reclaim any authority they lost as a result of the treatment of both genders as identical. Choice D is incorrect because in the passage, Tocqueville never claims that treating men and women the same would result in superfluous privileges for either.

QUESTION 34.

Choice C is the best answer. The previous question asks what Tocqueville implies would result from treating men and women as identical in nature. The answer, that he believes such treatment would harm both men and women, is supported in the second paragraph of Passage 1: "It may readily be conceived, that by thus attempting to make one sex equal to the other, both are degraded."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about what Tocqueville implies would result from treating men and women as identical; instead, they discuss European approaches to such treatment, with no reference to the actual effects of it on men and women (choices A and B), and what Tocqueville considers Americans' proper conception of equality as it relates to gender roles (choice D).

QUESTION 35.

Choice B is the best answer. In the first paragraph of Passage 2, when discussing changing social relations, Mill writes that in her time there had come to exist "a just equality, instead of the dominion of the strongest." In this context of a society where some had once wielded much greater power than others, the word "dominion" most nearly means supremacy, or greater power.

Choices A, C, and D are incorrect because in the context of a paragraph discussing differences in the amount of power possessed by members of a society, "dominion" means supremacy, or greater power, not omnipotence, or the state of being all-powerful (choice A), ownership (choice C), or territory (choice D).

QUESTION 36.

Choice B is the best answer. In the first paragraph of Passage 2, Mill suggests that social roles are resistant to change in part because of their being entrenched in the cultural tradition: "for, in proportion to the strength of a feeling is the tenacity with which it clings to the forms and circumstances with which it has even accidentally become associated." In the context of a discussion of equality between men and women, Mill's statement serves to imply that gender roles change so slowly precisely because they are so deeply ingrained in society and culture.

Choice A is incorrect because although Mill suggests in Passage 2 that gender roles are deeply entrenched, she does not imply that they serve as the foundation of society. Choice C is incorrect because Passage 2 does not address the issue of legislative reforms, only societal ones. Choice D is incorrect because although Mill addresses the difficulty of reforming traditional gender roles, she does not attribute it to the benefits that certain groups or institutions derive from those roles.

QUESTION 37.

Choice C is the best answer. The previous question asks about what Mill implies is the reason it is hard to change gender roles. The answer, that they are deeply entrenched in tradition, is supported in the first paragraph of Passage 2: "In proportion to the strength of a feeling is the tenacity with which it clings to the forms and circumstances with which it has even accidentally become associated."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about what Mill implies is the reason it is hard to change gender roles, instead describing the condition of general inequality in prior eras (choices A and B) and optimistically considering a future society that she imagines will be less unequal (choice D).

QUESTION 38.

Choice A is the best answer. Although the authors generally disagree about the roles men and women should occupy, both Tocqueville and Mill share the idea that gender equality is one small part of a societal shift toward equality in general. This can be seen in the first paragraph of Passage 1, where Tocqueville explains that raising woman to be "more and more the equal of man" is part of the overall "social changes which bring nearer to the same level the father and son, the master and servant," and in the first paragraph of Passage 2, where Mill writes that "mankind have outgrown" the state of inequality and "now tend to substitute, as the general principle of human relations, a just equality," with gender roles being the last of these relations to undergo such a shift.

Choice B is incorrect because although in Passage 1 Tocqueville argues that there are costs to treating men and women the same, in Passage 2 Mill characterizes gender equality as a source of benefits only. Choice C is incorrect because neither author considers changing gender roles in terms of economic ramifications, focusing instead on questions of fairness and justice and the fulfillment of people's potential. Choice D is incorrect because Mill does not discuss the issue in terms of American democracy, though Tocqueville does.

QUESTION 39.

Choice C is the best answer. In the second paragraph of Passage 2, Mill writes that she believes job opportunities in her society should be open to all: "Let every occupation be open to all, without favor or discouragement to any, and employments will fall into the hands of those men or women who are found by experience to be most capable of worthily exercising them." In the second paragraph of Passage 1, Tocqueville argues that equality between men and women would leave both degraded; nonetheless, he recognizes that the belief in such equality is widespread: "There are people in Europe who . . . would give to both the same functions, impose on both the same duties, and

grant to both the same rights; they would mix them in all things — their occupations." It can be inferred, then, that although Tocqueville would consider Mill's position ill-advised, he does recognize this position as one that is held by a number of reformers.

Choice A is incorrect because Tocqueville in Passage 1 never characterizes advocacy on behalf of gender equality (such as Mill engages in, in Passage 2) as less radical than it initially seems. Choice B is incorrect because Mill's stated belief that all jobs should be open to both men and women would clearly be refuted by Tocqueville as harmful to men and women alike. Choice D is incorrect because what Tocqueville praises the United States for is not gender equality as a component of economic progress, but rather the United States' division of activity into masculine and feminine spheres, which he likens to the division of labor in industrial production.

QUESTION 40.

Choice A is the best answer. In Passage 1, Tocqueville argues that equality is generally beneficial for society, but he moderates that claim in the third paragraph by further stating that even if men and women should be considered equal, they should not work in the same jobs: "As nature has appointed such wide differences between the physical and moral constitution of man and woman, her manifest design was to give a distinct employment to their various faculties." In contrast, Mill argues in the second paragraph of Passage 2 that men and women should be awarded work based on individual ability: "Let every occupation be open to all, without favor or discouragement to any, and employments will fall into the hands of those men or women who are found by experience to be most capable of worthily exercising them." It can therefore be said that Tocqueville believes one's gender should play a determining factor in one's position in society, whereas Mill believes it should not.

Choice B is incorrect because both Tocqueville in Passage 1 and Mill in Passage 2 would likely argue against limiting an individual to the social class he or she was born to. Choice C is incorrect because it is Mill, not Tocqueville, who argues that individual temperament is the proper determining factor for social position. Choice D is incorrect because although it accurately represents Tocqueville's implicit stance that an individual's social position should contribute to society as a whole, it misrepresents Mill's argument, which conceives of social position in relation to individual aptitude, not individual satisfaction.

QUESTION 41.

Choice A is the best answer. In the third paragraph of Passage 1, Tocqueville credits the Americans of his time for applying "to the sexes the great principle of political economy . . . by carefully dividing the duties of man from those of woman." In contrast, in the second paragraph of Passage 2, Mill argues that rigid social roles function to

"declare that whatever be the genius, talent, energy, or force of mind, of an individual of a certain sex or class, those faculties shall not be exerted." It can be inferred, then, that Mill would argue that the principle praised by Tocqueville tends to limit both men and women from developing their full potential.

Choice B is incorrect because in Passage 2, Mill focuses her argument on gender roles and equality between sexes but never addresses the idea of sympathy between them. Choice C is incorrect because Mill considers the division of professions by gender as a perpetuation of a long tradition of gender inequality. Choice D is incorrect because although Mill suggests that gender equality would involve rethinking the professional options available to men and women, she dismisses the notion that one gender is better suited to certain professions or would displace the other gender in certain professions.

QUESTION 42.

Choice C is the best answer. The passage's first two paragraphs describe how "Peter Higgs and a handful of other physicists were trying to understand the origin of a basic physical feature: mass," and the third paragraph discusses the idea put forth ("now called the Higgs field") to explain the environment where mathematical equations are most helpful in understanding mass. The passage shifts its focus, however: the fourth and fifth paragraphs describe how the idea of the Higgs field was not initially well-received in the scientific community, and the last paragraph illustrates that in modern times, the idea ultimately became an accepted fact to most scientists. Over the course of the passage, then, it can be seen that the main focus of the passage changes from an explanation of what the Higgs field is to an explanation of how the theory of it was received.

Choice A is incorrect because the passage makes no shift from a more to a less technical mode of description, and indeed the entire passage is aimed at readers with no specialized knowledge of physics. Choice B is incorrect because the passage never provides any contextualization of Higgs's work within other lines of inquiry in physics contemporary to Higgs. Choice D is incorrect because the passage offers no speculation regarding future discoveries that may result from the confirmation of the Higgs field's existence.

QUESTION 43.

Choice D is the best answer. The third paragraph of the passage provides the following analogy: "For a mental toehold, think of a ping-pong ball submerged in water." Since this analogy occurs in a discussion of how mass operates within the Higgs field, it functions to explain an abstract concept in terms more readily grasped by readers with no background in physics.

Choices A, B, and C are incorrect because the analogy of the ping-pong ball is used in the passage to help laypeople understand the difficult concept of the Higgs field, rather than to make a little-known fact more widely known (choice A), draw a contrast between oppositional scientific theories (choice B), or refute any established explanation (choice C).

QUESTION 44.

Choice D is the best answer. The fourth paragraph of the passage explains why Higgs's idea of the Higgs field was initially rebuffed by the scientific community: "The paper was rejected. Not because it contained a technical error, but because the premise of an invisible something permeating space, interacting with particles to provide their mass, well, it all just seemed like heaps of overwrought speculation." In other words, the scientific community was skeptical of Higgs's idea because it appeared to be mere theoretical speculation, with no empirical evidence to support it.

Choice A is incorrect because the passage makes clear that Higgs's idea addressed a theoretical problem already recognized by scientists, rather than a problem yet to be noticed by them. Choice B is incorrect because the fourth paragraph implies that Higgs's paper was rigorous (free from "technical error"), rather than problematic at the level of its equations. Choice C is incorrect because the passage never indicates that the acceptance of the Higgs field had the effect of rendering other, earlier theories in physics obsolete.

QUESTION 45.

Choice C is the best answer. The previous question asks why the scientific community initially rejected the idea of the Higgs field. The answer, that Higgs offered only theoretical speculation for the existence of the field, not actual evidence, is supported in the fourth paragraph: "The paper was rejected. Not because it contained a technical error, but because the premise of an invisible something permeating space, interacting with particles to provide their mass, well, it all just seemed like heaps of overwrought speculation."

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about why the scientific community initially rejected the idea of the Higgs field, instead discussing how Higgs dealt with established equations in physics when he theorized the field (choice A), describing the circumstances in which Higgs revealed his theory to the scientific community (choice B), and illustrating the fact that the Higgs field eventually came to be an accepted fact to most scientists (choice D).

QUESTION 46.

Choice A is the best answer. The fifth paragraph of the passage explains how the idea of the Higgs field eventually came to be accepted in the scientific community: "But Higgs persevered (and his revised paper appeared later that year in another journal), and physicists who took the time to study the proposal gradually realized that his idea was a stroke of genius, one that allowed them to have their cake and eat it too. In Higgs's scheme, the fundamental equations can retain their pristine form because the dirty work of providing the particles' masses is relegated to the environment." In saying that the Higgs field came to be accepted because it allowed scientists to "have their cake and eat it too," the author suggests that Higgs's theory was ultimately accepted as fact in part because it allowed physicists to reconcile what had seemed to be contradictory conditions: the harmony of the mathematical equations and the particles' apparent mass.

Choice B is incorrect because the passage does not suggest that the Higgs field was necessarily a concept that could be applied to other problems in physics than those immediately under Higgs's consideration. Choice C is incorrect because the passage does not suggest that Higgs's theory was accepted because it provided an answer to a question that earlier scientists had failed to anticipate. Choice D is incorrect because the passage never addresses any two phenomena being misinterpreted as a single phenomenon.

QUESTION 47.

Choice C is the best answer. The previous question asks for one reason Higgs's theory eventually gained acceptance in the scientific community. The answer, that it reconciled two seemingly irreconcilable conditions, is supported in the passage's fifth paragraph: "But Higgs persevered (and his revised paper appeared later that year in another journal), and physicists who took the time to study the proposal gradually realized that his idea was a stroke of genius, one that allowed them to have their cake and eat it too. In Higgs's scheme, the fundamental equations can retain their pristine form because the dirty work of providing the particles' masses is relegated to the environment." These lines make clear that Higgs's theory allowed for the particles' mass, while at the same time accepting the fundamental equations as valid.

Choices A, B, and D are incorrect because the lines cited do not support the answer to the previous question about why the Higgs field eventually gained acceptance in the scientific community, instead explaining certain aspects of the Higgs field (choices A and B) and discussing how certain scientific theories become accepted as fact even before they are proven (choice D).

QUESTION 48.

Choice A is the best answer. The main point of the last paragraph can be seen in its final sentence, which states that "mathematical equations can sometimes tell such a convincing tale, they can seemingly radiate reality so strongly, that they become entrenched in the vernacular of working physicists, even before there's data to confirm them." This point is borne out by the preceding lines of the paragraph, which recount the author's own experience of studying the still unproven Higgs field as it if were already a settled fact.

Choice B is incorrect because the anecdote the author shares about his own education does not demonstrate that physics, as a discipline, has come to operate differently over the course of his career. Choice C is incorrect because the details of the author's experience do not point to the process by which the existence of the Higgs field was confirmed, and indeed the passage does not describe that process at all. Choice D is incorrect because the passage broadly discusses the status of Higgs's theory at two different times (its initial rejection and later acceptance by physicists) and never considers how the details of the theory may have evolved.

QUESTION 49.

Choice A is the best answer. In the last paragraph, the author states that "the professor presented the Higgs field with such certainty that for a long while I had no idea it had yet to be established experimentally." In this context, for a scientific theory to be established most nearly means that it is validated, or proven.

Choices B, C, and D are incorrect because in the context of the last paragraph describing a scientific theory as being "established experimentally," the word "established" means validated, or proven, not founded (choice B), introduced (choice C), or enacted (choice D).

QUESTION 50.

Choice B is the best answer. The graph shows the periods of time that transpired between the moment when certain scientific concepts were introduced and the moment when those concepts were scientifically proven. Given the passage's discussion of the Higgs field, which was initially rejected by the scientific community before ultimately being accepted by it, the graph can therefore be seen as a means to put Higgs's work on mass into a greater context with other radical concepts that were ultimately accepted by the scientific community.

Choice A is incorrect because the graph illustrates that the Higgs boson required significantly more time to be confirmed than did any of the other theorized particles. Choice C is incorrect because the graph displays information only on the length of time necessary for any of the particles to be confirmed experimentally and does not indicate how any

of them were regarded by scientists. Choice D is incorrect because the graph does not clarify anything about the Higgs boson other than the time that transpired between its being introduced and being confirmed.

QUESTION 51.

Choice A is the best answer. Both the W boson and Z boson were introduced in the late 1960s and experimentally confirmed in the early 1980s. It is therefore accurate to say that they were both proposed and proven at about the same time.

Choice B is incorrect because the graph shows that it took more than forty years for the Higgs boson to be experimentally confirmed, while all the other particles were confirmed in a significantly shorter period of time than that. Choice C is incorrect because the graph shows that the tau neutrino was experimentally confirmed in 2000, while tau itself was experimentally confirmed in approximately 1975. Choice D is incorrect because the muon neutrino took approximately fifteen years to be confirmed, while the electron neutrino took well over twenty years.

QUESTION 52.

Choice D is the best answer. In the last paragraph of the passage, the author explains that by the mid-1980s, "the physics community had, for the most part, fully bought into the idea that there was a Higgs field permeating space." That was fifteen years after the concept was introduced but decades before it would be confirmed, which would be analogous to most physicists believing in the existence of the electron neutrino in 1940, well after it had been introduced but many years before it was confirmed via experiment.

Choices A, B, and C are incorrect because the author depicts the Higgs field in the mid-1980s as being virtually an accepted fact, even though it had not yet been proven experimentally. This situation is not analogous to a proposed particle that is widely disputed until it is confirmed experimentally (choice A), a particle that has already been confirmed and consequently elicits widespread acceptance (choice B), or particles that are not considered as possibilities before the date on which they are formally proposed (choice C).

Section 2: Writing Test

QUESTION 1.

Choice D is the best answer. Since "frequently" and "many times" repeat the same idea, "many times" can be deleted without changing the meaning of the sentence.

Choices A, B, and C are incorrect. They all provide options that repeat the idea of "frequently" and are unnecessary in the sentence.

QUESTION 2.

Choice A is the best answer. The noun "effect" is needed in the sentence to provide a direct object for the verb "has." Furthermore, the article "a" indicates that a noun will follow. In this sentence the noun "effect" is used to suggest a positive influence. The preposition "on" is idiomatic when used with "effect."

Choice B is incorrect because "affect" is a verb and the noun "effect" is needed in the sentence. (There is also the noun "affect," but it means a "display of emotion" and is not appropriate in this context.) Choice C is incorrect because the preposition "to" is not idiomatic in this context. Choice D is incorrect because a noun is needed, not the verb "affects."

QUESTION 3.

Choice B is the best answer. The participle "creating" is consistent with "serving" and "showing," the other participles in the sentence, and provides parallel structure in the sentence.

Choices A, C, and D are incorrect and do not provide options that create parallel structure in the sentence.

QUESTION 4.

Choice A is the best answer. The comma between "Telescope" and the conjunction "and" correctly separates the series of projects listed in the sentence.

Choices B and C are incorrect because there is no reason to use a semicolon in the sentence. Choices C and D are incorrect because when listing a series of items in a sentence, punctuation should be placed before the conjunction.

QUESTION 5.

Choice C is the best answer. It most effectively sets up the list of examples of new technology that are listed in the sentence that follows: "communications satellites, invisible braces, and cordless tools."

Choices A, B, and D are incorrect because they mention "international cooperation," "national publicity," and "money for the agency," respectively; however, the sentence that follows lists examples of technology.

QUESTION 6.

Choice C is the best answer because this option makes the most sense within the context of the paragraph. The inventions listed in the sentence were created or "developed" by NASA.

Choices A, B, and D are incorrect because they don't clearly convey the idea that NASA created the inventions.

QUESTION 7.

Choice B is the best answer. The past tense verb "spawned" is consistent with the other past tense verbs in the paragraph.

Choice A is incorrect because the present tense verb "spawns" is inconsistent with the past tense verbs in the paragraph. Choice C is incorrect because the helping verb "has" is not needed since the action took place in the past. Choice D is incorrect because the sentence needs a simple verb to create a complete sentence, and the participle "spawning" doesn't provide that.

QUESTION 8.

Choice D is the best answer. The contribution of money occurred in 2005, so the simple past tense verb "came" makes the most sense in the sentence. It also acts as a main verb, which creates a complete sentence.

Choices A, B, and C are incorrect because the participle "coming," the relative clause that begins "which came," and the infinitive phrase "to come" would each result in a sentence fragment and not a complete sentence in this context.

QUESTION 9.

Choice A is the best answer. Leaving the sentence where it is now makes the paragraph logical. Sentence 1 serves as a topic sentence for the paragraph by introducing the idea that NASA contributed a significant amount of money to the economy in 2005. The supporting sentences that follow develop the topic sentence by explaining why the benefits of the NASA funding are significant.

Choices B, C, and D are incorrect because if sentence 1 were to be placed after any other sentence, the paragraph would not be logical and would therefore be confusing.

QUESTION 10.

Choice D is the best answer. The sentence should not be added because the information it contains — the locations of various NASA facilities — is not relevant to the claim about the importance of NASA's work.

Choices A and B are incorrect because the sentence should not be added. Choice C is incorrect because the information it contains is not true. A statement about the locations of various NASA facilities does not undermine the claim about the economic benefits of NASA's work.

QUESTION 11.

Choice A is the best answer. "Therefore" conveys the true relationship between the previous sentence and the statement that follows by indicating that, in addition to the practical benefits it contributes to the economy and society, NASA needs to be supported for global reasons as well.

Choices B, C, and D are incorrect because the transitional words "instead," "for example," and "however" would change the meaning of the sentence and do not convey the idea that a result or reason will follow.

QUESTION 12.

Choice D is the best answer because it is clear and concise and provides parallel structure in the sentence. This choice eliminates unnecessary words and creates a list in which the topics "theories," "practices," and "technologies" are equally important.

Choices A, B, and C are incorrect because they contain words that are unnecessary and interrupt the flow of the sentence.

QUESTION 13.

Choice C is the best answer. A pair of commas is needed to set off the phrase "from social services to manufacturing" to indicate that this information is explanatory but not crucial for understanding the sentence.

Choices A and D are incorrect because they both provide an incorrect punctuation mark. Choice B is incorrect because it doesn't provide a comma.

QUESTION 14.

Choice A is the best answer. The adverb "accordingly" indicates correctly that because professional development provides a joint benefit to employers and employees, both parties share a joint responsibility to take advantage of the opportunities offered.

Choices B, C, and D are incorrect because they provide transitions that don't indicate the true relationship of shared responsibility between employees and employers.

QUESTION 15.

Choice C is the best answer. Employees "must be in charge of their own careers." This claim provides an argument for what follows — "it is the duty of . . . employees to identify . . . resources" should they find themselves "falling behind in the workplace" — and supports the previous statement about shared responsibility, as well.

Choices A, B, and D are incorrect because they do not provide an argument for what must happen if employees find themselves "falling behind in the workplace."

QUESTION 16.

Choice D is the best answer. A comma is needed between the dependent and independent clauses in order to create one sentence. The introductory conditional dependent clause beginning with "if" cannot stand alone and needs to be separated from the independent clause by a comma.

Choice A is incorrect because the dependent clause needs to be attached to an independent clause. Choice B is incorrect because a semicolon would be correct in this context only if it were connecting two independent clauses. Choice C is incorrect because there is no comma between the dependent and independent clauses.

QUESTION 17.

Choice B is the best answer. It provides a clear and concise sentence that doesn't repeat ideas and specifically focuses on workers' "deficiencies."

Choices A and D are incorrect because they are wordy and repeat previously stated ideas. Choice C uses the casual expression "deal with," which is not the appropriate tone for the passage, and "flaws and shortcomings" mean the same thing.

QUESTION 18.

Choice C is the best answer. "Obsolete" clearly and concisely conveys the idea that skills can become outdated.

Choices A, B, and D are incorrect either because they are not clear or they convey a tone that is inappropriate for the passage.

QUESTION 19.

Choice B is the best answer. "Include" is a plural, present tense verb that agrees in number with the plural noun "forms" and the other present tense verbs in the paragraph.

Choice A is incorrect because the singular verb "includes" does not agree in number with the plural noun "forms." Choice C is incorrect because a simple present tense verb is needed to provide a predicate

for the sentence. The participle "including" doesn't provide a predicate. Choice D is incorrect because the present perfect verb form is inconsistent with the present tense verbs in the paragraph.

QUESTION 20.

Choice D is the best answer. No transitional link is needed between the two sentences.

In addition to the fact that no transition is needed, choice A is incorrect because "around the same time" indicates that time has been discussed earlier in the passage, but it hasn't. Choice B incorrectly indicates that additional information will be added to the previous statement. Choice C wrongly indicates that regardless of what has been said already, what follows is true.

QUESTION 21.

Choice C is the best answer. Since "professional networks" is the largest circle in the illustration, it is therefore the overarching framework "within which staff receive coaching and consultation as well as the opportunity to attend foundation and skill-building workshops."

Choices A, B, and D are incorrect because as shown in the illustration, "coaching and consultation" and "foundation and skill-building workshops" occupy smaller circles within the professional-development framework, and thus cannot be the overarching framework.

QUESTION 22.

Choice C is the best answer. No punctuation is needed between the main verb "can identify" and the clause that begins with "which" and functions as the object of the verb.

Choices A, B, and D are incorrect because they all contain punctuation marks.

QUESTION 23.

Choice C is the best answer. The transition "however" indicates that a contrast or difference will follow. In this sentence two types of diners are being contrasted: "on-the-go eaters" and those who value "regional foods" and "culture built on cooking and long meals."

Choices A, B, and D are incorrect because these transitions do not indicate the contrast that sets up the resistance to the Slow Food movement discussed in the passage.

QUESTION 24.

Choice A is the best answer. A comma is needed to separate the introductory infinitive phrase beginning with "to counter" from the independent main clause of the sentence beginning with "a cohort."

Choice B is incorrect because a semicolon is used in this context between two independent clauses. Choice C is incorrect because a colon is used before a list or to set off an important idea. Choice D is incorrect because the infinitive phrase beginning with "to counter" is not a complete sentence.

QUESTION 25.

Choice C is the best answer. The sentence should not be added because the fact that the Slow Food movement's philosophy "was connected to the tale of the hare and the tortoise" blurs the focus of the paragraph, which is the contrast between two attitudes toward eating. The idea is also not clearly explained.

Choices A and B are incorrect because the sentence is irrelevant without further explanation. Choice D is incorrect because the paragraph doesn't emphasize the "Slow Food movement's origins and beliefs."

QUESTION 26.

Choice D is the best answer. The auxiliary verb "has" correctly indicates that the Slow Food movement's opposition to fast food's standardization of taste is ongoing.

Choices A, B, and C provide verb tenses that do not indicate an opposition that began in the past and is ongoing: choice A provides a past perfect tense verb; choice B, a present tense verb; and choice C, a future tense verb.

QUESTION 27.

Choice B is the best answer. The comma, which is necessary to set off information that may be informative but is not necessary for understanding the sentence, is placed correctly after the noun "factors" and after the noun "weather."

Choice A is incorrect because commas are needed to set off the nonrestrictive phrase. Choice C is incorrect because the first comma is misplaced. Choice D is incorrect because there should be a comma after "weather."

QUESTION 28.

Choice D is the best answer. This choice most effectively supports the central point of the paragraph — the factors that influence the diversity of food flavors.

Choices A, B, and C are incorrect because they contain ideas that are not consistent with those in the paragraph. Choice A is subjective and mentions flavor quality instead of diversity, choice B addresses learning about traditional food, and choice C addresses how food is made.

QUESTION 29.

Choice C is the best answer. The singular possessive pronoun "its" refers correctly to the singular noun "movement."

Choice A is incorrect because "their" is a plural possessive pronoun, which cannot be used with a singular noun. Choice B is incorrect because the pronoun "there" refers to a place or is used to introduce a clause, and it is not possessive. Choice D is incorrect because "it's" is a contraction for "it is," not a possessive pronoun, and does not make sense in the sentence.

QUESTION 30.

Choice B is the best answer. "Leisurely meals with friends and family" is clear and concise and eliminates unnecessary repetition.

Choices A and C are wordy and contain unnecessary repetition: In choice A, "lots of time" and "long meals" are the same. In choice C, "loved ones such as friends and family" is redundant. In choice D, "time-consuming meals" has a negative connotation, which is not consistent with the Slow Food movement's belief that long, leisurely meals are beneficial.

QUESTION 31.

Choice C is the best answer. "Drew criticism" is an idiomatic phrase meaning "caused criticism to flow forth," which fits in the context of the sentence.

Choices A, B, and D are incorrect. All contain synonyms for "drew," but they refer to drawing as an artistic exercise. None of these choices works, within the context of the sentence, since drawing here means enticing or attracting.

QUESTION 32.

Choice C is the best answer. The sentence contains an indirect question, which does not take a question mark.

Choices A and B are incorrect because they contain question marks. Choice D is incorrect because the word order is confusing.

QUESTION 33.

Choice C is the best answer. The prepositional phrase "to these ends" is used correctly as a transition to show that the three beliefs identified in the previous sentence cause the action (supporting small-scale producers) in the sentence that the prepositional phrase introduces.

Choices A, B, and D are incorrect. None of these options shows the true relationship between the sentences. "In short" (choice A) means that a summary will follow; "nonetheless" (choice B) means that in spite of the fact that something has been stated as being a certain way, an exception or contrasting statement will follow; and "by the same token" (choice D) indicates that a similar idea will follow.

QUESTION 34.

Choice A is the best answer. The comma is placed correctly after "declared" to set off the headline that follows.

Choices B, C, and D are incorrect because they contain misplaced commas. Additionally, the inclusion of a second comma in choices C and D suggests incorrectly that the information between the commas could be eliminated without changing the meaning of the sentence.

QUESTION 35.

Choice B is the best answer. This choice clearly says that "other newspapers also ran stories claiming that the broadcast had incited mass hysteria," which suggests that the story was widely reported.

Choice A is incorrect because it identifies only one news source. Choices C and D are incorrect because they are not relevant to the paragraph.

QUESTION 36.

Choice C is the best answer. The participle "fearing" clearly describes the people who thought that Martians had invaded Earth and places the focus on "fear."

Choice A is incorrect because it changes the meaning of the sentence. A broadcast can't "have" people. Choice A would also require a comma before "who feared" to make it grammatically correct. Choice B is incorrect because the relative pronoun "that" isn't used to begin clauses describing people. Choice D is incorrect because the infinitive "to fear" doesn't make sense in the sentence.

QUESTION 37.

Choice D is the best answer. "Go so far as to" is an idiomatic expression meaning "proceed to the point of doing something."

Choices A, B, and C are incorrect because they are not idiomatic.

QUESTION 38.

Choice C is the best answer. The prepositional phrase "in the article" is used correctly to link the article mentioned in the previous sentence to a statement that was made in the article.

Choices A, B, and D are incorrect because they don't show the true relationship between the sentences. The previous sentence makes a statement that the following sentence expands upon.

QUESTION 39.

Choice D is the best answer. The prepositional phrase "by portraying the new medium as irresponsible" clearly and concisely tells how the newspaper industry "sought to discredit the newly emerging technology of radio."

Choices A and B are incorrect because they include unnecessary words that do not add meaning to the sentence. Choice C is incorrect because the conjunction "and" is unnecessary and confusing.

QUESTION 40.

Choice B is the best answer. It best establishes the main idea of the paragraph by focusing on the overblown reports of panic. The paragraph lists various pieces of evidence to support the claim that reports were exaggerated; for instance, "a mere 2 percent of households had tuned in to the broadcast" and the validity of "an oft-cited report" is called into question.

Choices A, C, and D are incorrect. Choice A is too specific since the paragraph doesn't evaluate the strength of Pooley and Socolow's argument. Choice C is too specific since the paragraph doesn't focus on Pooley and Socolow's insistence on newspapers' distortions. Choice D is too general and doesn't focus on a topic.

QUESTION 41.

Choice A is the best answer. "Fewer" is an adjective that is used with things that can be counted and therefore is used correctly in this sentence to describe "people." "Far" is an adverb that describes the adjective "fewer" and is used to indicate the extent to which the number of people listening to the broadcast differed from a million.

Choices B and C are incorrect because the adjective "less" is used when describing things that cannot be counted. Choices C and D are incorrect because they use "then" and not the appropriate comparison preposition "than."

QUESTION 42.

Choice D is the best answer. Sentence 4 is most logically placed after sentence 7 because sentence 7 implies that the words used in the survey were used synonymously, even though the words convey different levels of reaction. Sentence 4 supports this idea with further explanation.

Choices A, B, and C are incorrect because it would be illogical and confusing to place sentence 4 after sentence 2, 3, or 5.

QUESTION 43.

Choice C is the best answer. The pronoun "some" is used correctly as the subject of the independent clause. The comma after "some" is needed to set off the nonrestrictive clause ("influenced by the sensationalized news coverage afterward") that follows it.

Choice A is incorrect because without a comma, the resulting restrictive clause changes the meaning of the sentence. Choice B is incorrect because the pronoun "they" introduces an independent clause and provides another, unnecessary subject for the sentence. Choice D is incorrect because a comma is needed to set off the nonrestrictive clause.

QUESTION 44.

Choice A is the best answer. "Not unlike," which means the same as "like," most effectively signals the similarity between the two groups mentioned by the researchers.

Choices B, C, and D are incorrect because they all indicate difference instead of similarity.

Section 3: Math Test — No Calculator

QUESTION 1.

Choice C is correct. Maria spends x minutes running each day and y minutes biking each day. Therefore, $x + y$ represents the total number of minutes Maria spent running and biking each day. Because $x + y = 75$, it follows that 75 is the total number of minutes that Maria spent running and biking each day.

Choices A and B are incorrect. The problem states that Maria spends time in both activities each day, therefore x and y must be positive. If 75 represents the number of minutes Maria spent running each day, then Maria spent no minutes biking each day. Similarly, if 75 represents the number of minutes Maria spent biking each day, then Maria spent no minutes running each day. The number of minutes Maria spends running each day and biking each day may vary; however, the total number of minutes she spends each day on these activities is constant and equal to 75. Choice D is incorrect. The number of minutes Maria spent biking for each minute spent running cannot be determined from the information provided.

QUESTION 2.

Choice C is correct. Using the distributive property to multiply 3 and $(x + 5)$ gives $3x + 15 - 6$, which can be rewritten as $3x + 9$.

Choice A is incorrect and may result from rewriting the given expression as $3(x + 5 - 6)$. Choice B is incorrect and may result from incorrectly rewriting the expression as $(3x + 5) - 6$. Choice D is incorrect and may result from incorrectly rewriting the expression as $3(5x) - 6$.

Alternatively, evaluating the given expression and each answer choice for the same value of x, for example $x = 0$, will reveal which of the expressions is equivalent to the given expression.

QUESTION 3.

Choice B is correct. The first equation can be rewritten as $y - x = 3$ and the second as $\frac{x}{4} + y = 3$, which implies that $-x = \frac{x}{4}$, and so $x = 0$. The ordered pair (0, 3) satisfies the first equation and also the second, since $0 + 2(3) = 6$ is a true equality.

Alternatively, the first equation can be rewritten as $y = x + 3$. Substituting $x + 3$ for y in the second equation gives $\frac{x}{2} + 2(x + 3) = 6$. This can be rewritten using the distributive property as $\frac{x}{2} + 2x + 6 = 6$. It follows that $2x + \frac{x}{2}$ must be 0. Thus, $x = 0$. Substituting 0 for x in the equation $y = x + 3$ gives $y = 3$. Therefore, the ordered pair (0, 3) is the solution to the system of equations shown.

Choice A is incorrect; it satisfies the first equation but not the second. Choices C and D are incorrect because neither satisfies the first equation, $x = y - 3$.

QUESTION 4.

Choice D is correct. Applying the distributive property, the original expression is equivalent to $5 + 12i - 9i^2 + 6i$. Since $i = \sqrt{-1}$, it follows that $i^2 = -1$. Substituting -1 for i^2 into the expression and simplifying yields $5 + 12i + 9 + 6i$, which is equal to $14 + 18i$.

Choices A, B, and C are incorrect and may result from substituting 1 for i^2 or errors made when rewriting the given expression.

QUESTION 5.

Choice A is correct. Substituting -1 for x in the equation that defines f gives $f(-1) = \frac{(-1)^2 - 6(-1) + 3}{(-1) - 1}$. Simplifying the expressions in the numerator and denominator yields $\frac{1 + 6 + 3}{-2}$, which is equal to $\frac{10}{-2}$ or -5.

Choices B, C, and D are incorrect and may result from misapplying the order of operations when substituting -1 for x.

QUESTION 6.

Choice C is correct. The value of the camera equipment depreciates from its original purchase value at a constant rate for 12 years. So if x is the amount, in dollars, by which the value of the equipment depreciates each year, the value of the camera equipment, in dollars, t years after it is purchased would be $32{,}400 - xt$. Since the value of the camera equipment after 12 years is \$0, it follows that $32{,}400 - 12x = 0$. To solve for x, rewrite the equation as $32{,}400 = 12x$. Dividing both sides of the equation by 12 gives $x = 2{,}700$. It follows that the value of the camera equipment depreciates by \$2,700 each year. Therefore, the value of the equipment after 4 years, represented by the expression $32{,}400 - 2{,}700(4)$, is \$21,600.

Choice A is incorrect. The value given in choice A is equivalent to $\$2{,}700 \times 4$. This is the amount, in dollars, by which the value of the camera equipment depreciates 4 years after it is purchased, not the dollar value of the camera equipment 4 years after it is purchased. Choice B is incorrect. The value given in choice B is equal to $\$2{,}700 \times 6$, which is the amount, in dollars, by which the value of the camera equipment depreciates 6 years after it is purchased, not the dollar value of the camera equipment 4 years after it is purchased. Choice D is incorrect. The value given in choice D is equal to $\$32{,}400 - \$2{,}700$. This is the dollar value of the camera equipment 1 year after it is purchased.

QUESTION 7.

Choice B is correct. Each of the options is a quadratic expression in vertex form. To rewrite the given expression in this form, the number 9 needs to be added to the first two terms, because $x^2 + 6x + 9$ is equivalent to $(x + 3)^2$. Rewriting the number 4 as $9 - 5$ in the given expression yields $x^2 + 6x + 9 - 5$, which is equivalent to $(x + 3)^2 - 5$.

Choice A is incorrect. Squaring the binomial and simplifying the expression in option A gives $x^2 + 6x + 9 + 5$. Combining like terms gives $x^2 + 6x + 14$, not $x^2 + 6x + 4$. Choice C is incorrect. Squaring the binomial and simplifying the expression in choice C gives $x^2 - 6x + 9 + 5$. Combining like terms gives $x^2 - 6x + 14$, not $x^2 + 6x + 4$. Choice D is incorrect. Squaring the binomial and simplifying, the expression in choice D gives $x^2 - 6x + 9 - 5$. Combining like terms gives $x^2 - 6x + 4$, not $x^2 + 6x + 4$.

QUESTION 8.

Choice C is correct. Ken earned \$8 per hour for the first 10 hours he worked, so he earned a total of \$80 for the first 10 hours he worked. For the rest of the week, Ken was paid at the rate of \$10 per hour. Let x be the number of hours he will work for the rest of the week. The total of Ken's earnings, in dollars, for the week will be $10x + 80$. He saves

90% of his earnings each week, so this week he will save $0.9(10x + 80)$ dollars. The inequality $0.9(10x + 80) \geq 270$ represents the condition that he will save at least $270 for the week. Factoring 10 out of the expression $10x + 80$ gives $10(x + 8)$. The product of 10 and 0.9 is 9, so the inequality can be rewritten as $9(x + 8) \geq 270$. Dividing both sides of this inequality by 9 yields $x + 8 \geq 30$, so $x \geq 22$. Therefore, the least number of hours Ken must work the rest of the week to save at least $270 for the week is 22.

Choices A and B are incorrect because Ken can save $270 by working fewer hours than 38 or 33 for the rest of the week. Choice D is incorrect. If Ken worked 16 hours for the rest of the week, his total earnings for the week will be $80 + $160 = $240, which is less than $270. Since he saves only 90% of his earnings each week, he would save even less than $240 for the week.

QUESTION 9.

Choice B is correct. Marisa will hire x junior directors and y senior directors. Since she needs to hire at least 10 staff members, $x + y \geq 10$. Each junior director will be paid $640 per week, and each senior director will be paid $880 per week. Marisa's budget for paying the new staff is no more than $9,700 per week; in terms of x and y, this condition is $640x + 880y \leq 9{,}700$. Since Marisa must hire at least 3 junior directors and at least 1 senior director, it follows that $x \geq 3$ and $y \geq 1$. All four of these conditions are represented correctly in choice B.

Choices A and C are incorrect. For example, the first condition, $640x + 880y \geq 9{,}700$, in each of these options implies that Marisa can pay the new staff members more than her budget of $9,700. Choice D is incorrect because Marisa needs to hire at least 10 staff members, not at most 10 staff members, as the inequality $x + y \leq 10$ implies.

QUESTION 10.

Choice B is correct. In general, a binomial of the form $x + f$, where f is a constant, is a factor of a polynomial when the remainder of dividing the polynomial by $x + f$ is 0. Let R be the remainder resulting from the division of the polynomial $P(x) = ax^3 + bx^2 + cx + d$ by $x + 1$. So the polynomial $P(x)$ can be rewritten as $P(x) = (x + 1)q(x) + R$, where $q(x)$ is a polynomial of second degree and R is a constant. Since -1 is a root of the equation $P(x) = 0$, it follows that $P(-1) = 0$.

Since $P(-1) = 0$ and $P(-1) = R$, it follows that $R = 0$. This means that $x + 1$ is a factor of $P(x)$.

Choices A, C, and D are incorrect because none of these choices can be a factor of the polynomial $P(x) = ax^3 + bx^2 + cx + d$. For example, if $x - 1$ were a factor (choice A), then $P(x) = (x - 1)h(x)$, for some polynomial function h. It follows that $P(1) = (1 - 1)h(1) = 0$, so 1 would be another root of the given equation, and thus the given equation would have at least 4 roots. However, a third-degree equation cannot have more than three roots. Therefore, $x - 1$ cannot be a factor of $P(x)$.

QUESTION 11.

Choice D is correct. For $x > 1$ and $y > 1$, $x^{\frac{1}{3}}$ and $y^{\frac{1}{2}}$ are equivalent to $\sqrt[3]{x}$ and $\sqrt{y}$, respectively. Also, x^{-2} and y^{-1} are equivalent to $\frac{1}{x^2}$ and $\frac{1}{y}$, respectively. Using these equivalences, the given expression can be rewritten as $\frac{y\sqrt{y}}{x^2\sqrt[3]{x}}$.

Choices A, B, and C are incorrect because these choices are not equivalent to the given expression for $x > 1$ and $y > 1$.

For example, for $x = 2$ and $y = 2$, the value of the given expression is $2^{-\frac{5}{6}}$; the values of the choices, however, are $2^{-\frac{1}{3}}$, $2^{\frac{5}{6}}$, and 1, respectively.

QUESTION 12.

Choice B is correct. The graph of a quadratic function in the xy-plane is a parabola. The axis of symmetry of the parabola passes through the vertex of the parabola. Therefore, the vertex of the parabola and the midpoint of the segment between the two x-intercepts of the graph have the same x-coordinate. Since $f(-3) = f(-1) = 0$, the x-coordinate of the vertex is $\frac{(-3) + (-1)}{2} = -2$. Of the shown intervals, only the interval in choice B contains -2.

Choices A, C, and D are incorrect and may result from either calculation errors or misidentification of the graph's x-intercepts.

QUESTION 13.

Choice D is correct. The numerator of the given expression can be rewritten in terms of the denominator, $x - 3$, as follows: $x^2 - 2x - 5 = x^2 - 3x + x - 3 - 2$, which is equivalent to $x(x - 3) + (x - 3) - 2$. So the given expression is equivalent to $\frac{x(x - 3) + (x - 3) - 2}{x - 3} = \frac{x(x - 3)}{x - 3} + \frac{x - 3}{x - 3} - \frac{2}{x - 3}$. Since the given expression is defined for $x \neq 3$, the expression can be rewritten as $x + 1 - \frac{2}{x - 3}$.

Long division can also be used as an alternate approach.

Choices A, B, and C are incorrect and may result from errors made when dividing the two polynomials or making use of structure.

QUESTION 14.

Choice A is correct. If x is the width, in inches, of the box, then the length of the box is $2.5x$ inches. It follows that the perimeter of the base is $2(2.5x + x)$, or $7x$ inches. The height of the box is given to be 60 inches. According to the restriction, the sum of the perimeter of the base and the height of the box should not exceed 130 inches. Algebraically, that is $7x + 60 \leq 130$, or $7x \leq 70$. Dividing both sides of the inequality by 7 gives $x \leq 10$. Since x represents the width of the box, x must also be a positive number. Therefore, the inequality $0 < x \leq 10$ represents all the allowable values of x that satisfy the given conditions.

Choices B, C, and D are incorrect and may result from calculation errors or misreading the given information.

QUESTION 15.

Choice D is correct. Factoring out the coefficient $\frac{1}{3}$, the given expression can be rewritten as $\frac{1}{3}(x^2 - 6)$. The expression $x^2 - 6$ can be approached as a difference of squares and rewritten as $(x - \sqrt{6})(x + \sqrt{6})$. Therefore, k must be $\sqrt{6}$.

Choice A is incorrect. If k were 2, then the expression given would be rewritten as $\frac{1}{3}(x - 2)(x + 2)$, which is equivalent to $\frac{1}{3}x^2 - \frac{4}{3}$, not $\frac{1}{3}x^2 - 2$. Choice B is incorrect. This may result from incorrectly factoring the expression and finding $(x - 6)(x + 6)$ as the factored form of the expression. Choice C is incorrect. This may result from incorrectly distributing the $\frac{1}{3}$ and rewriting the expression as $\frac{1}{3}(x^2 - 2)$.

QUESTION 16.

The correct answer is 8. The expression $2x + 8$ contains a factor of $x + 4$. It follows that the original equation can be rewritten as $2(x + 4) = 16$. Dividing both sides of the equation by 2 gives $x + 4 = 8$.

QUESTION 17.

The correct answer is 30. It is given that the measure of $\angle QPR$ is 60°. Angle MPR and $\angle QPR$ are collinear and therefore are supplementary angles. This means that the sum of the two angle measures is 180°, and so the measure of $\angle MPR$ is 120°. The sum of the angles in a triangle is 180°. Subtracting the measure of $\angle MPR$ from 180° yields the sum of the other angles in the triangle MPR. Since $180 - 120 = 60$, the sum of the measures of $\angle QMR$ and $\angle NRM$ is 60°. It is given that $MP = PR$, so it follows that triangle MPR is isosceles. Therefore $\angle QMR$ and $\angle NRM$ must be congruent. Since the sum of the measure of these two angles is 60°, it follows that the measure of each angle is 30°.

An alternate approach would be to use the exterior angle theorem, noting that the measure of $\angle QPR$ is equal to the sum of the measures of $\angle QMR$ and $\angle NRM$. Since both angles are equal, each of them has a measure of 30°.

QUESTION 18.

The correct answer is 4. There are π radians in a 180° angle. A 720° angle is 4 times greater than a 180° angle. Therefore, the number of radians in a 720° angle is 4π.

QUESTION 19.

The correct answer is 8. Since the line passes through the point (2, 0), its equation is of the form $y = m(x - 2)$. The coordinates of the point (1, 4) must also satisfy this equation. So $4 = m(1 - 2)$, or $m = -4$. Substituting -4 for m in the equation of the line gives $y = -4(x - 2)$, or equivalently $y = -4x + 8$. Therefore, $b = 8$.

Alternate approach: Given the coordinates of two points through which the line passes, the slope of the line is $\frac{4 - 0}{1 - 2} = -4$. So, the equation of the line is of the form $y = -4x + b$. Since (2, 0) satisfies this equation, $0 = -4(2) + b$ must be true. Solving this equation for b gives $b = 8$.

QUESTION 20.

The correct answer is 6632. Applying the distributive property to the expression yields $7532 + 100y^2 + 100y^2 - 1100$. Then adding together $7532 + 100y^2$ and $100y^2 - 1100$ and collecting like terms results in $200y^2 + 6432$. This is written in the form $ay^2 + b$, where $a = 200$ and $b = 6432$. Therefore $a + b = 200 + 6432 = 6632$.

Section 4: Math Test - Calculator

QUESTION 1.

Choice B is correct. There are 2 dogs that are fed only dry food and a total of 25 dogs. Therefore, the fraction of dogs fed only dry food is $\frac{2}{25}$.

Choice A is incorrect. This fraction is the number of dogs fed only dry food divided by the total number of pets instead of the total number of dogs. Choice C is incorrect because it is the fraction of all pets fed only dry food. Choice D is incorrect. This fraction is the number of dogs fed only dry food divided by the total number of pets fed only dry food.

QUESTION 2.

Choice A is correct. Applying the distributive property, the given expression can be rewritten as $x^2 - 3 + 3x^2 - 5$. Combining like terms yields $4x^2 - 8$.

Choice B is incorrect and is the result of disregarding the negative sign in front of the first 3 before combining like terms. Choice C is incorrect and is the result of not multiplying $-3x^2$ by -1 before combining like terms. Choice D is incorrect and is the result of disregarding the negative sign in front of the first 3 and not multiplying $-3x^2$ by -1 before combining like terms.

QUESTION 3.

Choice C is correct. Multiplying each side of 1 meter = 100 cm by 6 gives 6 meters = 600 cm. Each package requires 3 centimeters of tape. The number of packages that can be secured with 600 cm of tape is $\frac{600}{3}$, or 200 packages.

Choices A, B, and D are incorrect and may be the result of incorrect interpretations of the given information or of computation errors.

QUESTION 4.

Choice D is correct. The survey was given to a group of people who liked the book, and therefore, the survey results can be applied only to the population of people who liked the book. Choice D is the most appropriate inference from the survey results because it describes a conclusion about people who liked the book, and the results of the survey indicate that most people who like the book disliked the movie.

Choices A, B, and C are incorrect because none of these inferences can be drawn from the survey results. Choices A and B need not be true. The people surveyed all liked the book on which the movie was based, which is not true of all people who go see movies or all people who read books. Thus, the people surveyed are not representative of all people who go see movies or all people who read books. Therefore, the results of this survey cannot appropriately be extended to at least 95% of people who go see movies or to at least 95% of people who read books. Choice C need not be true because the sample includes only people who liked the book, and so the results do not extend to people who dislike the book.

QUESTION 5.

Choice C is correct. Substituting (1, 1) into the inequality gives $5(1) - 3(1) < 4$, or $2 < 4$, which is a true statement. Substituting (2, 5) into the inequality gives $5(2) - 3(5) < 4$, or $-5 < 4$, which is a true statement. Substituting (3, 2) into the inequality gives $5(3) - 3(2) < 4$, or $9 < 4$, which is not a true statement. Therefore, (1, 1) and (2, 5) are the only ordered pairs that satisfy the given inequality.

Choice A is incorrect because the ordered pair (2, 5) also satisfies the inequality. Choice B is incorrect because the ordered pair (1, 1) also satisfies the inequality. Choice D is incorrect because the ordered pair (3, 2) does not satisfy the inequality.

QUESTION 6.

Choice C is correct. Since $x = -3$ is a solution to the equation, substituting -3 for x gives $(-3a + 3)^2 = 36$. Taking the square root of each side of this equation gives the two equations $-3a + 3 = 6$ and $-3a + 3 = -6$. Solving each of these for a yields $a = -1$ and $a = 3$. Therefore, -1 is a possible value of a.

Choice A is incorrect and may be the result of ignoring the squared expression and solving $-3a + 3 = 36$ for a. Choice B is incorrect and may be the result of dividing 36 by 2 instead of taking the square root of 36 when solving for a. Choice D is incorrect and may be the result of taking the sum of the value of x, -3, and the constant, 3.

QUESTION 7.

Choice A is correct. The slope of the line of best fit is negative, meaning as the distance of planetoids from the Sun increases, the density of the planetoids decreases. Therefore, planetoids that are more distant from the Sun tend to have lesser densities.

Choice B is incorrect because as the distance of planetoids from the sun increases, the density of the planetoids decreases. Choice C is incorrect. For example, according to the line of best fit, a planetoid that is 0.8 AU from the Sun has a density of 5 g/cm^3, but a planetoid that is twice as far from the Sun with a distance of 1.6 AU has a density of 4.25 g/cm^3. However, the density of 4.25 g/cm^3 is not half the density of 5 g/cm^3. Choice D is incorrect because there is a relationship between the distance from a planetoid to the Sun and density, as shown by the line of best fit.

QUESTION 8.

Choice C is correct. According to the line of best fit, a planetoid with a distance from the Sun of 1.2 AU has a density between 4.5 g/cm^3 and 4.75 g/cm^3. The only choice in this range is 4.6.

Choices A, B, and D are incorrect and may result from misreading the information in the scatterplot.

QUESTION 9.

Choice A is correct. To isolate the terms that contain ax and b, 6 can be added to both sides of the equation, which gives $9ax + 9b = 27$. Then, both sides of this equation can be divided by 9, which gives $ax + b = 3$.

Choices B, C, and D are incorrect and may result from computation errors.

QUESTION 10.

Choice D is correct. There are 60 minutes in one hour, so an 8-hour workday has (60)(8) = 480 minutes. To calculate 15% of 480, multiply 0.15 by 480: (0.15)(480) = 72. Therefore, Lani spent 72 minutes of her workday in meetings.

Choice A is incorrect because 1.2 is 15% of 8, which gives the time Lani spent of her workday in meetings in hours, not minutes. Choices B and C are incorrect and may be the result of computation errors.

QUESTION 11.

Choice A is correct. The total number of copies of the game the company will ship is 75, so one equation in the system is $s + c = 75$, which can be written as $75 - s = c$. Because each standard edition of the game has a volume of 20 cubic inches and s represents the number of standard edition games, the expression $20s$ represents the volume of the shipment that comes from standard edition copies of the game. Similarly, the expression $30c$ represents the volume of the shipment that comes from collector's edition copies of the games. Because these volumes combined are 1,870 cubic inches, the equation $20s + 30c = 1{,}870$ represents this situation. Therefore, the correct answer is choice A.

Choice B is incorrect. This equation gives the volume of each standard edition game as 30 cubic inches and the volume of each collector's edition game as 20 cubic inches. Choice C is incorrect. This is the result of finding the average volume of the two types of games, using that average volume (25) for both types of games, and assuming that there are 75 more standard editions of the game than there are collector's editions of the game. Choice D is incorrect. This is the result of assuming that the volume of each standard edition game is 30 cubic inches, that the volume of each collector's edition game is 20 cubic inches, and that there are 75 more standard editions than there are collector's editions.

QUESTION 12.

Choice B is correct. Let x be the price, in dollars, of the jacket before sales tax. The price of the jacket after the 6% sales tax is added was $53. This can be expressed by the equation $x + 0.06x = 53$, or $1.06x = 53$. Dividing each side of this equation by 1.06 gives $x = 50$. Therefore, the price of the jacket before sales tax was $50.

Choices A, C, and D are incorrect and may be the result of computation errors.

QUESTION 13.

Choice B is correct. Theresa's speed was increasing from 0 to 5 minutes and from 20 to 25 minutes, which is a total of 10 minutes. Theresa's speed was decreasing from 10 minutes to 20 minutes and from 25 to 30 minutes, which is a total of 15 minutes. Therefore, Theresa's speed was NOT increasing for a longer period of time than it was decreasing.

Choice A is incorrect. Theresa ran at a constant speed for the 5-minute period from 5 to 10 minutes. Choice C is incorrect. Theresa's speed decreased at a constant rate during the last 5 minutes. Choice D is incorrect. Theresa's speed reached its maximum at 25 minutes, which is within the last 10 minutes.

QUESTION 14.

Choice D is correct. The figure is a quadrilateral, so the sum of the measures of its interior angles is 360°. The value of x can be found by using the equation $45 + 3x = 360$. Subtracting 45 from both sides of the equation results in $3x = 315$, and dividing both sides of the resulting equation by 3 yields $x = 105$. Therefore, the value of x in the figure is 105.

Choice A is incorrect. If the value of x were 45, the sum of the measures of the angles in the figure would be $45 + 3(45)$, or 180°, but the sum of the measures of the angles in a quadrilateral is 360°. Choice B is incorrect. If the value of x were 90, the sum of the measures of the angles in the figure would be $45 + 3(90)$, or 315°, but the sum of the measures of the angles in a quadrilateral is 360°. Choice C is incorrect. If the value of x were 100, the sum of the measures of the angles in the figure would be $45 + 3(100)$, or 345°, but the sum of the measures of the angles in a quadrilateral is 360°.

QUESTION 15.

Choice B is correct. A column of 50 stacked one-cent coins is about $3\frac{7}{8}$ inches tall, which is slightly less than 4 inches tall. Therefore a column of stacked one-cent coins that is 4 inches tall would contain slightly more than 50 one-cent coins. It can then be reasoned that because 8 inches is twice 4 inches, a column of stacked one-cent coins that is 8 inches tall would contain slightly more than twice as many coins; that is, slightly more than 100 one-cent coins. An alternate approach is to set up a proportion comparing the column height to the number of one-cent coins, or $\frac{3\frac{7}{8} \text{ inches}}{50 \text{ coins}} = \frac{8 \text{ inches}}{x \text{ coins}}$, where x is the number of coins in an 8-inch-tall column. Multiplying each side of the proportion by $50x$ gives $3\frac{7}{8}x = 400$. Solving for x gives $x = \frac{400 \times 8}{31}$, which is approximately 103. Therefore, of the given choices, 100 is closest to the number of one-cent coins it would take to build an 8-inch-tall column.

Choice A is incorrect. A column of 75 stacked one-cent coins would be slightly less than 6 inches tall. Choice C is incorrect. A column of 200 stacked one-cent coins would be more than 15 inches tall. Choice D is incorrect. A column of 390 stacked one-cent coins would be over 30 inches tall.

QUESTION 16.

Choice D is correct. If $\frac{b}{2} = 10$, then multiplying each side of this equation by 2 gives $b = 20$. Substituting 20 for b in the equation $a - b = 12$ gives $a - 20 = 12$. Adding 20 to each side of this equation gives $a = 32$. Since $a = 32$ and $b = 20$, it follows that the value of $a + b$ is $32 + 20$, or 52.

Choice A is incorrect. If the value of $a + b$ were less than the value of $a - b$, it would follow that b is negative. But if $\frac{b}{2} = 10$, then b must be positive. This contradiction shows that the value of $a + b$ cannot be 2. Choice B is incorrect. If the value of $a + b$ were equal to the value of $a - b$, then it would follow that $b = 0$. However, b cannot equal zero because it is given that $\frac{b}{2} = 10$. Choice C is incorrect. This is the value of a, but the question asks for the value of $a + b$.

QUESTION 17.

Choice A is correct. The y-intercept of the graph of $y = 19.99 + 1.50x$ in the xy-plane is the point on the graph with an x-coordinate equal to 0. In the model represented by the equation, the x-coordinate represents the number of miles a rental truck is driven during a one-day rental, and so the y-intercept represents the charge, in dollars, for the rental when the truck is driven 0 miles; that is, the y-intercept represents the cost, in dollars, of the flat fee. Since the y-intercept of the graph of $y = 19.99 + 1.50x$ is (0, 19.99), the y-intercept represents a flat fee of $19.99 in terms of the model.

Choice B is incorrect. The slope of the graph of $y = 19.99 + 1.50x$ in the xy-plane, not the y-intercept, represents a driving charge per mile of $1.50 in terms of the model. Choice C is incorrect. Since the coefficient of x in the equation is 1.50, the charge per mile for driving the rental truck is $1.50, not $19.99. Choice D is incorrect. The sum of 19.99 and 1.50, which is 21.49, represents the cost, in dollars, for renting the truck for one day and driving the truck 1 mile; however, the total daily charges for renting the truck does not need to be $21.49.

QUESTION 18.

Choice B is correct. The charity with the greatest percent of total expenses spent on programs is represented by the highest point on the scatterplot; this is the point that has a vertical coordinate slightly less than halfway between 90 and 95 and a horizontal coordinate slightly less than halfway between 3,000 and 4,000. Thus, the charity represented by this point has a total income of about $3,400 million and spends about 92% of its total expenses on programs. The percent predicted by the line of best fit is the vertical coordinate of the point on the line of best fit with horizontal coordinate $3,400 million; this vertical coordinate is very slightly more than 85. Thus, the line of best fit predicts that the charity with the greatest percent of total expenses spent on programs will spend slightly more than 85% on programs. Therefore, the difference between the actual percent (92%) and the prediction (slightly more than 85%) is slightly less than 7%.

Choice A is incorrect. There is no charity represented in the scatterplot for which the difference between the actual percent of total expenses spent on programs and the percent predicted by the line of best fit is as much as 10%. Choices C and D are incorrect. These choices may result

from misidentifying in the scatterplot the point that represents the charity with the greatest percent of total expenses spent on programs.

QUESTION 19.

Choice A is correct. Current's formula is $A = \frac{4 + w}{30}$. Multiplying each side of the equation by 30 gives $30A = 4 + w$. Subtracting 4 from each side of $30A = 4 + w$ gives $w = 30A - 4$.

Choices B, C, and D are incorrect and may result from errors in choosing and applying operations to isolate w as one side of the equation in Current's formula.

QUESTION 20.

Choice C is correct. If Mosteller's and Current's formulas give the same estimate for A, then the right-hand sides of these two equations are equal; that is, $\frac{\sqrt{hw}}{60} = \frac{4 + w}{30}$. Multiplying each side of this equation by 60 to isolate the expression $\sqrt{hw}$ gives $\sqrt{hw} = 60\left(\frac{4 + w}{30}\right)$ or $\sqrt{hw} = 2(4 + w)$. Therefore, if Mosteller's and Current's formulas give the same estimate for A, then $\sqrt{hw}$ is equivalent to $2(4 + w)$.

An alternate approach is to multiply the numerator and denominator of Current's formula by 2, which gives $\frac{2(4 + w)}{60}$. Since it is given that Mosteller's and Current's formulas give the same estimate for A, $\frac{2(4 + w)}{60} = \frac{\sqrt{hw}}{60}$. Therefore, $\sqrt{hw} = 2(4 + w)$.

Choices A, B, and D are incorrect and may result from errors in the algebraic manipulation of the equations.

QUESTION 21.

Option C is correct. The predicted increase in total fat, in grams, for every increase of 1 gram in total protein is represented by the slope of the line of best fit. Any two points on the line can be used to calculate the slope of the line as the change in total fat over the change in total protein. For instance, it can be estimated that the points (20, 34) and (30, 48) are on the line of best fit, and the slope of the line that passes through them is $\frac{48 - 34}{30 - 20} = \frac{14}{10}$, or 1.4. Of the choices given, 1.5 is the closest to the slope of the line of best fit.

Choices A, B, and D are incorrect and may be the result of incorrectly finding ordered pairs that lie on the line of best fit or of incorrectly calculating the slope.

QUESTION 22.

Choice B is correct. The median of a set of numbers is the middle value of the set values when ordered from least to greatest. If the percents in the table are ordered from least to greatest, the middle value is 27.9%. The difference between 27.9% and 26.95% is 0.95%.

Choice A is incorrect and may be the result of calculation errors or not finding the median of the data in the table correctly. Choice C is incorrect and may be the result of finding the mean instead of the median. Choice D is incorrect and may be the result of using the middle value of the unordered list.

QUESTION 23.

Choice C is correct. The total volume of the cylindrical can is found by multiplying the area of the base of the can, 75 cm^2, by the height of the can, 10 cm, which yields 750 cm^3. If the syrup needed to fill the can has a volume of 110 cm^3, then the remaining volume for the pieces of fruit is 750 – 110 = 640 cm^3.

Choice A is incorrect because if the fruit had a volume of 7.5 cm^3, there would be 750 – 7.5 = 742.5 cm^3 of syrup needed to fill the can to the top. Choice B is incorrect because if the fruit had a volume of 185 cm^3, there would be 750 – 185 = 565 cm^3 of syrup needed to fill the can to the top. Choice D is incorrect because it is the total volume of the can, not just of the pieces of fruit.

QUESTION 24.

Choice A is correct. The variable t represents the seconds after the object is launched. Since $h(0) = 72$, this, means that the height, in feet, at 0 seconds, or the initial height, is 72 feet.

Choices B, C, and D are incorrect and may be the result of misinterpreting the function in context.

QUESTION 25.

Choice B is correct. The relationship between x food calories and k kilojoules can be modeled as a proportional relationship. Let (x_1, k_1) and (x_2, k_2) represent the values in the first two rows in the table: (4.0, 16.7) and (9.0, 37.7). The rate of change, or $\frac{(k_2 - k_1)}{(x_2 - x_1)}$, is $\frac{21}{5} = 4.2$; therefore, the equation that best represents the relationship between x and k is $k = 4.2x$.

Choice A is incorrect and may be the result of calculating the rate of change using $\frac{(x_2 - x_1)}{(k_2 - k_1)}$. Choice C is incorrect and may be the result of confusing the independent and dependent variables. Choice D is incorrect and may be the result of an error when setting up the equation.

QUESTION 26.

Choice B is correct. It is given that there are 4.0 food calories per gram of protein, 9.0 food calories per gram of fat, and 4.0 food calories per gram of carbohydrate. If 180 food calories in a granola bar came from p grams of protein, f grams of fat, and c grams of carbohydrate, then the situation can be represented by the equation $180 = 4p + 9f + 4c$. The equation can then be rewritten in terms of f by subtracting $4p$ and $4c$ from both sides of the equation and then dividing both sides of the equation by 9. The result is the equation $f = 20 - \frac{4}{9}(p + c)$.

Choices A, C, and D are incorrect and may be the result of not representing the situation with the correct equation or incorrectly rewriting the equation in terms of f.

QUESTION 27.

Choice A is correct. Because the world's population has grown at an average rate of 1.9% per year since 1945, it follows that the world's population has been growing by a constant factor of 1.019 since 1945. If the world's population in 1975 was about 4 billion, in 1976 the world's population would have been about $4(1.019)$; in 1977 the world's population would have been about $4(1.019)(1.019)$, or $4(1.019)^2$; and so forth. Therefore, the world's population, $P(t)$, t years since 1975 could be represented by the function $P(t) = 4(1.019)^t$.

Choice B is incorrect because it represents a 90% increase in population each year. Choices C and D are incorrect because they are linear models, which represent situations that have a constant growth.

QUESTION 28.

Choice C is correct. The line shown has a slope of $\frac{6 - 0}{3 - 0} = 2$ and a y-intercept of (0, 0); therefore, the equation of the line is $y = 2x$. This means that for each point on the line, the value of the y-coordinate is twice the value of the x-coordinate. Therefore, for the point (s, t), the ratio of t to s is 2 to 1.

Choice A is incorrect and would be the ratio of t to s if the slope of the line were $\frac{1}{3}$. Choice B is incorrect and would be the ratio of t to s if the slope of the line were $\frac{1}{2}$. Choice D is incorrect and would be the ratio of t to s if the slope of the line were 3.

QUESTION 29.

Choice D is correct. The circle with equation $(x + 3)^2 + (y - 1)^2 = 25$ has center (–3, 1) and radius 5. For a point to be inside of the circle, the distance from that point to the center must be less than the radius, 5. The distance between (3, 2) and (–3, 1) is $\sqrt{(-3 - 3)^2 + (1 - 2)^2} = \sqrt{(-6)^2 + (-1)^2} = \sqrt{37}$, which is greater than 5. Therefore, (3, 2) does NOT lie in the interior of the circle.

Choice A is incorrect. The distance between (–7, 3) and (–3, 1) is $\sqrt{(-7 + 3)^2 + (3 - 1)^2} = \sqrt{(-4)^2 + (2)^2} = \sqrt{20}$, which is less than 5, and therefore (–7, 3) lies in the interior of the circle. Choice B is incorrect because it is the center of the circle. Choice C is incorrect because the distance between (0, 0) and (–3, 1) is $\sqrt{(0 + 3)^2 + (0 - 1)^2} = \sqrt{(3)^2 + (1)^2} = \sqrt{8}$, which is less than 5, and therefore (0, 0) lies in the interior of the circle.

QUESTION 30.

Choice B is correct. The percent increase from 2012 to 2013 was $\frac{5{,}880 - 5{,}600}{5{,}600} = 0.05$, or 5%. Since the percent increase from 2012 to 2013 was estimated to be double the percent increase from 2013 to 2014, the percent increase from 2013 to 2014 was expected to be 2.5%. Therefore, the number of subscriptions sold in 2014 is expected to be the number of subscriptions sold in 2013 multiplied by (1 + 0.025), or 5,880(1.025) = 6,027.

Choices A and C are incorrect and may be the result of a conceptual or calculation error. Choice D is incorrect and is the result of interpreting the percent increase from 2013 to 2014 as double the percent increase from 2012 to 2013.

QUESTION 31.

The correct answer is 195. Since the mass of gold was worth $62,400 and each ounce of gold was worth $20, the mass of the gold was $\frac{62{,}400}{20} = 3120$ ounces. Since 1 pound = 16 ounces, 3120 ounces is equivalent to $\frac{3120}{16} = 195$ pounds.

QUESTION 32.

The correct answer is $\frac{2}{5}$. The slope of the line can be found by selecting any two points (x_1, y_1) and (x_2, y_2) on the line and then dividing the difference of the y-coordinates $(y_2 - y_1)$ by the difference of the x-coordinates $(x_2 - x_1)$. Using the points $(-6, -\frac{27}{5})$ and $(9, \frac{3}{5})$, the slope is $\frac{\frac{3}{5} - \left(-\frac{27}{5}\right)}{9 - (-6)} = \frac{\frac{30}{5}}{15}$. This can be rewritten as $\frac{6}{15}$, which reduces to $\frac{2}{5}$. Any of the following equivalent expressions can be gridded as the correct answer: 2/5, .4, .40, .400, 4/10, 8/20.

QUESTION 33.

The correct answer is 30. Let x represent the number of correct answers from the player and y represent the number of incorrect answers from the player. Since the player answered 40 questions in total, the equation $x + y = 40$ represents this situation. Also, since the score is found by subtracting the number of incorrect answers from twice the number of correct answers and the player received a score of 50, the equation $2x - y = 50$ represents this situation. Adding the system of

two equations together yields $(x + y) + (2x - y) = 40 + 50$. This can be rewritten as $3x = 90$. Finally, solving for x by dividing both sides of the equation by 3 yields $x = 30$.

QUESTION 34.

The correct answer is $\frac{5}{18}$. There are 360° in a circle, and it is shown that the central angle of the shaded region is 100°. Therefore, the area of the shaded region can be represented as a fraction of the area of the entire circle, $\frac{100}{360}$, which can be reduced to $\frac{5}{18}$. Either 5/18, .277, or .288 can be gridded as the correct answer.

QUESTION 35.

The correct answer is 0 or 3. For an ordered pair to satisfy a system of equations, both the x- and y-values of the ordered pair must satisfy each equation in the system. Both expressions on the right-hand side of the given equations are equal to y, therefore it follows that both expressions on the right-hand side of the equations are equal to each other: $x^2 - 4x + 4 = 4 - x$. This equation can be rewritten as $x^2 - 3x = 0$, and then through factoring, the equation becomes $x(x - 3) = 0$. Because the product of the two factors is equal to 0, it can be concluded that either $x = 0$ or $x - 3 = 0$, or rather, $x = 0$ or $x = 3$.

QUESTION 36.

The correct answer is 6. Since $\tan B = \frac{3}{4}$, ΔABC and ΔDBE are both 3-4-5 triangles. This means that they are both similar to the right triangle with sides of lengths 3, 4, and 5. Since $BC = 15$, which is 3 times as long as the hypotenuse of the 3-4-5 triangle, the similarity ratio of ΔABC to the 3-4-5 triangle is 3:1. Therefore, the length of $\overline{AC}$ (the side opposite to B) is $3 \times 3 = 9$, and the length of $\overline{AB}$ (the side adjacent to angle B) is $4 \times 3 = 12$. It is also given that $DA = 4$. Since $AB = DA + DB$ and $AB = 12$, it follows that $DB = 8$, which means that the similarity ratio of ΔDBE to the 3-4-5 triangle is 2:1 ($\overline{DB}$ is the side adjacent to angle B). Therefore, the length of $\overline{DE}$, which is the side opposite to angle B, is $3 \times 2 = 6$.

QUESTION 37.

The correct answer is 2.4. The mean score of the 20 contestants on Day 1 is found by dividing the sum of the total scores of the contestants by the number of contestants. It is given that each contestant received 1 point for each correct answer. The table shows that on Day 1, 2 contestants each answered 5 questions correctly, so those 2 contestants scored 10 points in total ($2 \times 5 = 10$). Similarly, the table shows 3 contestants each answered 4 questions correctly, so those 3 contestants scored 12 points in total ($3 \times 4 = 12$). Continuing these calculations reveals that the 4 contestants who answered 3 questions correctly scored 12 points in total ($4 \times 3 = 12$);

the 6 contestants who answered 2 questions correctly scored 12 points in total (6 × 2 = 12); the 2 contestants who answered 1 question correctly scored 2 points in total (2 × 1 = 2); and the 3 contestants who answered 0 questions correctly scored 0 points in total (3 × 0 = 0). Adding up the total of points scored by these 20 contestants gives 10 + 12 + 12 + 12 + 2 + 0 = 48. Therefore, the mean score of the contestants is $\frac{48}{20}$ = 2.4. Either 12/5, 2.4, or 2.40 can be gridded as the correct answer.

QUESTION 38.

The correct answer is $\frac{5}{7}$. It is given that no contestant received the same score on two different days, so each of the contestants who received a score of 5 is represented in the "5 out of 5" column of the table exactly once. Therefore, the probability of selecting a contestant who received a score of 5 on Day 2 or Day 3, given that the contestant received a score of 5 on one of the three days, is found by dividing the total number of contestants who received a score of 5 on Day 2 or Day 3 (2 + 3 = 5) by the total number of contestants who received a score of 5, which is given in the table as 7. So the probability is $\frac{5}{7}$. Either 5/7 or .714 can be gridded as the correct answer.

Answer Explanation Test #4

Answer Explanations

SAT Practice Test #4

Section 1: Reading Test

QUESTION 1

Choice D is the best answer. Throughout the passage, the narrator describes a visit to her family's ink shop. The narrator's father and uncles are employed at the shop, and in the third and fifth paragraphs the narrator describes her father's interactions with a customer. Her father praises the color, sound, and smell of an ink sample as indicators of the ink's quality. This interaction leads the narrator to conclude in the last paragraph, "I was very proud to hear Father speak of our family's ink this way." Therefore, the passage is best summarized as a character's visit to her family's ink shop that deepens her appreciation of her family's work.

Choice A is incorrect. Although the narrator's arrival at her family's ink shop does spark memories of her Precious Auntie, these memories center on Precious Auntie's beliefs about creativity, including the conviction that inferior ink produces inferior thought. The narrator's thoughts on Precious Auntie occur in the fourth paragraph, so choice A isn't the best summary of the overall passage. Choice B is incorrect. Although the passage describes the narrator's surprise visit to the ink shop and a reunion with her uncles, these events occur in the first paragraph. Therefore, choice B doesn't provide the best summary of the passage as a whole. Choice C is incorrect because the narrator doesn't make any reference to her father's ambitions.

QUESTION 2

Choice B is the best answer. In the fourth paragraph, the narrator recounts her Precious Auntie's belief that "you can never be an artist if your work comes without effort." Her Precious Auntie states that when the physical act of writing is done with an "inkstick along an inkstone," this process requires an artist to "take the first step to cleansing your mind and your heart. You push and you ask yourself, What are my intentions? What is in my heart that matches my mind?" In the following paragraphs, the narrator recalls the pride she felt while listening to her father describe the high quality of the ink that her family had worked hard to produce. Therefore, a main theme of the passage is that quality is achieved through deliberate effort.

Choice A is incorrect. Although family relationships form a backdrop to the passage, the nurturing of these relationships isn't a main theme. Choice C is incorrect. Although the passage does emphasize that hard work produces higher quality writing than that which is produced through minimal work, the passage doesn't mention that hard work results in material compensation. Choice D is incorrect. Although the passage discusses the role of concentrated effort in creative expression, a main theme of the passage isn't that creativity needs to be expressed concretely.

QUESTION 3

Choice B is the best answer. In the first sentence of the second paragraph, the narrator states: "I tried to notice everything so I could later tell GaoLing what I had seen." She then proceeds to describe the floors of the family's ink shop, the walls and display cases, and the various items for sale. According to the third paragraph, these include an inkstick "with a top shaped like a fairy boat," another inkstick with "a bird shape," and a collection of ink cakes "embellished with designs of peonies and bamboo." Therefore, throughout the passage, the narrator is portrayed as someone who is attuned to her immediate surroundings.

Choice A is incorrect. Although the narrator describes herself as shy, the people she interacts with aren't unfamiliar to her because they are members of her family whom she has met before. Choices C and D are incorrect because the narrator isn't portrayed as sympathetic to the needs of others (choice C) or anxious about her responsibilities (choice D).

QUESTION 4

Choice A is the best answer. Big Uncle and Little Uncle offer Old Widow Lau and the narrator a seat at a table reserved for customers upon their arrival at the narrator's family's ink shop. According to the tenth sentence of the first paragraph, "Old Widow Lau refused their invitation three times, exclaiming that my father and uncles must be too busy for visitors." Old Widow Lau's rejection of the uncles' offer is characterized as insincere, as the next sentence of that paragraph shows that she doesn't actually want to leave the shop: "She made weak efforts to leave." Instead, her gestures are intended to inspire exaggerated insistence from the uncles, such that it isn't until the uncles' "fourth insistence, [that Old Widow Lau and the narrator] finally sat." Therefore, it can be most reasonably inferred from the passage that Old Widow Lau's reluctance to stay for tea is feigned because she isn't genuinely firm in her resolve.

Choice B is incorrect because the passage doesn't imply that Old Widow Lau's reluctance is inconsiderate or that the family has been planning her visit. Choice C is incorrect because the shop isn't unusually busy. Instead, only one customer is mentioned in the passage. Choice D is incorrect because the passage doesn't state or imply that Old Widow Lau is exhausted from her journey.

QUESTION 5

Choice C is the best answer. The previous question asks what can be most reasonably inferred from the passage about Old Widow Lau's reluctance to stay for tea. The answer, that her reluctance is feigned because she isn't genuinely firm in her resolve, is best supported by the tenth and eleventh sentences of the first paragraph: "Old Widow Lau refused their invitation three times, exclaiming that my father and uncles must be too busy for visitors. She made weak efforts to leave."

Choices A, B, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they describe the narrator and Old Widow Lau's arrival at the shop (choice A), their initial reception by the uncles (choice B), and the hospitality the uncles lavish on them once they are seated (choice D).

QUESTION 6

Choice A is the best answer. In the second paragraph, the narrator describes the "shiny" glass display cases at her family's ink shop and how the silk-wrapped boxes of ink inside these cases "looked so much nicer [in the shop] than they had in the ink-making studio at Immortal Heart village." Therefore, the narrator indicates that the contrast between the ink-making studio at Immortal Heart village and her family's ink shop is that the ink shop displays the family's ink more impressively.

Choices B, C, and D are incorrect because the narrator doesn't state or imply that her family's ink shop, in comparison to the ink-making studio at Immortal Heart village, is more conveniently located for the public (choice B), provides greater individual attention to customers (choice C), or offers a larger space for presenting products (choice D).

QUESTION 7

Choice C is the best answer. In the fourth paragraph, the narrator summarizes Precious Auntie's artistic philosophy: when you write without effort, "you do not have to think. You simply write what is swimming on the top of your brain. And the top is nothing but pond scum, dead leaves, and mosquito spawn." In other words, anything written too quickly, and therefore without concerted effort and thought, would be synonymous with the debris floating on top of a pool of water. Therefore, it is reasonable to infer that Precious Auntie would consider a hastily written first draft of a story to be essentially worthless in and of itself.

Choice A is incorrect because Precious Auntie's description of work made without effort is exclusively negative; therefore, it isn't reasonable to infer that she would praise a hastily written story draft as emotionally raw and powerful. Choice B is incorrect because Precious Auntie's artistic philosophy is concerned solely with the quality of the artist's output rather than with the satisfaction the artist experiences. Choice D is incorrect because whether a hastily produced work would be inappropriately analytical isn't discussed in the passage.

QUESTION 8

Choice C is the best answer. The previous question asks what can be reasonably inferred about Precious Auntie's view of a hastily written first draft of a story, based on the artistic philosophy expressed in the fourth paragraph. The answer, that she would consider such a story to be essentially worthless in and of itself, is best supported by the sixth and seventh sentences of the fourth paragraph, which describe Precious Auntie's view of writing produced without effort: "You simply write what is swimming on the top of your brain. And the top is nothing but pond scum, dead leaves, and mosquito spawn."

Choices A, B, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they transition between the scene in the ink shop and the narrator's memories of Precious Auntie (choice A), summarize Precious Auntie's assessment of ink quality (choice B), and describe the process of creating good writing through concerted effort (choice D).

QUESTION 9

Choice B is the best answer. In the last sentences of the fourth paragraph, the narrator describes Precious Auntie's artistic philosophy, or, more specifically, the questions that an artist is forced to ask when working with concerted effort: "You push and you ask yourself, What are my intentions? What is in my heart that matches my mind?" With the second question, Precious Auntie highlights how an artist must strive to create work that resembles, or corresponds with, what is in both the artist's heart and mind. Therefore, the word "matches," as used in this sentence, most nearly means corresponds with.

Choices A, C, and D are incorrect because in the context of the passage, "matches" means corresponds with, not competes against (choice A), runs counter to (choice C), or treats equally (choice D).

QUESTION 10

Choice C is the best answer. In the fifth paragraph, the narrator's father demonstrates the quality of an inkstick to a customer. He strikes the inkstick, and the narrator describes "a sound as clean and pure as a small silver bell." Therefore, the word "clean," as used in this paragraph to describe a sound that the inkstick produced, most nearly means distinct, or clear.

Choices A, B, and D are incorrect because in the context of the passage, "clean" means distinct, not complete (choice A), skillful (choice B), or upright (choice D).

QUESTION 11

Choice D is the best answer. The first paragraph of the passage introduces research by Harvard psychology professor Daniel Wegner demonstrating that the Internet is changing "the way our

memories function." One finding of Wegner's study, as stated in the second paragraph, is that "when people have access to search engines, they remember fewer facts and less information because they know they can rely on 'search' as a readily available shortcut." In the third paragraph, Wegner claims that his study shows how "the Internet has become part of a transactive memory source, a method by which [humans'] brains compartmentalize information," such that "computers and technology as well are becoming virtual extensions of [human] memory." The remainder of the passage details Wegner's experiments and findings. Thus, the main purpose of the passage is to share the findings of a study examining the effect of computer use on memory recall.

Choice A is incorrect. Although the author suggests in the sixth paragraph that technology may interfere with critical thinking, this isn't the focus of Wegner's experiments, nor is illustrating this position the main purpose of the passage. Choices B and C are incorrect because the passage doesn't support the assertion that people have become overly dependent on computers for storing information (choice B) or that humans' capacity for memory is much weaker that it once was (choice C).

QUESTION 12

Choice D is the best answer. The fifth paragraph details the results of the fourth experiment of Wegner's study, where participants were more likely to recall digital folder locations where statements they typed were saved than the actual statements themselves. The first sentence of the last paragraph summarizes why this result may not be alarming: "And even though we may not be taxing our memories to recall distinct facts, we are still using them to consider where the facts are located and how to access them." In this sentence, the author paraphrases Wegner's view that although human memory is changing as a result of technology, this doesn't indicate that human memory is declining, as people are relying on their memory to access specific types of information. Therefore, this sentence best supports the idea that reliance on computers doesn't necessarily diminish human memory.

Choices A, B, and C are incorrect because the cited lines don't support the idea that reliance on computers doesn't necessarily diminish human memory. Instead, they introduce the topic of Wegner's research (choice A), provide examples of the types of information that people may now rely on the Internet to provide (choice B), and concede that the Internet may diminish critical thinking skills (choice C).

QUESTION 13

Choice D is the best answer. In the third paragraph, the author outlines Wegner's theory of a "transactive memory source." According to Wegner, transactive memory is a "network of memory," where an individual can access information that he or she can't personally

recall from a particular source. The author illustrates this idea in the second sentence of this paragraph, with the example of "a husband [who] relies on his wife to remember a relative's birthday." Thus, the reference to remembering a relative's birthday mainly serves to illustrate the concept of a transactive memory source using a familiar situation.

Choice A is incorrect. Although the situation of a husband relying on his wife's memory does suggest that closely related people tend to have shared memories, this isn't the main purpose of this reference in the context of the passage. Choice B is incorrect because the example doesn't demonstrate how people initially developed external sources of memory. Choice C is incorrect because the function of the example isn't to emphasize the effectiveness and accuracy of transactive memory sources. Instead, its function is to make the abstract concept of transactive memory more easily understandable.

QUESTION 14

Choice B is the best answer. In the third paragraph, Wegner describes transactive memory as a "network of memory where you don't have to remember everything in the world yourself." Instead, the burden of storing information is shifted to transactive memory sources that can function as "extensions of [human] memory." Examples of sources provided in the fourth paragraph of the passage include cell phones, GPS devices, and search engines. What these examples have in common is that they store information, such as phone numbers, directions, and general knowledge, so that a person doesn't have to commit this information to memory. A written list of a user's passwords for different websites serves the same function as these examples. Although remembering a list of passwords for different websites is conceivable without a list, keeping such a list shifts the burden of storing readily memorable information away from the user because the list preserves the information in place of the user's memory. Therefore, based on the passage, a written list of a user's passwords for different websites would be considered a transactive memory source.

Choices A, C, and D are incorrect because they don't accurately exemplify transactive memory sources. A souvenir brought home from a memorable trip (choice A) may evoke memories of that place for the owner. However, it doesn't preserve actual information in the way the examples provided in the passage do. A library database that helps users locate specific books (choice C) may seem similar to a search engine. However, it doesn't store information that would otherwise be readily memorable in the way that a search engine can help a user remember an actor's name or a detail of geography, according to the fourth paragraph of the passage. Instead, it helps a library patron navigate a system that is typically far too vast to be committed to memory. A website that helps users plan and make travel arrangements

(choice D) may help facilitate transactions in the form of ticket purchases or hotel reservations. However, it doesn't store information that the user would otherwise memorize.

QUESTION 15

Choice B is the best answer. In the last sentence of the third paragraph, the author states that "computers and technology . . . are becoming virtual extensions of our memory." In other words, computers and technology are becoming memory sources that serve as additions to human memory. Thus, "extensions of," as used in the passage, most nearly means additions to.

Choices A, C, and D are incorrect because in the context of the passage, "extensions of" means additions to, not delays in (choice A), lengths of (choice C), or developments of (choice D).

QUESTION 16

Choice C is the best answer. The fifth paragraph of the passage describes four experiments that Wegner conducted to demonstrate his theory of a transactional memory source. The first experiment, described in the second sentence of this paragraph, found that participants "were more likely to think of computer terms like 'Yahoo' or 'Google' after being asked a set of difficult trivia questions." The second, third, and fourth experiments explored participants' tendency to remember the location of information rather than the information itself. Therefore, the discussion of the experiments, most specifically the first experiment, suggests that people are inclined to think of specific information sources in response to being asked to provide facts that aren't already familiar to them.

Choice A is incorrect. Although some of the subjects in the second experiment did memorize information that later became inaccessible, this act of memorization didn't cause the subjects to think of specific information sources. Choice B is incorrect. Although participants in the fourth experiment were told their work would be saved in specific folders, they weren't directed to develop a system for organizing and saving content. Choice D is incorrect because none of the experiments involved participants being prompted to identify terms related to dependence on computers.

QUESTION 17

Choice A is the best answer. The previous question asks, based on Wegner's experiments, when people would be inclined to think of specific information sources. The answer, that being asked to provide facts that aren't already familiar to them provokes this response, is best supported by the second sentence of the fifth paragraph: "In the first experiment, participants demonstrated that they were more likely to think of computer terms like 'Yahoo' or 'Google' after being asked a set of difficult trivia questions."

Choices B, C, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they describe the different parameters for the participants in the second and third experiments (choice B), summarize the results of the second and third experiments (choice C), and summarize the results of the fourth experiment (choice D).

QUESTION 18

Choice A is the best answer. The second sentence of the sixth paragraph states: "Students who have trouble remembering distinct facts, for example, may struggle to employ those facts in critical thinking." In other words, students who find it difficult to remember information may find it challenging to utilize that information to develop logical arguments. Therefore, the word "employ," as used in the context of this sentence, most nearly means utilize.

Choices B, C, and D are incorrect because in the context of the passage, "employ" means utilize, not enroll (choice B), exert (choice C), or assign (choice D).

QUESTION 19

Choice C is the best answer. The passage explains that in the fourth experiment participants were given statements and folder locations where they were told those statements would be saved. On the graph, the bar farthest to the left represents those who remembered both elements of the information given to them during the experiment. This bar rises to a point midway between 15% and 20%. Therefore, according to the graph, approximately 17% of participants remembered both parts of the information given to them during the fourth experiment.

Choice A is incorrect because none of the groups represented on the graph comprised 7% of participants. Choices B and D are incorrect because neither 10% (choice B) nor 30% (choice D) of participants remembered both elements of the information given to them during the fourth experiment. Instead, 10% remembered statements but not folder locations (according to the second bar from the left), while 30% remembered folder locations but not statements (according to the third bar from the left).

QUESTION 20

Choice D is the best answer. The largest single group of participants represented on the graph is composed of those who remembered nothing, as indicated by the bar that is farthest to the right. Why approximately 40% of participants could not remember the statements or the folder locations isn't explained by the description of the fourth experiment in the fifth paragraph of the passage. Therefore, the

most likely explanation for the findings regarding the largest single group of participants represented on the graph is that there isn't enough information to determine the cause of the results for those participants.

Choices A, B, and C are incorrect because these speculations aren't supported by the passage. There isn't enough information provided about the fourth experiment to know whether the participants who could remember nothing focused on remembering the folder locations (choice A), attempted to remember the statements and the folder locations (choice B), or didn't attempt to remember any specific pieces of information (choice C).

QUESTION 21

Choice A is the best answer. Throughout the passage, the author describes experiments conducted on guppies to determine the guppies' rate of and types of evolutionary change. The first paragraph outlines the reason why these fish were an optimal choice for this research: their "unstinting rate of reproduction makes guppies ideally suited for studying the rate of evolution." Therefore, the first paragraph mainly serves to establish the reason why a certain species was selected for scientific observation.

Choice B is incorrect because the purpose of the first paragraph isn't to illustrate the value of studying the offspring of a particular animal shortly after birth. Instead, guppies were selected because of their rapid rate of reproduction and weren't only studied shortly after being born, according to the passage. Choices C and D are incorrect. Although the fourth paragraph does introduce a new method of scientific inquiry (experimental evolution), the first paragraph doesn't mainly serve to introduce a theory at the center of an ongoing scientific debate (choice C) or offer a rationale for the prevalence of a new field of scientific inquiry (choice D).

QUESTION 22

Choice B is the best answer. The third sentence of the second paragraph states, "A lucky guppy is born above a waterfall or a set of rapids, which keep out the predatory fish called pike cichlids found in calmer downstream waters." In other words, pike cichlids normally eat guppies, but waterfalls and rapids can create natural barriers that prevent these predators from entering certain areas where guppies live. Thus, in describing the living conditions of guppies, the author indicates that a "lucky guppy" is one that inhabits an environment that provides natural protection from predators.

Choices A and C are incorrect because the author doesn't indicate that being born in a major river with an established guppy population is an advantage for a guppy (choice A) or that there are risks associated with living near a waterfall or that guppies benefit by avoiding such risks (choice C). Choice D is incorrect because the author doesn't indicate that there is an advantage for guppies living in calmer

downstream waters. Instead, the author notes that calmer downstream waters are where guppies' predators live, making these zones more dangerous for guppies than the areas above waterfalls or rapids.

QUESTION 23

Choice D is the best answer. In the last paragraph, the author describes an experiment in which Reznick's team removed groups of guppies from areas with large populations of pike cichlid predators and relocated them into areas above waterfalls and rapids. According to the second sentence of this paragraph, "Although small predatory killifish occurred in these new sites, these fish do not pose anything close to the danger of the cichlids." This sentence provides the best evidence for the conclusion that the streams used by Reznick's team were not entirely free of predators, as they contained populations of killifish.

Choices A, B, and C are incorrect because the cited lines don't provide the best evidence for the conclusion that the streams used by Reznick's team were not entirely free of predators. Instead, they explain the advantage for guppies living above waterfalls or rapids (choice A), outline the correlation between numbers of pike cichlids and guppy mortality rates (choice B), and explain the growing popularity of "experimental evolution" among scientists (choice C).

QUESTION 24

Choice A is the best answer. According to the fourth paragraph, the existence of streams in Trinidad with populations of guppies and those without guppies led Reznick to the conclusion that he could conduct experiments by altering the guppy populations in various streams. According to the second sentence of the fourth paragraph, Reznick realized he could "'treat streams like giant test tubes by introducing guppies or predators' to places they had not originally occurred, and then watch as natural selection acted on the guppies." Reznick uses the phrase "giant test tubes" in this sentence to suggest that certain streams can provide suitable experimental conditions for his guppy research.

Choices B, C, and D are incorrect because the phrase "giant test tubes" serves to characterize certain streams as suitable for experimental research, not to suggest that those streams promote cooperative behaviors among guppies used as subjects in experimental studies (choice B), increase the rate of genetic change among guppies (choice C), or assist scientists in solving environmental problems in the natural habitat of guppies (choice D).

QUESTION 25

Choice C is the best answer. The fourth paragraph describes Reznick's rationale for moving populations of guppies from one body of water to another. The last sentence of the paragraph states, "This kind of real-world manipulation of nature is called 'experimental evolution,'

and it is growing increasingly popular among scientists working with organisms that reproduce quickly enough for humans to be able to see the outcome within our lifetimes." In other words, the fact that this type of research is "growing increasingly popular" means that it is becoming more widespread. Thus, the word "popular" as used in the passage most nearly means widespread.

Choices A, B, and D are incorrect because in the context of the passage, "popular" means widespread, not accessible (choice A), suitable (choice B), or likable (choice D).

QUESTION 26

Choice B is the best answer. Reznick's team found that guppies, when moved from predator-ridden environments to a site where there was not the same level of predation, "evolved to mature later, and have fewer, bigger offspring in each litter, just like the guppies that naturally occurred in the cichlid-free streams," according to the fourth sentence of the last paragraph. If it were discovered that the new site into which Reznick released the guppies were inhabited by fish found to be as predatory as the cichlids in the original sites, this discovery would undermine Reznick's findings. Such a finding would mean that the pressure of predation on the guppies remained constant from one site to the next. As a consequence, some other factor or factors would be responsible for the developmental changes in the guppies that Reznick's team recorded.

Choice A is incorrect. If guppies examined in other parts of the globe were found to exhibit genetic shifts in traits at a different rate from the guppies Reznick examined, these findings would not undermine his research because they would have occurred outside the confines of his experimental conditions. Choice C is incorrect. If experimental evolution were shown to be harmful to the environment, this finding, though important, would not undermine Reznick's findings. Choice D is incorrect. If the descendants of Reznick's transplanted fish were proven to mature later than the guppies living below the waterfall, this finding would support, rather than undermine, Reznick's findings.

QUESTION 27

Choice A is the best answer. The last sentence of the passage states, "Other studies of guppies in Trinidad have shown evolutionary change in as few as two and a half years, or a little over four generations, with more time required for genetic shifts in traits such as the ability to form schools and less time for changes in the colorful spots and stripes on a male's body." That is, certain traits, such as physical markings, seem to change more quickly than other traits, such as aspects of group behavior. Thus, it can most reasonably be inferred from the passage that the experiments in Trinidad have shown that some genetic traits will evolve more readily than others.

Choices B, C, and D are incorrect because the experiments in Trinidad led to conclusions about guppies' rate of evolutionary changes. These experiments did not lead to an identification of other dangerous predators (choice B), an analysis of how certain guppies thrive better in predator-ridden environments (choice C), or an examination as to how evolutionary changes can be prevented in a natural environment (choice D).

QUESTION 28

Choice D is the best answer. The previous question asks what can most reasonably be inferred about guppies based on the experiments in Trinidad described in the passage. The answer, that some guppy genetic traits will evolve more readily than others, is best supported by the last sentence of the passage: "Other studies of guppies in Trinidad have shown evolutionary change in as few as two and a half years, or a little over four generations, with more time required for genetic shifts in traits such as the ability to form schools and less time for changes in the colorful spots and stripes on a male's body."

Choices A, B, and C are incorrect because the cited lines don't support the answer to the previous question. Instead, they pose a question central to Reznick's research (choice A), describe the conditions that led Reznick to consider conducting experimental evolution tests in Trinidad (choice B), and describe how Reznick's team removed guppies from one area and reintroduced them in another (choice C).

QUESTION 29

Choice D is the best answer. The number of offspring produced by guppies living in the south slope high-predation environment is indicated by the first bar from the left in figure 1. This bar rises to a point midway between 6 and 7 on the graph. Therefore, according to figure 1, guppies living in the south slope high-predation environment produced a mean number of offspring between 6 and 7.

Choice A is incorrect because 2 to 3 offspring were produced by guppies living in the south slope low-predation environment, rather than those living in the high-predation environment, as indicated by the second bar from the left in figure 1. Choice B is incorrect because 3 to 4 offspring were produced by guppies living in the north slope low-predation environment, rather than guppies living in the south slope high-predation environment, as indicated by the bar that is farthest to the right in figure 1. Choice C is incorrect because none of the groups represented in figure 1 produced 5 to 6 offspring.

QUESTION 30

Choice C is the best answer. The graph shows that the mean embryo mass in a low-predation environment for south slope guppies (second bar from the left) is higher than mean embryo mass in a

high-predation environment for south slope guppies (bar farthest to the left). A similar relationship exists for north slope guppies, as the mean embryo mass in a low-predation environment (bar farthest to the right) is higher than the mean embryo mass in a high-predation environment (third bar from the left). Meanwhile, a comparison of south slope high-predation environments (bar farthest to the left) to north slope high-predation environments shows no difference in mean embryo mass. The graph shows that while there is a slightly lower mean embryo mass in north slope low-predation environments (bar farthest to the right) than in south slope low-predation environments (second bar from the left), this difference is only 0.2 mg, which is considerably less than the difference that results from comparing the low- and high-predation environments in each of the two locations. Therefore, the conclusion about the mean mass of guppy embryos that is best supported by figure 2 is that the predation level observed in each environment had more of an effect on mean embryo mass than did slope location.

Choice A is incorrect because slope location wasn't a better indicator of mean embryo mass than was the predation level observed in each environment. Instead, the mean masses of embryos in the two locations were roughly equivalent. Choice B is incorrect because the mean embryo mass of guppies born in the north slope environments didn't exceed the mean embryo mass of guppies born in the south slope environments. Guppies living in high-predation environments in both north and south slope locations had embryos with the same mass, while those living on the north slope in low-predation environments had embryos with a slightly lower mass than that of south slope guppies in low-predation environments. Therefore, the mean embryo mass of guppies born in the south slope environment exceeded the mean embryo mass of guppies born in the north slope environment. Choice D is incorrect because guppies born in low-predation environments didn't have a mean embryo mass less than that of guppies born in high-predation environments. Instead, these guppies had a greater mass.

QUESTION 31

Choice B is the best answer. Figure 1 shows that guppies from low-predation environments (represented on the graph by second and fourth bars from the left) had smaller litters, or fewer guppy offspring, than did guppies from high-predation environments (represented by the first and third bars from the left). Similarly, figure 2 shows that guppies from low-predation environments (the second and fourth bars from the left) also had embryos with a greater mean mass than did guppies from high-predation environments (the first and third bars from the left).

Choice A is incorrect. Although figure 1 does support the conclusion that guppies from low-predation environments have fewer offspring than those from high-predation environments, neither figure indicates the time required for guppies to reach full maturity. Choice C is incorrect because neither figure indicates the survival rate of guppies,

and figure 2 directly contradicts the conclusion that guppies from low-predation environments have less mean embryo mass than those from high-predation environments. Choice D is incorrect. Although figure 2 supports the conclusion that guppies from low-predation environments have a greater mean embryo mass than those from high-predation environments, figure 1 directly contradicts the conclusion that guppies from low-predation environments produce a greater number of offspring than those from high-predation environments.

QUESTION 32

Choice D is the best answer. In the passage, Sara T. Smith addresses the Second Anti-Slavery Convention of American Women. In the second sentence of the first paragraph, Smith states that confronting slavery is "a question of justice" and that it involves "considerations of immense importance to the welfare and prosperity of our country." In the third paragraph, Smith argues that women shouldn't be deterred from participating in the abolitionist cause. In the last paragraph, she argues that women "cannot remain inactive" in confronting slavery as "our country is as dear to us as to the proudest statesman. . . . Let our course, then, still be *onward*!" Therefore, Smith's main purpose in the passage is to encourage women to see their participation in the abolitionist cause as just and important.

Choices A and C are incorrect because Smith doesn't accuse fellow abolitionists of overlooking the contributions that women have made to the movement (choice A) or make the case that women's rights are meaningless while slavery exists (choice C). Choice B is incorrect. Although Smith quotes the Declaration of Independence in the third paragraph, the main purpose of the passage isn't to argue that the causes of abolition and women's rights are continuations of the spirit of the American Revolution.

QUESTION 33

Choice A is the best answer. Throughout the passage, Smith poses questions that aren't answered explicitly until the last paragraph, but the leading tone of the speech makes it clear that the implied answer to these questions is "no." In the second paragraph, Smith questions her critics' claim that upholding humanitarian values undermines conventional feminine virtues. In the third paragraph, she wonders how women can "have no interest" in the subject of slavery when it could lead to the destruction of their families through war. In the last paragraph, she asks women numerous questions and then answers them with a "no." Thus, a technique that Smith uses throughout the passage to advance her main point is to present her claims in the form of rhetorical questions that mostly have implicit negative answers.

Choice B is incorrect. Although Smith questions the assertions that her opponents made, she doesn't criticize her opponents themselves by quoting self-contradictory remarks they have made. Choice C

is incorrect. Although Smith makes use of vivid language and imagery throughout the passage, she doesn't illustrate each of her central ideas with an emotionally powerful anecdote. Choice D is incorrect. Although it is implied that Smith considers her views to be reasonable, she doesn't present them as universally held.

QUESTION 34

Choice B is the best answer. In the first sentence of the passage, Smith introduces the argument that slavery is a "political question" and therefore not "within the 'province of woman.'" In the second sentence, Smith voices her opposition to this argument: "It is not true that [slavery] is *merely* a political question, it is likewise a question of justice, of humanity, of morality, of religion." In other words, slavery is too broad a problem to be classified solely as "political," in Smith's view. However, in the fourth paragraph, Smith returns to the political aspect of the argument at hand by addressing how women must engage in the subject of slavery on a political scale. She argues that "admitting [slavery] to be a political question" doesn't mean that women have "no interest in the welfare of our country," as women must criticize slavery and its "unjust laws" and seek to stop the nation's "downward course" by choosing to not "remain inactive." Therefore, Smith develops her argument about slavery as a "political question" over the course of the passage by dismissing the designation as too narrow but then demonstrates its relevance to her audience.

Choice A is incorrect. Although Smith does offer alternative ways of defining the problem of slavery, she doesn't claim that the designation of slavery as a "political question" is outdated, but rather that it is insufficient. Choice C is incorrect because Smith doesn't contend that the designation of slavery as a "political question" has become trite, nor does she invite her audience to revitalize it. Choice D is incorrect. Although Smith's argument is intertwined with questions of gender roles, she doesn't describe the meaning the designation of a "political question" has for men and then challenge women to embrace it.

QUESTION 35

Choice B is the best answer. In the first sentence of the passage, Smith relays a claim: "We are told that it is not within the 'province of woman,' to discuss the subject of slavery; that it is a 'political question,' and we are 'stepping out of our sphere,' when we take part in its discussion." In the next sentence, Smith rejects this claim: "It is not true that it is *merely* a political question, it is likewise a question of justice, of humanity, of morality, of religion." She then argues that the subject of slavery "involves considerations of immense importance to the welfare and prosperity of our country, enters deeply into the home-concerns, the every-day feelings of millions of our fellow beings" and expands upon this point by providing an example of the difference, under slavery, between laborers who are enslaved and those

who are within the "dignity of conscious manhood." Therefore, the best summary of the first paragraph is that Smith rejects a claim and elaborates on her reasons for doing so.

Choice A is incorrect. Although Smith may outline a conventional viewpoint in the first paragraph, she doesn't present evidence to support it. Choice C is incorrect. Although Smith introduces her subject in the first paragraph, she doesn't provide historical background for understanding it. Choice D is incorrect. Although Smith does identify a problem in the first paragraph, she doesn't propose steps to remedy it.

QUESTION 36

Choice A is the best answer. In the first sentence of the second paragraph, Smith relays the sentiment, presumably voiced by those opposed to women abolitionists, that "woman 'can take no part [in the debate over slavery] without losing something of the modesty and gentleness which are her most appropriate ornaments.'" Smith opposes this view in the following sentence: "must woman necessarily be less gentle because her heart is open to the claims of humanity, or less modest because she feels for the degradation of her enslaved sisters, and would stretch forth her hand for their rescue?" The leading tone of this rhetorical question makes it clear that Smith would answer it with a "no." Thus, Smith argues that it is possible for women to act according to humanitarian principles while preserving their femininity.

Choices B, C, and D are incorrect because Smith doesn't argue that it is possible for women to adhere to personal morality while being politically neutral (choice B), contribute to their family's financial security while meeting social expectations (choice C), or resist calls for war while still opposing slavery (choice D).

QUESTION 37

Choice A is the best answer. The previous question asks which activity Smith argues it is possible for women to engage in. The answer, that she argues that women can act according to humanitarian principles while preserving their femininity, is best supported in the last sentence of the second paragraph: "must woman necessarily be less gentle because her heart is open to the claims of humanity, or less modest because she feels for the degradation of her enslaved sisters, and would stretch forth her hand for their rescue?" The leading tone of this rhetorical question makes it clear that Smith would answer it with a "no." In other words, Smith believes that women can uphold humanitarian principles while maintaining conventional feminine virtues.

Choices B, C, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they link women's conventional domestic concerns with the losses that would be incurred by a war over slavery (choice B), affirm that the potential horrors of

war are enough to stir women out of a state of political inactivity (choice C), and equate women's patriotism with that of male political leaders (choice D).

QUESTION 38

Choice C is the best answer. In the first sentence of the third paragraph, Smith states "by the Constitution of the United States, the whole physical power of the North is pledged for the suppression of domestic insurrections, and should the slaves, maddened by oppression, endeavor to shake off the yoke of the taskmaster, the men of the North are bound to make common cause with the tyrant, and put down, at the point of the bayonet, every effort on the part of the slave, for the attainment of his freedom." In other words, according to Smith, if slaves were to revolt, the US Constitution would require that Northern states help the slave states fight the slaves' rebellion.

Choices A, B, and D are incorrect because Smith doesn't argue that if the slaves were to revolt the US Constitution would require the Northern states to sever ties with the slave states (choice A), give shelter to refugees from the slave states (choice B), or provide financial assistance to the rebelling slaves (choice D).

QUESTION 39

Choice D is the best answer. The word "tyrant" describes a cruel and unfair ruler. It is first used in the first sentence of the third paragraph, when Smith argues that in the event of a slave rebellion in the slave states, "the men of the North are bound to make common cause with the tyrant, and put down, at the point of the bayonet, every effort on the part of the slave, for the attainment of his freedom." The word occurs again in the seventh sentence of the last paragraph, when Smith asserts the strength of women's "aspirations that every inhabitant of our land may be protected . . . by just and equal laws" so that "the foot of the tyrant may no longer invade the domestic sanctuary." In both instances, the word "tyrant" is used to represent slaveholders and their allies. Thus, Smith's use of "tyrant" emphasizes the unjustness of slavery.

Choice A is incorrect because Smith's use of the word "tyrant" doesn't identify a specific individual as oppressive. Instead, it refers to all those individuals who profit from and abet the unjust institution of slavery. Choice B is incorrect because Smith's use of the word "tyrant" doesn't highlight the threat of aggression from abroad. Instead, it highlights national injustice. Choice C is incorrect because Smith's use of the word "tyrant" doesn't critique the limited roles for women in antislavery movements. Smith's use of the word "tyrant" refers to slaveholders and their allies, not those who would discourage women's participation in the antislavery movement.

QUESTION 40

Choice C is the best answer. In the last sentence of the third paragraph, Smith argues that the threat of a war precipitated by slavery "is of itself sufficient to arouse the slumbering energies of woman" to speak out against slavery's injustice. In other words, women have the potential to protest slavery, but they have been relatively inactive, or dormant, up until now. Therefore, the word "slumbering," as used in this sentence, most nearly means dormant.

Choices A, B, and D are incorrect because in the context of the passage, "slumbering" means dormant, not lethargic (choice A), drowsy (choice B), or unconscious (choice D).

QUESTION 41

Choice A is the best answer. The fifth sentence of the last paragraph poses the following question: "Shall we silently behold the land which we love with all the heart-warm affection of children, rendered a hissing and a reproach throughout the world, by this system which is already tolling the death-bell of her decease among the nations?" In other words, the continuation of slavery in the United States is being criticized "throughout the world," such that the existence of slavery affects the United States by lowering the country's reputation in the international community.

Choice B is incorrect because Smith doesn't suggest that slavery affects the United States by leading many women to disavow their allegiance to the country. Instead, she suggests that it is partly women's patriotism that should stir them to protest slavery because it is lowering the reputation of the United States in the international community. Choice C is incorrect. Although Smith speaks ominously in the last paragraph of "the events of the last two years" that are "overclouding the bright prospects of the future," she doesn't cite any current violent conflicts in the country. Choice D is incorrect because Smith doesn't suggest that slavery weakens the authority of the country's government. Instead, she argues that it damages the country's reputation abroad.

QUESTION 42

Choice C is the best answer. The previous question asks how Smith most strongly suggests that slavery affects the United States. The answer, that slavery affects the United States by lowering the country's reputation in the international community, is best supported by the fifth sentence of the last paragraph: "Shall we silently behold the land which we love with all the heart-warm affection of children, rendered a hissing and a reproach throughout the world, by this system which is already tolling the death-bell of her decease among the nations?"

Choices A, B, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they suggest that because war affects home life, women are right to concern themselves

with the possibility of war (choice A), imply that women have a right to consider issues that fall outside the domestic sphere (choice B), and issue a call to action for women to voice condemnation of slavery (choice D).

QUESTION 43

Choice C is the best answer. The first paragraph of Passage 1 presents a quote by biochemist Kim Lewis of Northeastern University: "Pathogens are acquiring resistance faster than we can introduce new antibiotics, and this is causing a human health crisis." The rest of the passage describes Lewis's research and the experimental antibiotic called teixobactin that her research has produced. According to the second paragraph of the passage, teixobactin has "proved effective at killing off a wide variety of disease-causing bacteria—even those that have developed immunity to other drugs." Therefore, the first paragraph of Passage 1 primarily serves to identify a problem that the research discussed in the passage may help to address.

Choice A is incorrect because although the first paragraph quotes a claim by Lewis regarding antibiotic resistance, this claim isn't developed over the course of Passage 1. Choice B is incorrect because the claim made in the first paragraph regarding antibiotic resistance isn't presented as controversial, nor does Passage 1 attempt to resolve any scientific controversies. Choice D is incorrect because the claim made in Paragraph 1 isn't presented as a theory; moreover, the findings in Passage 1 support this claim rather than challenge it.

QUESTION 44

Choice D is the best answer. The third paragraph of Passage 1 describes how, historically, the development of antibiotics requires "natural microbial substances," but this reliance has severe limitations as only about one percent of these microbial substances can be grown in a laboratory. The author goes on to explain how "the rest, in staggering numbers, have remained uncultured and of limited use to medical science, until now." The paragraph then describes the method Lewis's team used to grow teixobactin microorganisms "in their natural environment where they already have the conditions they need for growth." Therefore, the author of Passage 1 suggests that an advantage of the method Lewis's team used to grow microorganisms is that it allows researchers to make use of soil bacteria that they had previously been unable to exploit.

Choice A is incorrect because although the author of Passage 1 suggests that Lewis's team identified the requirements for soil bacteria to thrive, the team didn't replicate those features in artificial soil. Instead, the author suggests in the third and fourth paragraphs of Passage 1 that they used real soil samples. Choice B is incorrect because the author of Passage 1 doesn't suggest that the method Lewis's team used to grow microorganisms enabled soil bacteria to

take in more nutrients than they typically consume in natural settings. Instead, it can be inferred from the fourth paragraph of the passage that the bacteria were provided with the same nutrients they consume in natural settings. Choice C is incorrect because the last paragraph of Passage 1 explains that it isn't the method Lewis's team used to grow bacteria but the antibiotic the team created that affects the cell walls of bacteria.

QUESTION 45

Choice A is the best answer. The previous question asks what advantage of the method Lewis's team used to grow microorganisms is suggested by the author of Passage 1. The answer, that this method allows researchers to make use of soil bacteria that they had previously been unable to exploit, is best supported by the first through third sentences of the third paragraph of Passage 1: "Natural microbial substances from soil bacteria and fungi have been at the root of most antibiotic drug development during the past century. But only about one percent of these organisms can be grown in a lab. The rest, in staggering numbers, have remained uncultured and of limited use to medical science, until now."

Choices B, C, and D are incorrect because the cited lines don't support the answer to the previous question. Instead, they describe the gadget that Lewis's team developed to grow microorganisms (choice B), explain how the team's technique affects the bacteria (choice C), and outline how teixobactin attacks harmful bacteria (choice D).

QUESTION 46

Choice D is the best answer. In the first sentence of Passage 2, the author outlines the "long . . . suspected" belief that if researchers could "grow more types of bacteria from soil . . . then we might find new natural antibiotics." The author then explains how Lewis's team's technique that led to the development of teixobactin employed growing bacteria from soil. The author concludes in the last sentence of the first paragraph that Lewis's team's "simple and elegant methodology . . . opens a gateway to cultivating a wealth of potentially antibiotic-producing bacteria." Therefore, the author of Passage 2 would most likely agree with the statement that the development of teixobactin confirms a long-held belief about a potential source of new antibiotics.

Choice A is incorrect because the author of Passage 2 wouldn't likely agree with the statement that the development of teixobactin reveals that some antibiotics are effective against gram-negative bacteria. The author mentions gram-negative bacteria in the third paragraph to highlight teixobactin's ineffectiveness in combating it, not to discuss other antibiotics that are effective against gram-negative bacteria. Choice B is incorrect because the author wouldn't likely agree with the statement that the development of teixobactin shows that conventional methods can still yield new types of antibiotics. Instead, the author

contends that the unconventional method used to produce teixobactin may yield new types of antibiotics. Choice C is incorrect because the author wouldn't likely agree with the statement that the development of teixobactin casts doubt on the practicality of searching for new antibiotics in exotic environments. Rather, in the first paragraph of Passage 2, the author states that exotic environments might yield new antibiotics.

QUESTION 47

Choice C is the best answer. In the first sentence of the last paragraph of Passage 2, the author expresses reservations about the immediate usefulness of teixobactin: "So, what are my caveats? Well, I see three. First, teixobactin isn't a potential panacea. . . . Secondly, scaling to commercial manufacture will be challenging. . . . And, thirdly . . . teixobactin now faces the long haul of clinical trials." The author uses the word "caveats" to introduce skeptical comments about teixobactin's value. Thus, the word "caveats," as used in the first sentence of the last paragraph of Passage 2, most nearly means misgivings.

Choices A, B, and D are incorrect because in the context of the passage, "caveats" means misgivings, not exceptions (choice A), restrictions (choice B), or explanations (choice D).

QUESTION 48

Choice A is the best answer. In the last paragraph of Passage 2, the author expresses reservations regarding teixobactin. One of these reservations is that the drug "now faces the long haul of clinical trials" before teixobactin can be made available for consumers. These clinical trials will be used to discover "what dose you can safely give the patient . . . if it cures infections, and . . . to compare its efficacy to that of 'standard of care treatment,'" and are "going to take five years and £500 million." Thus, the author uses the phrase "five years and £500 million" primarily to emphasize the scale of the effort needed to make teixobactin available for consumer use.

Choices B, C, and D are incorrect because the author of Passage 2 uses the phrase "five years and £500 million" as a reference to the time and financial commitment that will be required to make teixobactin available to the public. That being the case, the phrase doesn't imply criticism of the level of funding that the government has committed to teixobactin development (choice B), address the amount of time and money that has already been spent researching teixobactin (choice C), or compare the amount of money spent developing teixobactin with the amount spent developing other antibiotics (choice D).

QUESTION 49

Choice A is the best answer. Passage 1 discusses research conducted by biochemist Kim Lewis. As described in the second paragraph of the passage, this research explored "a new way to tap the powers of

soil microorganisms" in the laboratory and led to the development of teixobactin, a promising new drug that could "function effectively for decades," thereby addressing the problem of pathogens' resistance to antibiotics. The author of Passage 2 critiques the research described in Passage 1. In the first paragraph of Passage 2, the author declares that the methodology Lewis and others developed "is their most important finding . . . for it opens a gateway to cultivating a wealth of potentially antibiotic-producing bacteria." However, teixobactin "is less exciting" to the author of Passage 2 because it has proved ineffective at combating certain types of bacteria and large investments of time and money will be needed before it can be made available to the public at large, according to the second and third paragraphs of Passage 2. Therefore, the best description of the relationship between Passage 1 and Passage 2 is that Passage 2 offers an evaluation of the significance of the research discussed in Passage 1.

Choice B is incorrect because Passage 2 doesn't suggest a modification to the methodology described in Passage 1. Instead, the author of Passage 2 embraces the "simple and elegant" methodology described in Passage 1. Choice C is incorrect because Passage 2 doesn't use concrete examples to illustrate concepts considered in Passage 1. Instead, it evaluates the significance of the research. Choice D is incorrect because Passage 2 doesn't take a dismissive stance regarding the findings mentioned in Passage 1. The author of Passage 2 endorses the methodology described in Passage 1, and concedes that teixobactin "doesn't look bad," while outlining some reservations about the drug's value.

QUESTION 50

Choice B is the best answer. The first paragraph of Passage 1 quotes biochemist Kim Lewis of Northeastern University: "Pathogens are acquiring resistance faster than we can introduce new antibiotics, and this is causing a human health crisis." However, research conducted by Lewis has produced a drug called teixobactin, which has "proved effective at killing off a wide variety of disease-causing bacteria—even those that have developed immunity to other drugs," according to the second sentence of the second paragraph of Passage 1. Similarly, in the third sentence of the second paragraph of Passage 2, the author of the passage states that teixobactin "killed the tuberculosis bacterium, which is important because there is a real problem with resistant tuberculosis in the developing world." Therefore, both passages make the point that teixobactin could be useful in combating infections that are no longer responding to treatment with other antibiotics.

Choice A is incorrect because Passage 1 outlines the methodology used to produce teixobactin but doesn't offer it as a model for future development of antibiotics produced in laboratory environments. Passage 2 suggests that future development of antibiotics may draw on the methodology that Lewis and others developed, but the passage doesn't go so far as to suggest that teixobactin could be used to

standardize this development. Choices C and D are incorrect because neither passage makes the point that teixobactin could be useful in controlling the spread of pathogenic soil fungi (choice C) or in shaping a new method of studying the effectiveness of antibiotics (choice D).

QUESTION 51

Choice C is the best answer. According to the last sentence of the fifth paragraph of Passage 1, "Mice infected with bacteria that cause upper respiratory tract infections . . . were treated with teixobactin, and the drug knocked out the infections with no noticeable toxic effects." The second paragraph of Passage 2 explains that teixobactin was tested in a laboratory and killed gram-positive bacteria, but, according to the fourth sentence of the third paragraph, it "doesn't kill the Gram-negative opportunists as it is too big to cross their complex cell wall." Therefore, since teixobactin was not successful in eradicating gram-negative bacteria as stated in Passage 2, this information best supports the conclusion that the mice described in the experiment in Passage 1 had upper respiratory tract infections that were likely not caused by gram-negative bacteria since these infections were successfully treated by teixobactin.

Choices A, B, and D are incorrect because no information in Passage 2 supports the conclusion that the mice in the experiment described in Passage 1 were less susceptible to subsequent upper respiratory tract infections due to exposure to teixobactin (choice A), the gram-positive bacteria enhanced the effectiveness of teixobactin against the upper respiratory tract infections in the mice (choice B), or the teixobactin attacked the proteins of the bacteria that caused the upper respiratory tract infections in the mice.

QUESTION 52

Choice D is the best answer. The previous question asks which conclusion about the mice in the experiment described in Passage 1 is best supported by information in Passage 2. The answer, that their upper respiratory tract infections were likely not caused by gram-negative bacteria, is best supported by the fourth sentence of the third paragraph of Passage 2: "[Teixobactin] doesn't kill the Gram-negative opportunists as it is too big to cross their complex cell wall."

Choices A, B, and C are incorrect because the cited lines don't support the answer to the previous question. Instead, they provide a historical background to Lewis's cultivation of soil bacteria (choice A), praise the methodology used by Lewis's team and others (choice B), and introduce an evaluation of teixobactin (choice C).

Section 2: Writing and Language Test

QUESTION 1

Choice B is the best answer. The verb "watch" clearly and concisely indicates that scientists can view underwater volcanic eruptions "via remotely operated vehicles."

Choices A, C, and D are incorrect because they're repetitive. "Observe," "see," and "visually" unnecessarily reiterate the idea that scientists can view underwater volcanic eruptions.

QUESTION 2

Choice B is the best answer. Sentence 5 should be placed after sentence 1. The phrase "at that depth" at the beginning of sentence 5 refers to the statement in sentence 1 that NW Rota-1's summit is located "more than 1,700 feet under the ocean's surface." Furthermore, sentence 5 leads into sentence 2, which explains what scientists were able to determine about the volcano's growth from remotely operated vehicles.

Choices A, C, and D are incorrect because placing sentence 5 anywhere in the paragraph other than after sentence 1 would create an illogical, confusing paragraph.

QUESTION 3

Choice A is the best answer. The adverb "nevertheless" correctly indicates that despite the fact that sunlight doesn't reach NW Rota-1, the bacteria there have adapted to the "perpetually dark environment" and "use hydrogen sulfide instead of sunlight" for energy.

Choices B, C, and D are incorrect because they don't indicate the true relationship between the two independent clauses. "Afterward" indicates that one event happens after another. "Furthermore" suggests that additional information about what has been said earlier in the sentence will follow. "Similarly" indicates that a comparison is being made.

QUESTION 4

Choice C is the best answer. The plural pronoun "them" agrees in number with the plural antecedent "bacteria."

Choices A, B, and D are incorrect because they're singular pronouns that don't agree in number with the plural antecedent "bacteria."

QUESTION 5

Choice D is the best answer. The conjunction "and" followed by "other chemicals" results in a sentence with a parallel series of nouns.

Choices A, B, and C are incorrect because they don't maintain the sentence's parallel structure, and they unnecessarily repeat a form of the verb "remove."

QUESTION 6

Choice C is the best answer. The dashes after "shrimp" and "Hawaii" are used correctly to set off the nonessential information between them.

Choices A and B are incorrect because neither a comma nor a semicolon can be used with a dash to set off nonessential information. Choice D is incorrect because punctuation, in this case a dash, is needed after "Hawaii" to finish setting off the nonessential information.

QUESTION 7

Choice D is the best answer. This choice's reference to "predators" most effectively sets up the sentence that follows, which explains that, as adults, the previously unknown species of shrimp feeds on the Loihi shrimp.

Choices A, B, and C are incorrect because they don't effectively set up the information in the sentence that follows. The following sentence doesn't discuss the idea that the other species of shrimp is able to adapt to its noxious environment. Additionally, it doesn't address the idea that scientists don't yet understand the adaptations of the shrimp or that their unusual ecosystem also includes crabs, limpets, and barnacles.

QUESTION 8

Choice A is the best answer. This choice most effectively combines the sentences at the underlined portion by creating a compound predicate using two parallel, singular, present tense verbs ("condenses" and "leaves") to show that as the steam condenses only "carbon dioxide bubbles and droplets of molten sulfur" are left.

Choices B, C, and D are incorrect because they don't effectively combine the sentences. The resulting sentences aren't concise, and the verbs aren't parallel.

QUESTION 9

Choice D is the best answer. This choice results in a logical comparison between the water near NW Rota-1 and stomach acid.

Choices A and B are incorrect because the demonstrative pronouns "that" and "those" don't have clear antecedents, leaving unclear what the water near NW Rota-1 is being compared to. Choice C is incorrect because it unnecessarily repeats the word "acid," resulting in a nonsensical expression ("the acid from stomach acid").

QUESTION 10

Choice C is the best answer. The singular possessive noun "world's" is used correctly to indicate that the plural noun "oceans" belongs to one world.

Choice A is incorrect because "worlds'" is a plural possessive noun, and there is only one world being referred to. Furthermore, the possessive noun "ocean's" is incorrect because nothing belongs to the ocean in this sentence. Choice B is incorrect because "oceans'" is a possessive noun, and nothing belongs to "oceans" in this sentence. Choice D is incorrect because "worlds" is a plural noun, and this noun needs to be the singular possessive noun "world's" to show that the oceans belong to one world.

QUESTION 11

Choice A is the best answer. The writer should make the revision because it shows the relevance of the sentence about rising carbon dioxide levels in Earth's atmosphere to the paragraph's point about the increasing acidity of the world's oceans.

Choice B is incorrect because the revision doesn't help readers to understand why organisms near NW Rota-1 evolved the way they did. Choices C and D are incorrect because the revision should be made. The revision doesn't repeat information, and it does contribute to the paragraph's main idea. Furthermore, it doesn't add an irrelevant detail that interrupts the discussion of oceanic life-forms.

QUESTION 12

Choice C is the best answer. The comma after "ridership" is used correctly to separate the dependent clause that begins with the word "while" from the independent clause that follows "ridership."

Choice A is incorrect because the conjunction "but" can't join a dependent clause to an independent clause. Choice B is incorrect because the conjunctions "and while" create a second dependent clause, but an independent clause is needed to make the sentence complete. Choice D is incorrect because a semicolon can't be used in this way to separate an introductory dependent clause from an independent clause.

QUESTION 13

Choice B is the best answer. This choice is the most effective because it doesn't repeat the word "people." Furthermore, this choice's use of the active voice, which indicates that "more people" (the subject of the sentence) use public transportation, eliminates unnecessary wording.

Choices A and C are incorrect because they unnecessarily repeat the noun "people." Choice D is incorrect because the use of the passive voice, which changes the subject of the sentence from "more people" to "using public transportation," creates a wordy sentence.

QUESTION 14

Choice B is the best answer. The colon correctly introduces information that illustrates what has come before it. The independent clause that follows the colon indicates that "car traffic in Tallinn was down less than 3 percent," which supports the statement before the colon that "car use in Tallinn has only slightly declined."

Choice A is incorrect because the semicolon awkwardly joins an independent clause with the dependent clause that follows. Choice C is incorrect because it creates a comma splice. Choice D is incorrect because it creates a sentence fragment after the period.

QUESTION 15

Choice D is the best answer. "The policy" clearly indicates what was enacted. The passage indicates that "car traffic in Tallinn was down less than 3 percent" since the policy of fare-free rides was enacted.

Choices A, B, and C are incorrect because the pronouns in these choices don't have clear antecedents.

QUESTION 16

Choice A is the best answer. This choice best introduces the paragraph; the phrase "devastating effect" sets up the paragraph's discussion of how fare-free systems can negatively impact a city's transportation budget.

Choices B, C, and D are incorrect because they don't introduce the paragraph's topic, which is the devastating effects of a fare-free system on a city's budget. The paragraph doesn't focus on changes in service, negative environmental impact, or increased crowding on public transportation.

QUESTION 17

Choice C is the best answer. The comma after "savings" and the conjunction "but" are used correctly to connect the two independent clauses.

Choices A and B are incorrect because they each create a comma splice. Choice D is incorrect because the conjunction "and" signals additional information rather than the needed contrast.

QUESTION 18

Choice D is the best answer. The expression "overly optimistic" is consistent with the formal tone of the passage.

Choices A, B, and C are incorrect. While "way too sunny," "looking too much on the bright side," and "pretty upbeat" all convey optimism, they're colloquial expressions that don't fit the formal tone of the passage.

QUESTION 19

Choice C is the best answer. This choice provides an accurate interpretation because the chart indicates that the projected total additional operating costs for implementing a fare-free policy in San Francisco, CA, would be $184 million per year.

Choices A, B, and D are incorrect because they don't accurately interpret the information provided in the chart for San Francisco, CA. The chart projects a cost of $112 million in lost fares, not a deficit of $72 million per year in lost fares (choice A) or a savings of $112 million from lost fares (choice B). The chart projects a cost of $72 million per year to add fare-free service, not a savings of $72 million (choice D).

QUESTION 20

Choice C is the best answer. The sentence shouldn't be added because the fact that Eugene, OR, "would lose only $5 million" doesn't support the writer's argument that fare-free systems cause large financial losses to governments.

Choices A and B are incorrect. The sentence shouldn't be added because the fact that Eugene, OR, would lose only $5 million in fares doesn't support the writer's argument against fare-free systems. Furthermore, it doesn't reinforce any claim made earlier in the paragraph by advocates of fare-free policies. Choice D is incorrect because the sentence doesn't contradict any point made earlier in the paragraph about fare collection.

QUESTION 21

Choice B is the best answer. The present indicative verb "do [not] have" is consistent in tense and mood with the present indicative verb "can go" earlier in the sentence.

Choice A is incorrect because "would [not] have had" is a perfect conditional verb. Choice C is incorrect because "did [not] have" is a past indicative verb. Choice D is incorrect because "will [not] have" is a future indicative verb.

QUESTION 22

Choice D is the best answer. This choice provides the best conclusion to the passage, which argues that fare-free transportation policies "have not been found to be an effective way to address traffic problems" and "may result in serious budget shortfalls."

Choices A, B, and C are incorrect because they don't provide the best conclusion to the passage. Choice A is too narrowly focused, and choices B and C make claims that aren't supported by information in the passage.

QUESTION 23

Choice B is the best answer. The singular third person pronoun "it" correctly refers to the singular antecedent "digital camera."

Choice A is incorrect because the plural pronoun "they" doesn't agree in number with the singular antecedent "digital camera." (It wouldn't make sense here to assume that "they" refers to "professional photographers," as there's no clear indication that the photographers referred to used the earliest digital cameras.) Choice C is incorrect because the indefinite pronoun "one" doesn't refer to a specific noun. Choice D is incorrect because the personal pronouns "he or she" refer to people, not things.

QUESTION 24

Choice B is the best answer. To make the paragraph most logical, the new sentence "Why wouldn't they?" should be placed after sentence 2. The pronoun "they" in the new sentence refers to the "vast majority" of professional photographers mentioned in sentence 2. Furthermore, the two sentences that follow the new sentence answer the question of why photographers would trade film for digital cameras by stating that the latest digital cameras take pictures that are "crisp," "bright," and "sharp."

Choices A, C, and D are incorrect because placing the new sentence anywhere in the paragraph other than after sentence 2 would create an illogical and confusing paragraph.

QUESTION 25

Choice B is the best answer. The new sentence should be added because its reference to "several intricate steps" sets up the process of wet plate photography discussed in the rest of the paragraph.

Choice A is incorrect. The sentence should be added, but it doesn't reiterate the previous paragraph's main idea. Choices C and D are incorrect because the sentence should be added. The new sentence doesn't blur the paragraph's focus on the dangers of developing wet plate photographs. It also doesn't offer an opinion: while "labor-intensive" can be interpreted as an opinion, the description of the steps is factual.

QUESTION 26

Choice D is the best answer. The plural possessive pronoun "their" agrees in number with the plural antecedent "photographers" and correctly indicates that the subjects belong to the photographers.

Choice A is incorrect because "it's" is a contraction for "it is" and doesn't make sense in the sentence. Choice B is incorrect because "its" is a singular possessive pronoun and doesn't agree in number with the plural antecedent "photographers." Choice C is incorrect because "there" isn't a possessive pronoun.

QUESTION 27

Choice A is the best answer. The coordinating conjunction "so" is used correctly to indicate that because dried collodion is unusable, a photographer has to work quickly to develop the film once the photo is taken.

Choices B, C, and D are incorrect because they don't convey the intended cause-and-effect relationship between the two independent clauses. "But" (choice B) indicates that an exception or contrast to what was said previously will follow. "And" (choice C) suggests that the two clauses indicate separate ideas instead of a cause-and-effect relationship. "For" (choice D), used as a conjunction, means "because." If used in this sentence, "for" would indicate that dried collodion is unusable because the photographer must quickly develop the photograph.

QUESTION 28

Choice D is the best answer. The word "mere" most effectively suggests that the photographer has only a very brief time to develop wet plate photographs.

Choices A, B, and C are incorrect because they don't accomplish the writer's goal of emphasizing how quickly wet plate photographers must work. "Nominal" isn't idiomatic when referring to a short amount of time. "A few" and "a matter of" can be used to describe time, but neither choice emphasizes how quickly wet plate photographers have to work.

QUESTION 29

Choice B is the best answer. The adverb "finally" correctly indicates that the last step in the process of wet plate photography is to coat the photo with a protective finish.

Choices A, C, and D are incorrect because they don't indicate that the final step in a process will follow. "In conclusion" is used to introduce a summary of what has previously been said. "Thus" indicates that a result of what has been previously stated will follow. "Nevertheless" is used to introduce a contrast to what has been stated earlier.

QUESTION 30

Choice D is the best answer. No punctuation is needed in the sentence except for a period.

Choice A is incorrect because the parentheses indicate that the information between them could be deleted without changing the meaning of the sentence. In this sentence, the information in the parentheses contains the direct object of the verb "give" and is essential. Choice B is incorrect because the dash wrongly indicates that the information following is being emphasized. Choice C is incorrect because the commas indicate that the information between them is nonessential and could be deleted.

QUESTION 31

Choice A is the best answer. The present tense verb "swirl" is consistent with the other present tense verbs in the paragraph's description of wet plate photographs.

Choices B, C, and D are incorrect because the tenses of these choices are inconsistent with the present tense verbs in the paragraph's description of wet plate photographs. "Will have swirled" (choice B) is a future perfect tense verb. "Have swirled" (choice C) is a present perfect tense verb. "Swirled" (choice D) is a simple past tense verb.

QUESTION 32

Choice D is the best answer. This choice is clear and concise and doesn't unnecessarily repeat the idea that long exposure time can cause parts of a subject to disappear in a photo.

Choices A, B, and C are incorrect because they're repetitive. The previous sentence already mentions the "long exposures," and this noun phrase doesn't need to be repeated.

QUESTION 33

Choice A is the best answer. The reference to "nineteenth-century wave riders" accomplishes the writer's goal of highlighting the contrast between present-day photographer Joni Sternbach's nineteenth-century techniques and her contemporary subjects.

Choices B, C, and D are incorrect because they don't highlight a contrast between Sternbach's techniques and her subjects. The descriptions "ordinary people," "surfers," and people "from all walks of life" don't clearly allude to the old style of her photographic techniques and, therefore, don't offer a contrast to her subjects who wear "modern board shorts and bikinis."

QUESTION 34

Choice A is the best answer. The revision should be made because the passage is about how a team of urban archaeologists uncovered the history of New York City's South Street Seaport, and this revision helps explain the job of urban archaeologists.

Choice B is incorrect because, although the revision should be made, it doesn't identify the characteristics that make "cities worthy of archaeological study." Choices C and D are incorrect because the revision should be made. Neither the kinds of artifacts that urban archaeologists find nor how excavation benefits historical study explains what urban archaeologists do.

QUESTION 35

Choice C is the best answer. The singular verb "is required" agrees in number with the singular subject "project."

Choices A, B, and D are incorrect because the plural verbs "are required," "have been required," and "were required" don't agree in number with the singular subject "project."

QUESTION 36

Choice D is the best answer. This choice is clear and concise and doesn't repeat the idea of "possibility" already mentioned in the sentence.

Choices A and B are incorrect because the words "possible" and "potentially" repeat the idea of "possibility" mentioned earlier in the sentence. Choice C is incorrect because "it is necessary that" repeats the idea mentioned later in the sentence that "an urban archaeologist must be consulted."

QUESTION 37

Choice B is the best answer. The adverb "though" correctly conveys a contrast between the facts that the work continued and the team faced obstacles.

Choices A, C, and D are incorrect because they don't indicate the true relationship between the progression of the team's work and the obstacles. "Therefore" suggests that because the work continued, the team faced obstacles. "Meanwhile" is redundant: the dependent clause "as the work continued" already implies that the work was happening when obstacles emerged. "Similarly" suggests that a comparison is being made.

QUESTION 38

Choice D is the best answer. No punctuation is needed between the verb "halted" and the prepositional phrase "by stormy weather and the discovery of toxic materials underground" that follows it.

Choices A, B, and C are incorrect because each introduces unnecessary punctuation between the verb and the prepositional phrase.

QUESTION 39

Choice C is the best answer. The noun "pedestrians" is parallel in form to the nouns "vehicles" and "car horns."

Choices A, B, and D are incorrect because the repetition of "noise" in choices A and B and the inclusion of the pronoun "that" (which stands in for "noise") in choice D violate the parallel structure of the series of nouns ("construction vehicles," "car horns," "pedestrians") serving as the objects of the preposition "of."

QUESTION 40

Choice C is the best answer. The comma is used correctly to separate the independent clause from the participial phrase that begins with "including."

Choice A is incorrect because the period after "site" results in a rhetorically poor fragment. Choice B is incorrect because the comma after "site" creates a comma splice. Choice D is incorrect because a semicolon can't be used in this way to connect an independent clause to a participial phrase.

QUESTION 41

Choice C is the best answer. This idea of "public utility planning and infrastructure development" best sets up the example that follows about how colonial-era New Yorkers secured fresh drinking water.

Choices A, B, and D are incorrect because they don't set up the discussion of colonial-era New Yorkers' public utility planning and infrastructure development. The example that follows doesn't deal with construction materials, hospitality rituals, or the financing of construction projects.

QUESTION 42

Choice A is the best answer. The word "effort" is consistent with the formal style and tone of the passage.

Choices B, C, and D are incorrect because they don't maintain the formal style and tone of the passage. Choices B and C are colloquial, and choices B and D are exaggerations that are inconsistent with the passage's informative style.

QUESTION 43

Choice D is the best answer. The subject of the sentence, "urban archaeologists," clearly identifies who makes discoveries and tells the story of a city's history.

Choices A and B are incorrect because the pronouns "they" and "we" don't have clear antecedents. Choice C is incorrect because it isn't true. "Colonial-era New Yorkers" don't make the discoveries or tell the stories to which the sentence refers.

QUESTION 44

Choice C is the best answer. This choice accomplishes the goal of identifying the broad impact of the urban archaeological team's work by mentioning that excavation "makes New York City's history real."

Choices A, B, and D are incorrect because they don't illustrate the broad impact of the team's work. Loorya's references to one of her favorite things about her work (choice A), New York City construction (choice B), and the archaeological technique of monitoring (choice D) don't provide an effective concluding statement about her team's impact.

Section 3: Math Test – No Calculator

QUESTION 1

Choice B is correct. Multiplying both sides of the first equation in the system by 2 yields $4x - 2y = 16$. Adding $4x - 2y = 16$ to the second equation in the system yields $5x = 20$. Dividing both sides of $5x = 20$ by 5 yields $x = 4$. Substituting 4 for x in $x + 2y = 4$ yields $4 + 2y = 4$. Subtracting 4 from both sides of $4 + 2y = 4$ yields $2y = 0$. Dividing both sides of this equation by 2 yields $y = 0$. Substituting 4 for x and 0 for y in the expression $x + y$ yields $4 + 0 = 4$.

Choices A, C, and D are incorrect and may result from various computation errors.

QUESTION 2

Choice A is correct. Since $(x^2 - x)$ is a common term in the original expression, like terms can be added: $2(x^2 - x) + 3(x^2 - x) = 5(x^2 - x)$. Distributing the constant term 5 yields $5x^2 - 5x$.

Choice B is incorrect and may result from not distributing the negative signs in the expressions within the parentheses. Choice C is incorrect and may result from not distributing the negative signs in the expressions within the parentheses and from incorrectly eliminating the x^2-term. Choice D is incorrect and may result from incorrectly eliminating the x-term.

QUESTION 3

Choice D is correct. To find the slope and y-intercept, the given equation can be rewritten in slope-intercept form $y = mx + b$, where m represents the slope of the line and b represents the y-intercept. The given equation $2y - 3x = -4$ can be rewritten in slope-intercept form by first adding $3x$ to both sides of the equation, which yields $2y = 3x - 4$. Then, dividing both sides of the equation by 2 results in the equation $y = \frac{3}{2}x - 2$. The coefficient of x, $\frac{3}{2}$, is the slope of the graph and is positive, and the constant term, -2, is the y-intercept of the graph and is negative. Thus, the graph of the equation $2y - 3x = -4$ has a positive slope and a negative y-intercept.

Choice A is incorrect and may result from reversing the values of the slope and the y-intercept. Choices B and C are incorrect and may result from errors in calculation when determining the slope and y-intercept values.

QUESTION 4

Choice A is correct. It's given that the front of the roller-coaster car starts rising when it's 15 feet above the ground. This initial height of 15 feet can be represented by a constant term, 15, in an equation. Each second, the front of the roller-coaster car rises 8 feet, which can

be represented by $8s$. Thus, the equation $h = 8s + 15$ gives the height, in feet, of the front of the roller-coaster car s seconds after it starts up the hill.

Choices B and C are incorrect and may result from conceptual errors in creating a linear equation. Choice D is incorrect and may result from switching the rate at which the roller-coaster car rises with its initial height.

QUESTION 5

Choice C is correct. Since the variable h represents the number of hours a job took, the coefficient of h, 75, represents the electrician's charge per hour, in dollars, after an initial fixed charge of $125. It's given that the electrician worked 2 hours longer on Ms. Sanchez's job than on Mr. Roland's job; therefore, the additional charge for Ms. Sanchez's job is $75 × 2 = $150.

Alternate approach: The amounts the electrician charged for Mr. Roland's job and Ms. Sanchez's job can be expressed in terms of t. If Mr. Roland's job took t hours, then it cost $75t + 125$ dollars. Ms. Sanchez's job must then have taken $t + 2$ hours, so it cost $75(t + 2) + 125 = 75t + 275$ dollars. The difference between the two costs is $(75t + 275) – (75t + 125) = $150.

Choice A is incorrect. This is the electrician's charge per hour, not the difference between what Ms. Sanchez was charged and what Mr. Roland was charged. Choice B is incorrect. This is the fixed charge for each job, not the difference between the two. Choice D is incorrect and may result from finding the total charge for a 2-hour job.

QUESTION 6

Choice B is correct. The ratio of the lengths of two arcs of a circle is equal to the ratio of the measures of the central angles that subtend the arcs. It's given that arc $\overset{\frown}{ADC}$ is subtended by a central angle with measure 100°. Since the sum of the measures of the angles about a point is 360°, it follows that arc $\overset{\frown}{ABC}$ is subtended by a central angle with measure 360° − 100° = 260°. If s is the length of arc $\overset{\frown}{ABC}$, then s must satisfy the ratio $\frac{s}{5\pi} = \frac{260}{100}$. Reducing the fraction $\frac{260}{100}$ to its simplest form gives $\frac{13}{5}$. Therefore, $\frac{s}{5\pi} = \frac{13}{5}$. Multiplying both sides of $\frac{s}{5\pi} = \frac{13}{5}$ by 5π yields $s = 13\pi$.

Choice A is incorrect. This is the length of an arc consisting of exactly half of the circle, but arc $\overset{\frown}{ABC}$ is greater than half of the circle. Choice C is incorrect. This is the total circumference of the circle. Choice D is incorrect. This is half the length of arc $\overset{\frown}{ABC}$, not its full length.

QUESTION 7

Choice D is correct. Multiplying both sides of the given equation by x yields $160x = 8$. Dividing both sides of the equation $160x = 8$ by 160 results in $x = \frac{8}{160}$. Reducing $\frac{8}{160}$ to its simplest form gives $x = \frac{1}{20}$, or its decimal equivalent 0.05.

Choice A is incorrect and may result from multiplying, instead of dividing, the left-hand side of the given equation by 160. Choice B is incorrect and may result from a computational error. Choice C is incorrect. This is the value of $\frac{1}{x}$.

QUESTION 8

Choice C is correct. Applying the distributive property of multiplication to the right-hand side of the given equation gives $(3x + 15) + (5x - 5)$, or $8x + 10$. An equation in the form $cx + d = rx + s$ will have no solutions if $c = r$ and $d \neq s$. Therefore, it follows that the equation $2ax - 15 = 8x + 10$ will have no solutions if $2a = 8$, or $a = 4$.

Choice A is incorrect. If $a = 1$, then the given equation could be written as $2x - 15 = 8x + 10$. Since $2 \neq 8$, this equation has exactly one solution. Choice B is incorrect. If $a = 2$, then the given equation could be written as $4x - 15 = 8x + 10$. Since $4 \neq 8$, this equation has exactly one solution. Choice D is incorrect. If $a = 8$, then the given equation could be written as $16x - 15 = 8x + 10$. Since $16 \neq 8$, this equation has exactly one solution.

QUESTION 9

Choice B is correct. A solution to the system of three equations is any ordered pair (x, y) that is a solution to each of the three equations. Such an ordered pair (x, y) must lie on the graph of each equation in the xy-plane; in other words, it must be a point where all three graphs intersect. The graphs of all three equations intersect at exactly one point, $(-1, 3)$. Therefore, the system of equations has one solution.

Choice A is incorrect. A system of equations has no solutions when there is no point at which all the graphs intersect. Because the graphs of all three equations intersect at the point $(-1, 3)$, there is a solution. Choice C is incorrect. The graphs of all three equations intersect at only one point, $(-1, 3)$. Since there is no other such point, there cannot be two solutions. Choice D is incorrect and may result from counting the number of points of intersection of the graphs of any two equations, including the point of intersection of all three equations.

QUESTION 10

Choice C is correct. If the equation is true for all x, then the expressions on both sides of the equation will be equivalent. Multiplying the polynomials on the left-hand side of the equation gives $5ax^3 - abx^2 + 4ax + 15x^2 - 3bx + 12$. On the right-hand side of the equation, the only x^2-term is $-9x^2$. Since the expressions on both

sides of the equation are equivalent, it follows that $-abx^2 + 15x^2 = -9x^2$, which can be rewritten as $(-ab + 15)x^2 = -9x^2$. Therefore, $-ab + 15 = -9$, which gives $ab = 24$.

Choice A is incorrect. If $ab = 18$, then the coefficient of x^2 on the left-hand side of the equation would be $-18 + 15 = -3$, which doesn't equal the coefficient of x^2, -9, on the right-hand side. Choice B is incorrect. If $ab = 20$, then the coefficient of x^2 on the left-hand side of the equation would be $-20 + 15 = -5$, which doesn't equal the coefficient of x^2, -9, on the right-hand side. Choice D is incorrect. If $ab = 40$, then the coefficient of x^2 on the left-hand side of the equation would be $-40 + 15 = -25$, which doesn't equal the coefficient of x^2, -9, on the right-hand side.

QUESTION 11

Choice B is correct. The right-hand side of the given equation, $\frac{2x}{2}$, can be rewritten as x. Multiplying both sides of the equation $\frac{x}{x-3} = x$ by $x - 3$ yields $x = x(x - 3)$. Applying the distributive property of multiplication to the right-hand side of the equation $x = x(x - 3)$ yields $x = x^2 - 3x$. Subtracting x from both sides of this equation yields $0 = x^2 - 4x$. Factoring x from both terms of $x^2 - 4x$ yields $0 = x(x - 4)$. By the zero product property, the solutions to the equation $0 = x(x - 4)$ are $x = 0$ and $x - 4 = 0$, or $x = 4$. Substituting 0 and 4 for x in the given equation yields $0 = 0$ and $4 = 4$, respectively. Since both are true statements, both 0 and 4 are solutions to the given equation.

Choice A is incorrect and may result from a sign error. Choice C is incorrect and may result from an error in factoring. Choice D is incorrect and may result from not considering 0 as a possible solution.

QUESTION 12

Choice D is correct. The original expression can be combined into one rational expression by multiplying the numerator and denominator of the second term by the denominator of the first term: $\frac{1}{2x+1} + 5\left(\frac{2x+1}{2x+1}\right)$, which can be rewritten as $\frac{1}{2x+1} + \frac{10x+5}{2x+1}$. This expression is now the sum of two rational expressions with a common denominator, and it can be rewritten as $\frac{1}{2x+1} + \frac{10x+5}{2x+1} = \frac{10x+6}{2x+1}$.

Choice A is incorrect and may result from a calculation error. Choice B is incorrect and may be the result of adding the denominator of the first term to the second term rather than multiplying the first term by the numerator and denominator of the second term. Choice C is incorrect and may result from not adding the numerator of $\frac{1}{2x+1}$ to the numerator of $\frac{10x+5}{2x+1}$.

QUESTION 13

Choice A is correct. The equation of a parabola in vertex form is $f(x) = a(x - h)^2 + k$, where the point (h, k) is the vertex of the parabola and a is a constant. The graph shows that the coordinates of the vertex

are (3, 1), so $h = 3$ and $k = 1$. Therefore, an equation that defines f can be written as $f(x) = a(x - 3)^2 + 1$. To find a, substitute a value for x and its corresponding value for y, or $f(x)$. For example, (4, 5) is a point on the graph of f. So a must satisfy the equation $5 = a(4 - 3)^2 + 1$, which can be rewritten as $4 = a(1)^2$, or $a = 4$. An equation that defines f is therefore $f(x) = 4(x - 3)^2 + 1$.

Choice B is incorrect and may result from a sign error when writing the equation of the parabola in vertex form. Choice C is incorrect and may result from omitting the constant a from the vertex form of the equation of the parabola. Choice D is incorrect and may result from a sign error when writing the equation of the parabola in vertex form as well as by miscalculating the value of a.

QUESTION 14

Choice B is correct. The solutions of the first inequality, $y \geq x + 2$, lie on or above the line $y = x + 2$, which is the line that passes through (−2, 0) and (0, 2). The second inequality can be rewritten in slope-intercept form by dividing the second inequality, $2x + 3y \leq 6$, by 3 on both sides, which yields $\frac{2}{3}x + y \leq 2$, and then subtracting $\frac{2}{3}x$ from both sides, which yields $y \leq -\frac{2}{3}x + 2$. The solutions to this inequality lie on or below the line $y = -\frac{2}{3}x + 2$, which is the line that passes through (0, 2) and (3, 0). The only graph in which the shaded region meets these criteria is choice B.

Choice A is incorrect and may result from reversing the inequality sign in the first inequality. Choice C is incorrect and may result from reversing the inequality sign in the second inequality. Choice D is incorrect and may result from reversing the inequality signs in both inequalities.

QUESTION 15

Choice B is correct. Squaring both sides of the given equation yields $x + 2 = x^2$. Subtracting x and 2 from both sides of $x + 2 = x^2$ yields $x^2 - x - 2 = 0$. Factoring the left-hand side of this equation yields $(x - 2)(x + 1) = 0$. Applying the zero product property, the solutions to $(x - 2)(x + 1) = 0$ are $x - 2 = 0$, or $x = 2$ and $x + 1 = 0$, or $x = -1$. Substituting $x = 2$ in the given equation gives $\sqrt{4} = -2$, which is false because $\sqrt{4} = 2$ by the definition of a principal square root. So, $x = 2$ isn't a solution. Substituting $x = -1$ into the given equation gives $\sqrt{1} = -(-1)$, which is true because $-(-1) = 1$. So $x = -1$ is the only solution.

Choices A and C are incorrect. The square root symbol represents the principal, or nonnegative, square root. Therefore, in the equation $\sqrt{x + 2} = -x$, the value of $-x$ must be zero or positive. If $x = 2$, then $-x = -2$, which is negative, so 2 can't be in the set of solutions. Choice D is incorrect and may result from incorrectly reasoning that $-x$ always has a negative value and therefore can't be equal to a value of a principal square root, which cannot be negative.

QUESTION 16

The correct answer is 360. The volume of a right rectangular prism is calculated by multiplying its dimensions: length, width, and height. Multiplying the values given for these dimensions yields a volume of (4)(9)(10) = 360 cubic centimeters.

QUESTION 17

The correct answer is 2. The left-hand side of the given equation contains a common factor of 2 and can be rewritten as $2(2x + 1)$. Dividing both sides of this equation by 2 yields $2x + 1 = 2$. Therefore, the value of $2x + 1$ is 2.

Alternate approach: Subtracting 2 from both sides of the given equation yields $4x = 2$. Dividing both sides of this equation by 4 yields $x = \frac{1}{2}$. Substituting $\frac{1}{2}$ for x in the expression $2x + 1$ yields $2\left(\frac{1}{2}\right) + 1 = 2$.

QUESTION 18

The correct answer is 8. The graph shows that the maximum value of $f(x)$ is 2. Since $g(x) = f(x) + 6$, the graph of g is the graph of f shifted up by 6 units. Therefore, the maximum value of $g(x)$ is 2 + 6 = 8.

QUESTION 19

The correct answer is $\frac{3}{4}$, or .75. By definition of the sine ratio, since $\sin R = \frac{4}{5}$, $\frac{PQ}{PR} = \frac{4}{5}$. Therefore, if $PQ = 4n$, then $PR = 5n$, where n is a positive constant. Then $QR = kn$, where k is another positive constant. Applying the Pythagorean theorem, the following relationship holds: $(kn)^2 + (4n)^2 = (5n)^2$, or $k^2n^2 + 16n^2 = 25n^2$. Subtracting $16n^2$ from both sides of this equation yields $k^2n^2 = 9n^2$. Taking the square root of both sides of $k^2n^2 = 9n^2$ yields $kn = 3n$. It follows that $k = 3$. Therefore, if $PQ = 4n$ and $PR = 5n$, then $QR = 3n$, and by definition of the tangent ratio, $\tan P = \frac{3n}{4n}$, or $\frac{3}{4}$. Either 3/4 or .75 may be entered as the correct answer.

QUESTION 20

The correct answer is 2.5. The graph of the linear function f passes through the points (0, 3) and (1, 1). The slope of the graph of the function f is therefore $\frac{1 - 3}{1 - 0} = -2$. It's given that the graph of the linear function g is perpendicular to the graph of the function f. Therefore, the slope of the graph of the function g is the negative reciprocal of −2, which is $-\frac{1}{-2} = \frac{1}{2}$, and an equation that defines the function g is $g(x) = \frac{1}{2}x + b$, where b is a constant. Since it's given that the graph of the function g passes through the point (1, 3), the value of b can be found using the equation $3 = \frac{1}{2}(1) + b$. Solving this equation for b yields $b = \frac{5}{2}$, so an equation that defines the function g is $g(x) = \frac{1}{2}x + \frac{5}{2}$. Finding the value of $g(0)$ by substituting 0 for x into this equation yields $g(0) = \frac{1}{2}(0) + \frac{5}{2}$, or $\frac{5}{2}$. Either 2.5 or 5/2 may be entered as the correct answer.

Section 4: Math Test – Calculator

QUESTION 1

Choice B is correct. Subtracting 3 from both sides of the equation yields $3x = 24$. Dividing both sides of this equation by 3 yields $x = 8$.

Choice A is incorrect and may result from finding a common factor among the three given terms instead of finding x. Choice C is incorrect and may result from incorrectly adding 3 to, instead of subtracting 3 from, the right-hand side of the equation. Choice D is incorrect. This is the value of $3x + 3$, not the value of x.

QUESTION 2

Choice D is correct. Since 1 cubit is equivalent to 7 palms, 140 cubits are equivalent to 140(7) palms, or 980 palms.

Choice A is incorrect and may result from dividing 7 by 140. Choice B is incorrect and may result from dividing 140 by 7. Choice C is incorrect. This is the length of the Great Sphinx statue in cubits, not palms.

QUESTION 3

Choice B is correct. Multiplying both sides of the given equation by 5 yields $2n = 50$. Substituting 50 for $2n$ in the expression $2n - 1$ yields $50 - 1 = 49$.

Alternate approach: Dividing both sides of $2n = 50$ by 2 yields $n = 25$. Evaluating the expression $2n - 1$ for $n = 25$ yields $2(25) - 1 = 49$.

Choice A is incorrect and may result from finding the value of $n - 1$ instead of $2n - 1$. Choice C is incorrect and may result from finding the value of $2n$ instead of $2n - 1$. Choice D is incorrect and may result from finding the value of $4n - 1$ instead of $2n - 1$.

QUESTION 4

Choice A is correct. The square root symbol represents the principal, or nonnegative, square root. Therefore, the equation $\sqrt{x^2} = x$ is only true for values of x greater than or equal to 0. Thus, -4 isn't a solution to the given equation.

Choices B, C, and D are incorrect because these values of x are solutions to the equation $\sqrt{x^2} = x$. Choosing one of these as a value of x that isn't a solution may result from incorrectly using the rules of exponents or incorrectly evaluating these values in the given equation.

QUESTION 5

Choice D is correct. The x-axis of the graph represents the time, in minutes, after the coffee was removed from the heat source, and the y-axis of the graph represents the temperature, in degrees Fahrenheit, of the coffee. The coffee was first removed from the heat source when $x = 0$. The graph shows that when $x = 0$, the y-value was a little less than 200°F. Of the answer choices given, 195 is the best approximation.

Choice A is incorrect and may result from finding the temperature after 140 minutes. Choice B is incorrect and may result from finding the temperature after 50 minutes. Choice C is incorrect and may result from finding the temperature after 10 minutes.

QUESTION 6

Choice A is correct. The average rate of change in temperature of the coffee in degrees Fahrenheit per minute is calculated by dividing the difference between two recorded temperatures by the number of minutes in the corresponding interval of time. Since the time intervals given are all 10 minutes, the average rate of change is greatest for the points with the greatest difference in temperature. Of the choices, the greatest difference in temperature occurs between 0 and 10 minutes.

Choices B, C, and D are incorrect and may result from misinterpreting the average rate of change from the graph.

QUESTION 7

Choice C is correct. It's given that $x = 100$; therefore, substituting 100 for x in triangle ABC gives two known angle measures for this triangle. The sum of the measures of the interior angles of any triangle equals 180°. Subtracting the two known angle measures of triangle ABC from 180° gives the third angle measure: $180° - 100° - 20° = 60°$. This is the measure of angle BCA. Since vertical angles are congruent, the measure of angle DCE is also 60°. Subtracting the two known angle measures of triangle CDE from 180° gives the third angle measure: $180° - 60° - 40° = 80°$. Therefore, the value of y is 80.

Choice A is incorrect and may result from a calculation error. Choice B is incorrect and may result from classifying angle CDE as a right angle. Choice D is incorrect and may result from finding the measure of angle BCA or DCE instead of the measure of angle CDE.

QUESTION 8

Choice A is correct. The cost of each additional mile traveled is represented by the slope of the given line. The slope of the line can be calculated by identifying two points on the line and then calculating the ratio of the change in y to the change in x between the two points. Using the points (1, 5) and (2, 7), the slope is equal to $\frac{7-5}{2-1}$, or 2. Therefore, the cost for each additional mile traveled of the cab ride is $2.00.

Choice B is incorrect and may result from calculating the slope of the line that passes through the points (5, 13) and (0, 0). However, (0, 0) does not lie on the line shown. Choice C is incorrect. This is the y-coordinate of the y-intercept of the graph and represents the flat fee for a cab ride before the charge for any miles traveled is added. Choice D is incorrect. This value represents the total cost of a 1-mile cab ride.

QUESTION 9

Choice D is correct. The total number of gas station customers on Tuesday was 135. The table shows that the number of customers who did not purchase gasoline was 50. Finding the ratio of the number of customers who did not purchase gasoline to the total number of customers gives the probability that a customer selected at random on that day did not purchase gasoline, which is $\frac{50}{135}$.

Choice A is incorrect and may result from finding the probability that a customer did not purchase a beverage, given that the customer did not purchase gasoline. Choice B is incorrect and may result from finding the probability that a customer did not purchase gasoline, given that the customer did not purchase a beverage. Choice C is incorrect and may result from finding the probability that a customer did purchase a beverage, given that the customer did not purchase gasoline.

QUESTION 10

Choice D is correct. It is given that the number of students surveyed was 336. Finding $\frac{1}{4}$ of 336 yields $\left(\frac{1}{4}\right)(336) = 84$, the number of freshmen, and finding $\frac{1}{3}$ of 336 yields $\left(\frac{1}{3}\right)(336) = 112$, the number of sophomores. Subtracting these numbers from the total number of selected students results in $336 - 84 - 112 = 140$, the number of juniors and seniors combined. Finding half of this total yields $\left(\frac{1}{2}\right)(140) = 70$, the number of juniors. Subtracting this number from the number of juniors and seniors combined yields $140 - 70 = 70$, the number of seniors.

Choices A and C are incorrect and may result from calculation errors. Choice B is incorrect. This is the total number of juniors and seniors.

QUESTION 11

Choice A is correct. It's given that the ratio of the heights of Plant A to Plant B is 20 to 12 and that the height of Plant C is 54 centimeters. Let x be the height of Plant D. The proportion $\frac{20}{12} = \frac{54}{x}$ can be used to solve for the value of x. Multiplying both sides of this equation by x yields $\frac{20x}{12} = 54$ and then multiplying both sides of this equation by 12 yields $20x = 648$. Dividing both sides of this equation by 20 yields $x = 32.4$ centimeters.

Choice B is incorrect and may result from a calculation error. Choice C is incorrect and may result from finding the difference in heights between Plant A and Plant B and then adding that to the height of Plant C. Choice D is incorrect and may result from using the ratio 12 to 20 rather than 20 to 12.

QUESTION 12

Choice D is correct. It's given that 1 kilometer is approximately equivalent to 0.6214 miles. Let x be the number of kilometers equivalent to 3.1 miles. The proportion $\frac{1 \text{ kilometer}}{0.6214 \text{ miles}} = \frac{x \text{ kilometers}}{3.1 \text{ miles}}$ can be used to solve for the value of x. Multiplying both sides of this equation by 3.1 yields $\frac{3.1}{0.6214} = x$, or $x \approx 4.99$. This is approximately 5 kilometers.

Choice A is incorrect and may result from misidentifying the ratio of kilometers to miles as miles to kilometers. Choice B is incorrect and may result from calculation errors. Choice C is incorrect and may result from calculation and rounding errors.

QUESTION 13

Choice C is correct. Let a equal the number of 120-pound packages, and let b equal the number of 100-pound packages. It's given that the total weight of the packages can be at most 1,100 pounds: the inequality $120a + 100b \leq 1{,}100$ represents this situation. It's also given that the helicopter must carry at least 10 packages: the inequality $a + b \geq 10$ represents this situation. Values of a and b that satisfy these two inequalities represent the allowable numbers of 120-pound packages and 100-pound packages the helicopter can transport. To maximize the number of 120-pound packages, a, in the helicopter, the number of 100-pound packages, b, in the helicopter needs to be minimized. Expressing b in terms of a in the second inequality yields $b \geq 10 - a$, so the minimum value of b is equal to $10 - a$. Substituting $10 - a$ for b in the first inequality results in $120a + 100(10 - a) \leq 1{,}100$. Using the distributive property to rewrite this inequality yields $120a + 1{,}000 - 100a \leq 1{,}100$, or $20a + 1{,}000 \leq 1{,}100$. Subtracting 1,000 from both sides of this inequality yields $20a \leq 100$. Dividing both sides of this inequality by 20 results in $a \leq 5$. This means that the maximum number of 120-pound packages that the helicopter can carry per trip is 5.

Choices A, B, and D are incorrect and may result from incorrectly creating or solving the system of inequalities.

QUESTION 14

Choice B is correct. The difference between the machine's starting value and its value after 10 years can be found by subtracting $30,000 from $120,000: 120,000 − 30,000 = 90,000. It's given that the value of the machine depreciates by the same amount each year for 10 years. Dividing $90,000 by 10 gives $9,000, which is the amount by which the value depreciates each year. Therefore, over a period of t years,

the value of the machine depreciates by a total of $9{,}000t$ dollars. The value v of the machine, in dollars, t years after it was purchased is the starting value minus the amount of depreciation after t years, or $v = 120{,}000 - 9{,}000t$.

Choice A is incorrect and may result from using the value of the machine after 10 years as the machine's starting value. Choice C is incorrect. This equation shows the amount the machine's value changes each year being added to, rather than subtracted from, the starting value. Choice D is incorrect and may result from multiplying the machine's value after 10 years by t instead of multiplying the amount the machine depreciates each year by t.

QUESTION 15

Choice D is correct. The slope-intercept form of a linear equation is $y = ax + b$, where a is the slope of the graph of the equation and b is the y-coordinate of the y-intercept of the graph. Two ordered pairs (x_1, y_1) and (x_2, y_2) can be used to compute the slope of the line with the formula $a = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the two ordered pairs (2, 4) and (0, 1) into this formula gives $a = \frac{4 - 1}{2 - 0}$, which simplifies to $\frac{3}{2}$. Substituting this value for a in the slope-intercept form of the equation yields $y = \frac{3}{2}x + b$. Substituting values from the ordered pair (0, 1) into this equation yields $1 = \frac{3}{2}(0) + b$, so $b = 1$. Substituting this value for b in the slope-intercept equation yields $y = \frac{3}{2}x + 1$.

Choice A is incorrect. This may result from misinterpreting the change in x-values as the slope and misinterpreting the change in y-values as the y-coordinate of the y-intercept of the graph. Choice B is incorrect and may result from using the x- and y-values of one of the given points as the slope and y-coordinate of the y-intercept, respectively. Choice C is incorrect. This equation has the correct slope but the incorrect y-coordinate of the y-intercept.

QUESTION 16

Choice B is correct. Multiplying the binomials in the given expression results in $4ax^2 + 4ax - 4x - 4 - x^2 + 4$. Combining like terms yields $4ax^2 + 4ax - 4 - x^2$. Grouping by powers of x and factoring out their greatest common factors yields $(4a - 1)x^2 + (4a - 4)x$. It's given that this expression is equivalent to bx, so $(4a - 1)x^2 + (4a - 4)x = bx$. Since the right-hand side of the equation has no x^2 term, the coefficient of the x^2 term on the left-hand side must be 0. This gives $4a - 1 = 0$ and $4a - 4 = b$. Since $4a - 1 = 0$, $4a = 1$. Substituting the value of $4a$ into the second equation gives $1 - 4 = b$, so $b = -3$.

Choices A, C, and D are incorrect and may result from a calculation error.

QUESTION 17

Choice C is correct. Multiplying both sides of $2w + 4t = 14$ by 2 yields $4w + 8t = 28$. Subtracting the second given equation from $4w + 8t = 28$ yields $(4w - 4w) + (8t - 5t) = (28 - 25)$ or $3t = 3$. Dividing both sides of this equation by 3 yields $t = 1$. Substituting 1 for t in the equation $2w + 4t = 14$ yields $2w + 4(1) = 14$, or $2w + 4 = 14$. Subtracting 4 from both sides of this equation yields $2w = 10$, and dividing both sides of this equation by 2 yields $w = 5$. Substituting 5 for w and 1 for t in the expression $2w + 3t$ yields $2(5) + 3(1) = 13$.

Choices A, B, and D are incorrect and may result from incorrectly calculating the values of w and t, or from correctly calculating the values of w and t but finding the value of an expression other than $2w + 3t$. For instance, choice A is the value of $w + t$, choice B is the value of $2w$, and choice D is the value of $2t + 3w$.

QUESTION 18

Choice B is correct. It's given that each serving of Crunchy Grain cereal provides 5% of an adult's daily allowance of potassium, so x servings would provide x times 5%. The percentage of an adult's daily allowance of potassium, p, is 5 times the number of servings, x. Therefore, the percentage of an adult's daily allowance of potassium can be expressed as $p = 5x$.

Choices A, C, and D are incorrect and may result from incorrectly converting 5% to its decimal equivalent, which isn't necessary since p is expressed as a percentage. Additionally, choices C and D are incorrect because the context should be represented by a linear relationship, not by an exponential relationship.

QUESTION 19

Choice B is correct. It's given that a $\frac{3}{4}$-cup serving of Crunchy Grain cereal provides 210 calories. The total number of calories per cup can be found by dividing 210 by $\frac{3}{4}$, which gives $210 \div \frac{3}{4} = 280$ calories per cup. Let c be the number of cups of Crunchy Grain cereal and s be the number of cups of Super Grain cereal. The expression $280c$ represents the number of calories in c cups of Crunchy Grain cereal, and $240s$ represents the number of calories in s cups of Super Grain cereal. The equation $280c + 240s = 270$ gives the total number of calories in one cup of the mixture. Since $c + s = 1$ cup, $c = 1 - s$. Substituting $1 - s$ for c in the equation $280c + 240s = 270$ yields $280(1 - s) + 240s = 270$, or $280 - 280s + 240s = 270$. Simplifying this equation yields $280 - 40s = 270$. Subtracting 280 from both sides results in $-40s = -10$. Dividing both sides of the equation by -40 results in $s = \frac{1}{4}$, so there is $\frac{1}{4}$ cup of Super Grain cereal in one cup of the mixture.

Choices A, C, and D are incorrect and may result from incorrectly creating or solving the system of equations.

QUESTION 20

Choice A is correct. There are 0 calories in 0 servings of Crunchy Grain cereal so the line must begin at the point (0, 0). Point (0, 0) is the origin, labeled *O*. Additionally, each serving increases the calories by 250. Therefore, the number of calories increases as the number of servings increases, so the line must have a positive slope. Of the choices, only choice A shows a graph with a line that begins at the origin and has a positive slope.

Choices B, C, and D are incorrect. These graphs don't show a line that passes through the origin. Additionally, choices C and D may result from misidentifying the slope of the graph.

QUESTION 21

Choice D is correct. Since the function h is exponential, it can be written as $h(x) = ab^x$, where a is the y-coordinate of the y-intercept and b is the growth rate. Since it's given that the y-coordinate of the y-intercept is d, the exponential function can be written as $h(x) = db^x$. These conditions are only met by the equation in choice D.

Choice A is incorrect. For this function, the value of $h(x)$ when $x = 0$ is −3, not d. Choice B is incorrect. This function is a linear function, not an exponential function. Choice C is incorrect. This function is a polynomial function, not an exponential function.

QUESTION 22

Choice B is correct. The median weight is found by ordering the horses' weights from least to greatest and then determining the middle value from this list of weights. Decreasing the value for the horse with the lowest weight doesn't affect the median since it's still the lowest value.

Choice A is incorrect. The mean is calculated by finding the sum of all the weights of the horses and then dividing by the number of horses. Decreasing one of the weights would decrease the sum and therefore decrease the mean. Choice C is incorrect. Range is the difference between the highest and lowest weights, so decreasing the lowest weight would increase the range. Choice D is incorrect. Standard deviation is calculated based on the mean weight of the horses. Decreasing one of the weights decreases the mean and therefore would affect the standard deviation.

QUESTION 23

Choice B is correct. In order for the poll results from a sample of a population to represent the entire population, the sample must be representative of the population. A sample that is randomly selected from a population is more likely than a sample of the type described to represent the population. In this case, the people who responded were people with access to cable television and websites,

which aren't accessible to the entire population. Moreover, the people who responded also chose to watch the show and respond to the poll. The people who made these choices aren't representative of the entire population of the United States because they were not a random sample of the population of the United States.

Choices A, C, and D are incorrect because they present reasons unrelated to whether the sample is representative of the population of the United States.

QUESTION 24

Choice C is correct. Substituting $x + a$ for x in $f(x) = 5x^2 - 3$ yields $f(x + a) = 5(x + a)^2 - 3$. Expanding the expression $5(x + a)^2$ by multiplication yields $5x^2 + 10ax + 5a^2$, and thus $f(x + a) = 5x^2 + 10ax + 5a^2 - 3$. Setting the expression on the right-hand side of this equation equal to the given expression for $f(x + a)$ yields $5x^2 + 30x + 42 = 5x^2 + 10ax + 5a^2 - 3$. Because this equality must be true for all values of x, the coefficients of each power of x are equal. Setting the coefficients of x equal to each other gives $10a = 30$. Dividing each side of this equation by 10 yields $a = 3$.

Choices A, B, and D are incorrect and may result from a calculation error.

QUESTION 25

Choice C is correct. The sine of an angle is equal to the cosine of the angle's complement. This relationship can be expressed by the equation $\sin x° = \cos (90° - x°)$. Therefore, if $\sin x° = a$, then $\cos (90° - x°)$ must also be equal to a.

Choices A and B are incorrect and may result from misunderstanding the relationship between the sine and cosine of complementary angles. Choice D is incorrect and may result from misinterpreting $\sin (x^2)°$ as $\sin^2 (x)°$.

QUESTION 26

Choice D is correct. The positive x-intercept of the graph of $y = h(x)$ is a point (x, y) for which $y = 0$. Since $y = h(x)$ models the height above the ground, in feet, of the projectile, a y-value of 0 must correspond to the height of the projectile when it is 0 feet above ground or, in other words, when the projectile is on the ground. Since x represents the time since the projectile was launched, it follows that the positive x-intercept, $(x, 0)$, represents the time at which the projectile hits the ground.

Choice A is incorrect and may result from misidentifying the y-intercept as a positive x-intercept. Choice B is incorrect and may result from misidentifying the y-value of the vertex of the graph of the function as an x-intercept. Choice C is incorrect and may result from misidentifying the x-value of the vertex of the graph of the function as an x-intercept.

QUESTION 27

Choice A is correct. Since $(a, 0)$ and $(b, 0)$ are the only two points where the graph of f crosses the x-axis, it must be true that $f(a) = 0$ and $f(b) = 0$ and that $f(x)$ is not equal to 0 for any other value of x. Of the given choices, choice A is the only function for which this is true. If $f(x) = (x - a)(x - b)$, then $f(a) = (a - a)(a - b)$, which can be rewritten as $f(a) = 0(a - b)$, or $f(a) = 0$. Also, $f(b) = (b - a)(b - b)$, which can be rewritten as $f(b) = (b - a)(0)$, or $f(b) = 0$. Furthermore, if $f(x) = (x - a)(x - b)$ is equal to 0, then it follows that either $x - a = 0$ or $x - b = 0$. Solving each of these equations by adding a to both sides of the first equation and adding b to both sides of the second equation yields $x = a$ or $x = b$. Therefore, the graph of $f(x) = (x - a)(x - b)$ crosses the x-axis at exactly two points, $(a, 0)$ and $(b, 0)$.

Choice B is incorrect because $f(a) = (2a)(a + b)$, which can't be 0 because it's given that a and b are positive. Choice C is incorrect because $f(b) = (b - a)(2b)$; its graph could only be 0 if $b = a$, but it would cross the x-axis at only one point, since $(a, 0)$ and $(b, 0)$ would be the same point. Choice D is incorrect because its graph crosses the x-axis at (0, 0) as well as at $(a, 0)$ and $(b, 0)$.

QUESTION 28

Choice C is correct. Substituting 0 for x in the given equation yields $3(0)^2 + 6(0) + 2 = 2$. Therefore, the graph of the given equation passes through the point (0, 2), which is the y-intercept of the graph. The right-hand side of the given equation, $y = 3x^2 + 6x + 2$, displays the constant 2, which directly corresponds to the y-coordinate of the y-intercept of the graph of this equation in the xy-plane.

Choice A is incorrect. The y-coordinate of the vertex of the graph is −1, not 3, 6, or 2. Choice B is incorrect. The x-coordinates of the x-intercepts of the graph are at approximately −1.577 and −0.423, not 3, 6, or 2. Choice D is incorrect. The x-coordinate of the x-intercept of the line of symmetry is at −1, not 3, 6, or 2.

QUESTION 29

Choice A is correct. The given equation is in slope-intercept form, or $y = mx + b$, where m is the value of the slope of the line of best fit. Therefore, the slope of the line of best fit is 0.096. From the definition of slope, it follows that an increase of 1 in the x-value corresponds to an increase of 0.096 in the y-value. Therefore, the line of best fit predicts that for each year between 1940 and 2010, the minimum wage will increase by 0.096 dollar per hour.

Choice B is incorrect and may result from using the y-coordinate of the y-intercept as the average increase, instead of the slope. Choice C is incorrect and may result from using the 10-year increments given on the x-axis to incorrectly interpret the slope of the line of best fit. Choice D is incorrect and may result from using the y-coordinate

of the y-intercept as the average increase, instead of the slope, and from using the 10-year increments given on the x-axis to incorrectly interpret the slope of the line of best fit.

QUESTION 30

Choice D is correct. On the line of best fit, d increases from approximately 480 to 880 between $t = 12$ and $t = 24$. The slope of the line of best fit is the difference in d-values divided by the difference in t-values, which gives $\frac{880 - 480}{24 - 12} = \frac{400}{12}$, or approximately 33. Writing the equation of the line of best fit in slope-intercept form gives $d = 33t + b$, where b is the y-coordinate of the y-intercept. This equation is satisfied by all points on the line, so $d = 480$ when $t = 12$. Thus, $480 = 33(12) + b$, which is equivalent to $480 = 396 + b$. Subtracting 396 from both sides of this equation gives $b = 84$. Therefore, an equation for the line of best fit could be $d = 33t + 84$.

Choice A is incorrect and may result from an error in calculating the slope and misidentifying the y-coordinate of the y-intercept of the graph as the value of d at $t = 10$ rather than the value of d at $t = 0$. Choice B is incorrect and may result from using the smallest value of t on the graph as the slope and misidentifying the y-coordinate of the y-intercept of the graph as the value of d at $t = 10$ rather than the value of d at $t = 0$. Choice C is incorrect and may result from misidentifying the y-coordinate of the y-intercept as the smallest value of d on the graph.

QUESTION 31

The correct answer is 6. Circles are symmetric with respect to any given diameter through the center (h, k). One diameter of the circle is perpendicular to the x-axis. Therefore, the value of h is the mean of the x-coordinates of the circle's two x-intercepts: $h = \frac{20 + 4}{2} = 12$. The radius of the circle is given as 10, so the point (h, k) must be a distance of 10 units from any point on the circle. The equation of any circle can be written as $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center of the circle and r is the length of the radius of the circle. Substituting 12 for h and 10 for r into this equation gives $(x - 12)^2 + (y - k)^2 = 10^2$. Substituting the x-coordinate and y-coordinate of a point on the circle, $(4, 0)$, gives $(4 - 12)^2 + (0 - k)^2 = 10^2$, or $64 + k^2 = 100$. Subtracting 64 from both sides of this equation yields $k^2 = 36$. Therefore, $k = \pm\sqrt{36}$. Since the graph shows the point (h, k) in the first quadrant, k must be the positive square root of 36, so $k = 6$.

QUESTION 32

The correct answer is 2. It's given that line ℓ is perpendicular to the line with equation $y = -\frac{2}{3}x$. Since the equation $y = -\frac{2}{3}x$ is written in slope-intercept form, the slope of the line is $-\frac{2}{3}$. The slope of line ℓ must be the negative reciprocal of $-\frac{2}{3}$, which is $\frac{3}{2}$. It's also given that

the y-coordinate of the y-intercept of line ℓ is -13, so the equation of line ℓ in slope-intercept form is $y = \frac{3}{2}x - 13$. If $y = b$ when $x = 10$, $b = \frac{3}{2}(10) - 13$, which is equivalent to $b = 15 - 13$, or $b = 2$.

QUESTION 33

The correct answer is 8. In this group, $\frac{1}{9}$th of the people who are rhesus negative have blood type B. The total number of people who are rhesus negative in the group is $7 + 2 + 1 + x$, and there are 2 people who are rhesus negative with blood type B. Therefore, $\frac{2}{(7 + 2 + 1 + x)} = \frac{1}{9}$. Combining like terms on the left-hand side of the equation yields $\frac{2}{(10 + x)} = \frac{1}{9}$. Multiplying both sides of this equation by 9 yields $\frac{18}{(10 + x)} = 1$, and multiplying both sides of this equation by $(10 + x)$ yields $18 = 10 + x$. Subtracting 10 from both sides of this equation yields $8 = x$.

QUESTION 34

The correct answer is 9. The median number of goals scored is found by ordering the number of goals scored from least to greatest and then determining the middle value in the list. If the number of goals scored in each of the 29 games were listed in order from least to greatest, the median would be the fifteenth number of goals. The graph shows there were 8 games with 1 goal scored and 9 games with 2 goals scored. Therefore, the fifteenth number, or the median number, of goals scored must be 2. According to the graph, the soccer team scored 2 goals in 9 of the games played.

QUESTION 35

The correct answer is 15. It's given that the deductions reduce the original amount of taxes owed by $2,325.00. Since the deductions reduce the original amount of taxes owed by d%, the equation $\frac{2{,}325}{15{,}500} = \frac{d}{100}$ can be used to find this percent decrease, d. Multiplying both sides of this equation by 100 yields $\frac{232{,}500}{15{,}500} = d$, or $15 = d$. Thus, the tax deductions reduce the original amount of taxes owed by 15%.

QUESTION 36

The correct answer is 1.5. It's given that the system of linear equations has no solutions. Therefore, the lines represented by the two equations are parallel. Each of the equations can be written in slope-intercept form, or $y = mx + b$, where m is the slope of the line and b is the y-coordinate of the line's y-intercept. Subtracting $\frac{3}{4}x$ from both sides of $\frac{3}{4}x - \frac{1}{2}y = 12$ yields $-\frac{1}{2}y = -\frac{3}{4}x + 12$. Dividing both sides of

this equation by $-\frac{1}{2}$ yields $y = \frac{-\frac{3}{4}}{-\frac{1}{2}}x + \frac{12}{-\frac{1}{2}}$, or $y = \frac{3}{2}x - 24$. Therefore, the slope of the line represented by the first equation in the system is $\frac{3}{2}$. The second equation in the system can be put into slope-intercept form by first subtracting ax from both sides of $ax - by = 9$, then dividing both sides of the equation by $-b$, which yields $y = \frac{a}{b}x - \frac{9}{b}$. Therefore, the slope of the line represented by the second equation in the system is $\frac{a}{b}$. Parallel lines have equal slopes. Therefore, $\frac{a}{b} = \frac{3}{2}$. Either 3/2 or 1.5 may be entered as the correct answer.

QUESTION 37

The correct answer is 1.3. The median number of tourists is found by ordering the number of tourists from least to greatest and determining the middle value from this list. When the number of tourists in 2012 is ordered from least to greatest, the middle value, or the fifth number, is 46.4 million. When the number of tourists in 2013 is ordered from least to greatest, the middle value, or the fifth number, is 47.7 million. The difference between these two medians is 47.7 million − 46.4 million = 1.3 million.

QUESTION 38

The correct answer is 3. Let y be the number of international tourist arrivals in Russia in 2012, and let x be the number of these arrivals in 2011. It's given that y is 13.5% greater than x, or $y = 1.135x$. The table gives that $y = 24.7$, so $24.7 = 1.135x$. Dividing both sides of this equation by 1.135 yields $\frac{24.7}{1.135} = x$, or $x \approx 21.8$ million arrivals. The difference in the number of tourist arrivals between these two years is 24.7 million − 21.8 million = 2.9 million. Therefore, the value of k is 3 when rounded to the nearest integer.

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Answers Explanation Test #5

Answer Explanations

SAT Practice Test #5

Section 1: Reading Test

QUESTION 1

Choice A is the best answer. Throughout the passage, the narrator refers to Miss Spivey's 1938 class as "we" and "us" and describes interactions between Miss Spivey and her students as a firsthand observer, indicating that the narrator was a member of this 1938 class. Therefore, the narrator of the passage can best be described as one of Miss Spivey's former students.

Choice B is incorrect because the narrator refers to Miss Spivey's predecessor, Miss Chandler, by name, not as "I" or "me," and therefore the narrator isn't Miss Spivey's predecessor. Choice C is incorrect because the passage identifies the narrator as a member of Miss Spivey's 1938 class and also mentions the narrator's mother and brother, Ralphord. Choice D is incorrect because the narrator refers to Miss Spivey by name and as "she" and "her," not as "I" or "me," and thus can't be Miss Spivey herself.

QUESTION 2

Choice B is the best answer. The description of the train's arrival in the first paragraph suggests that Threestep is a rural town: instead of a paved platform, the tracks are lined with "burned grass." Meanwhile, the description of the school in the sixth paragraph implies that the community is small: instead of individual rooms for separate grade levels, the school's single room contains twenty-six students spread "across seven grade levels." Therefore, Threestep is mainly presented in the passage as a small rural town.

Choice A is incorrect because the narrator describes Threestep as uncomfortably hot for its residents, not as a summer retreat for vacationers. Choice C is incorrect because Miss Spivey refers to prominent universities located in other cities, not ones located in Threestep. Choice D is incorrect because in the first paragraph Threestep is characterized as a small rural town that is experiencing "hard times," not as a comfortable suburb.

QUESTION 3

Choice D is the best answer. In the first paragraph, Miss Spivey remarks that the heat in Georgia is nothing compared to the heat she experienced in Timbuktu. Later in this paragraph the narrator states, "I believe her remark irritated some of the people gathered to welcome her on the burned grass alongside the tracks. When folks are sweating through their shorts, they don't like to hear that this is *nothing* compared to someplace else." Hence it can reasonably be inferred from the passage that some of the people at the train station regard Miss Spivey's comment about the Georgia heat with resentment because they feel that she is minimizing their discomfort.

Choice A is incorrect because Miss Spivey informs the people at the train station that she has experienced even more extreme heat, so they wouldn't have assumed that she is experiencing intense heat for the first time. Choice B is incorrect because the passage indicates that the people at the station know Miss Spivey is coming to Threestep to work, not that they doubt she will stay there very long. Choice C is incorrect because the passage doesn't indicate that the people at the train station imagine that she is superior to them.

QUESTION 4

Choice B is the best answer. The previous question asks what can be inferred from the passage about the reaction of the people at the train station to Miss Spivey's comment about the Georgia heat. The answer, that it can be reasonably inferred from the passage that some of the people at the train station regard Miss Spivey's comment about the Georgia heat with resentment because they feel that she's minimizing their discomfort, is best supported in the first paragraph: "I believe her remark irritated some of the people gathered to welcome her on the burned grass alongside the tracks. When folks are sweating through their shorts, they don't like to hear that this is *nothing* compared to someplace else."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe Miss Spivey's appearance (choice A), reflect on why people viewed her arrival positively in spite of their irritation over her remark (choice C), and outline her education (choice D).

QUESTION 5

Choice A is the best answer. In the second paragraph, Miss Spivey describes a break she took from her formal education as a "fruitful intermission." She explains that she "traveled extensively in the Near East and Africa with a friend of her grandmother's, one Janet Miller" during this time. Therefore, Miss Spivey most likely uses the phrase "fruitful intermission" to indicate that she benefited from taking time off from her studies to travel.

Choice B is incorrect because Miss Spivey's use of the phrase "fruitful intermission" doesn't indicate that her travels with Janet Miller encouraged her to start medical school. Choice C is incorrect because Miss Spivey uses the phrase "fruitful intermission" to refer to a break in her formal education after boarding school, not during her early years there. Choice D is incorrect because Miss Spivey's use of the phrase "fruitful intermission" doesn't indicate that this break lasted longer than she had expected.

QUESTION 6

Choice A is the best answer. In the second paragraph, Miss Spivey tells her class that she went to Barnard College in New York City, which prompts Ralphord to ask her what she studied at "Barnyard College." In response, Miss Spivey explains that Barnard College "was the sister school of Columbia University, of which, she expected, we all had heard." This interaction implies that, contrary to Miss Spivey's expectations, the names of prestigious East Coast schools aren't common knowledge among her pupils. Thus the interaction between Miss Spivey and Ralphord serves mainly to suggest that Miss Spivey has an exaggerated view of what information should be considered common knowledge.

Choice B is incorrect because the interaction between Miss Spivey and Ralphord establishes an atmosphere of misunderstanding, not friendliness. Choice C is incorrect because Ralphord's question demonstrates his naivety rather than his precociousness. Choice D is incorrect because the passage doesn't suggest that Ralphord's question is an attempt to amuse Miss Spivey.

QUESTION 7

Choice D is the best answer. The third paragraph describes Miss Spivey as having "wandered," or walked aimlessly, into a lecture by John Dewey. Following her interactions with the professor, Miss Spivey was inspired to work as an educator; consequently, she "marched," or walked purposefully, to sign up for the Teacher's College. Hence, by describing Miss Spivey as having "wandered" in the former situation and "marched" in the latter, the narrator is most likely suggesting that Miss Spivey's initial encounter with Dewey's ideas was somewhat accidental but ultimately motivated her to decisive action.

Choices A and C are incorrect because the narrator's description of Miss Spivey as having "wandered" into Dewey's class and "marched" to sign up for the Teacher's College suggests that her accidental encounter with him motivated her to begin studying to be a teacher, not that Dewey saw Miss Spivey as lacking confidence in her ability to teach (choice A) or that she was anxious to be in charge of her own classroom (choice C). Choice B is incorrect

because Miss Spivey didn't express a desire to teach in the poorest, most remote corner of America until two years after talking with Dewey over coffee.

QUESTION 8

Choice C is the best answer. According to the third paragraph, after two years at the Teacher's College, Miss Spivey told a woman from the WPA that "she wanted to bring democracy and education to the poorest, darkest, most remote and forgotten corner of America." Consequently, "they sent her to Threestep, Georgia," according to the fourth paragraph. Thus Miss Spivey ended up in Threestep as a direct result of talking with a woman at the WPA.

Choices A and B are incorrect because Miss Spivey ended up in Threestep as a direct result of talking with a woman at the WPA, not as an immediate consequence of her friendship with Janet Miller (choice A), or her decision to attend college in New York City (choice B). Choice D is incorrect because Miss Chandler is mentioned as Miss Spivey's predecessor in Threestep, but Miss Spivey's arrival in town doesn't occur as a direct result of Miss Chandler's retirement.

QUESTION 9

Choice C is the best answer. The ninth paragraph describes the students' reaction to Miss Spivey's announcement that she had seen camels on her trip to Baghdad: "We all hung there for a minute, thinking hard, until Mavis Davis spoke up." Mavis reminds the other students that camels appear in a story they are familiar with. Thus, when Miss Spivey announces that she had seen camels, the students' reaction suggests that they are baffled.

Choices A, B, and D are incorrect because when Miss Spivey announces that she had seen camels, the students' reaction suggests that they are baffled, not delighted (choice A), fascinated (choice B), or worried (choice D).

QUESTION 10

Choice B is the best answer. The previous question asks what the students' reaction suggests about them when Miss Spivey announces that she had seen camels. The answer, that their reaction suggests that they are baffled, is best supported in the ninth paragraph: "We all hung there for a minute, thinking hard, until Mavis Davis spoke up."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe Miss Spivey's anticipation of a delighted or amazed response to her announcement that she had seen camels (choice A),

relay Mavis's reference to a story familiar to the students (choice C), and reflect on the subdued nature of Miss Spivey's response to Mavis (choice D).

QUESTION 11

Choice D is the best answer. Throughout the passage, the author contends that efforts to make driving more unpleasant can curtail the negative environmental effects of car use, such as the rapid growth of "energy-hungry subdivisions." According to the second paragraph, "one of the few forces with a proven ability to slow the growth of suburban sprawl has been the ultimately finite tolerance of commuters for long, annoying commutes." Consequently, according to the last paragraph, "from an environmental perspective, inconvenient travel is a worthy goal." Thus the main purpose of the passage is to argue that one way to reduce the negative environmental effects of traffic is to make driving less agreeable.

Choice A is incorrect because the author introduces the claim that efforts to reduce traffic actually increase traffic as a supporting point, not as the main purpose of the passage. Choice B is incorrect because, in the second paragraph, the author does dispute the environmental value of making car travel more convenient, but this isn't the main purpose of the passage. Choice C is incorrect because the negative environmental consequences of car-focused development and suburban sprawl are supporting details of the passage, not its main purpose.

QUESTION 12

Choice A is the best answer. In the first paragraph, the author states, "Building good transit isn't a bad idea, but it can actually backfire if the new trains and buses merely clear space on highway lanes for those who would prefer to drive—a group that, historically, has included almost everyone with access to a car." In this sentence, the author bases his claim about the unintended consequences of building public transit on the expectation that most people would prefer to drive a car than take trains and buses. Hence this sentence best supports the idea that the author assumes that, all things being equal, people would rather drive than take mass transit.

Choices B, C, and D are incorrect because the cited lines don't provide the best support for the idea that the author assumes that, all things being equal, people would rather drive than take mass transit. Instead, they argue that in order to have positive environmental effects, new transit options have to persuade a substantial number of people not to drive (choice B), contend that unpopular efforts to make driving less convenient are necessary to reduce driving (choice C), and connect increased commute times to a reduction in suburban sprawl (choice D).

QUESTION 13

Choice A is the best answer. The first paragraph states, "That means that a new transit system has to be backed up by something that impels complementary reductions in car use." In other words, new public transportation initiatives need to be supported, or reinforced, by policies that reduce car use. Thus "backed up," as used in the passage, most nearly means supported.

Choices B, C, and D are incorrect because in the context of the passage, "backed up" means supported, not copied (choice B), substituted (choice C), or jammed (choice D).

QUESTION 14

Choice B is the best answer. In the first paragraph, the author introduces some proposals for reducing car traffic by making driving slower and less convenient. However, he also acknowledges that "those ideas are not popular." Thus, in the first paragraph, the author concedes that his recommendations aren't widely supported.

Choice A is incorrect because, in the first paragraph, the author doesn't indicate that his recommendations are costly to implement. Choice C is incorrect because the author concedes that his recommendations are unpopular with the general public, not strongly opposed by experts. Choice D is incorrect because the author suggests that his recommendations are environmentally beneficial in the long term, not environmentally harmful in the short term.

QUESTION 15

Choice C is the best answer. In the second paragraph, the author argues that "if, in a misguided effort to do something of environmental value, municipalities take steps that make long-distance car commuting faster or more convenient . . . we actually make the sprawl problem worse." That is, measures that make driving more convenient actually harm the environment because they encourage more people to live in suburban developments, which represents wasteful expansion in his view. Therefore, based on the passage, the author would most likely characterize many attempts to improve traffic as well intentioned but ultimately leading to environmental harm.

Choices A, B, and D are incorrect because the author doesn't characterize attempts to improve traffic as doomed to fail due to drivers' reluctance to change their behavior (choice A), as overestimating drivers' tolerance of long commutes (choice B), or as viable only if they make driving more economical and productive (choice D).

QUESTION 16

Choice C is the best answer. The previous question asks how the author would most likely characterize many attempts to improve traffic. The answer, that the author would most likely characterize such attempts as well intentioned but ultimately leading to environmental harm, is best supported in the second paragraph: "If, in a misguided effort to do something of environmental value, municipalities take steps that make long-distance car commuting faster or more convenient—by adding lanes, building bypasses, employing traffic-control measures that make it possible for existing roads to accommodate more cars with fewer delays, replacing tollbooths with radio-based systems that don't require drivers even to slow down—we actually make the sprawl problem worse."

Choices A, B, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they assert that public transit improvements must be supported by measures to reduce car use (choice A), indicate that tolerance for long commutes has grown recently, but has a natural limit (choice B), and elaborate on why improvements in public transport can fail to decrease road use (choice D).

QUESTION 17

Choice D is the best answer. The second paragraph discusses how efforts to make commuting more convenient can have the unintended consequence of encouraging people to live farther away from their jobs: "If you cut commuting time by 10 percent, people who now drive fifty miles each way to work can justify moving five miles farther out, because their travel time won't change." Therefore, according to the passage, reducing commuting time for drivers can have the effect of making drivers more willing to live farther from their places of employment.

Choices A, B, and C are incorrect because the passage doesn't suggest that reducing commuting time can make drivers more productive employees (choice A), can cause mass transit to be extended farther into suburban areas (choice B), or can result in less government funding for mass transit (choice C).

QUESTION 18

Choice C is the best answer. The last paragraph asserts, "No one ever promotes a transit scheme by arguing that it would make traveling less convenient." In other words, nobody advocates, or pushes for, changes to the transportation system by arguing that they would make traveling less convenient. Thus "promotes," as used in the passage, most nearly means advocates.

Choices A, B, and D are incorrect because in the context of the passage, "promotes" means advocates, not upgrades (choice A), serves (choice B), or develops (choice D).

QUESTION 19

Choice B is the best answer. Figure 1 presents data related to the effect of route capacity reduction on selected regions. In the row pertaining to Southampton city center, the number 5,316 appears under the heading "Vehicles per day on altered road" in the column that specifies "Before alteration." Thus, according to figure 1, the number of vehicles that traveled on the altered road through Southampton city center per day before the route was altered is 5,316.

Choice A is incorrect because 3,081 is the number of vehicles per day that traveled on the Southampton city center road after it was altered, not before. Choice C is incorrect because 24,101 is the number of vehicles per day that traveled on roads surrounding the Southampton city center road after it was altered. Choice D is incorrect because 26,522 is the number of vehicles that traveled on roads surrounding the Southampton city center road before it was altered.

QUESTION 20

Choice B is the best answer. In the first paragraph, the author of the passage argues that "to have environmental value . . . a new transit system has to be backed up by something that impels complementary reductions in car use—say, the physical elimination of traffic lanes." According to figure 1, reducing route capacity resulted in a net reduction in regional traffic in all five areas studied. Therefore, the data in figure 1 support the author's argument because the data show that reducing road capacity can lead to a net reduction in traffic.

Choice A is incorrect. Figure 1 data support the author's argument that route capacity reduction results in a reduction of car use, but the figure doesn't provide data relating to the "induced traffic" phenomenon. Choices C and D are incorrect because figure 1 data support, not weaken, the author's argument that route capacity reduction such as elimination of traffic lanes results in reduction of traffic.

QUESTION 21

Choice D is the best answer. Figure 2 presents data related to an opinion poll of transportation engineers. According to the *y*-axis label, the engineers were asked whether a significant road space reallocation could result in people changing various aspects of their driving. The graph shows four different answer possibilities: "yes," "yes (in exceptional circumstances)," "no," and "don't know." The question asks for the aspect of driver behavior that the engineers surveyed thought was least likely to change in the event of a reallocation of road space according to figure 2: when they travel,

their means of traveling, how often they make a journey, or their driving style. Of these four choices, "their driving style," received the smallest percentage of "yes" and "yes (in exceptional circumstances)" responses and the largest percentage of "no" responses. Hence, based on figure 2, the engineers surveyed were most skeptical of the idea that, in the event of a reallocation of road space, drivers would change their driving style.

Choices A, B, and C are incorrect because, according to figure 2, when the engineers were asked whether they thought that drivers would change when they travel (choice A), their means of traveling (choice B), or how often they make a journey (choice C) in the event of a significant road space reallocation, they gave more "yes" or "yes (in exceptional circumstances)" answers, and fewer "no" answers than they gave in response to the question of whether they thought drivers would change their driving style. Thus the engineers were less skeptical of these potential changes than they were of the idea that drivers would change their driving style in the event of a significant road space reallocation.

QUESTION 22

Choice D is the best answer. The first paragraph asserts that textbook authors in the early 1990s believed that "sensations of pressure and vibration . . . travel only along myelinated, fast-signaling nerve fibers." Thus, based on the passage, textbook authors in the early 1990s would most likely have expected that the ability to perceive vibrations would be impaired as a result of blocking fast fibers.

Choices A, B, and C are incorrect because the passage indicates that textbook authors in the early 1990s believed blocking fast nerve fibers would impair sensations of vibration, not that blocking would increase the firing rate of other fibers (choice A), cause gentle stimuli to be perceived as painful (choice B), or make the body compensate by using slow fibers to sense pressure (choice C).

QUESTION 23

Choice B is the best answer. The previous question asks what condition textbook authors in the early 1990s would most likely have expected to result from blocking fast fibers. The answer, that they would most likely have expected blocking fast fibers to result in an impairment of the ability to perceive vibrations, is best supported in the first paragraph, which refers to the views of textbook authors in the early 1990s: "Sensations of pressure and vibration were believed to travel only along myelinated, fast-signaling nerve fibers, which also give information about location."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they assert that textbook authors in the early 1990s believed

slow-conducting nerves responded only to pain and temperature stimuli (choice A), noted that blocking slow fibers only seemed to reduce sensitivity to warmth or small painful shocks (choice C), and knew that fast-conducting fibers responded to touch at a signal rate of 35 to 75 m/s (choice D).

QUESTION 24

Choice A is the best answer. The second paragraph states, "Håkan Olausson and his Gothenburg University colleagues Åke Vallbo and Johan Wessberg wondered if slow fibers responsive to gentle pressure might be active in humans as well as in other mammals." In other words, the researchers wondered if these nerves were present, or existent, in humans and other mammals. Therefore, in the context of the passage, the word "active" most nearly means present.

Choices B, C, and D are incorrect because in the context of the passage, "active" most nearly means present, not attentive (choice B), movable (choice C), or restless (choice D).

QUESTION 25

Choice C is the best answer. The second paragraph states, "Using a technique called microneurography, in which a fine filament is inserted into a single nerve to capture its electrical impulses, the scientists were able to measure how quickly—or slowly—the nerves fired." In other words, the researchers used the technique known as microneurography to record, or register, the electrical signals sent by nerve fibers. Therefore, in the context of the passage, the word "capture" most nearly means record.

Choices A, B, and D are incorrect because in the context of the passage, "capture" most nearly means record, not occupy (choice A), seize (choice B), or influence (choice D).

QUESTION 26

Choice C is the best answer. According to the passage, different types of nerve fibers carry signals at different speeds, either fast or slow. The second paragraph outlines a study led by Håkan Olausson in 1993 that measured the response time of nerves when exposed to gentle pressure. Olausson and his team found that "soft stroking prompted two different signals" in test subjects' nerve fibers, "one immediate and one delayed." Therefore, the conclusion that is best supported by the findings of Olausson's 1993 experiment is that gentle pressure is sensed not only by fast fibers but also by slow fibers.

Choices A and D are incorrect because according to the passage, Olausson's 1993 study didn't compare how signal speed was affected by stimulation in different bodily areas (choice A) or by different

amounts of pressure applied to the nerve (choice D). Choice B is incorrect because the passage notes that only human hairy skin contains slow nerve fibers, not that hair causes signal speeds to slow.

QUESTION 27

Choice B is the best answer. The previous question asks which conclusion is best supported by the findings of Olausson's 1993 experiment. The answer, that Olausson's 1993 experiment best supports the conclusion that gentle pressure is sensed not only by fast fibers but also by slow fibers, is best supported in the second paragraph: Olausson's team "showed that soft stroking prompted two different signals, one immediate and one delayed."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe a technique used by Olausson's team (choice A), quantify the amount of time between the fast signals and the slow signals observed by Olausson's team (choice C), and introduce a further study conducted by Olausson's team in 1999 (choice D).

QUESTION 28

Choice D is the best answer. This sentence from the fourth paragraph outlines a quandary that arose from the 1999 study conducted by Olausson's team: "But why exactly humans might have such fibers, which respond only to a narrow range of rather subtle stimuli, was initially mystifying." The passage presents this line of inquiry as a justification for the team's subsequent research on CT fibers. Thus this sentence serves mainly to show a problem from the perspective of Olausson's team.

Choices A, B, and C are incorrect. The cited lines serve mainly to show a problem from the perspective of Olausson's team, not to identify factors Olausson had previously failed to consider (choice A), propose a solution to a dilemma encountered by Olausson (choice B), or anticipate a potential criticism of Olausson by the reader (choice C).

QUESTION 29

Choice A is the best answer. According to the fifth paragraph, Olausson set out to discover, in his team's 1999 research, whether a CT nerve "can distinguish *where* the brush touches the arm, and whether it can discern the difference between a goat-hair brush and a feather. Most importantly, could that same fiber convey a pleasant sensation?" Therefore, it can reasonably be inferred that one of the intended goals of the 1999 experiment was to determine the precise nature of sensations that CT fibers can convey.

Choices B, C, and D are incorrect because in their 1999 research, Olausson's team didn't seek to determine the relationship between human body hair and CT fiber function (choice B), the role played by CT fibers in the perception of pain (choice C), or the effects of microneurography on CT fiber signaling (choice D).

QUESTION 30

Choice D is the best answer. In the 1999 study, Olausson's team conducted experiments on a patient known as G.L. The researchers wanted to learn more about what type of sensations slow-conducting CT nerve fibers transmit, and G.L. was of special interest to them, according to the sixth paragraph: "More than 2 decades earlier . . . she had lost responsiveness to pressure, and a nerve biopsy confirmed that G.L.'s quick-conducting fibers were gone. . . . But she could still sense warmth, suggesting that her slow-conducting unmyelinated fibers were intact." The fact that G.L.'s slow-conducting fibers were still intact while her other nerves were unresponsive allowed Olausson's team to study her slow-conducting CT fibers in isolation. Thus the main purpose of the sixth paragraph is to indicate why G.L.'s medical condition was of value to Olausson's experiment.

Choices A, B, and C are incorrect because the sixth paragraph doesn't indicate that Olausson's team set out to relieve any of the neurological conditions that G.L. exhibited (choice A), compare G.L.'s nerve function with that of other adults (choice B), or detail any procedures that G.L. had experienced during previous experiments (choice C).

QUESTION 31

Choice A is the best answer. According to the last paragraph, "in normal subjects, both the somatosensory and insular cortices were activated [by gentle brushing], but only the insular cortex [which processes emotion] was active when researchers brushed G.L.'s arm." Therefore, according to the passage, G.L. differed from Olausson's other test subjects in terms of the number of cortices activated in the brain during gentle brushing.

Choice B is incorrect because the passage doesn't address the physical dimensions of the somatosensory cortex in G.L. or other test subjects. Choice C is incorrect because G.L. differed from other test subjects in terms of the number of cortices activated in the brain during gentle brushing, not in terms of the intensity of nerve signals required to activate the insular cortex. Choice D is incorrect because MRI scanning is discussed in the passage as a method used to locate brain activity, not as a focus of study in Olausson's research.

QUESTION 32

Choice B is the best answer. According to the last paragraph, Olausson's 1999 research, in which CT fibers were stimulated, "solidified the notion that CT fibers convey a more emotional quality of touch." Hence humans experience an emotional aspect of touch when CT fibers are exposed to a stimulus, according to the passage.

Choice A is incorrect because the passage doesn't indicate that humans experience an emotional aspect of touch when brain cortices are shielded from nerve signals. Choice C is incorrect because the suppression of G.L.'s pain-sensing fibers did help Olausson study CT fibers in isolation and determine that they transmit an emotional aspect of touch, but the passage doesn't suggest that suppressing these fibers is what allows humans to experience this emotional aspect of touch. Choice D is incorrect because the passage indicates that CT fibers transmit an emotional aspect of touch rather than conscious aspects of sensation, not that humans must ignore the conscious aspects of sensation in order to experience the emotional aspects of touch.

QUESTION 33

Choice C is the best answer. In the first paragraph of Passage 1, Beveridge portrays America as "a noble land that God has given us; a land that can feed and clothe the world; a land whose coast lines would enclose half the countries of Europe." Thus, in Passage 1, Beveridge asserts that the resources and immensity of the United States constitute a divine gift to the American people.

Choice A is incorrect because Beveridge envisions Americans occupying foreign lands, not being subject to foreign invasion; moreover, he asserts that the resources and immensity of the United States constitute a divine gift, not a safeguard against invasion. Choice B is incorrect because Beveridge asserts that American society constitutes an improvement on English society, not that the resources and immensity of the United States replicate conditions in Europe. Choice D is incorrect because Beveridge doesn't assert that the resources and immensity of the United States constitute a source of envy for people in other countries.

QUESTION 34

Choice B is the best answer. In the second paragraph of Passage 1, Beveridge commands his audience several times to think of a future in which American laws and customs have been extended to foreign countries, leading American citizens to move to those places. According to Beveridge, this will provide Hawaii and Puerto Rico with "justice and safety," the Philippines with "order and equity," and Cuba with a "civilization of energy and industry." Thus, in the second paragraph of Passage 1, the commands given by Beveridge mainly serve to anticipate the benefits of a proposed policy.

Choices A, C, and D are incorrect because Beveridge's commands serve to anticipate the benefits of a proposed foreign policy, not to remind the audience of its civic responsibilities (choice A), emphasize the urgency of a national problem (choice C), or refute an argument advanced by opponents (choice D).

QUESTION 35

Choice B is the best answer. The fourth paragraph of Passage 2 asserts that "a truth once spoken can never be recalled. It goes on and on, and no one can set a limit to its ever-widening influence." In other words, when a true idea has been introduced to the world, it can never be retracted, or taken back. Therefore, in the context of the passage, the word "recalled" most nearly means retracted.

Choices A, C, and D are incorrect because in the context of the passage, "recalled" most nearly means retracted, not repeated (choice A), rejected (choice C), or remembered (choice D).

QUESTION 36

Choice D is the best answer. In the fourth paragraph of Passage 2, Bryan argues that the principle of self-rule set forth in the Declaration of Independence is, in fact, a value that all people instinctively aspire to. Indeed, for Bryan, "[God] never made a race of people so low in the scale of civilization or intelligence that it would welcome a foreign master." Therefore, it can reasonably be inferred from Passage 2 that Bryan considers the preference for national sovereignty over foreign rule to be a manifestation of an innate drive in humans toward self-rule.

Choices A and C are incorrect because it can reasonably be inferred that Bryan considers the preference for national sovereignty over foreign rule to be a manifestation of a universal drive in humans that's independent of circumstances, not a reaction to the excesses of imperial governments in the modern era (choice A) or a testament to the effects of the foreign policy of the United States (choice C). Choice B is incorrect because Bryan indicates that a preference for self-rule is universal, not that belief in human equality is widespread.

QUESTION 37

Choice C is the best answer. The previous question asks what can reasonably be inferred from Passage 2 about Bryan's views on the preference for national sovereignty over foreign rule. The answer, that Bryan considers the preference to be a manifestation of an innate drive in humans toward self-rule, is best supported in the fourth paragraph of Passage 2: "[God] never made a race of people so low in the scale of civilization or intelligence that it would welcome a foreign master."

Choices A, B, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they indicate that explicitly promoting imperialism would run counter to the words of American founding father Patrick Henry (choice A), assert that once a truth is uttered, its influence will continually grow (choice B), and introduce the notion that, in Bryan's view, an imperial project in the Philippines would hurt not only the people of that nation but also the people of the United States (choice D).

QUESTION 38

Choice A is the best answer. The last paragraph of Passage 2 states, "Those who would have this Nation enter upon a career of empire must consider, not only the effect of imperialism on the Filipinos, but they must also calculate its effects upon our own nation." In other words, proponents of imperial conquest must evaluate, or assess, the consequences of this policy for the United States. Therefore, in the context of the passage, the word "calculate" most nearly means evaluate.

Choices B, C, and D are incorrect because in the context of the passage, "calculate" most nearly means evaluate, not design (choice B), assume (choice C), or multiply (choice D).

QUESTION 39

Choice A is the best answer. In the first paragraph of Passage 1, Beveridge references the founding and history of the United States as "a glorious history" that was bestowed upon God's "chosen people," a history heroic with faith in its mission and future, and "statesmen, who flung the boundaries of the Republic out into unexplored lands." Similarly, in the second paragraph of Passage 2, Bryan declares, "Our whole history has been an encouragement . . . to all who are denied a voice in their own government." Bryan goes on to extol the virtues of several figures who were instrumental in the founding of the United States, including Thomas Jefferson and George Washington. Hence, in developing their respective arguments, Beveridge (Passage 1) and Bryan (Passage 2) both express admiration for the founding and history of the United States.

Choice B is incorrect because neither Bryan, in Passage 1, nor Beveridge, in Passage 2, expresses admiration for the vibrancy and diversity of American culture. Choice C is incorrect because Bryan expresses admiration for the worldwide history of struggles for independence, but Beveridge doesn't. Choice D is incorrect because Beveridge expresses admiration for the idealism that permeates many aspects of American society, but Bryan doesn't.

QUESTION 40

Choice B is the best answer. In the first paragraph of Passage 1, Beveridge argues that Americans are "imperial by virtue of their power" and are therefore justified in being "the propagandists . . . of liberty." In the second paragraph, he extols the benefits that will arise from American administration of various island nations. Meanwhile, in the last sentence of Passage 2, Bryan cautions, "We cannot repudiate the principle of self-government in the Philippines without weakening that principle here"; in other words, imperial expansion by the United States would erode a key American value. Therefore, the difference between how the speakers view liberty as it is realized in the United States is that Beveridge considers it so exemplary as to justify the conquest of other regions, whereas Bryan warns that its exemplary quality would be undermined by imperial expansion.

Choice A is incorrect because Beveridge doesn't present the concept of liberty as it's realized in the United States as the direct inheritance of European colonization. Choice C is incorrect because Beveridge doesn't argue that the concept of liberty as it's realized in the United States arose organically as the country matured; instead, both Beveridge and Bryan emphasize the divinely inspired, intrinsic nature of the American concept of liberty. Choice D is incorrect because Bryan views the concept of liberty as it's realized in the United States as encompassing a desire for self-rule and argues that this desire is universal and not unique to the United States.

QUESTION 41

Choice D is the best answer. In Passage 1, Beveridge advocates for American administration of island nations, such as the Philippines. However, in the first paragraph of Passage 2, Bryan warns, "If it is right for the United States to hold the Philippine Islands permanently and imitate European empires in the government of colonies, the Republican party . . . must expect the subject races to protest against such a policy and to resist to the extent of their ability." Thus it can most reasonably be inferred from Passage 2 that Bryan would criticize the vision of American governance of island territories that Beveridge presents in Passage 1 for being naive, since the islanders would object to being governed by Americans.

Choices A, B, and C are incorrect because, in Passage 2, Bryan doesn't imply that Beveridge's vision of American governance of island territories is unrealistic due to most Americans' unwillingness to relocate to distant islands (choice A), deceptive due to the fact that economic domination would be the true goal of the American government (choice B), or impractical due to the islanders' insistence upon an equal distribution of resources (choice C).

QUESTION 42

Choice A is the best answer. The previous question asks what criticism Bryan would most likely make of Beveridge's vision of American governance of island territories. The answer, that Bryan would criticize this vision for being naive, since islanders would object to being governed by Americans, is best supported by the first paragraph of Passage 2: "If it is right for the United States to hold the Philippine Islands permanently and imitate European empires in the government of colonies, the Republican party ought to state its position and defend it, but it must expect the subject races to protest against such a policy and to resist to the extent of their ability."

Choices B, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they assert that the people of the Philippines don't need encouragement from Americans to resist imperialism (choice B), state that American history encourages resistance to imperialism by all people, including the people of the Philippines (choice C), and note the enduring resonance of Patrick Henry's famous quote about liberty (choice D).

QUESTION 43

Choice A is the best answer. The passage summarizes research on the relationship between plowing and weed growth. According to the fourth paragraph, the research of Karl Hartmann suggests that plowing fields during the day leads to weed growth because exposure to even small amounts of light can "induce seed germination," or cause seeds to sprout. Thus, according to the passage, exposure to light allows seeds to begin to develop.

Choices B and D are incorrect because the passage indicates that small amounts of light cause seeds to sprout, but it doesn't explicitly assert that light exposure allows seeds to absorb necessary nutrients (choice B) and doesn't discuss whether light exposure helps seeds achieve maximum growth (choice D). Choice C is incorrect because the passage doesn't indicate that light exposure can help seeds withstand extreme temperatures.

QUESTION 44

Choice B is the best answer. In the second paragraph of the passage, the following question is posed: "Do the blades of a plow, which can reach more than a foot beneath the soil surface, bring some of these buried seeds to the surface where their germination is induced by exposure to sunlight?" The passage goes on to describe research conducted both in the laboratory and in the field that sought to answer this question. Hence the question in the second paragraph primarily serves to introduce the specific research topic addressed in the passage.

Choice A is incorrect because the question in the second paragraph doesn't primarily serve to emphasize the provisional nature of the findings discussed in the passage. Sauer and Struik's 1960s lab experiments, described in the third paragraph, produced findings that could be characterized as provisional; however, Karl Hartmann's research described in the fourth paragraph clearly demonstrated that plowing at night can be an effective way to reduce weed growth. Choice C is incorrect because the impact of the studies analyzed in the passage has been real and practical, not hypothetical. Choice D is incorrect because the question in the second paragraph doesn't indicate that there is any significant disagreement about the methods explored in the passage.

QUESTION 45

Choice D is the best answer. The last sentence of the second paragraph asks, "Do the blades of a plow . . . bring some of these buried seeds to the surface where their germination is induced by exposure to sunlight?" In other words, does some farm equipment bring buried seeds to the surface where their sprouting is stimulated, or activated, by exposure to sunlight? Therefore, in the context of the passage, the word "induced" most nearly means stimulated.

Choices A, B, and C are incorrect because in the context of the passage, "induced" most nearly means stimulated, not lured (choice A), established (choice B), or convinced (choice C).

QUESTION 46

Choice C is the best answer. The question asks which selection from the passage best supports the idea that seeds present in fields plowed at night are exposed to some amount of light. The fourth paragraph asserts that plowing at night can reduce the germination of weed seeds. The paragraph concludes that "although even under these conditions hundreds of millions of photons strike each square millimeter of ground each second, this illumination is below the threshold needed to stimulate the germination of most seeds." Thus this sentence best supports the idea that seeds present in fields plowed at night are exposed to some amount of light.

Choices A, B, and D are incorrect because the cited lines don't provide the best support for the idea that seeds present in fields plowed at night are exposed to some amount of light. Instead, they relay Hartmann's initial reasoning about seed exposure to light in fields plowed during the day (choice A), affirm that even minute durations of sunlight exposure can induce seed germination (choice B), and explain Hartmann's initial skepticism regarding his own idea about the effectiveness of nighttime plowing as a weed deterrent (choice D).

QUESTION 47

Choice A is the best answer. The sixth paragraph describes an experiment conducted by Karl Hartmann with the help of farmer Karl Seydel. Seydel plowed one strip of land during the day and the other at night to see what effect this had on weed growth. However, "no crops were planted in these pilot experiments, to avoid possible competition with the emerging weeds." Thus the passage suggests that if Seydel had planted wheat or corn on the two agricultural strips in Hartmann's experiment, the percentage of the surface of each strip covered with weeds would likely have been lower than the percentage that Hartmann found.

Choice B is incorrect. If Seydel had planted wheat or corn crops on the two agricultural strips, the percentage of weeds wouldn't have been higher than the percentage predicted because competition with the crops would have prevented some weed growth. Choice C is incorrect because a reduction in weed growth would have been easily observable, not nearly impossible for Hartmann to determine. Choice D is incorrect. Hartmann's original projection was that plowing at night wouldn't provide more effective weed control. Therefore, the dramatic drop in the percentage of weeds covering the strip plowed at night wouldn't have been comparable with Hartmann's original projection, regardless of whether crops were planted.

QUESTION 48

Choice B is the best answer. The previous question asks what the passage suggests about the percentage of surface that would have been covered with weeds if Seydel had planted wheat or corn on the two agricultural strips in Hartmann's experiment. The answer, that the percentage of surface with weeds would have been lower than the percentage Hartmann found, is best supported in the sixth paragraph: "No crops were planted in these pilot experiments, to avoid possible competition with the emerging weeds."

Choices A, C, and D are incorrect because the cited lines don't provide the best evidence for the answer to the previous question. Instead, they describe the conditions of Hartmann's experiment (choice A), characterize the results of the experiment as dramatic (choice C), and report the results of the experiment (choice D).

QUESTION 49

Choice C is the best answer. The sixth paragraph states, in reference to Hartmann's experiment, "The results were dramatic. More than 80 percent of the surface of the field plowed in daylight was covered by weeds, whereas only about 2 percent of the field plowed at night was covered by weeds." In other words, the outcome of the experiment was impressive, or striking. Therefore, in the context of the passage, the word "dramatic" most nearly means impressive.

Choices A, B, and D are incorrect because, in the context of the passage, "dramatic" most nearly means impressive, not theatrical (choice A), sudden (choice B), or emotional (choice D).

QUESTION 50

Choice A is the best answer. According to the table, 0 weed seedlings emerged in sample A when the soil was disturbed in darkness. This is the lowest number of seedlings recorded among all the samples in the table when the soil was disturbed in darkness.

Choices B, C, and D are incorrect because sample B (choice B), sample C (choice C), and sample D (choice D) had 1, 2, and 3 seedlings emerge, respectively, when the soil was disturbed in darkness. These totals are all greater than 0, the number of seedlings that emerged from sample A when the soil was disturbed in darkness.

QUESTION 51

Choice C is the best answer. According to the table, 14 weed seedlings emerged in sample I when the soil was disturbed in light. This is the highest number of seedlings recorded among all the samples in the table when the soil was disturbed in light.

Choices A, B, and D are incorrect because sample G (choice A), sample H (choice B), and sample J (choice D) had 0, 2, and 5 seedlings emerge, respectively, when the soil was disturbed in light. This is less than the 14 seedlings that emerged from sample I when the soil was disturbed in light.

QUESTION 52

Choice D is the best answer. The data presented in the table show that in nine of the ten soil samples studied, fewer weeds grew in the soil when it was disturbed in darkness than when it was disturbed in light. The fourth paragraph relays Karl Hartmann's hypothesis based on Sauer and Struik's studies of weed growth in the 1960s: "Thus the germination of weed seeds would be minimized if farmers simply plowed their fields during the night, when the photon fluence rate [the rate at which photons hit the surface] is below 10^{15} photons per square meter per second." Therefore, the data presented in the table most directly support the claim made in the fourth paragraph of the passage.

Choices A, B, and C are incorrect because the cited lines aren't directly supported by the data presented in the table. While the findings in the table report on weed growth in soil stirred up during the day and night, these lines discuss the prehistoric use of plowing to control weeds (choice A), the number of weed seeds buried beneath the soil surface (choice B), and the depth at which seeds are buried that prevents them from germinating (choice C).

Section 2: Writing and Language Test

QUESTION 1

Choice A is the best answer. The conjunction "and" appropriately separates the last two nouns in the series, "radio" and "other media."

Choices B, C, and D are incorrect because "and with," "and also," and "and competing with" disrupt the parallel structure of the series of three nouns ("television," "radio," "[other] media") introduced by "competing with."

QUESTION 2

Choice D is the best answer. The topic of the passage is the creation of *The Cat in the Hat* as a means of getting children more interested in learning to read. Hersey's suggestion that one way of making children's books more interesting was to use "drawings like those of the wonderfully imaginative geniuses among children's illustrators" best supports the topic of the passage.

Choices A, B, and C are incorrect because they don't support the topic of the passage. A sense of wholeness and accomplishment, the value of failure, and a difference between journalism and fiction don't support the idea of making children's literature more interesting.

QUESTION 3

Choice A is the best answer. The comma after "Spaulding" is paired correctly with the comma after "Mifflin" to set off grammatically nonessential information.

Choice B is incorrect because a comma is needed after "Spaulding" to set off the nonessential phrase that ends with "Mifflin." Choice C is incorrect because placing a comma after "Spaulding" and after "director" wrongly indicates that "the director" could be deleted without changing the meaning of the sentence. Choice D is incorrect because a dash can't be paired with a comma to set off grammatically nonessential information.

QUESTION 4

Choice A is the best answer. This choice most effectively combines the sentences at the underlined portion because it's concise and correctly indicates that Spaulding saw a need for appealing books for beginning readers at the same time that he thought he knew who should write one.

Choice B is incorrect because "namely" indicates that a more specific restatement of an earlier point or an example will follow. In this case, what follows the idea that Spaulding saw a need for appealing books is his thought about who should write one. Choice C is incorrect because the repetition of Spaulding's name is unnecessary.

Choice D is incorrect because the adverb "meanwhile" is redundant; the conjunction "and" is sufficient to indicate that Spaulding had two thoughts simultaneously.

QUESTION 5

Choice D is the best answer. This choice, which indicates that Geisel published nine children's books and received three nominations for the prestigious Caldecott Medal, supports the information that follows in the sentence about Geisel being an experienced writer and illustrator.

Choices A, B, and C are incorrect. Geisel's long relationship with Spaulding, Geisel's reputation for perfectionism and for setting high standards, and his interest in politics don't support the idea that Geisel was an experienced writer and illustrator.

QUESTION 6

Choice A is the best answer; "however" correctly indicates that even though Geisel was an experienced writer and illustrator, the new project presented him with an obstacle.

Choices B, C, and D are incorrect because none of these transitional words or phrases shows the true relationship between the challenging nature of the new project and Geisel's experience. "For example," "furthermore," and "at any rate" indicate that what follows is an instance of, additional to, or unrelated to what was stated in the previous sentence.

QUESTION 7

Choice C is the best answer. The introductory phrase "on the verge of giving up" doesn't have its own subject. Instead, the subject appears at the beginning of the sentence's main clause and makes clear what is being described in the introductory phrase. "Geisel" is the logical subject of the sentence because he can be described as being "on the verge of giving up."

Choices A, B, and D are incorrect because "Geisel's story," "an image," and "the story" can't be described as being "on the verge of giving up."

QUESTION 8

Choice D is the best answer. This choice concisely indicates that it took Geisel nine months to complete *The Cat in the Hat*.

Choices A, B, and C are incorrect because they're repetitive. "Duration" and "long" (choice A), "thirty-six weeks" (choice B), and "length" (choice C) unnecessarily repeat the idea that nine months had passed.

QUESTION 9

Choice D is the best answer. The underlined portion should be deleted because it isn't necessary. Since "were entertained" appears earlier in the sentence, the past participle "captivated" is sufficient without the repetition of "were."

Choices A, B, and C are incorrect because "is captivated," "was captivated," and "has been captivated" are singular verbs that don't agree in number with the plural subject "children."

QUESTION 10

Choice C is the best answer. The comma after "followed" is used correctly to separate the dependent phrase "in the years that followed" from the independent clause that begins with "many."

Choices A, B, and D are incorrect because a period, a semicolon, or a dash can't be used in this way to separate an introductory dependent phrase from an independent clause.

QUESTION 11

Choice C is the best answer. This choice indicates that *The Cat in the Hat*'s success is attributable to its enduring ability to delight children and engage them in learning how to read. This idea restates the main themes of the passage, which are the need to make books appealing to beginning readers and the importance of engaging those readers through interesting plots and illustrations.

Choices A, B, and D are incorrect. The idea that the best proof of *The Cat in the Hat*'s success is its limited vocabulary and appealing word choices, its impressive worldwide sales, or its important role in the history of twentieth-century illustration doesn't restate the main themes of the passage.

QUESTION 12

Choice D is the best answer. The gerund "picking up" is parallel in structure to the other gerunds in the sentence, "helping" and "working."

Choices A, B, and C are incorrect because they don't maintain parallelism in the sentence. "When they pick up litter," "to pick up litter," and "litter collection" don't contain gerunds.

QUESTION 13

Choice A is the best answer. The transitional phrase "by its very definition" points to the criticism in the previous paragraph that when volunteering is compulsory, it's no longer volunteerism.

Choices B, C, and D are incorrect because the reference to general work, students, or communities in need doesn't highlight the criticism of compulsory volunteering mentioned in the previous paragraph.

QUESTION 14

Choice D is the best answer. The plural noun "officials" correctly refers to the people who require students to give up time for nonprofit activities. Additionally, the plural possessive noun "students'" indicates that the choice to give up personal time is supposed to belong to multiple students.

Choice A is incorrect because "officials'" is a plural possessive noun, but nothing belongs to the officials in this sentence. Choice B is incorrect because "students" is a plural noun, but the plural possessive noun "students'" is needed to indicate that the choice is supposed to belong to students. Choice C is incorrect because "student's" is a singular possessive noun, but the plural possessive noun "students'" is needed to show that the choice is supposed to belong to multiple students.

QUESTION 15

Choice C is the best answer. This choice is clear and concise and doesn't repeat the idea of proponents that begins the sentence.

Choices A, B, and D are incorrect because they're repetitive. Since proponents are people who support a cause, describing proponents of compulsory volunteering as being in favor of it, advocating it, or being advocates creates redundancy.

QUESTION 16

Choice B is the best answer. This choice, a closer connection with their community, is a benefit of volunteering and provides a supporting example that is most similar to the other examples of benefits offered in the sentence: increased self-esteem and better relationship-building skills.

Choices A, C, and D are incorrect because they don't provide supporting examples that are similar to the examples in the sentence. Increasingly busy schedules, less time spent engaging in social activities, and little increase in academic achievement aren't benefits of volunteering.

QUESTION 17

Choice B is the best answer. The infinitive "[to] affect" parallels the earlier infinitive "[to] volunteer" ("are more likely to volunteer," "[are more likely to] affect"). Moreover, "affect," meaning "to influence," is used correctly to indicate that students who do community service positively influence society.

Choices A and C are incorrect because the verb "effect" generally means "to bring about" and the noun "effect" means "result," neither of which makes sense in the sentence. Choice D is incorrect because the singular verb "affects" doesn't work here, where the infinitive "affect" is required.

QUESTION 18

Choice A is the best answer; "mandatory" is the most precise word to use when describing the volunteering that students are required to do.

Choices B, C, and D are incorrect because the meanings of these words don't fit the context of the sentence. "Coercive" and "forcible" suggest that threats or force are used to make someone do something. "Imperative" suggests that something is very important or necessary. None of these words is appropriate to use when describing the volunteering that students are required to do.

QUESTION 19

Choice D is the best answer. The semicolon is used correctly to separate the independent clause that begins with "she" from the independent clause that begins with "they." In addition, this choice contains no unnecessary punctuation.

Choice A is incorrect because a comma can't be used by itself to join two independent clauses. Choice B is incorrect because it's unnecessary to place a comma between the adverb "then" and the verb "did," which the adverb describes. Choice C is incorrect because no punctuation is needed to separate the subject "they" from the adverb "then."

QUESTION 20

Choice B is the best answer because "than did students who were" results in a logical comparison between two types of students: those who were required to volunteer ("they then did") and those who weren't ("than did those").

Choices A and C are incorrect because each illogically compares "hours" to students ("they"). Choice D is incorrect because it results in a nonstandard expression; "less" is already comparative, meaning that "compared with" isn't appropriate.

QUESTION 21

Choice C is the best answer. The idea that schools should focus on offering arrangements that make volunteering an easy and attractive choice most effectively sets up the point made in the next sentence: more students willingly volunteer when schools tell them about volunteering opportunities and connect them with organizations.

Choices A, B, and D are incorrect because they don't effectively set up the point made in the next sentence. The ideas that schools have to recognize that not all students are equally well suited to the same activities, should allow students to spend their time participating in athletics and other extracurricular activities, and are advised to recognize the limits of their ability to influence their students don't set up the point that students willingly volunteer when schools connect them to volunteer opportunities and organizations.

QUESTION 22

Choice B is the best answer. This choice provides a conclusion that states the main claim of the passage: schools that don't make volunteering compulsory will produce more engaged, enthusiastic volunteers than will schools that require volunteer work.

Choices A, C, and D are incorrect. The idea that schools should find volunteers for organizations in the United States, that psychological and economic studies have revolutionized understandings of volunteerism, or that students should choose charitable work that suits their interests and values doesn't state the passage's main claim that schools that don't require volunteering produce more engaged, enthusiastic volunteers.

QUESTION 23

Choice C is the best answer. The present perfect tense verb "have believed" correctly indicates that scientists in the past believed that the corpus callosum enables complex tasks and that scientists continue to hold this belief in the present.

Choices A, B, and D are incorrect because they don't describe a belief that originated in the past and continues in the present. The present progressive tense verb "are believing," the future progressive tense verb "will be believing," and the simple present tense verb "believe" aren't appropriate to use in a case that requires a present perfect tense verb.

QUESTION 24

Choice A is the best answer. This choice concisely defines handedness without unnecessarily repeating the ideas of preference or consistency.

Choices B and C are incorrect because "favor the use of" and "could be chosen," respectively, repeat the idea of "prefer," which appears earlier in the sentence. Choice D is incorrect because "on a regular basis" is synonymous with "consistently," which also appears earlier in the sentence.

QUESTION 25

Choice A is the best answer. No punctuation is necessary between the noun "trait" and the preposition "other than."

Choices B, C, and D are incorrect because neither a comma, a semicolon, nor a colon is necessary to separate the noun "trait" from the phrase that follows.

QUESTION 26

Choice B is the best answer. The phrase "correlates with" is idiomatic when indicating that two things are directly related to each other. In the passage, handedness in marsupials is believed to be related to the trait of bipedalism in those mammals.

Choices A, C, and D are incorrect because "links as," "correlates from," and "links on" aren't idiomatic when indicating that two things are directly related to each other.

QUESTION 27

Choice D is the best answer. According to the graph, positive mean handedness index scores indicated a left-forelimb preference and negative scores indicated a right-forelimb preference.

Choices A, B, and C are incorrect because they don't accurately reflect the information in the graph.

QUESTION 28

Choice B is the best answer. The comma after "kangaroo" and before the conjunction "and" is used correctly to separate the last two items, "red kangaroo" and "brush-tailed bettong," in the list of bipedal marsupials.

Choice A is incorrect because the comma needs to be placed immediately before the conjunction "and," not after it. Choice C is incorrect because a semicolon isn't used to separate individual items in a simple list. Choice D is incorrect because a dash isn't used to separate items in a list, and the comma after "and" is unnecessary.

QUESTION 29

Choice C is the best answer. According to the graph, the four bipedal marsupials had positive mean handedness index values between 0.4 and 0.6, which revealed their preference for using their left forelimbs.

Choices A, B, and D are incorrect because they don't accurately reflect the data in the graph. The four bipedal marsupials didn't have positive mean handedness index values less than 0.2 or greater than 0.6, and they didn't have mean handedness index values of 0.

QUESTION 30

Choice C is the best answer. The transitional phrase "in contrast to" provides the best transition from the previous paragraph, which illustrates bipedal marsupials' forelimb preference, to this paragraph, which discusses how quadrupedal marsupials differ from their bipedal counterparts by not showing a strong forelimb preference.

Choices A, B, and D are incorrect because they don't provide a transition from the previous paragraph. The introductory phrases "having four feet," "like most other mammals," and "while using their forelimbs for eating" don't establish a connection between the discussion of bipedal marsupials' forelimb preference in the previous paragraph and quadrupedal marsupials' forelimb preference in this paragraph.

QUESTION 31

Choice B is the best answer. A main claim of the passage is that scientists now believe there's a correlation between bipedalism and handedness in marsupials. Choice B, by mentioning that bipedal marsupials in the study demonstrated handedness, references this main claim.

Choices A, C, and D are incorrect because they don't present a main claim of the passage. The passage isn't about how kangaroos still don't exhibit handedness to the extent that humans do, the many things scientists don't understand about the marsupial brain, or additional studies on the phenomenon of handedness that will need to be performed with other mammals.

QUESTION 32

Choice B is the best answer. "Which" is a standard relative pronoun in reference to a concept such as a task.

Choice A is incorrect because "whom" is used to refer to people, not concepts. Choice C is incorrect because "what" isn't a typical relative pronoun and isn't idiomatic in context ("tasks in what handedness may confer an evolutionary advantage"). Choice D is incorrect because "whose" nonsensically suggests that tasks have handedness.

QUESTION 33

Choice A is the best answer. No change is needed because this choice concludes the passage by recalling a topic from the first paragraph that requires additional research: scientists' enduring question about how the left and right hemispheres of marsupials' brains communicate since these mammals lack a corpus callosum.

Choices B, C, and D are incorrect because none of these choices concludes the passage by recalling a topic from the first paragraph that requires additional research. The first paragraph doesn't refer to the minority of humans who are left handed, the fact that studies like this one may someday yield insights into the causes of neurological disorders, or an additional study to examine handedness in other animals that sometimes stand upright.

QUESTION 34

Choice C is the best answer. "Although these levels are impressive" provides the most effective transition from the previous sentence, which indicates the percent of surveyed companies that provide employees with tuition assistance, to the information that follows in this sentence, that even more companies should consider providing such assistance.

Choice A is incorrect because "despite these findings" suggests that regardless of the percentages, more companies should consider providing tuition assistance, which is illogical. Choice B is incorrect because the information that follows in the sentence isn't additional to the 2014 study. Choice D is incorrect because the issue of whether companies want or don't want to provide tuition assistance isn't mentioned in the previous sentence.

QUESTION 35

Choice D is the best answer. This choice most effectively establishes the main idea of the passage, which is that companies should offer tuition assistance because doing so helps attract and retain employees. This main idea is supported in the second paragraph, which argues that tuition assistance appeals to highly motivated and disciplined individuals, and in the third paragraph, which claims that employees receiving tuition assistance often stay with their employers even after they complete their degrees.

Choices A, B, and C are incorrect because they don't establish the passage's main idea. The passage isn't about increasing customer satisfaction, solving the problem of rising tuition costs, or strengthening the US economy.

QUESTION 36

Choice C is the best answer. The plural noun "workers" correctly indicates that companies have more than one worker. The plural noun "opportunities" indicates that employers offer workers multiple chances for personal and professional development.

Choices A and B are incorrect because the plural possessive nouns "workers'" and "opportunities'" should be the plural nouns "workers" and "opportunities," since nothing belongs to the workers

or opportunities in the sentence. Choice D is incorrect because the singular nouns "worker" and "opportunity" should be plural, and the apostrophes indicating possession aren't needed.

QUESTION 37

Choice B is the best answer. The main verb "stressed" provides a simple predicate for the subject "John Fox" to create a grammatically complete sentence.

Choices A and C are incorrect because "who stressed" and "stressing" leave the sentence without an independent clause. Choice D is incorrect because although "he stressed" gives the sentence an independent clause, that clause is improperly joined by "and" to the phrases "John Fox" and "the director of dealer training at Fiat Chrysler Automobiles in the United States."

QUESTION 38

Choice C is the best answer. This choice most effectively combines the sentences at the underlined portion because the pronoun "which" creates a relative clause ("which . . . workers") that clearly and concisely describes "retain."

Choice A is incorrect because "retention" repeats the idea of "retain," which is already mentioned in the sentence. Choice B is incorrect because "retaining" repeats the idea of "retain," and the pronoun "whom" repeats the idea of "employees." Choice D is incorrect because the pronoun "that" doesn't have a clear antecedent and therefore creates a vague sentence.

QUESTION 39

Choice C is the best answer. The subordinate conjunction "because" begins the dependent clause "because their new qualifications give them opportunities for advancement within the company." No punctuation is needed to separate this dependent clause from the independent clause that directly precedes it.

Choices A and D are incorrect because placing a period or a semicolon after "degrees" results in a rhetorically ineffective sentence fragment. Choice B is incorrect because no punctuation is needed between the noun and subordinate conjunction. (Although colons can be used to introduce additional explanatory information in a sentence, they're not typically used between a main clause and a dependent clause beginning with a subordinate conjunction such as "because.")

QUESTION 40

Choice D is the best answer. The comma after "(UTC)" is paired correctly with the comma after "Lincoln" to set off grammatically nonessential information. The information between the commas, which describes who Valerie Lincoln is, could be removed and the sentence would still make sense.

Choice A is incorrect because a comma is needed after "(UTC)" to set off the grammatically nonessential phrase. Choices B and C are incorrect because neither a dash nor a colon can be paired with a comma to set off grammatically nonessential information.

QUESTION 41

Choice A is the best answer. The adjective "deep" is used idiomatically with "knowledge" to indicate that Lincoln possessed extensive, in-depth information about her industry.

Choice B is incorrect because "hidden" doesn't make sense within the context of the sentence. A person whose knowledge is hidden wouldn't be an asset to a company. Choices C and D are incorrect because "large" and "spacious" aren't idiomatic when describing the extent of a person's knowledge.

QUESTION 42

Choice D is the best answer. "Keeping down costs" clearly and concisely identifies what businesses have succeeded in doing.

Choices A, B, and C are incorrect because they're redundant. In choice A, the verbs "minimizing" and "keeping down" are synonyms, so only one is needed in the sentence. In choice B, "employees' coursework" isn't needed because this phrase already appears in the sentence. In choice C, "being effective" repeats the idea of "succeeded," which appears earlier in the sentence.

QUESTION 43

Choice A is the best answer. The infinitive "[to] divert" is grammatically correct when preceded by "are likely," indicating that classes can redirect employees' time and energy away from their jobs.

Choices B, C, and D are incorrect because "diverted," "in diverting," and "diversions for" create ungrammatical sentences.

QUESTION 44

Choice D is the best answer. To make the passage most logical, the sentence should be placed after the last sentence of paragraph 4. The use of "still" in the inserted sentence indicates that a contrast to what was stated previously will follow. Paragraph 4 ends by stating that tuition reimbursement may not be appropriate in all cases, and the inserted sentence indicates that despite this fact, employers should give serious thought to investing in reimbursement programs. Moreover, the inserted sentence restates the passage's main claim and, therefore, effectively concludes the passage.

Choices A, B, and C are incorrect because placing the sentence at the end of paragraph 1, 2, or 3 would result in an illogical passage.

Section 3: Math Test – No Calculator

QUESTION 1

Choice B is correct. Subtracting z from both sides of $2z + 1 = z$ results in $z + 1 = 0$. Subtracting 1 from both sides of $z + 1 = 0$ results in $z = -1$.

Choices A, C, and D are incorrect. When each of these values is substituted for z in the given equation, the result is a false statement. Substituting -2 for z yields $2(-2) + 1 = -2$, or $-3 = -2$. Substituting $\frac{1}{2}$ for z yields $2\left(\frac{1}{2}\right) + 1 = \frac{1}{2}$, or $2 = \frac{1}{2}$. Lastly, substituting 1 for z yields $2(1) + 1 = 1$, or $3 = 1$.

QUESTION 2

Choice C is correct. To complete the purchase, the initial payment of \$60 plus the w weekly payments of \$30 must be equivalent to the \$300 price of the television. The total, in dollars, of w weekly payments of \$30 can be expressed by $30w$. It follows that $300 = 30w + 60$ can be used to find the number of weekly payments, w, required to complete the purchase.

Choice A is incorrect. Since the television is to be purchased with an initial payment and w weekly payments, the price of the television must be equivalent to the sum, not the difference, of these payments. Choice B is incorrect. This equation represents a situation where the television is purchased using only w weekly payments of \$30, with no initial payment of \$60. Choice D is incorrect. This equation represents a situation where the w weekly payments are \$60 each, not \$30 each, and the initial payment is \$30, not \$60. Also, since the television is to be purchased with weekly payments and an initial payment, the price of the television must be equivalent to the sum, not the difference, of these payments.

QUESTION 3

Choice B is correct. Since the relationship between the merchandise weight x and the shipping charge $f(x)$ is linear, a function in the form $f(x) = mx + b$, where m and b are constants, can be used. In this situation, the constant m represents the additional shipping charge, in dollars, for each additional pound of merchandise shipped, and the constant b represents a one-time charge, in dollars, for shipping any weight, in pounds, of merchandise. Using any two pairs of values from the table, such as (10, 21.89) and (20, 31.79), and dividing the difference in the charges by the difference in the weights gives the value of m: $m = \frac{31.79 - 21.89}{20 - 10}$, which simplifies to $\frac{9.9}{10}$, or 0.99. Substituting the value of m and any pair of values from the table, such as (10, 21.89), for x and $f(x)$, respectively, gives the value of b: $21.89 = 0.99(10) + b$, or $b = 11.99$. Therefore, the function $f(x) = 0.99x + 11.99$ can be used to determine the total shipping charge $f(x)$, in dollars, for an order with a merchandise weight of x pounds.

Choices A, C, and D are incorrect. If any pair of values from the table is substituted for x and $f(x)$, respectively, in these functions, the result is false. For example, substituting 10 for x and 21.89 for $f(x)$ in $f(x) = 0.99x$ yields $21.89 = 0.99(10)$, or $21.89 = 9.9$, which is false. Similarly, substituting the values (10, 21.89) for x and $f(x)$ into the functions in choices C and D results in $21.89 = 33.9$ and $21.89 = 50.84$, respectively. Both are false.

QUESTION 4

Choice C is correct. It's given that the graph represents $y = h(x)$, thus the y-coordinate of each point on the graph corresponds to the height, in feet, of a Doric column with a base diameter of x feet. A Doric column with a base diameter of 5 feet is represented by the point (5, 35), and a Doric column with a base diameter of 2 feet is represented by the point (2, 14). Therefore, the column with a base diameter of 5 feet has a height of 35 feet, and the column with a base diameter of 2 feet has a height of 14 feet. It follows that the difference in heights of these two columns is $35 - 14$, or 21 feet.

Choice A is incorrect. This value is the slope of the line and represents the increase in the height of a Doric column for each increase in the base diameter by 1 foot. Choice B is incorrect. This value represents the height of a Doric column with a base diameter of 2 feet, or the difference in height between a Doric column with base diameter of 5 feet and a Doric column with base diameter of 3 feet. Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 5

Choice A is correct. The expression $\sqrt{9x^2}$ can be rewritten as $(\sqrt{9})(\sqrt{x^2})$. The square root symbol in an expression represents the principal square root, or the positive square root, thus $\sqrt{9} = 3$. Since $x > 0$, taking the square root of the second factor, $\sqrt{x^2}$, gives x. It follows that $\sqrt{9x^2}$ is equivalent to $3x$.

Choice B is incorrect and may result from rewriting $\sqrt{9x^2}$ as $(\sqrt{9})(x^2)$ rather than $(\sqrt{9})(\sqrt{x^2})$. Choices C and D are incorrect and may result from misunderstanding the operation indicated by a radical symbol. In both of these choices, instead of finding the square root of the coefficient 9, the coefficient has been multiplied by 2. Additionally, in choice D, x^2 has been squared to give x^4, instead of taking the square root of x^2 to get x.

QUESTION 6

Choice A is correct. Factoring the numerator of the rational expression $\frac{x^2 - 1}{x - 1}$ yields $\frac{(x + 1)(x - 1)}{x - 1}$. The expression $\frac{(x + 1)(x - 1)}{x - 1}$ can be rewritten as $\left(\frac{x + 1}{1}\right)\left(\frac{x - 1}{x - 1}\right)$. Since $\frac{x - 1}{x - 1} = 1$, when x is not equal to 1, it follows that $\left(\frac{x + 1}{1}\right)\left(\frac{x - 1}{x - 1}\right) = \left(\frac{x + 1}{1}\right)(1)$ or $x + 1$. Therefore, the given equation is equivalent to $x + 1 = -2$. Subtracting 1 from both sides of $x + 1 = -2$ yields $x = -3$.

Choices B, C, and D are incorrect. Substituting 0, 1, or −1, respectively, for x in the given equation yields a false statement. Substituting 0 for x in the given equation yields $\frac{0^2 - 1}{0 - 1} = -2$ or $1 = -2$, which is false. Substituting 1 for x in the given equation makes the left-hand side $\frac{1^2 - 1}{1 - 1} = \frac{0}{0}$, which is undefined and not equal to −2. Substituting −1 for x in the given equation yields $\frac{(-1)^2 - 1}{-1 - 1} = -2$, or $0 = -2$, which is false. Therefore, these values don't satisfy the given equation.

QUESTION 7

Choice D is correct. Since $y = f(x)$, the value of $f(0)$ is equal to the value of $f(x)$, or y, when $x = 0$. The graph indicates that when $x = 0$, $y = 4$. It follows that the value of $f(0) = 4$.

Choice A is incorrect. If the value of $f(0)$ were 0, then when $x = 0$, the value of $f(x)$, or y, would be 0 and the graph would pass through the point (0, 0). Choice B is incorrect. If the value of $f(0)$ were 2, then when $x = 0$, the value of $f(x)$, or y, would be 2 and the graph would pass through the point (0, 2). Choice C is incorrect. If the value of $f(0)$ were 3, then when $x = 0$, the value of $f(x)$, or y, would be 3 and the graph would pass through the point (0, 3).

QUESTION 8

Choice C is correct. Since point B lies on $\overline{AD}$, angles ABC and CBD are supplementary. It's given that angle ABC is a right angle; therefore, its measure is 90°. It follows that the measure of angle CBD is 180° − 90°, or 90°. By the angle addition postulate, the measure of angle CBD is equivalent to $x° + 2x° + 2x°$. Therefore, $90 = x + 2x + 2x$. Combining like terms gives $90 = 5x$. Dividing both sides of this equation by 5 yields $x = 18$. Therefore, the value of $3x$ is 3(18), or 54.

Choice A is incorrect. This is the value of x. Choice B is incorrect. This is the value of $2x$. Choice D is incorrect. This is the value of $4x$.

QUESTION 9

Choice C is correct. The equation defining any line can be written in the form $y = mx + b$, where m is the slope of the line and b is the y-coordinate of the y-intercept. Line ℓ passes through the point (0, −4), which is the y-intercept. Therefore, for line ℓ, $b = -4$. The slope of a line is the ratio of the difference between the y-coordinates of any two points to the difference between the x-coordinates of the same points. Calculating the slope using two points that line ℓ passes through, (−4, 0) and (0, −4), gives $m = \frac{0 - (-4)}{(-4) - 0} = \frac{4}{-4}$, or −1. Since $m = -1$ and $b = -4$, the equation of line ℓ can be written as $y = (-1)x + (-4)$, or $y = -x - 4$. Adding x to both sides of $y = -x - 4$ yields $x + y = -4$.

Choices A and B are incorrect. These equations both represent lines with a positive slope, but line ℓ has a negative slope. Choice D is incorrect. This equation represents a line that passes through the points (4, 0) and (0, 4), not the points (−4, 0) and (0, −4).

QUESTION 10

Choice D is correct. Since the graph represents the equation $y = 2x^2 + 10x + 12$, it follows that each point (x, y) on the graph is a solution to this equation. Since the graph crosses the y-axis at $(0, k)$, then substituting 0 for x and k for y in $y = 2x^2 + 10x + 12$ creates a true statement: $k = 2(0)^2 + 10(0) + 12$, or $k = 12$.

Choice A is incorrect. If $k = 2$ when $x = 0$, it follows that $2 = 2(0)^2 + 10(0) + 12$, or $2 = 12$, which is false. Choice B is incorrect. If $k = 6$ when $x = 0$, it follows that $6 = 2(0)^2 + 10(0) + 12$, or $6 = 12$, which is false. Choice C is incorrect. If $k = 10$ when $x = 0$, it follows that $10 = 2(0)^2 + 10(0) + 12$, or $10 = 12$, which is false.

QUESTION 11

Choice A is correct. A circle in the xy-plane with center (h, k) and radius r is defined by the equation $(x - h)^2 + (y - k)^2 = r^2$. Therefore, an equation of a circle with center (5, 7) and radius 2 is $(x - 5)^2 + (y - 7)^2 = 2^2$, or $(x - 5)^2 + (y - 7)^2 = 4$.

Choice B is incorrect. This equation defines a circle with center (−5, −7) and radius 2. Choice C is incorrect. This equation defines a circle with center (5, 7) and radius $\sqrt{2}$. Choice D is incorrect. This equation defines a circle with center (−5, −7) and radius $\sqrt{2}$.

QUESTION 12

Choice B is correct. Since figures are drawn to scale unless otherwise stated and triangle ABC is similar to triangle DEF, it follows that the measure of angle B is equal to the measure of angle E. Furthermore, it follows that side AB corresponds to side DE and that side BC corresponds to side EF. For similar triangles, corresponding sides are proportional, so $\frac{AB}{BC} = \frac{DE}{EF}$. In right triangle DEF, the cosine of angle E, or $\cos(E)$, is equal to the length of the side adjacent to angle E divided by the length of the hypotenuse in triangle DEF. Therefore, $\cos(E) = \frac{DE}{EF}$, which is equivalent to $\frac{AB}{BC}$. Therefore, $\cos(E) = \frac{12}{13}$.

Choice A is incorrect. This value represents the tangent of angle F, or $\tan(F)$, which is defined as the length of the side opposite angle F divided by the length of the side adjacent to angle F. Choice C is incorrect. This value represents the tangent of angle E, or $\tan(E)$, which is defined as the length of the side opposite angle E divided by the length of the side adjacent to angle E. Choice D is incorrect. This value represents the sine of angle E, or $\sin(E)$, which is defined as the length of the side opposite angle E divided by the length of the hypotenuse.

QUESTION 13

Choice C is correct. The x-intercepts of the graph of $f(x) = x^2 + 5x + 4$ are the points $(x, f(x))$ on the graph where $f(x) = 0$. Substituting 0 for $f(x)$ in the function equation yields $0 = x^2 + 5x + 4$. Factoring the right-hand side of $0 = x^2 + 5x + 4$ yields $0 = (x + 4)(x + 1)$.

If $0 = (x + 4)(x + 1)$, then $0 = x + 4$ or $0 = x + 1$. Solving both of these equations for x yields $x = -4$ and $x = -1$. Therefore, the x-intercepts of the graph of $f(x) = x^2 + 5x + 4$ are $(-4, 0)$ and $(-1, 0)$. Since both points lie on the x-axis, the distance between $(-4, 0)$ and $(-1, 0)$ is equivalent to the number of unit spaces between -4 and -1 on the x-axis, which is 3.

Choice A is incorrect. This is the distance from the origin to the x-intercept $(-1, 0)$. Choice B is incorrect and may result from incorrectly calculating the x-intercepts. Choice D is incorrect. This is the distance from the origin to the x-intercept $(-4, 0)$.

QUESTION 14

Choice B is correct. Squaring both sides of the equation $\sqrt{4x} = x - 3$ yields $4x = (x - 3)^2$, or $4x = (x - 3)(x - 3)$. Applying the distributive property on the right-hand side of the equation $4x = (x - 3)(x - 3)$ yields $4x = x^2 - 3x - 3x + 9$. Subtracting $4x$ from both sides of $4x = x^2 - 3x - 3x + 9$ yields $0 = x^2 - 3x - 3x - 4x + 9$, which can be rewritten as $0 = x^2 - 10x + 9$. Factoring the right-hand side of $0 = x^2 - 10x + 9$ gives $0 = (x - 1)(x - 9)$. By the zero product property, if $0 = (x - 1)(x - 9)$, then $0 = x - 1$ or $0 = x - 9$. Adding 1 to both sides of $0 = x - 1$ gives $x = 1$. Adding 9 to both sides of $0 = x - 9$ gives $x = 9$. Substituting these values for x into the given equation will determine whether they satisfy the equation. Substituting 1 for x in the given equation yields $\sqrt{4(1)} = 1 - 3$, or $\sqrt{4} = -2$, which is false. Therefore, $x = 1$ doesn't satisfy the given equation. Substituting 9 for x in the given equation yields $\sqrt{4(9)} = 9 - 3$ or $\sqrt{36} = 6$, which is true. Therefore, $x = 9$ satisfies the given equation.

Choices A and C are incorrect because $x = 1$ doesn't satisfy the given equation: $\sqrt{4x}$ represents the principal square root of $4x$, which can't be negative. Choice D is incorrect because $x = 9$ does satisfy the given equation.

QUESTION 15

Choice A is correct. A system of two linear equations has no solution if the graphs of the lines represented by the equations are parallel and are not equivalent. Parallel lines have equal slopes but different y-intercepts. The slopes and y-intercepts for the two given equations can be found by solving each equation for y in terms of x, thus putting the equations in slope-intercept form. This yields $y = 3x + 6$ and $y = \left(-\frac{a}{2}\right)x + 2$. The slope and y-intercept of the line with equation $-3x + y = 6$ are 3 and $(0, 6)$, respectively. The slope and y-intercept of the line with equation $ax + 2y = 4$ are represented by the expression $-\frac{a}{2}$ and the point $(0, 2)$, respectively. The value of a can be found by setting the two slopes equal to each other, which gives $-\frac{a}{2} = 3$. Multiplying both sides of this equation by -2 gives $a = -6$. When $a = -6$, the lines are parallel and have different y-intercepts.

Choices B, C, and D are incorrect because these values of a would result in two lines that are not parallel, and therefore the resulting system of equations would have a solution.

QUESTION 16

The correct answer is 2200. If the total shipping cost was $47,000, then $T = 47{,}000$. If 3000 units were shipped to the farther location, then $f = 3000$. Substituting 47,000 for T and 3000 for f in the equation $T = 5c + 12f$ yields $47{,}000 = 5c + 12(3000)$. Multiplying 12 by 3000 yields $47{,}000 = 5c + 36{,}000$. Subtracting 36,000 from both sides of the equation yields $11{,}000 = 5c$. Dividing both sides by 5 yields $c = 2200$. Therefore, 2200 units were shipped to the closer location.

QUESTION 17

The correct answer is 5. By definition of absolute value, if $|2x + 1| = 5$, then $2x + 1 = 5$ or $-(2x + 1) = 5$, which can be rewritten as $2x + 1 = -5$. Subtracting 1 from both sides of $2x + 1 = 5$ and $2x + 1 = -5$ yields $2x = 4$ and $2x = -6$, respectively. Dividing both sides of $2x = 4$ and $2x = -6$ by 2 yields $x = 2$ and $x = -3$, respectively. If a and b are the solutions to the given equation, then $a = 2$ and $b = -3$. It follows then that $|a - b| = |2 - (-3)| = |5|$, which is 5. Similarly, if $a = -3$ and $b = 2$, it follows that $|a - b| = |-3 - 2| = |-5|$, which is also 5.

QUESTION 18

The correct answer is 1.21. It's given that each year, the value of the antique is estimated to increase by 10% over its value the previous year. Increasing a quantity by 10% is equivalent to the quantity increasing to 110% of its original value or multiplying the original quantity by 1.1. Therefore, 1 year after the purchase, the estimated value of the antique is 200(1.1) dollars. Then, 2 years after purchase, the estimated value of the antique is 200(1.1)(1.1), or 200(1.21) dollars. It's given that the estimated value of the antique after 2 years is $200a$ dollars. Therefore, $200(1.21) = 200a$. It follows that $a = 1.21$.

QUESTION 19

The correct answer is 2500. Adding the given equations yields $(2x + 3y) + (3x + 2y) = (1200 + 1300)$. Combining like terms yields $5x + 5y = 2500$. Therefore, the value of $5x + 5y$ is 2500.

QUESTION 20

The correct answer is 20. Factoring the expression $u^2 - t^2$ yields $(u - t)(u + t)$. Therefore, the expression $(u - t)(u^2 - t^2)$ can be rewritten as $(u - t)(u - t)(u + t)$. Substituting 5 for $u + t$ and 2 for $u - t$ in this expression yields (2)(2)(5), which is equal to 20.

Section 4: Math Test – Calculator

QUESTION 1

Choice B is correct. It's given that the helicopter's initial height is 40 feet above the ground and that when the helicopter's altitude begins to increase, it increases at a rate of 21 feet per second. Therefore, the altitude gain t seconds after the helicopter begins rising is represented by the expression $21t$. Adding this expression to the helicopter's initial height gives the helicopter's altitude above the ground y, in feet, t seconds after the helicopter begins to gain altitude: $y = 40 + 21t$.

Choice A is incorrect. This is the helicopter's altitude above the ground 1 second after it began to gain altitude, not t seconds after it began to gain altitude. Choice C is incorrect because adding the expression $-21t$ makes this function represent a decrease in altitude. Choice D is incorrect and is the result of using the initial height of 40 feet as the rate at which the helicopter's altitude increases per second and the rate of 21 feet per second as the initial height.

QUESTION 2

Choice A is correct. The text messaging plan charges a flat fee of $5 per month for up to 100 text messages. This is represented graphically with a constant value of $y = 5$ for $0 \le x \le 100$. After 100 messages, each additional message sent costs $0.25. This is represented graphically with an increase of 0.25 on the y-axis for every increase of 1 on the x-axis. Choice A matches these descriptions.

Choice B is incorrect. This choice shows a linear decrease after $x = 100$, indicating the price of the plan would decrease, rather than increase, after 100 text messages. Choices C and D are incorrect. These choices don't represent a constant value of $y = 5$ for $0 \le x \le 100$, which is needed to represent the $5 per month for the first 100 text messages.

QUESTION 3

Choice B is correct. During the first 15 minutes Jake is in the theater, or from 0 to 15 minutes, Jake's popcorn amount decreases by half. This is represented graphically by a linear decrease. From 15 to 45 minutes, Jake stops eating popcorn. This is represented graphically by a constant y-value. From 45 to 90 minutes, Jake eats more popcorn. This is represented graphically by another linear decrease as the amount of popcorn in the bag gradually goes down. At 90 minutes, Jake spills all of his remaining popcorn. This is represented graphically by a vertical drop in the y-value to 0. Choice B matches these representations.

Choices A, C, and D are incorrect. At no point during this period of time did Jake buy more popcorn. All of these graphs represent an increase in the amount of popcorn in Jake's bag at some point during this period of time.

QUESTION 4

Choice C is correct. Subtracting 20 from both sides of the given equation yields $-x = -5$. Dividing both sides of the equation $-x = -5$ by -1 yields $x = 5$. Lastly, substituting 5 for x in $3x$ yields the value of $3x$, or $3(5) = 15$.

Choice A is incorrect. This is the value of x, not the value of $3x$. Choices B and D are incorrect. If $3x = 10$ or $3x = 35$, then it follows that $x = \frac{10}{3}$ or $x = \frac{35}{3}$, respectively. Substituting $\frac{10}{3}$ and $\frac{35}{3}$ for x in the given equation yields $\frac{50}{3} = 15$ and $\frac{25}{3} = 15$, respectively, both of which are false statements. Since $3x = 10$ and $3x = 35$ both lead to false statements, then $3x$ can't be equivalent to either 10 or 35.

QUESTION 5

Choice C is correct. The value of $f(-1)$ can be found by substituting -1 for x in the given function $f(x) = \frac{x + 3}{2}$, which yields $f(-1) = \frac{-1 + 3}{2}$. Rewriting the numerator by adding -1 and 3 yields $\frac{2}{2}$, which equals 1. Therefore, $f(-1) = 1$.

Choice A is incorrect and may result from miscalculating the value of $\frac{-1 + 3}{2}$ as $\frac{-4}{2}$, or -2. Choice B is incorrect and may result from misinterpreting the value of x as the value of $f(-1)$. Choice D is incorrect and may result from adding the expression $-1 + 3$ in the numerator.

QUESTION 6

Choice D is correct. To determine which option is equivalent to the given expression, the expression can be rewritten using the distributive property by multiplying each term of the binomial $(x^2 - 3x)$ by $2x$, which gives $2x^3 - 6x^2$.

Choices A, B, and C are incorrect and may result from incorrectly applying the laws of exponents or from various computation errors when rewriting the expression.

QUESTION 7

Choice B is correct. Selecting employees from each store at random is most appropriate because it's most likely to ensure that the group surveyed will accurately represent each store location and all employees.

Choice A is incorrect. Surveying employees at a single store location will only provide an accurate representation of employees at that location, not at all 50 store locations. Choice C is incorrect. Surveying the highest- and lowest-paid employees will not give an accurate representation of employees across all pay grades at the company.

Choice D is incorrect. Collecting only the first 50 responses mimics the results of a self-selected survey. For example, the first 50 employees to respond to the survey could be motivated by an overwhelming positive or negative experience and thus will not accurately represent all employees.

QUESTION 8

Choice C is correct. The graph for Ian shows that the initial deposit was $100 and that each week the total amount deposited increased by $100. Therefore, Ian deposited $100 each week. The graph for Jeremy shows that the initial deposit was $300 and that each week the total amount deposited increased by $50. Therefore, Jeremy deposited $50 each week. Thus, Ian deposited $50 more than Jeremy did each week.

Choice A is incorrect. This is the difference between the initial deposits in the savings accounts. Choice B is incorrect. This is the amount Ian deposited each week. Choice D is incorrect. This is half the amount that Jeremy deposited each week.

QUESTION 9

Choice C is correct. The value of the expression $h(5) - h(3)$ can be found by substituting 5 and 3 for x in the given function. Substituting 5 for x in the function yields $h(5) = 2^5$, which can be rewritten as $h(5) = 32$. Substituting 3 for x in the function yields $h(3) = 2^3$, which can be rewritten as $h(3) = 8$. Substituting these values into the expression $h(5) - h(3)$ produces $32 - 8 = 24$.

Choice A is incorrect. This is the value of $5 - 3$, not of $h(5) - h(3)$. Choice B is incorrect. This is the value of $h(5 - 3)$, or $h(2)$, not of $h(5) - h(3)$. Choice D is incorrect and may result from calculation errors.

QUESTION 10

Choice D is correct. The margin of error is applied to the sample statistic to create an interval in which the population statistic most likely falls. An estimate of 23% with a margin of error of 4% creates an interval of 23% ± 4%, or between 19% and 27%. Thus, it's plausible that the percentage of students in the population who see a movie at least once a month is between 19% and 27%.

Choice A is incorrect and may result from interpreting the estimate of 23% as the minimum number of students in the population who see a movie at least once per month. Choice B is incorrect and may result from interpreting the estimate of 23% as the minimum number of students in the population who see a movie at least once per month and adding half of the margin of error to conclude that it isn't possible that more than 25% of students in the population see a movie at least once per month. Choice C is incorrect and may result from interpreting the sample statistic as the researcher's level of confidence in the survey results and applying the margin of error to the level of confidence.

QUESTION 11

Choice A is correct. The mean number of each list is found by dividing the sum of all the numbers in each list by the count of the numbers in each list. The mean of list A is $\frac{1 + 2 + 3 + 4 + 5 + 6}{6} = 3.5$, and the mean of list B is $\frac{2 + 3 + 3 + 4 + 4 + 5}{6} = 3.5$. Thus, the means are the same. The standard deviations can be compared by inspecting the distances of the numbers in each list from the mean. List A contains two numbers that are 0.5 from the mean, two numbers that are 1.5 from the mean, and two numbers that are 2.5 from the mean. List B contains four numbers that are 0.5 from the mean and two numbers that are 1.5 from the mean. Overall, list B contains numbers that are closer to the mean than are the numbers in list A, so the standard deviations of the lists are different.

Choice B is incorrect and may result from assuming that two data sets with the same mean must also have the same standard deviation. Choices C and D are incorrect and may result from an error in calculating the means.

QUESTION 12

Choice C is correct. Let x represent the original price of the book. Then, 40% off of x is $(1 - 0.40)x$, or $0.60x$. Since the sale price is \$18.00, then $0.60x = 18$. Dividing both sides of this equation by 0.60 yields $x = 30$. Therefore, the original price of the book was \$30.

Choice A is incorrect and may result from computing 40% of the sale price. Choice B is incorrect and may result from computing 40% off the sale price instead of the original price. Choice D is incorrect and may result from computing the original price of a book whose sale price is \$18 when the sale is for 60% off the original price.

QUESTION 13

Choice C is correct. According to the bar graph, the number of insects in colony A at week 0 was approximately 80, and this number decreased over each respective two-week period to approximately 50, 32, 25, and 18. Similarly, the graph shows that the number of insects in colony B at week 0 was approximately 64, and this number also decreased over each respective two-week period to approximately 60, 40, 38, and 10. Finally, the graph shows that the number of insects in colony C at week 0 was approximately 58; however, the number of insects increased in week 2, to approximately 140. Therefore, only colony A and colony B showed a decrease in size every two weeks after the initial treatment.

Choice A is incorrect. Colony B also showed a decrease in size every two weeks. Choices B and D are incorrect. Colony C showed an increase in size between weeks 0 and 2.

QUESTION 14

Choice A is correct. According to the bar graph, the total number of insects in all three colonies in week 8 was approximately 20 + 10 + 50 = 80, and the total number of insects at the time of initial treatment (week 0) was approximately 80 + 65 + 55 = 200. The ratio of these approximations is 80 to 200, which is equivalent to 2 to 5. Therefore, the ratio 2 to 5 is closest to the ratio of the total number of insects in all three colonies in week 8 to the total number of insects at the time of initial treatment.

Choices B, C, and D are incorrect and may result from setting up ratios using weeks other than week 8 and week 0 or from calculation errors.

QUESTION 15

Choice B is correct. The formula for the volume V of a right circular cone is $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the base and h is the height of the cone. It's given that the cone's volume is 24π cubic inches and its height is 2 inches. Substituting 24π for V and 2 for h yields $24\pi = \frac{1}{3}\pi r^2(2)$. Rewriting the right-hand side of this equation yields $24\pi = \left(\frac{2\pi}{3}\right)r^2$, which is equivalent to $36 = r^2$. Taking the square root of both sides of this equation gives $r = \pm 6$. Since the radius is a measure of length, it can't be negative. Therefore, the radius of the base of the cone is 6 inches.

Choice A is incorrect and may result from using the formula for the volume of a right circular cylinder instead of a right circular cone. Choice C is incorrect. This is the diameter of the cone. Choice D is incorrect and may result from not taking the square root when solving for the radius.

QUESTION 16

Choice C is correct. It's given that the population of City X was 120,000 in 2010, and that it increased by 20% from 2010 to 2015. Therefore, the population of City X in 2015 was 120,000 (1 + 0.20) = 144,000. It's also given that the population of City Y decreased by 10% from 2010 to 2015. If y represents the population of City Y in 2010, then $y(1 - 0.10) = 144{,}000$. Solving this equation for y yields $y = \frac{144{,}000}{1 - 0.10}$. Simplifying the denominator yields $\frac{144{,}000}{0.90}$, or 160,000.

Choice A is incorrect. If the population of City Y in 2010 was 60,000, then the population of City Y in 2015 would have been 60,000(0.90) = 54,000, which is not equal to the City X population in 2015 of 144,000. Choice B is incorrect because 90,000(0.90) = 81,000, which is not equal to the City X population in 2015 of 144,000. Choice D is incorrect because 240,000(0.90) = 216,000, which is not equal to the City X population in 2015 of 144,000.

QUESTION 17

Choice D is correct. Dividing both sides of the equation $V = \frac{4}{3}\pi r^3$ by $\frac{4}{3}\pi$ results in $\frac{3V}{4\pi} = r^3$. Taking the cube root of both sides produces $\sqrt[3]{\frac{3V}{4\pi}} = r$. Therefore, $\sqrt[3]{\frac{3V}{4\pi}}$ gives the radius of the sphere in terms of the volume of the sphere.

Choice A is incorrect. This expression is equivalent to the reciprocal of r^3. Choice B is incorrect. This expression is equivalent to r^3. Choice C is incorrect. This expression is equivalent to the reciprocal of r.

QUESTION 18

Choice C is correct. It's given that the tablet user did not answer "Never," so the tablet user could have answered only "Rarely," "Often," or "Always." These answers make up 24.3% + 13.5% + 30.9% = 68.7% of the answers the tablet users gave in the survey. The answer "Always" makes up 30.9% of the answers tablet users gave in the survey. Thus, the probability is $\frac{30.9\%}{68.7\%}$, or $\frac{0.309}{0.687} = 0.44978$, which rounds up to 0.45.

Choice A is incorrect. This reflects the tablet users in the survey who answered "Always." Choice B is incorrect. This reflects all tablet users who did not answer "Never" or "Always." Choice D is incorrect. This reflects all tablet users in the survey who did not answer "Never."

QUESTION 19

Choice D is correct. The vertex form of a quadratic equation is $y = n(x - h)^2 + k$, where (h, k) gives the coordinates of the vertex of the parabola in the xy-plane and the sign of the constant n determines whether the parabola opens upward or downward. If n is negative, the parabola opens downward and the vertex is the maximum. The given equation has the values $h = 3$, $k = a$, and $n = -1$. Therefore, the vertex of the parabola is $(3, a)$ and the parabola opens downward. Thus, the parabola's maximum occurs at $(3, a)$.

Choice A is incorrect and may result from interpreting the given equation as representing a parabola in which the vertex is a minimum, not a maximum, and from misidentifying the value of h in the given equation as -3, not 3. Choice B is incorrect and may result from interpreting the given equation as representing a parabola in which the vertex is a minimum, not a maximum. Choice C is incorrect and may result from misidentifying the value of h in the given equation as -3, not 3.

QUESTION 20

Choice C is correct. Let m be the minimum value of the original data set. The range of a data set is the difference between the maximum value and the minimum value. The range of the original data set is therefore $84 - m$. The new data set consists of the original set and the positive integer 96. Thus, the new data set has the same minimum m and a maximum of 96. Therefore, the range of the new data set is $96 - m$. The difference in the two ranges can be found by subtracting the ranges: $(96 - m) - (84 - m)$. Using the distributive property, this can be rewritten as $96 - m - 84 + m$, which is equal to 12. Therefore, the range of the new data set must be 12 greater than the range of the original data set.

Choices A, B, and D are incorrect. Only the maximum value of the original data set is known, so the amount that the mean, median, and standard deviation of the new data set differ from those of the original data set can't be determined.

QUESTION 21

Choice B is correct. It's given that Clayton uses 100 milliliters of the 20% by mass solution, so $y = 100$. Substituting 100 for y in the given equation yields $0.10x + 0.20(100) = 0.18(x + 100)$, which can be rewritten as $0.10x + 20 = 0.18x + 18$. Subtracting $0.10x$ and 18 from both sides of the equation gives $2 = 0.08x$. Dividing both sides of this equation by 0.08 gives $x = 25$. Thus, Clayton uses 25 milliliters of the 10% by mass saline solution.

Choices A, C, and D are incorrect and may result from calculation errors.

QUESTION 22

Choice D is correct. It's given that the number of people Eleanor invited the first year was 30 and that the number of people invited doubles each of the following years, which is the same as increasing by a constant factor of 2. Therefore, the function f can be defined by $f(n) = 30(2)^n$, where n is the number of years after Eleanor began organizing the event. This is an increasing exponential function.

Choices A and B are incorrect. Linear functions increase or decrease by a constant number over equal intervals, and exponential functions increase or decrease by a constant factor over equal intervals. Since the number of people invited increases by a constant factor each year, the function f is exponential rather than linear. Choice C is incorrect. The value of $f(n)$ increases as n increases, so the function f is increasing rather than decreasing.

QUESTION 23

Choice A is correct. The slope-intercept form of a linear equation in the xy-plane is $y = mx + b$, where m is the slope of the graph of the equation and b is the y-coordinate of the y-intercept of the graph. Any two ordered pairs (x_1, y_1) and (x_2, y_2) that satisfy a linear equation can be used to compute the slope of the graph of the equation using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the two pairs $(a, 0)$ and $(3a, -a)$ from the table into the formula gives $m = \frac{-a - 0}{3a - a}$, which can be rewritten as $\frac{-a}{2a}$, or $-\frac{1}{2}$. Substituting this value for m in the slope-intercept form of the equation produces $y = -\frac{1}{2}x + b$. Substituting values from the ordered pair $(a, 0)$ in the table into this equation produces $0 = -\frac{1}{2}(a) + b$, which simplifies to $b = \frac{a}{2}$. Substituting this value for b in the slope-intercept form of the equation produces $y = -\frac{1}{2}x + \frac{a}{2}$. Rewriting this equation in standard form by adding $\frac{1}{2}x$ to both sides and then multiplying both sides by 2 gives the equation $x + 2y = a$.

Choice B is incorrect and may result from a calculation error when determining the y-intercept of the graph of the equation. Choices C and D are incorrect and may result from an error in calculation when determining the slope of the graph of the equation.

QUESTION 24

Choice B is correct. The slope-intercept form of a linear equation is $y = mx + b$, where m is the slope of the graph of the equation and b is the y-coordinate of the y-intercept of the graph. Any two ordered pairs (x_1, y_1) and (x_2, y_2) that satisfy a linear equation can be used to compute the slope of the graph of the equation using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the coordinates of (120, 60) and (160, 80), which lie on the line of best fit, into this formula gives $m = \frac{80 - 60}{160 - 120}$, which simplifies to $\frac{20}{40}$, or 0.5. Substituting this value for m in the slope-intercept form of the equation produces $y = 0.5x + b$. Substituting values from the ordered pair (120, 60) into this equation produces $60 = 0.5(120) + b$, so $b = 0$. Substituting this value for b in the slope-intercept form of the equation produces $y = 0.5x + 0$, or $y = 0.5x$.

Choices A, C, and D are incorrect and may result from an error in calculation when determining the slope of the line of best fit.

QUESTION 25

Choice A is correct. The intersection point (x, y) of the two graphs can be found by multiplying the second equation in the system $1.6x + 0.5y = -1.3$ by 3, which gives $4.8x + 1.5y = -3.9$. The y-terms in the equation $4.8x + 1.5y = -3.9$ and the first equation in the system $2.4x - 1.5y = 0.3$ have coefficients that are opposites. Adding the left- and right-hand sides of the equations $4.8x + 1.5y = -3.9$ and $2.4x - 1.5y = 0.3$

produces $7.2x + 0.0y = -3.6$, which is equivalent to $7.2x = -3.6$. Dividing both sides of the equation by 7.2 gives $x = -0.5$. Therefore, the x-coordinate of the intersection point (x, y) of the system is -0.5.

Choice B is incorrect. An x-value of -0.25 produces y-values of -0.6 and -1.8 for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point. Choice C is incorrect. An x-value of 0.8 produces y-values of 1.08 and -5.16 for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point. Choice D is incorrect. An x-value of 1.75 produces y-values of 2.6 and -8.2 for each equation in the system, respectively. Since the same ordered pair doesn't satisfy both equations, neither point can be the intersection point.

QUESTION 26

Choice D is correct. A model for a quantity that increases by r% per time period is an exponential function of the form $P(t) = I\left(1+\frac{r}{100}\right)^t$, where I is the initial value at time $t = 0$ and each increase of t by 1 represents 1 time period. It's given that $P(t)$ is the number of pollen grains per square centimeter and t is the number of years after the first year the grains were deposited. There were 310 pollen grains at time $t = 0$, so $I = 310$. This number increased 1% per year after year $t = 0$, so $r = 1$. Substituting these values into the form of the exponential function gives $P(t) = 310\left(1 + \frac{1}{100}\right)^t$, which can be rewritten as $P(t) = 310(1.01)^t$.

Choices A, B, and C are incorrect and may result from errors made when setting up an exponential function.

QUESTION 27

Choice A is correct. Subtracting $\left(\frac{2}{3}\right)(9x - 6)$ from both sides of the given equation yields $-4 = \left(\frac{1}{3}\right)(9x - 6)$, which can be rewritten as $-4 = 3x - 2$.

Choices B and D are incorrect and may result from errors made when manipulating the equation. Choice C is incorrect. This is the value of x.

QUESTION 28

Choice D is correct. The graph of a quadratic function in the form $f(x) = a(x - b)(x - c)$ intersects the x-axis at $(b, 0)$ and $(c, 0)$. The graph will be a parabola that opens upward if a is positive and downward if a is negative. For the function f, $a = 1$, $b = -3$, and $c = k$. Therefore, the graph of the function f opens upward and intersects the x-axis at $(-3, 0)$ and $(k, 0)$. Since k is a positive integer, the intersection point $(k, 0)$ will have an x-coordinate that is a positive integer. The only graph that opens upward, passes through the point $(-3, 0)$, and has another x-intercept with a positive integer as the x-coordinate is choice D.

Choices A and B are incorrect. Both graphs open downward rather than upward. Choice C is incorrect. The graph doesn't pass through the point (−3, 0).

QUESTION 29

Choice D is correct. It's given that L is the femur length, in inches, and H is the height, in inches, of an adult male. Because L is multiplied by 1.88 in the equation, for every increase in L by 1, the value of H increases by 1.88. Therefore, the meaning of 1.88 in this context is that a man's height increases by approximately 1.88 inches for each one-inch increase in his femur length.

Choices A, B, and C are incorrect and may result from misinterpreting the context and the values the variables are representing.

QUESTION 30

Choice A is correct. A segment can be drawn inside of quadrilateral $ABCD$ from point B to point F (not shown) on segment AD such that segment BF is perpendicular to segment AD. This will create rectangle $FBCD$ such that $FB = CD$. This will also create right triangle ABF such that $FB = \frac{1}{2}AB$. An acute angle in a right triangle has measure 30° if and only if the side opposite this angle is half the length of the hypotenuse. (Such a triangle is called a 30°-60°-90° triangle.) Since AB is the hypotenuse of right triangle ABF and $FB = \frac{1}{2}AB$, triangle ABF must be a 30°-60°-90° triangle and angle ABF must measure 60°. The measure of angle ABC equals the sum of the measures of angles ABF and FBC. Because angle FBC is in rectangle $FBCD$, it has a measure of 90°. Therefore, the measure of angle ABC, or angle B shown in the original figure, is 60° + 90° = 150°.

Choice B is incorrect and may result from identifying triangle ABF as a 45°-45°-90° triangle and the measure of angle ABF as 45°. Choice C is incorrect and may result from adding the measures of angles BAF and FBC rather than angles ABF and FBC. Choice D is incorrect and may result from finding the measure of angle D rather than angle B.

QUESTION 31

The correct answer is 6. It's given that apples cost $0.65 each and oranges cost $0.75 each. If x is the number of apples, the cost for buying x apples is $0.65x$ dollars. If y is the number of oranges, the cost for buying y oranges is $0.75y$ dollars. Lynne has $8.00 to spend; therefore, the inequality for the number of apples and oranges Lynne can buy is $0.65x + 0.75y \leq 8.00$. Since Lynne bought 5 apples, $x = 5$. Substituting 5 for x yields $0.65(5) + 0.75y \leq 8.00$, which can be rewritten as $3.25 + 0.75y \leq 8.00$. Subtracting 3.25 from both sides of the inequality yields $0.75y \leq 4.75$. Dividing both sides of this inequality by 0.75 yields $y \leq 6.33$. Therefore, the maximum number of whole oranges Lynne can buy is 6.

QUESTION 32

The correct answer is 146. According to the triangle sum theorem, the sum of the measures of the three angles of a triangle is 180°. This triangle is made up of angles with measures of $a°$, $b°$, and $c°$. Therefore, $a + b + c = 180$. Substituting 34 for a yields $34 + b + c = 180$. Subtracting 34 from each side of the equation yields $b + c = 146$.

QUESTION 33

The correct answer is 2500. The mean number of the list is found by dividing the sum of all the numbers in the list by the count of numbers in the list. It's given that the mean of the five numbers in this list is 1600; therefore, $\frac{700 + 1200 + 1600 + 2000 + x}{5} = 1600$. Multiplying both sides of this equation by 5 gives $700 + 1200 + 1600 + 2000 + x = 8000$. The left-hand side of this equation can be rewritten as $5500 + x = 8000$. Subtracting 5500 from both sides of this equation gives $x = 2500$.

QUESTION 34

The correct answer is 34. Substituting the values $y = 17$ and $x = a$ into the equation $y = mx$ yields $17 = ma$. Solving for a gives $a = \frac{17}{m}$. This can be substituted for a in $x = 2a$, which yields $x = 2\left(\frac{17}{m}\right)$, or $x = \frac{34}{m}$. Substituting $x = \frac{34}{m}$ into the equation $y = mx$ yields $y = m\left(\frac{34}{m}\right)$. This equation can be rewritten as $y = 34$.

QUESTION 35

The correct answer is $\frac{5}{2}$. Applying the distributive property of multiplication on the left-hand side of $a(x + b) = 4x + 10$ yields $ax + ab = 4x + 10$. If $a(x + b) = 4x + 10$ has infinitely many solutions, then $ax + ab = 4x + 10$ must be true for all values of x. It follows that $ax = 4x$ and $ab = 10$. Since $ax = 4x$, it follows that $a = 4$. Substituting 4 for a in $ab = 10$ yields $4b = 10$. Dividing both sides of $4b = 10$ by 4 yields $b = \frac{10}{4}$, which simplifies to $\frac{5}{2}$. Either 5/2 or 2.5 may be entered as the correct answer.

QUESTION 36

The correct answer is $\frac{25}{4}$. If a line intersects a parabola at a point, the coordinates of the intersection point must satisfy the equation of the line and the equation of the parabola. Since the equation of the line is $y = c$, where c is a constant, the y-coordinate of the intersection point must be c. It follows then that substituting c for y in the equation for the parabola will result in another true equation: $c = -x^2 + 5x$. Subtracting c from both sides of $c = -x^2 + 5x$ and then dividing both sides by -1 yields $0 = x^2 - 5x + c$. The solution to this quadratic equation would give the x-coordinate(s) of the point(s) of intersection.

Since it's given that the line and parabola intersect at exactly one point, the equation $0 = x^2 - 5x + c$ has exactly one solution. A quadratic equation in the form $0 = ax^2 + bx + c$ has exactly one solution when its discriminant $b^2 - 4ac$ is equal to 0. In the equation $0 = x^2 - 5x + c$, $a = 1$, $b = -5$, and $c = c$. Therefore, $(-5)^2 - 4(1)(c) = 0$, or $25 - 4c = 0$. Subtracting 25 from both sides of $25 - 4c = 0$ and then dividing both sides by -4 yields $c = \frac{25}{4}$. Therefore, if the line $y = c$ intersects the parabola defined by $y = -x^2 + 5x$ at exactly one point, then $c = \frac{25}{4}$. Either 25/4 or 6.25 may be entered as the correct answer.

QUESTION 37

The correct answer is 293. It's given that a peregrine falcon's maximum speed while diving is 200 miles per hour and that 1 mile = 5280 feet. Therefore, a peregrine falcon's maximum speed while diving is $\left(\frac{200 \text{ miles}}{1 \text{ hour}}\right)\left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right) = 1{,}056{,}000$ feet per hour. There are 60 minutes in 1 hour and 60 seconds in each minute, so there are (60)(60) = 3600 seconds in 1 hour. A peregrine falcon's maximum speed while diving is therefore $\left(\frac{1{,}056{,}000 \text{ feet}}{1 \text{ hour}}\right)\left(\frac{1 \text{ hour}}{3600 \text{ seconds}}\right)$, which is approximately 293.33 feet per second. To the nearest whole number, this is 293 feet per second.

QUESTION 38

The correct answer is 9. If x is the number of hours it will take the falcon to dive 0.5 mile, then the speed of 200 miles per hour can be used to create the proportion $\frac{200 \text{ miles}}{1 \text{ hour}} = \frac{0.5 \text{ mile}}{x \text{ hours}}$. This proportion can be rewritten as $x \text{ hours} = \frac{0.5 \text{ mile}}{200 \frac{\text{miles}}{\text{hour}}}$, which gives $x = 0.0025$. There are 60 minutes in 1 hour and 60 seconds in each minute, so there are (60)(60) = 3600 seconds in one hour. Therefore, 0.0025 hour is equivalent to $(0.0025 \text{ hour})\left(\frac{3600 \text{ seconds}}{1 \text{ hour}}\right) = 9$ seconds.

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