CollegeBoard

Answer Explanations
SAT® Practice Test #1

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Section 1: Reading Test

QUESTION 1.

Choice B is the best answer. In the passage, a young man (Akira) asks a mother (Chie) for permission to marry her daughter (Naomi). The request was certainly surprising to the mother, as can be seen from line 47, which states that prior to Akira's question Chie "had no idea" the request was coming.

Choice A is incorrect because the passage depicts two characters engaged in a civil conversation, with Chie being impressed with Akira's "sincerity" and finding herself "starting to like him." Choice C is incorrect because the passage is focused on the idea of Akira's and Naomi's present lives and possible futures. Choice D is incorrect because the interactions between Chie and Akira are polite, not critical; for example, Chie views Akira with "amusement," not animosity.

QUESTION 2.

Choice B is the best answer. The passage centers on a night when a young man tries to get approval to marry a woman's daughter. The passage includes detailed descriptions of setting (a "winter's eve" and a "cold rain," lines 5-6); character (Akira's "soft, refined" voice, line 33; Akira's eyes "sh[ining] with sincerity," line 35); and plot ("Naomi was silent. She stood a full half minute looking straight into Chie's eyes. Finally, she spoke," lines 88-89).

Choice A is incorrect because the passage focuses on a nontraditional marriage proposal. Choice C is incorrect because the passage concludes without resolution to the question of whether Akira and Naomi will receive permission to marry. Choice D is incorrect because the passage repeatedly makes clear that for Chie, her encounter with Akira is momentous and unsettling, as when Akira acknowledges in line 73 that he has "startled" her.

QUESTION 3.

Choice C is the best answer. Akira "came directly, breaking all tradition," (line 1) when he approached Chie and asked to marry her daughter, and he "ask[ed] directly," without "a go-between" (line 65) or "mediation," because doing otherwise would have taken too much time.

Choices A, B, and D are incorrect because in these contexts, "directly" does not mean in a frank, confident, or precise manner.

QUESTION 4.

Choice A is the best answer. Akira is very concerned Chie will find his marriage proposal inappropriate because he did not follow traditional protocol and use a "go-between" (line 65). This is clear in lines 63-64, when Akira says to Chie "Please don't judge my candidacy by the unseemliness of this proposal."

Choice B is incorrect because there is no evidence in the passage that Akira worries that Chie will mistake his earnestness for immaturity. Choice C is incorrect because while Akira recognizes that his unscheduled visit is a nuisance, his larger concern is that Chie will reject him due to the inappropriateness of his proposal. Choice D is incorrect because there is no evidence in the passage that Akira worries Chie will underestimate the sincerity of his emotions.

QUESTION 5.

Choice C is the best answer. In lines 63-64, Akira says to Chie, "Please don't judge my candidacy by the unseemliness of this proposal." This reveals Akira's concern that Chie may say no to the proposal simply because Akira did not follow traditional practices.

Choices A, B, and D do not provide the best evidence for the answer to the previous question. Choice A is incorrect because line 33 merely describes Akira's voice as "soft, refined." Choice B is incorrect because lines 49-51 reflect Chie's perspective, not Akira's. Choice D is incorrect because lines 71-72 indicate only that Akira was speaking in an eager and forthright matter.

QUESTION 6.

Choice D is the best answer because Akira clearly treats Chie with respect, including "bow[ing]" (line 26) to her, calling her "Madame" (line 31), and looking at her with "a deferential peek" (line 34). Akira does not offer Chie utter deference, though, as he asks to marry Naomi after he concedes that he is not following protocol and admits to being a "disruption" (line 31).

Choice A is incorrect because while Akira conveys respect to Chie, there is no evidence in the passage that he feels affection for her. Choice B is incorrect because neither objectivity nor impartiality accurately describes how Akira addresses Chie. Choice C is incorrect because Akira conveys respect to Chie and takes the conversation seriously.

QUESTION 7.

Choice D is the best answer. The first paragraph (lines 1-4) reflects on how Akira approached Chie to ask for her daughter's hand in marriage. In these lines, the narrator is wondering whether Chie would have been more likely to say yes to Akira's proposal if Akira had followed tradition: "Akira came directly, breaking all tradition. Was that it? Had he followed form—had he asked his mother to speak to his father to approach a go-between—would Chie have been more receptive?" Thus, the main purpose of the first paragraph is to examine why Chie reacted a certain way to Akira's proposal.

Choice A is incorrect because the first paragraph describes only one aspect of Japanese culture (marriage proposals) but not the culture as a whole. Choice B is incorrect because the first paragraph implies a criticism of Akira's individual marriage proposal but not the entire tradition of Japanese marriage proposals. Choice C is incorrect because the narrator does not question a suggestion.

QUESTION 8.

Choice B is the best answer. In line 1, the narrator suggests that Akira's direct approach broke "all tradition." The narrator then wonders if Akira had "followed form," or the tradition expected of him, would Chie have been more receptive to his proposal. In this context, following "form" thus means following a certain tradition or custom.

Choices A, C, and D are incorrect because in this context "form" does not mean the way something looks (appearance), the way it is built (structure), or its essence (nature).

QUESTION 9.

Choice C is the best answer. Akira states that his unexpected meeting with Chie occurred only because of a "matter of urgency," which he explains as "an opportunity to go to America, as dentist for Seattle's Japanese community" (lines 41-42). Akira decides to directly speak to Chie because Chie's response to his marriage proposal affects whether Akira accepts the job offer.

Choice A is incorrect because there is no evidence in the passage that Akira is worried his parents will not approve of Naomi. Choice B is incorrect because Akira has "an understanding" with Naomi (line 63). Choice D is incorrect; while Akira may know that Chie is unaware of his feelings for Naomi, this is not what he is referring to when he mentions "a matter of urgency."

QUESTION 10.

Choice B is the best answer. In lines 39-42, Akira clarifies that the "matter of urgency" is that he has "an opportunity to go to America, as dentist for Seattle's Japanese community." Akira needs Chie's answer to his marriage proposal so he can decide whether to accept the job in Seattle.

Choices A, C, and D do not provide the best evidence for the answer to the previous question. Choice A is incorrect because in line 39 Akira apologizes for interrupting Chie's quiet evening. Choice C is incorrect because lines 58-59 address the seriousness of Akira's request, not its urgency. Choice D is incorrect because line 73 shows only that Akira's proposal has "startled" Chie and does not explain why his request is time-sensitive.

QUESTION 11.

Choice A is the best answer. Lines 1-9 include examples of how many people shop ("millions of shoppers"), how much money they spend ("over $30 billion at retail stores in the month of December alone"), and the many occasions that lead to shopping for gifts ("including weddings, birthdays, anniversaries, graduations, and baby showers."). Combined, these examples show how frequently people in the US shop for gifts.

Choice B is incorrect because even though the authors mention that "$30 billion" had been spent in retail stores in one month, that figure is never discussed as an increase (or a decrease). Choice C is incorrect because lines 1-9 provide a context for the amount of shopping that occurs in the US, but the anxiety (or "dread") it might cause is not introduced until later in the passage. Choice D is incorrect because lines 1-9 do more than highlight the number of different occasions that lead to gift-giving.

QUESTION 12.

Choice B is the best answer. Lines 9-10 state "This frequent experience of gift-giving can engender ambivalent feelings in gift-givers." In the subsequent sentences, those "ambivalent" feelings are further exemplified as conflicted feelings, as shopping is said to be something that "[m]any relish" (lines 10-11) and "many dread" (line 14).

Choices A, C, and D are incorrect because in this context, "ambivalent" does not mean feelings that are unrealistic, apprehensive, or supportive.

QUESTION 13.

Choice D is the best answer. In lines 10-13, the authors clearly state that some people believe gift-giving can help a relationship because it "offers a powerful means to build stronger bonds with one's closest peers."

Choice A is incorrect because even though the authors state that some shoppers make their choices based on "egocentrism," (line 33) there is no evidence in the passage that people view shopping as a form of self-expression. Choice B is incorrect because the passage implies that shopping is an expensive habit. Choice C is incorrect because the passage states that most people have purchased and received gifts, but it never implies that people are *required* to reciprocate the gift-giving process.

QUESTION 14.

Choice A is the best answer. In lines 10-13, the authors suggest that people value gift-giving because it may strengthen their relationships with others: "Many relish the opportunity to buy presents because gift-giving offers a powerful means to build stronger bonds with one's closest peers."

Choices B, C, and D do not provide the best evidence for the answer to the previous question. Choice B is incorrect because lines 22-23 discuss how people often buy gifts that the recipients would not purchase. Choice C is incorrect because lines 31-32 explain how gift-givers often fail to consider the recipients' preferences. Choice D is incorrect because lines 44-47 suggest that the cost of a gift may not correlate to a recipient's appreciation of it.

QUESTION 15.

Choice A is the best answer. The "deadweight loss" mentioned in the second paragraph is the significant monetary difference between what a gift-giver would pay for something and what a gift-recipient would pay for the same item. That difference would be predictable to social psychologists, whose research "has found that people often struggle to take account of others' perspectives—their insights are subject to egocentrism, social projection, and multiple attribution errors" (lines 31-34).

Choices B, C, and D are all incorrect because lines 31-34 make clear that social psychologists would expect a disconnect between gift-givers and gift-recipients, not that they would question it, be disturbed by it, or find it surprising or unprecedented.

QUESTION 16.

Choice C is the best answer. Lines 41-44 suggest that gift-givers assume a correlation between the cost of a gift and how well-received it will be: ". . . gift-givers equate how much they spend with how much recipients will appreciate the gift (the more expensive the gift, the stronger a gift-recipient's feelings of appreciation)." However, the authors suggest this assumption may be incorrect or "unfounded" (line 47), as gift-recipients "may not construe smaller and larger gifts as representing smaller and larger signals of thoughtfulness and consideration" (lines 63-65).

Choices A, B, and D are all incorrect because the passage neither states nor implies that the gift-givers' assumption is insincere, unreasonable, or substantiated.

QUESTION 17.

Choice C is the best answer. Lines 63-65 suggest that the assumption made by gift-givers in lines 41-44 may be incorrect. The gift-givers assume that recipients will have a greater appreciation for costly gifts than for less costly

gifts, but the authors suggest this relationship may be incorrect, as gift-recipients "may not construe smaller and larger gifts as representing smaller and larger signals of thoughtfulness and consideration" (lines 63-65).

Choices A and D are incorrect because lines 53-55 and 75-78 address the question of "why" gift-givers make specific assumptions rather than addressing the validity of these assumptions. Choice B is incorrect because lines 55-60 focus on the reasons people give gifts to others.

QUESTION 18.

Choice D is the best answer. Lines 53-55 state that "Perhaps givers believe that bigger (i.e., more expensive) gifts convey stronger signals of thoughtfulness and consideration." In this context, saying that more expensive gifts "convey" stronger signals means the gifts send, or communicate, stronger signals to the recipients.

Choices A, B, and C are incorrect because in this context, to "convey" something does not mean to transport it (physically move something), counteract it (act in opposition to something), or exchange it (trade one thing for another).

QUESTION 19.

Choice A is the best answer. The paragraph examines how gift-givers believe expensive gifts are more thoughtful than less expensive gifts and will be more valued by recipients. The work of Camerer and others offers an explanation for the gift-givers' reasoning: "gift-givers attempt to signal their positive attitudes toward the intended recipient and their willingness to invest resources in a future relationship" (lines 57-60).

Choices B, C, and D are incorrect because the theory articulated by Camerer and others is used to explain an idea put forward by the authors ("givers believe that bigger . . . gifts convey stronger signals"), not to introduce an argument, question a motive, or support a conclusion.

QUESTION 20.

Choice B is the best answer. The graph clearly shows that gift-givers believe that a "more valuable" gift will be more appreciated than a "less valuable gift." According to the graph, gift-givers believe the monetary value of a gift will determine whether that gift is well received or not.

Choice A is incorrect because the graph does not suggest that gift-givers are aware of gift-recipients' appreciation levels. Choices C and D are incorrect because neither the gift-givers' desire for the gifts they purchase nor the gift-givers' relationship with the gift-recipients is addressed in the graph.

QUESTION 21.

Choice A is the best answer. Lines 69-75 explain that while people are often both gift-givers and gift-receivers, they struggle to apply information they learned as a gift-giver to a time when they were a gift-receiver: "Yet, despite the extensive experience that people have as both givers and receivers, they often struggle to transfer information gained from one role (e.g., as a giver) and apply it in another, complementary role (e.g., as a receiver)." The authors suggest that the disconnect between how much appreciation a gift-giver thinks a gift merits and how much appreciation a gift-recipient displays for the gift may be caused by both individuals' inability to comprehend the other's perspective.

Choices B and C are incorrect because neither the passage nor the graph addresses the idea that society has become more materialistic or that there is a growing opposition to gift-giving. Choice D is incorrect because the passage emphasizes that gift-givers and gift-recipients fail to understand each other's perspective, but it offers no evidence that the disconnect results only from a failure to understand the other's intentions.

QUESTION 22.

Choice B is the best answer. Lines 2-4 of the passage describe DNA as "a very long chain, the backbone of which consists of a regular alternation of sugar and phosphate groups." The backbone of DNA, in other words, is the main structure of a chain made up of repeating units of sugar and phosphate.

Choice A is incorrect because the passage describes DNA on the molecular level only and never mentions the spinal column of organisms. Choice C is incorrect because the passage describes the backbone of the molecule as having "a regular alternation" of sugar and phosphate, not one or the other. Choice D is incorrect because the nitrogenous bases are not the main structural unit of DNA; rather, they are attached only to the repeating units of sugar.

QUESTION 23.

Choice D is the best answer. The authors explain that hydrogen bonds join together pairs of nitrogenous bases, and that these bases have a specific structure that leads to the pairing: "One member of a pair must be a purine and the other a pyrimidine in order to bridge between the two chains" (lines 27-29). Given the specific chemical properties of a nitrogenous base, it would be inaccurate to call the process random.

Choice A is incorrect because lines 5-6 describe how nitrogenous bases attach to sugar but not how those bases pair with one another. Choice B is incorrect because lines 9-10 do not contradict the student's claim. Choice C is incorrect because lines 23-25 describe how the two molecules' chains are linked, not what the specific pairing between nitrogenous bases is.

QUESTION 24.

Choice D is the best answer. In lines 12-14 the authors state: "the first feature of our structure which is of biological interest is that it consists not of one chain, but of two."

Choices A and B are incorrect because lines 12-14 explicitly state that it is the two chains of DNA that are of "biological interest," not the chemical formula of DNA, nor the common fiber axis those two chains are wrapped around. Choice C is incorrect because, while the X-ray evidence did help Watson and Crick to discover that DNA consists of two chains, it was not claimed to be the feature of biological interest.

QUESTION 25.

Choice C is the best answer. In lines 12-14 the authors claim that DNA molecules appear to be comprised of two chains, even though "it has often been assumed . . . there would be only one" (lines 15-17). The authors support this claim with evidence compiled from an X-ray: "the density, taken with the X-ray evidence, suggests very strongly that there are two [chains]" (lines 18-19).

Choices A, B, and D are incorrect because the authors mention density and X-ray evidence to support a claim, not to establish that DNA carries genetic information, present a hypothesis about the composition of a nucleotide, or confirm a relationship between the density and chemical formula of DNA.

QUESTION 26.

Choice B is the best answer. The authors explain that "only certain pairs of bases will fit into the structure" (lines 25-26) of the DNA molecule. These pairs must contain "a purine and the other a pyrimidine in order to bridge between the two chains" (lines 27-29), which implies that any other pairing would not "fit into the structure" of the DNA molecule. Therefore, a pair of purines would be larger than the required purine/pyrimidine pair and would not fit into the structure of the DNA molecule.

Choice A is incorrect because this section is not discussing the distance between a sugar and phosphate group. Choice C is incorrect because the passage never makes clear the size of the pyrimidines or purines in relation to each other, only in relation to the space needed to bond the chains of the DNA molecule. Choice D is incorrect because the lines do not make an implication about the size of a pair of pyrimidines in relation to the size of a pair consisting of a purine and a pyrimidine.

QUESTION 27.

Choice D is the best answer. The authors explain how the DNA molecule contains a "precise sequence of bases" (lines 43-44), and that the authors can use the order of bases on one chain to determine the order of bases on the other chain: "If the actual order of the bases on one of the pair of chains were

given, one could write down the exact order of the bases on the other one, because of the specific pairing. Thus one chain is, as it were, the complement of the other, and it is this feature which suggests how the deoxyribonucleic acid molecule might duplicate itself" (lines 45-51). The authors use the words "exact," "specific," and "complement" in these lines to suggest that the base pairings along a DNA chain is understood and predictable, and may explain how DNA "duplicate[s] itself" (line 51).

Choice A is incorrect because the passage does not suggest that most nucleotide sequences are known. Choice B is incorrect because these lines are not discussing the random nature of the base sequence along one chain of DNA. Choice C is incorrect because the authors are describing the bases attached only to the sugar, not to the sugar-phosphate backbone.

QUESTION 28.

Choice C is the best answer. Lines 6-7 state that "Two of the possible bases—adenine and guanine—are purines," and on the table the percentages of adenine and guanine in yeast DNA are listed as 31.3% and 18.7% respectively.

Choices A, B, and D are incorrect because they do not state the percentages of both purines, adenine and guanine, in yeast DNA.

QUESTION 29.

Choice A is the best answer. The authors state: "We believe that the bases will be present almost entirely in their most probable forms. If this is true, the conditions for forming hydrogen bonds are more restrictive, and the only pairs of bases possible are: adenine with thymine, and guanine with cytosine" (lines 31-35). The table shows that the pairs adenine/thymine and guanine/cytosine have notably similar percentages in DNA for all organisms listed.

Choice B is incorrect. Although the choice of "Yes" is correct, the explanation for that choice misrepresents the data in the table. Choices C and D are incorrect because the table does support the authors' proposed pairing of nitrogenous bases in DNA molecules.

QUESTION 30.

Choice A is the best answer because it gives the percentage of cytosine (17.3%) in sea urchin DNA and the percentage of guanine (17.7%) in sea urchin DNA. Their near similar pairing supports the authors' proposal that possible pairings of nitrogenous bases are "adenine with thymine, and guanine with cytosine" (line 35).

Choices B, C, and D do not provide the best evidence for the answer to the previous question. Choice B (cytosine and thymine), Choice C (cytosine and adenine), and Choice D (guanine and adenine) are incorrect because they show pairings of nitrogenous bases that do not compose a similar percentage of the bases in sea urchin DNA.

QUESTION 31.

Choice D is the best answer. The table clearly shows that the percentage of adenine in each organism's DNA is different, ranging from 24.7% in *E.coli* to 33.2% in the octopus. That such a variability would exist is predicted in lines 41-43, which states that "in a long molecule many different permutations are possible."

Choices A and B are incorrect because the table shows that the percentage of adenine varies between 24.7% and 33.2% in different organisms. Choice C is incorrect because lines 36-38 state that adenine pairs with thymine but does not mention the variability of the base composition of DNA.

QUESTION 32.

Choice B is the best answer. In this passage, Woolf asks women a series of questions. Woolf wants women to consider joining "the procession of educated men" (lines 56-57) by becoming members of the workforce. Woolf stresses that this issue is urgent, as women "have very little time in which to answer [these questions]" (lines 48-49).

Choice A is incorrect because Woolf argues against the tradition of only "the sons of educated men" (lines 82-83) joining the workforce. Choice C is incorrect because Woolf is not highlighting the severity of social divisions as much as she is explaining how those divisions might be reduced (with women joining the workforce). Choice D is incorrect because Woolf does not question the feasibility of changing the workforce dynamic.

QUESTION 33.

Choice A is the best answer. Throughout the passage, Woolf advocates for more women to engage with existing institutions by joining the workforce: "We too can leave the house, can mount those steps [to an office], pass in and out of those doors, . . . make money, administer justice . . ." (lines 30-32). Woolf tells educated women that they are at a "moment of transition" (line 51) where they must consider their future role in the workforce.

Choice B is incorrect because even though Woolf mentions women's traditional roles (lines 68-69: "while they stirred the pot, while they rocked the cradle"), she does not suggest that women will have to give up these traditional roles to gain positions of influence. Choice C is incorrect because though Woolf wonders how "the procession of the sons of educated men" impacts women's roles, she does not argue that this male-dominated society has had grave and continuing effects. Choice D is incorrect because while Woolf suggests educated women can hold positions currently held by men, she does not suggest that women's entry into positions of power will change those positions.

QUESTION 34.

Choice C is the best answer. Woolf uses the word "we" to refer to herself and educated women in English society, the "daughters of educated men"

(line 64). Woolf wants these women to consider participating in a changing workforce: "For there, trapesing along at the tail end of the procession [to and from work], we go ourselves" (lines 23-24). In using the word "we" throughout the passage, Woolf establishes a sense of solidarity among educated women.

Choice A is incorrect because Woolf does not use "we" to reflect on whether people in a group are friendly to one another; she is concerned with generating solidarity among women. Choice B is incorrect because though Woolf admits women have predominantly "done their thinking" within traditional female roles (lines 64-69), she does not use "we" to advocate for more candor among women. Choice D is incorrect because Woolf does not use "we" to emphasize a need for people in a group to respect one other; rather, she wants to establish a sense of solidarity among women.

QUESTION 35.

Choice B is the best answer. Woolf argues that the "bridge over the River Thames, [has] an admirable vantage ground for us to make a survey" (lines 1-3). The phrase "make a survey" means to carefully examine an event or activity. Woolf wants educated women to "fix [their] eyes upon the procession—the procession of the sons of educated men" (lines 9-11) walking to work.

Choice A is incorrect because while Woolf states the bridge "is a place to stand on by the hour dreaming," she states that she is using the bridge "to consider the facts" (lines 6-9). Woolf is not using the bridge for fanciful reflection; she is analyzing "the procession of the sons of educated men" (lines 10-11). Choice C is incorrect because Woolf does not compare the bridge to historic episodes. Choice D is incorrect because Woolf does not suggest that the bridge is a symbol of a male-dominated past, but rather that it serves as a good place to watch men proceed to work.

QUESTION 36.

Choice D is the best answer. Woolf writes that the men who conduct the affairs of the nation (lines 15-17: "ascending those pulpits, preaching, teaching, administering justice, practising medicine, transacting business, making money") are the same men who go to and from work in a "procession" (line 10). Woolf notes that women are joining this procession, an act that suggests the workforce has become less exclusionary: "For there, trapesing along at the tail end of the procession, we go ourselves" (lines 23-24).

Choice A is incorrect because the procession is described as "a solemn sight always" (lines 17-18), which indicates that it has always been influential. Choice B is incorrect because the passage does not indicate that this procession has become a celebrated feature of English life. Choice C is incorrect because the passage states only that the procession is made up of "the sons of educated men" (lines 10-11).

QUESTION 37.

Choice C is the best answer, as lines 23-24 suggest that the workforce has become less exclusionary. In these lines Woolf describes how women are joining the male-dominated procession that travels to and from the work place: "For there, trapesing along at the tail end of the procession, we go ourselves."

Choices A, B, and D are incorrect because they do not provide the best evidence for the answer to the previous question. Choice A is incorrect because lines 12-17 describe the positions predominantly held by men. Choice B is incorrect because lines 17-19 use a metaphor to describe how the procession physically looks. Choice D is incorrect because lines 30-34 hypothesize about future jobs for women.

QUESTION 38.

Choice C is the best answer. Woolf characterizes the questions she asks in lines 53-57 as significant ("so important that they may well change the lives of all men and women for ever," lines 52-53) and urgent ("we have very little time in which to answer them," lines 48-49). Therefore, Woolf considers the questions posed in lines 53-57 as both momentous (significant) and pressing (urgent).

Choice A is incorrect because Woolf characterizes the questions as urgent and important, not as something that would cause controversy or fear. Choice B is incorrect because though Woolf considers the questions to be weighty (or "important"), she implies that they can be answered. Choice D is incorrect because Woolf does not imply that the questions are mysterious.

QUESTION 39.

Choice B is the best answer. The answer to the previous question shows how Woolf characterizes the questions posed in lines 53-57 as momentous and pressing. In lines 48-49, Woolf describes these questions as "important," or momentous, and states that women "have very little time in which to answer them," which shows their urgency.

Choices A, C, and D do not provide the best evidence for the answer to the previous question. Choices A and D are incorrect because lines 46-47 and line 62 suggest that women need to think about these questions and not offer trivial objections to them. Choice C is incorrect because line 57 characterizes only the need for urgency and does not mention the significance of the questions.

QUESTION 40.

Choice C is the best answer. Woolf writes that women "have thought" while performing traditional roles such as cooking and caring for children

(lines 67-69). Woolf argues that this "thought" has shifted women's roles in society and earned them a "brand-new sixpence" that they need to learn how to "spend" (lines 70-71). The "sixpence" mentioned in these lines is not a literal coin. Woolf is using the "sixpence" as a metaphor, as she is suggesting women take advantage of the opportunity to join the male-dominated workforce.

Choices A, B, and D are incorrect because in this context, "sixpence" does not refer to tolerance, knowledge, or perspective.

QUESTION 41.

Choice B is the best answer. In lines 72-76, Woolf repeats the phrase "let us think" to emphasize how important it is for women to critically reflect on their role in society. Woolf states this reflection can occur at any time: "Let us think in offices; in omnibuses; while we are standing in the crowd watching Coronations and Lord Mayor's Shows; let us think . . . in the gallery of the House of Commons; in the Law Courts; let us think at baptisms and marriages and funerals."

Choices A, C, and D are incorrect because in lines 72-76 Woolf is not emphasizing the novelty of the challenge faced by women, the complexity of social and political issues, or the enjoyable aspect of women's career possibilities.

QUESTION 42.

Choice B is the best answer. The author of Passage 1 identifies specific companies such as the "Planetary Resources of Washington," "Deep Space Industries of Virginia," and "Golden Spike of Colorado" to support his earlier assertion that there are many interested groups "working to make space mining a reality" (line 8).

Choices A, C, and D are incorrect because the author of Passage 1 does not mention these companies to profile the technological advances in space mining, the profit margins from space mining, or the diverse approaches to space mining.

QUESTION 43.

Choice A is the best answer. The author of Passage 1 explicitly states that one benefit to space mining is access to precious metals and earth elements: "within a few decades, [space mining] may be meeting earthly demands for precious metals, such as platinum and gold, and the rare earth elements vital for personal electronics, such as yttrium and lanthanum" (lines 18-22).

Choice B is incorrect because Passage 1 does not suggest that precious metals extracted from space may make metals more valuable on Earth. Choice C and Choice D are incorrect because Passage 1 never mentions how space mining could create unanticipated technological innovations or change scientists' understanding of space resources.

QUESTION 44.

Choice A is the best answer. Lines 18-22 suggest that space mining may help meet "earthly demands for precious metals . . . and the rare earth elements vital for personal electronics." In this statement, the author is stating materials ("metals," "earth elements") that may be gathered as a result of space mining, and that these materials may be important to Earth's economy.

Choices B, C, and D do not provide the best evidence for the answer to the previous question. Choice B is incorrect because lines 24-28 focus on an "off-planet economy" but never address positive effects of space mining. Choice C is incorrect because lines 29-30 suggest the relative value of water found in space. Choice D is incorrect because lines 41-44 state that space mining companies hope to find specific resources in lunar soil and asteroids but do not address how these resources are important to Earth's economy.

QUESTION 45.

Choice D is the best answer. The author suggests in lines 19-22 that space mining may meet "earthly demands for precious metals, such as platinum and gold, and the rare earth elements vital for personal electronics." In this sentence, "earthly demands" suggests that people want, or desire, these precious metals and rare earth elements.

Choices A, B, and C are incorrect because in this context "demands" does not mean offers, claims, or inquiries.

QUESTION 46.

Choice C is the best answer. Lines 29-30 introduce the idea that water mined in space may be very valuable: "water mined from other worlds could become the most desired commodity." Lines 35-40 support this assertion by suggesting how mined space water could be used "for drinking or as a radiation shield" (lines 36-37) or to make "spacecraft fuel" (line 38).

Choice A is incorrect because the comparison in the previous paragraph (the relative value of gold and water to someone in the desert) is not expanded upon in lines 35-40. Choice B is incorrect because the question asked in the previous paragraph is also answered in that paragraph. Choice D is incorrect because no specific proposals are made in the previous paragraph; rather, an assertion is made and a question is posed.

QUESTION 47.

Choice B is the best answer. The author of Passage 2 recognizes that space mining may prove beneficial to humanity, stating that "we all stand to gain: the mineral bounty and spin-off technologies could enrich us all" (lines 50-52). The author also repeatedly mentions that space mining should be carefully considered before it is implemented: "But before the miners

start firing up their rockets, we should pause for thought" (lines 53-54); "But [space mining's] consequences—both here on Earth and in space—merit careful consideration" (lines 57-59).

Choice A is incorrect because the author of Passage 2 concedes that "space mining seems to sidestep most environmental concerns" (lines 55-56) but does not imply that space mining will recklessly harm the environment, either on Earth or in space. Choice C is incorrect because the author of Passage 2 does not address any key resources that may be disappearing on Earth. Choice D is incorrect because the author of Passage 2 admits that "resources that are valuable in orbit and beyond may be very different to those we prize on Earth" (lines 74-76) but does not mention any disagreement about the commercial viabilities of space mining discoveries.

QUESTION 48.

Choice A is the best answer. In lines 60-66, the author presents some environmental arguments against space mining: "[space] is not ours to despoil" and we should not "[glut] ourselves on space's riches." The author then suggests that these environmental arguments will be hard to "hold," or maintain, when faced with the possible monetary rewards of space mining: "History suggests that those will be hard lines to hold . . ." (line 68).

Choices B, C, and D are incorrect because in this context, "hold" does not mean grip, restrain, or withstand.

QUESTION 49.

Choice D is the best answer. The author of Passage 1 is excited about the possibilities of space mining and how it can yield valuable materials, such as metals and elements (lines 19-20 and lines 41-42), water ice (line 35), and space dirt (line 44). The author of Passage 2, on the other hand, recognizes the possible benefits of space mining but also states that space mining should be thoughtfully considered before being implemented. Therefore, the author of Passage 2 expresses some concerns about a concept discussed in Passage 1.

Choice A is incorrect because the author of Passage 2 does not refute the central claim of Passage 1; both authors agree there are possible benefits to space mining. Choice B is incorrect because the author of Passage 1 does not describe space mining in more general terms than does the author of Passage 2. Choice C is incorrect because the author of Passage 2 is not suggesting that the space mining proposals stated in Passage 1 are impractical.

QUESTION 50.

Choice B is the best answer. In lines 18-28, the author of Passage 1 describes many of the possible economic benefits of space mining, including the

building of "an off-planet economy" (line 25). The author of Passage 2 warns that there may be ramifications to implementing space mining and building an "emerging off-world economy" (line 73) without regulation: "But miners have much to gain from a broad agreement on the for-profit exploitation of space. Without consensus, claims will be disputed, investments risky, and the gains made insecure" (lines 83-87).

Choices A, C, and D are incorrect because the author of Passage 2 does not suggest that the benefits to space mining mentioned in lines 18-28 of Passage 1 are unsustainable, unachievable, or will negatively affect Earth's economy. Rather, the author recognizes the benefits of space mining but advocates for the development of regulation procedures.

QUESTION 51.

Choice D is the best answer. In lines 85-87, the author of Passage 2 states that the future of space mining will prove difficult without regulations because "claims will be disputed, investments risky, and the gains made insecure."

Choices A, B, and C are incorrect because they do not provide the best evidence for the answer to the previous question. Choice A is incorrect because lines 60-63 present some environmental concerns toward space mining. Choice B is incorrect because lines 74-76 focus on how space mining may discover valuable resources that are different from the ones found on Earth. Choice C is incorrect because lines 81-83 simply describe one person's objections to the regulation of the space mining industry.

QUESTION 52.

Choice A is the best answer because both Passage 1 and Passage 2 indicate a belief that the resources most valued in space may differ from those most valued on our planet. Passage 2 says this explicitly in lines 74-76: "The resources that are valuable in orbit and beyond may be very different to those we prize on Earth." Meanwhile Passage 1 suggests that water mined from space may be more valuable than metals or other earth elements when creating an "off-plant economy" (lines 25-30).

Choice B is incorrect because neither passage discusses, either implicitly or explicitly, the need for space mining to be inexpensive. Choice C is incorrect because Passage 2 does not specifically identify precious metals or rare earth elements but instead focuses on theoretical problems with space mining. Choice D is incorrect because diminishing resources on Earth is not discussed in Passage 2.

Section 2: Writing and Language Test

QUESTION 1.

Choice D is the best answer because "outweigh" is the only choice that appropriately reflects the relationship the sentence sets up between "advantages" and "drawbacks."

Choices A, B, and C are incorrect because each implies a competitive relationship that is inappropriate in this context.

QUESTION 2.

Choice B is the best answer because it offers a second action that farmers can undertake to address the problem of acid whey disposal, thus supporting the claim made in the previous sentence ("To address the problem of disposal, farmers have found a *number of uses* for acid whey").

Choices A, C, and D are incorrect because they do not offer examples of how farmers could make use of acid whey.

QUESTION 3.

Choice A is the best answer because it results in a sentence that is grammatically correct and coherent. In choice A, "waterways," the correct plural form of "waterway," conveys the idea that acid whey could impact multiple bodies of water. Additionally, the compound verb "can pollute" suggests that acid whey presents an ongoing, potential problem.

Choices B and D are incorrect because both use the possessive form of "waterway." Choice C is incorrect because it creates an unnecessary shift in verb tense. The present tense verb "can pollute" should be used instead, as it is consistent with the other verbs in the paragraph.

QUESTION 4.

Choice C is the best answer because it utilizes proper punctuation for items listed in a series. In this case those items are nouns: "Yogurt manufacturers, food scientists, and government officials."

Choices A and B are incorrect because both fail to recognize that the items are a part of a series. Since a comma is used after "manufacturers," a semicolon or colon should not be used after "scientists." Choice D is incorrect because the comma after "and" is unnecessary and deviates from grammatical conventions for presenting items in a series.

QUESTION 5.

Choice C is the best answer because sentence 5 logically links sentence 2, which explains why Greek yogurt production yields large amounts of acid

whey, and sentence 3, which mentions the need to dispose of acid whey properly.

Choices A, B, and D are incorrect because each would result in an illogical progression of sentences for this paragraph. If sentence 5 were left where it is or placed after sentence 3, it would appear illogically after the discussion of "the problem of disposal." If sentence 5 were placed after sentence 1, it would illogically discuss "acid-whey runoff" before the mention of acid whey being "difficult to dispose of."

QUESTION 6.

Choice D is the best answer because the paragraph includes several benefits of consuming Greek yogurt, particularly in regard to nutrition and satisfying hunger, to support the sentence's claim that the conservation efforts are "well worth the effort." This transition echoes the passage's earlier claim that "the advantages of Greek yogurt outweigh the potential drawbacks of its production."

Choices A, B, and C are incorrect because they inaccurately describe the sentence in question.

QUESTION 7.

Choice B is the best answer because it provides a grammatically standard preposition that connects the verb "serves" and noun "digestive aid" and accurately depicts their relationship.

Choice A is incorrect because the infinitive form "to be" yields a grammatically incorrect verb construction: "serves to be." Choices C and D are incorrect because both present options that deviate from standard English usage.

QUESTION 8.

Choice C is the best answer because it presents a verb tense that is consistent in the context of the sentence. The choice is also free of the redundant "it."

Choice A is incorrect because the subject "it" creates a redundancy. Choices B and D are incorrect because they present verb tenses that are inconsistent in the context of the sentence.

QUESTION 9.

Choice A is the best answer because it properly introduces an additional health benefit in a series of sentences that list health benefits. "Also" is the logical and coherent choice to communicate an addition.

Choices B, C, and D are incorrect because none of the transitions they offer logically fits the content that precedes or follows the proposed choice.

QUESTION 10.

Choice A is the best answer because "satiated" is the only choice that communicates effectively that Greek yogurt will satisfy hunger for a longer period of time.

Choices B, C, and D are incorrect because each is improper usage in this context. A person can be "fulfilled" spiritually or in other ways, but a person who has eaten until he or she is no longer hungry cannot be described as fulfilled. Neither can he or she be described as being "complacent" or "sufficient."

QUESTION 11.

Choice B is the best answer because it provides a syntactically coherent and grammatically correct sentence.

Choices A and C are incorrect because the adverbial conjunctions "therefore" and "so," respectively, are unnecessary following "Because." Choice D is incorrect because it results in a grammatically incomplete sentence (the part of the sentence before the colon must be an independent clause).

QUESTION 12.

Choice B is the best answer because the graph clearly indicates that, on March 5, average low temperatures are at their lowest point: 12 degrees Fahrenheit.

Choice A is incorrect because the phrase "as low as" suggests that the temperature falls no lower than 20 degrees Fahrenheit, but the chart shows that in January, February, and March, the temperature frequently falls below that point. Choices C and D are incorrect because the information each provides is inconsistent with the information on the chart.

QUESTION 13.

Choice A is the best answer because it concisely combines the two sentences while maintaining the original meaning.

Choices B, C, and D are incorrect because each is unnecessarily wordy, thus undermining one purpose of combining two sentences: to make the phrasing more concise.

QUESTION 14.

Choice B is the best answer because it provides a conjunctive adverb that accurately represents the relationship between the two sentences. "However" signals an exception to a case stated in the preceding sentence.

Choices A, C, and D are incorrect because each provides a transition that does not accurately represent the relationship between the two sentences, and as a result each compromises the logical coherence of these sentences.

QUESTION 15.

Choice C is the best answer because it provides commas to offset the nonrestrictive modifying clause "an associate professor of geology at Ohio State."

Choices A, B, and D are incorrect because each provides punctuation that does not adequately separate the nonrestrictive modifying clause about Jason Box from the main clause.

QUESTION 16.

Choice C is the best answer because the colon signals that the other factor that contributed to the early thaw is about to be provided.

Choice A is incorrect because it results in a sentence that deviates from grammatical standards: a semicolon should be used to separate two independent clauses, but in choice A the second clause only has a subject, not a verb. Choice B is incorrect because it is unnecessarily wordy. Choice D is incorrect because "being" is unnecessary and creates an incoherent clause.

QUESTION 17.

Choice C is the best answer because it provides the correct preposition ("of") and relative pronoun ("which") that together create a dependent clause following the comma.

Choices A, B, and D are incorrect because each results in a comma splice. Two independent clauses cannot be joined with only a comma.

QUESTION 18.

Choice A is the best answer because the verb tense is consistent with the preceding past tense verbs in the sentence, specifically "produced" and "drifted."

Choices B, C, and D are incorrect because each utilizes a verb tense that is not consistent with the preceding past tense verbs in the sentence.

QUESTION 19.

Choice D is the best answer because "their" is the possessive form of a plural noun. In this case, the noun is plural: "snow and ice."

Choices A and B are incorrect because the possessive pronoun must refer to a plural noun, "snow and ice," rather than a singular noun. Choice C is incorrect because "there" would result in an incoherent sentence.

QUESTION 20.

Choice D is the best answer. The preceding sentences in the paragraph have established that a darker surface of soot-covered snow leads to more melting

because this darker surface absorbs heat, whereas a whiter surface, free of soot, would deflect heat. As the passage points out, exposed land and water are also dark and cannot deflect heat the way ice and snow can. Only choice D reflects the self-reinforcing cycle that the preceding sentences already imply.

Choices A, B, and C are incorrect because the information each provides fails to support the previous claim that the "result" of the soot "is a self-reinforcing cycle."

QUESTION 21.

Choice B is the best answer because it is free of redundancies.

Choices A, C, and D are incorrect because each of the three presents a redundancy: Choice A uses "repeat" and "again"; Choice C uses "damage" and "harmful effects"; and Choice D uses "may" and "possibly."

QUESTION 22.

Choice D is the best answer because sentence 5 describes the information Box seeks: "to determine just how much the soot is contributing to the melting of the ice sheet." Unless sentence 4 comes after sentence 5, readers will not know what the phrase "this crucial information" in sentence 4 refers to.

Choices A, B, and C are incorrect because each results in an illogical sentence progression. None of the sentences that would precede sentence 4 provides details that could be referred to as "this crucial information."

QUESTION 23.

Choice D is the best answer because it is free of redundancies and offers the correct form of the verb "wear" in this context.

Choices A, B, and C are incorrect because all three contain a redundancy. Considering that "quickly" is a fixed part of the sentence, choice A's "soon" and choice B and C's "promptly" all result in redundancies. Choices A and B are also incorrect because each uses an incorrect form of the verb.

QUESTION 24.

Choice D is the best answer because it is the only choice that provides a grammatically standard and coherent sentence. The participial phrase "Having become frustrated. . ." functions as an adjective modifying "I," the writer.

Choices A, B, and C are incorrect because each results in a dangling modifier. The participial phrase "Having become frustrated . . ." does not refer to choice A's "no colleagues," choice B's "colleagues," or choice C's "ideas." As such, all three choices yield incoherent and grammatically incorrect sentences.

QUESTION 25.

Choice B is the best answer because it provides the correct preposition in this context, "about."

Choices A, C, and D are incorrect because each provides a preposition that deviates from correct usage. One might read an article "about" coworking spaces but not an article "into," "upon," or "for" coworking spaces.

QUESTION 26.

Choice A is the best answer because it provides the correct punctuation for the dependent clause that begins with the phrase "such as."

Choices B, C, and D are incorrect because each presents punctuation that deviates from the standard way of punctuating the phrase "such as." When "such as" is a part of a nonrestrictive clause, as it is here, only one comma is needed to separate it from the main independent clause.

QUESTION 27.

Choice B is the best answer because it provides a transitional phrase, "In addition to equipment," that accurately represents the relationship between the two sentences connected by the transitional phrase. Together, the sentences describe the key features of coworking spaces, focusing on what the spaces offer (equipment and meeting rooms).

Choices A, C, and D are incorrect because each provides a transition that does not accurately represent the relationship between the two sentences.

QUESTION 28.

Choice C is the best answer because the sentence is a distraction from the paragraph's focus. Nothing in the paragraph suggests that the cost of setting up a coworking business is relevant here.

Choices A and D are incorrect because neither accurately represents the information in the paragraph. Choice B is incorrect because it does not accurately represent the information in the next paragraph.

QUESTION 29.

Choice B is the best answer because it logically follows the writer's preceding statement about creativity and accurately represents the information in the graph.

Choices A, C, and D are incorrect because they present inaccurate and unsupported interpretations of the information in the graph. In addition, none of these choices provides directly relevant support for the main topic of the paragraph.

QUESTION 30.

Choice D is the best answer because it provides a relative pronoun and verb that create a standard and coherent sentence. The relative pronoun "who" refers to the subject "the people," and the plural verb "use" corresponds grammatically with the plural noun "people."

Choices A and B are incorrect because "whom" is the relative pronoun used to represent an object. The noun "people" is a subject performing an action (using the coworking space). Choices B and C are also incorrect because they display a form of the verb "to use" that does not correspond to the plural noun "people."

QUESTION 31.

Choice C is the best answer because the proposed sentence offers a necessary and logical transition between sentence 2, which introduces the facility the writer chose, and sentence 3, which tells what happened at the facility "Throughout the morning."

Choices A, B, and D are incorrect because each would result in an illogical progression of sentences.

QUESTION 32.

Choice A is the best answer because the punctuation it provides results in a grammatically standard and coherent sentence. When an independent clause is followed by a list, a colon is used to link the two.

Choice B is incorrect because the punctuation creates a fragment (a semicolon should be used to link two independent clauses). Choice C is incorrect because its use of the comma creates a series in which "several of my coworking colleagues" are distinguished from the "website developer" and others, although the logic of the sentence would suggest that they are the same. Choice D is incorrect because it lacks the punctuation necessary to link the independent clause and the list.

QUESTION 33.

Choice A is the best answer because it provides a phrase that is consistent with standard English usage and also maintains the tone and style of the passage.

Choice B is incorrect because "give some wisdom" deviates from standard English usage and presents a somewhat colloquial phrase in a text that is generally free of colloquialisms. Choices C and D are incorrect because both are inconsistent with the tone of the passage as well as its purpose. The focus of the paragraph is on sharing, not on proclaiming opinions.

QUESTION 34.

Choice A is the best answer because it offers a phrase that introduces a basic definition of philosophy and thereby fits the sentence.

Choices B, C, and D are incorrect because each offers a transition that does not suit the purpose of the sentence.

QUESTION 35.

Choice A is the best answer because it offers the most succinct comparison between the basic definition of philosophy and the fact that students can gain specific, practical skills from the study of philosophy. There is no need to include the participle "speaking" in this sentence, as it is clear from context that the writer is offering a different perspective.

Choices B, C, and D are incorrect because they provide options that are unnecessarily wordy.

QUESTION 36.

Choice B is the best answer because it provides a verb that creates a grammatically complete, standard, and coherent sentence.

Choices A, C, and D are incorrect because each results in a grammatically incomplete and incoherent sentence.

QUESTION 37.

Choice D is the best answer because it most effectively sets up the information in the following sentences, which state that (according to information from the 1990s) "only 18 percent of American colleges required at least one philosophy course," and "more than 400 independent philosophy departments were eliminated" from colleges. These details are most logically linked to the claim that "colleges have not always supported the study of philosophy."

Choices A, B, and C are incorrect because none of these effectively sets up the information that follows, which is about colleges' failure to support the study of philosophy.

QUESTION 38.

Choice C is the best answer because it provides a transition that logically connects the information in the previous sentence to the information in this one. Both sentences provide evidence of colleges' lack of support of philosophy programs, so the adverb "Moreover," which means "In addition," accurately captures the relationship between the two sentences.

Choices A, B, and D are incorrect because each presents a transition that does not accurately depict or support the relationship between the two sentences. The second sentence is not a result of the first ("Therefore," "Thus"), and the sentences do not provide a contrast ("However").

QUESTION 39.

Choice A is the best answer because it succinctly expresses the idea that "students who major in philosophy often do better . . . as measured by standardized test scores."

Choices B and D are incorrect because they introduce a redundancy and a vague term, "results." The first part of the sentence mentions a research finding or conclusion but does not directly address any "results," so it is confusing to refer to "these results" and indicate that they "can be" or "are measured by standardized test scores." The best way to express the idea is simply to say that some students "often do better" than some other students "in both verbal reasoning and analytical writing as measured by standardized test scores." Choice C is incorrect because there is no indication that multiple criteria are used to evaluate students' "verbal reasoning and analytical writing": test scores and something else. Only test scores are mentioned.

QUESTION 40.

Choice B is the best answer because it provides subject-verb agreement and thus creates a grammatically correct and coherent sentence.

Choice A is incorrect because the verb "has scored" does not correspond with the plural subject "students." Similarly, Choice C is incorrect because the verb "scores" would correspond with a singular subject, but not the plural subject present in this sentence. Choice D is incorrect because it results in a grammatically incomplete and incoherent sentence.

QUESTION 41.

Choice B is the best answer because it provides a coherent and grammatically standard sentence.

Choices A and D are incorrect because both present "students" in the possessive form, whereas the sentence establishes "students" as the subject ("many students . . . have"). Choice C is incorrect because the verb form it proposes results in an incomplete and incoherent sentence.

QUESTION 42.

Choice C is the best answer because it accurately depicts how inserting this sentence would affect the overall paragraph. The fact that Plato used the dialogue form has little relevance to the preceding claim about the usefulness of a philosophy background.

Choices A and B are incorrect because the proposed sentence interrupts the progression of reasoning in the paragraph. Choice D is incorrect because, as with Choice A, Plato's works have nothing to do with "the employability of philosophy majors."

QUESTION 43.

Choice D is the best answer because it creates a complete and coherent sentence.

Choices A, B, and C are incorrect because each inserts an unnecessary relative pronoun or conjunction, resulting in a sentence without a main verb.

QUESTION 44.

Choice D is the best answer because it provides a possessive pronoun that is consistent with the sentence's plural subject "students," thus creating a grammatically sound sentence.

Choices A, B, and C are incorrect because each proposes a possessive pronoun that is inconsistent with the plural noun "students," the established subject of the sentence.

Section 3: Math Test — No Calculator

QUESTION 1.

Choice D is correct. Since $k = 3$, one can substitute 3 for k in the equation $\frac{x-1}{3} = k$, which gives $\frac{x-1}{3} = 3$. Multiplying both sides of $\frac{x-1}{3} = 3$ by 3 gives $x - 1 = 9$ and then adding 1 to both sides of $x - 1 = 9$ gives $x = 10$.

Choices A, B, and C are incorrect because the result of subtracting 1 from the value and dividing by 3 is not the given value of k, which is 3.

QUESTION 2.

Choice A is correct. To calculate $(7 + 3i) + (-8 + 9i)$, add the real parts of each complex number, $7 + (-8) = -1$, and then add the imaginary parts, $3i + 9i = 12i$. The result is $-1 + 12i$.

Choices B, C, and D are incorrect and likely result from common errors that arise when adding complex numbers. For example, choice B is the result of adding $3i$ and $-9i$, and choice C is the result of adding 7 and 8.

QUESTION 3.

Choice C is correct. The total number of messages sent by Armand is the 5 hours he spent texting multiplied by his rate of texting: m texts/hour × 5 hours = $5m$ texts. Similarly, the total number of messages sent by Tyrone is the 4 hours he spent texting multiplied by his rate of texting: p texts/hour × 4 hours = $4p$ texts. The total number of messages sent by Armand and Tyrone is the sum of the total number of messages sent by Armand and the total number of messages sent by Tyrone: $5m + 4p$.

Choice A is incorrect and arises from adding the coefficients and multiplying the variables of $5m$ and $4p$. Choice B is incorrect and is the result of multiplying $5m$ and $4p$. The total number of messages sent by Armand and Tyrone should be the sum of $5m$ and $4p$, not the product of these terms. Choice D is incorrect because it multiplies Armand's number of hours spent texting by Tyrone's rate of texting, and vice versa. This mix-up results in an expression that does not equal the total number of messages sent by Armand and Tyrone.

QUESTION 4.

Choice B is correct. The value 108 in the equation is the value of P in $P = 108 - 23d$ when $d = 0$. When $d = 0$, Kathy has worked 0 days that week. In other words, 108 is the number of phones left before Kathy has started work for the week. Therefore, the meaning of the value 108 in the equation is that Kathy starts each week with 108 phones to fix because she has worked 0 days and has 108 phones left to fix.

Choice A is incorrect because Kathy will complete the repairs when $P = 0$. Since $P = 108 - 23d$, this will occur when $0 = 108 - 23d$ or when $d = \frac{108}{23}$, not when $d = 108$. Therefore, the value 108 in the equation does not represent the number of days it will take Kathy to complete the repairs. Choices C and D are incorrect because the number 23 in $P = 108 - 23P = 108$ indicates that the number of phones left will decrease by 23 for each increase in the value of d by 1; in other words, that Kathy is repairing phones at a rate of 23 per day, not 108 per hour (choice C) or 108 per day (choice D).

QUESTION 5.

Choice C is correct. Only like terms, with the same variables and exponents, can be combined to determine the answer as shown here:

$$\begin{aligned}
&(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2) \\
&\quad = (x^2y - (-x^2y)) + (-3y^2 - (-3y^2)) + (5xy^2 - 3xy^2) \\
&\quad = 2x^2y + 0 + 2xy^2 \\
&\quad = 2x^2y + 2xy^2
\end{aligned}$$

Choices A, B, and D are incorrect and are the result of common calculation errors or of incorrectly combining like and unlike terms.

QUESTION 6.

Choice A is correct. In the equation $h = 3a + 28.6$, if a, the age of the boy, increases by 1, then h becomes $h = 3(a + 1) + 28.6 = 3a + 3 + 28.6 = (3a + 28.6) + 3$. Therefore, the model estimates that the boy's height increases by 3 inches each year.

Alternatively: The height, h, is a linear function of the age, a, of the boy. The coefficient 3 can be interpreted as the rate of change of the function; in this

case, the rate of change can be described as a change of 3 inches in height for every additional year in age.

Choices B, C, and D are incorrect and are likely to result from common errors in calculating the value of h or in calculating the difference between the values of h for different values of a.

QUESTION 7.

Choice B is correct. Since the right-hand side of the equation is P times the expression $\frac{\left(\frac{r}{1{,}200}\right)\left(1+\frac{r}{1{,}200}\right)^N}{\left(1+\frac{r}{1{,}200}\right)^N-1}$, multiplying both sides of the equation by the reciprocal of this expression results in $\frac{\left(1+\frac{r}{1{,}200}\right)^N-1}{\left(\frac{r}{1{,}200}\right)\left(1+\frac{r}{1{,}200}\right)^N}m = P$.

Choices A, C, and D are incorrect and are likely the result of conceptual or computation errors while trying to solve for P.

QUESTION 8.

Choice C is correct. Since $\frac{a}{b} = 2$, it follows that $\frac{b}{a} = \frac{1}{2}$. Multiplying both sides of the equation by 4 gives $4\left(\frac{b}{a}\right) = \frac{4b}{a} = 2$.

Choice A is incorrect because if $\frac{4b}{a} = 0$, then $\frac{a}{b}$ would be undefined. Choice B is incorrect because if $\frac{4b}{a} = 1$, then $\frac{a}{b} = 4$. Choice D is incorrect because if $\frac{4b}{a} = 4$, then $\frac{a}{b} = 1$.

QUESTION 9.

Choice B is correct. Adding x and 19 to both sides of $2y - x = -19$ gives $x = 2y + 19$. Then, substituting $2y + 19$ for x in $3x + 4y = -23$ gives $3(2y + 19) + 4y = -23$. This last equation is equivalent to $10y + 57 = -23$. Solving $10y + 57 = -23$ gives $y = -8$. Finally, substituting -8 for y in $2y - x = -19$ gives $2(-8) - x = -19$, or $x = 3$. Therefore, the solution (x, y) to the given system of equations is $(3, -8)$.

Choices A, C, and D are incorrect because when the given values of x and y are substituted in $2y - x = -19$, the value of the left side of the equation does not equal -19.

QUESTION 10.

Choice A is correct. Since g is an even function, $g(-4) = g(4) = 8$.

Alternatively: First find the value of a, and then find $g(-4)$. Since $g(4) = 8$, substituting 4 for x and 8 for $g(x)$ gives $8 = a(4)^2 + 24 = 16a + 24$. Solving this

last equation gives $a = -1$. Thus $g(x) = -x^2 + 24$, from which it follows that $g(-4) = -(-4)^2 + 24$; $g(-4) = -16 + 24$; and $g(-4) = 8$.

Choices B, C, and D are incorrect because g is a function and there can only be one value of $g(-4)$.

QUESTION 11.

Choice D is correct. To determine the price per pound of beef when it was equal to the price per pound of chicken, determine the value of x (the number of weeks after July 1) when the two prices were equal. The prices were equal when $b = c$; that is, when $2.35 + 0.25x = 1.75 + 0.40x$. This last equation is equivalent to $0.60 = 0.15x$, and so $x = \frac{0.60}{0.15} = 4$. Then to determine b, the price per pound of beef, substitute 4 for x in $b = 2.35 + 0.25x$, which gives $b = 2.35 + 0.25(4) = 3.35$ dollars per pound.

Choice A is incorrect. It results from using the value 1, not 4, for x in $b = 2.35 + 0.25x$. Choice B is incorrect. It results from using the value 2, not 4, for x in $b = 2.35 + 0.25x$. Choice C is incorrect. It results from using the value 3, not 4, for x in $c = 1.75 + 0.40x$.

QUESTION 12.

Choice D is correct. Determine the equation of the line to find the relationship between the x- and y-coordinates of points on the line. All lines through the origin are of the form $y = mx$, so the equation is $y = \frac{1}{7}x$. A point lies on the line if and only if its y-coordinate is $\frac{1}{7}$ of its x-coordinate. Of the given choices, only choice D, (14, 2), satisfies this condition: $2 = \frac{1}{7}(14)$.

Choice A is incorrect because the line determined by the origin (0, 0) and (0, 7) is the vertical line with equation $x = 0$; that is, the y-axis. The slope of the y-axis is undefined, not $\frac{1}{7}$. Therefore, the point (0, 7) does not lie on the line that passes the origin and has slope $\frac{1}{7}$. Choices B and C are incorrect because neither of the ordered pairs has a y-coordinate that is $\frac{1}{7}$ the value of the x-coordinate.

QUESTION 13.

Choice B is correct. To rewrite $\dfrac{1}{\frac{1}{x+2} + \frac{1}{x+3}}$, multiply by $\dfrac{(x+2)(x+3)}{(x+2)(x+3)}$.

This results in the expression $\dfrac{(x+2)(x+3)}{(x+3)+(x+2)}$, which is equivalent to the expression in choice B.

Choices A, C, and D are incorrect and could be the result of common algebraic errors that arise while manipulating a complex fraction.

QUESTION 14.

Choice A is correct. One approach is to express $\frac{8^x}{2^y}$ so that the numerator and denominator are expressed with the same base. Since 2 and 8 are both

powers of 2, substituting 2^3 for 8 in the numerator of $\frac{8^x}{2^y}$ gives $\frac{(2^3)^x}{2^y}$, which can be rewritten as $\frac{2^{3x}}{2^y}$. Since the numerator and denominator of $\frac{2^{3x}}{2^y}$ have a common base, this expression can be rewritten as 2^{3x-y}. It is given that $3x - y = 12$, so one can substitute 12 for the exponent, $3x - y$, giving that the expression $\frac{8^x}{2^y}$ is equal to 2^{12}.

Choices B and C are incorrect because they are not equal to 2^{12}. Choice D is incorrect because the value of $\frac{8^x}{2^y}$ can be determined.

QUESTION 15.

Choice D is correct. One can find the possible values of a and b in $(ax + 2)(bx + 7)$ by using the given equation $a + b = 8$ and finding another equation that relates the variables a and b. Since $(ax + 2)(bx + 7) = 15x^2 + cx + 14$, one can expand the left side of the equation to obtain $abx^2 + 7ax + 2bx + 14 = 15x^2 + cx + 14$. Since ab is the coefficient of x^2 on the left side of the equation and 15 is the coefficient of x^2 on the right side of the equation, it must be true that $ab = 15$. Since $a + b = 8$, it follows that $b = 8 - a$. Thus, $ab = 15$ can be rewritten as $a(8 - a) = 15$, which in turn can be rewritten as $a^2 - 8a + 15 = 0$. Factoring gives $(a - 3)(a - 5) = 0$. Thus, either $a = 3$ and $b = 5$, or $a = 5$ and $b = 3$. If $a = 3$ and $b = 5$, then $(ax + 2)(bx + 7) = (3x + 2)(5x + 7) = 15x^2 + 31x + 14$. Thus, one of the possible values of c is 31. If $a = 5$ and $b = 3$, then $(ax + 2)(bx + 7) = (5x + 2)(3x + 7) = 15x^2 + 41x + 14$. Thus, another possible value for c is 41. Therefore, the two possible values for c are 31 and 41.

Choice A is incorrect; the numbers 3 and 5 are possible values for a and b, but not possible values for c. Choice B is incorrect; if $a = 5$ and $b = 3$, then 6 and 35 are the coefficients of x when the expression $(5x + 2)(3x + 7)$ is expanded as $15x^2 + 35x + 6x + 14$. However, when the coefficients of x are 6 and 35, the value of c is 41 and not 6 and 35. Choice C is incorrect; if $a = 3$ and $b = 5$, then 10 and 21 are the coefficients of x when the expression $(3x + 2)(5x + 7)$ is expanded as $15x^2 + 21x + 10x + 14$. However, when the coefficients of x are 10 and 21, the value of c is 31 and not 10 and 21.

QUESTION 16.

The correct answer is 2. To solve for t, factor the left side of $t^2 - 4 = 0$, giving $(t - 2)(t + 2) = 0$. Therefore, either $t - 2 = 0$ or $t + 2 = 0$. If $t - 2 = 0$, then $t = 2$, and if $t + 2 = 0$, then $t = -2$. Since it is given that $t > 0$, the value of t must be 2.

Another way to solve for t is to add 4 to both sides of $t^2 - 4 = 0$, giving $t^2 = 4$. Then, taking the square root of the left and the right side of the equation gives $t = \pm\sqrt{4} = \pm 2$. Since it is given that $t > 0$, the value of t must be 2.

QUESTION 17.

The correct answer is 1600. It is given that $\angle AEB$ and $\angle CDB$ have the same measure. Since $\angle ABE$ and $\angle CBD$ are vertical angles, they have the same measure. Therefore, triangle EAB is similar to triangle DCB because the triangles have two pairs of congruent corresponding angles (angle-angle criterion for similarity of triangles). Since the triangles are similar, the corresponding sides are in the same proportion; thus $\frac{CD}{x} = \frac{BD}{EB}$. Substituting the given values of 800 for CD, 700 for BD, and 1400 for EB in $\frac{CD}{x} = \frac{BD}{EB}$ gives $\frac{800}{x} = \frac{700}{1400}$. Therefore, $x = \frac{(800)(1400)}{700} = 1600$.

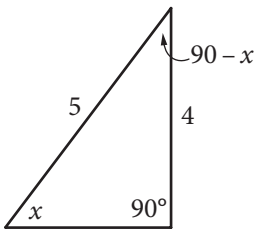
QUESTION 18.

The correct answer is 7. Subtracting the left and right sides of $x + y = -9$ from the corresponding sides of $x + 2y = -25$ gives $(x + 2y) - (x + y) = -25 - (-9)$, which is equivalent to $y = -16$. Substituting -16 for y in $x + y = -9$ gives $x + (-16) = -9$, which is equivalent to $x = -9 - (-16) = 7$.

QUESTION 19.

The correct answer is $\frac{4}{5}$ or 0.8. By the complementary angle relationship for sine and cosine, $\sin(x°) = \cos(90° - x°)$. Therefore, $\cos(90° - x°) = \frac{4}{5}$. Either the fraction $\frac{4}{5}$ or its decimal equivalent, 0.8, may be gridded as the correct answer.

Alternatively, one can construct a right triangle that has an angle of measure $x°$ such that $\sin(x°) = \frac{4}{5}$, as shown in the figure below, where $\sin(x°)$ is equal to the ratio of the opposite side to the hypotenuse, or $\frac{4}{5}$.



Since two of the angles of the triangle are of measure $x°$ and 90°, the third angle must have the measure $180° - 90° - x° = 90° - x°$. From the figure, $\cos(90° - x°)$, which is equal to the ratio of the adjacent side to the hypotenuse, is also $\frac{4}{5}$.

QUESTION 20.

The correct answer is 100. Since $a = 5\sqrt{2}$, one can substitute $5\sqrt{2}$ for a in $2a = \sqrt{2}x$, giving $10\sqrt{2} = \sqrt{2}x$. Squaring each side of $10\sqrt{2} = \sqrt{2}x$ gives $(10\sqrt{2})^2 = (\sqrt{2}x)^2$, which simplifies to $(10)^2(\sqrt{2})^2 = (\sqrt{2}x)^2$, or $200 = 2x$. This gives $x = 100$. Checking $x = 100$ in the original equation gives $2(5\sqrt{2}) = \sqrt{(2)(100)}$, which is true since $2(5\sqrt{2}) = 10\sqrt{2}$ and $\sqrt{(2)(100)} = (\sqrt{2})(\sqrt{100}) = 10\sqrt{2}$.

Section 4: Math Test — Calculator

QUESTION 1.

Choice B is correct. On the graph, a line segment with a positive slope represents an interval over which the target heart rate is strictly increasing as time passes. A horizontal line segment represents an interval over which there is no change in the target heart rate as time passes, and a line segment with a negative slope represents an interval over which the target heart rate is strictly decreasing as time passes. Over the interval between 40 and 60 minutes, the graph consists of a line segment with a positive slope followed by a line segment with a negative slope, with no horizontal line segment in between, indicating that the target heart rate is strictly increasing then strictly decreasing.

Choice A is incorrect because the graph over the interval between 0 and 30 minutes contains a horizontal line segment, indicating a period in which there was no change in the target heart rate. Choice C is incorrect because the graph over the interval between 50 and 65 minutes consists of a line segment with a negative slope followed by a line segment with a positive slope, indicating that the target heart rate is strictly decreasing then strictly increasing. Choice D is incorrect because the graph over the interval between 70 and 90 minutes contains horizontal line segments and no segment with a negative slope.

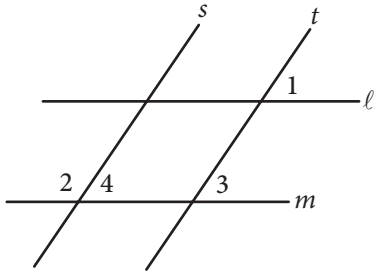
QUESTION 2.

Choice C is correct. Substituting 6 for x and 24 for y in $y = kx$ gives $24 = (k)(6)$, which gives $k = 4$. Hence, $y = 4x$. Therefore, when $x = 5$, the value of y is $(4)(5) = 20$. None of the other choices for y is correct because y is a function of x, and so there is only one y-value for a given x-value.

Choices A, B, and D are incorrect. Choice A is the result of using 6 for y and 5 for x when solving for k. Choice B results from using a value of 3 for k when solving for y. Choice D results from using $y = k + x$ instead of $y = kx$.

QUESTION 3.

Choice D is correct. Consider the measures of $\angle 3$ and $\angle 4$ in the figure below.



The measure of $\angle 3$ is equal to the measure of $\angle 1$ because they are corresponding angles for the parallel lines ℓ and m intersected by the transversal line t. Similarly, the measure of $\angle 3$ is equal to the measure of $\angle 4$ because they are corresponding angles for the parallel lines s and t intersected by the transversal line m. Since the measure of $\angle 1$ is 35°, the measures of $\angle 3$ and $\angle 4$ are also 35°. Since $\angle 4$ and $\angle 2$ are supplementary, the sum of the measures of these two angles is 180°. Therefore, the measure of $\angle 2$ is $180° - 35° = 145°$.

Choice A is incorrect because 35° is the measure of $\angle 1$, and $\angle 1$ is not congruent to $\angle 2$. Choice B is incorrect because it is the measure of the complementary angle of $\angle 1$, and $\angle 1$ and $\angle 2$ are not complementary angles. Choice C is incorrect because it is double the measure of $\angle 1$.

QUESTION 4.

Choice C is correct. The description "$16 + 4x$ is 10 more than 14" can be written as the equation $16 + 4x = 10 + 14$, which is equivalent to $16 + 4x = 24$. Subtracting 16 from each side of $16 + 4x = 24$ gives $4x = 8$. Since $8x$ is 2 times $4x$, multiplying both sides of $4x = 8$ by 2 gives $8x = 16$. Therefore, the value of $8x$ is 16.

Choice A is incorrect because it is the value of x, not $8x$. Choices B and D are incorrect; those choices may be a result of errors in rewriting $16 + 4x = 10 + 14$. For example, choice D could be the result of subtracting 16 from the left side of the equation and adding 16 to the right side of $16 + 4x = 10 + 14$, giving $4x = 40$ and $8x = 80$.

QUESTION 5.

Choice D is correct. A graph with a strong negative association between d and t would have the points on the graph closely aligned with a line that has a negative slope. The more closely the points on a graph are aligned with a line, the stronger the association between d and t, and a negative slope indicates a negative association. Of the four graphs, the points on graph D are most closely aligned with a line with a negative slope. Therefore, the graph in choice D has the strongest negative association between d and t.

Choice A is incorrect because the points are more scattered than the points in choice D, indicating a weak negative association between d and t. Choice B is incorrect because the points are aligned to either a curve or possibly a line with a small positive slope. Choice C is incorrect because the points are aligned to a line with a positive slope, indicating a positive association between d and t.

QUESTION 6.

Choice D is correct. Since there are 10 grams in 1 decagram, there are $2 \times 10 = 20$ grams in 2 decagrams. Since there are 1,000 milligrams in 1 gram, there are $20 \times 1{,}000 = 20{,}000$ milligrams in 20 grams. Therefore, 20,000 1-milligram doses of the medicine can be stored in a 2-decagram container.

Choice A is incorrect; 0.002 is the number of grams in 2 milligrams. Choice B is incorrect; it could result from multiplying by 1,000 and dividing by 10 instead of multiplying by both 1,000 and 10 when converting from decagrams to milligrams. Choice C is incorrect; 2,000 is the number of milligrams in 2 grams, not the number of milligrams in 2 decagrams.

QUESTION 7.

Choice C is correct. Let x represent the number of installations that each unit on the y-axis represents. Then $9x$, $5x$, $6x$, $4x$, and $3.5x$ are the number of rooftops with solar panel installations in cities A, B, C, D, and E, respectively. Since the total number of rooftops is 27,500, it follows that $9x + 5x + 6x + 4x + 3.5x = 27{,}500$, which simplifies to $27.5x = 27{,}500$. Thus, $x = 1{,}000$. Therefore, an appropriate label for the y-axis is "Number of installations (in thousands)."

Choices A, B, and D are incorrect and may result from errors when setting up and calculating the units for the y-axis.

QUESTION 8.

Choice D is correct. If the value of $|n - 1| + 1$ is equal to 0, then $|n - 1| + 1 = 0$. Subtracting 1 from both sides of this equation gives $|n - 1| = -1$. The expression $|n - 1|$ on the left side of the equation is the absolute value of $n - 1$, and the absolute value can never be a negative number. Thus $|n - 1| = -1$ has no solution. Therefore, there are no values for n for which the value of $|n - 1| + 1$ is equal to 0.

Choice A is incorrect because $|0 - 1| + 1 = 1 + 1 = 2$, not 0. Choice B is incorrect because $|1 - 1| + 1 = 0 + 1 = 1$, not 0. Choice C is incorrect because $|2 - 1| + 1 = 1 + 1 = 2$, not 0.

QUESTION 9.

Choice A is correct. Subtracting 1,052 from both sides of the equation $a = 1{,}052 + 1.08t$ gives $a - 1{,}052 = 1.08t$. Then dividing both sides of $a - 1{,}052 = 1.08t$ by 1.08 gives $t = \dfrac{a - 1{,}052}{1.08}$.

Choices B, C, and D are incorrect and could arise from errors in rewriting $a = 1{,}052 + 1.08t$. For example, choice B could result if 1,052 is added to the

left side of $a = 1{,}052 + 1.08t$ and subtracted from the right side, and then both sides are divided by 1.08.

QUESTION 10.

Choice B is correct. Substituting 1,000 for a in the equation $a = 1{,}052 + 1.08t$ gives $1{,}000 = 1{,}052 + 1.08t$, and thus $t = \frac{-52}{1.08} \approx -48.15$. Of the choices given, −48°F is closest to −48.15°F. Since the equation $a = 1{,}052 + 1.08t$ is linear, it follows that of the choices given, −48°F is the air temperature when the speed of a sound wave is closest to 1,000 feet per second.

Choices A, C, and D are incorrect, and might arise from errors in calculating $\frac{-52}{1.08}$ or in rounding the result to the nearest integer. For example, choice C could be the result of rounding −48.15 to −49 instead of −48.

QUESTION 11.

Choice A is correct. Subtracting $3x$ and adding 3 to both sides of $3x - 5 \geq 4x - 3$ gives $-2 \geq x$. Therefore, x is a solution to $3x - 5 \geq 4x - 3$ if and only if x is less than or equal to −2 and x is NOT a solution to $3x - 5 \geq 4x - 3$ if and only if x is greater than −2. Of the choices given, only −1 is greater than −2 and, therefore, cannot be a value of x.

Choices B, C, and D are incorrect because each is a value of x that is less than or equal to −2 and, therefore, could be a solution to the inequality.

QUESTION 12.

Choice C is correct. The average number of seeds per apple is the total number of seeds in the 12 apples divided by the number of apples, which is 12. On the graph, the horizontal axis is the number of seeds per apple and the height of each bar is the number of apples with the corresponding number of seeds. The first bar on the left indicates that 2 apples have 3 seeds each, the second bar indicates that 4 apples have 5 seeds each, the third bar indicates that 1 apple has 6 seeds, the fourth bar indicates that 2 apples have 7 seeds each, and the fifth bar indicates that 3 apples have 9 seeds each. Thus, the total number of seeds for the 12 apples is $(2 \times 3) + (4 \times 5) + (1 \times 6) + (2 \times 7) + (3 \times 9) = 73$, and the average number of seeds per apple is $\frac{73}{12} = 6.08$. Of the choices given, 6 is closest to 6.08.

Choice A is incorrect; it is the number of apples represented by the tallest bar but is not the average number of seeds for the 12 apples. Choice B is incorrect; it is the number of seeds per apple corresponding to the tallest bar, but is not the average number of seeds for the 12 apples. Choice D is incorrect; a student might choose this by correctly calculating the average number of seeds, 6.08, but incorrectly rounding up to 7.

QUESTION 13.

Choice C is correct. From the table, there was a total of 310 survey respondents, and 19% of all survey respondents is equivalent to $\frac{19}{100} \times 310 = 58.9$ respondents. Of the choices given, 59, the number of males taking geometry, is closest to 58.9 respondents.

Choices A, B, and D are incorrect because the number of males taking geometry is closer to 58.9 than the number of respondents in each of these categories.

QUESTION 14.

Choice C is correct. The range of the 21 fish is $24 - 8 = 16$ inches, and the range of the 20 fish after the 24-inch measurement is removed is $16 - 8 = 8$ inches. The change in range, 8 inches, is much greater than the change in the mean or median.

Choice A is incorrect. Let m be the mean of the lengths, in inches, of the 21 fish. Then the sum of the lengths, in inches, of the 21 fish is $21m$. After the 24-inch measurement is removed, the sum of the lengths, in inches, of the remaining 20 fish is $21m - 24$, and the mean length, in inches, of these 20 fish is $\frac{21m - 24}{20}$, which is a change of $\frac{24 - m}{20}$ inches. Since m must be between the smallest and largest measurements of the 21 fish, it follows that $8 < m < 24$, from which it can be seen that the change in the mean, in inches, is between $\frac{24 - 24}{20} = 0$ and $\frac{24 - 8}{20} = \frac{4}{5}$, and so must be less than the change in the range, 8 inches. Choice B is incorrect because the median length of the 21 fish is the length of the 11th fish, 12 inches. After removing the 24-inch measurement, the median of the remaining 20 lengths is the average of the 10th and 11th fish, which would be unchanged at 12 inches. Choice D is incorrect because the changes in the mean, median, and range of the measurements are different.

QUESTION 15.

Choice A is correct. The total cost C of renting a boat is the sum of the initial cost to rent the boat plus the product of the cost per hour and the number of hours, h, that the boat is rented. The C-intercept is the point on the C-axis where h, the number of hours the boat is rented, is 0. Therefore, the C-intercept is the initial cost of renting the boat.

Choice B is incorrect because the graph represents the cost of renting only one boat. Choice C is incorrect because the total number of hours of rental is represented by h-values, each of which corresponds to the first coordinate of a point on the graph. Choice D is incorrect because the increase in cost for each additional hour is given by the slope of the line, not by the C-intercept.

QUESTION 16.

Choice C is correct. The relationship between h and C is represented by any equation of the given line. The C-intercept of the line is 5. Since the points (0, 5) and (1, 8) lie on the line, the slope of the line is $\frac{8-5}{1-0}=\frac{3}{1}=3$. Therefore, the relationship between h and C can be represented by $C = 3h + 5$, the slope-intercept equation of the line.

Choices A and D are incorrect because each uses the wrong values for both the slope and intercept. Choice B is incorrect; this choice would result from computing the slope by counting the number of grid lines instead of using the values represented by the axes.

QUESTION 17.

Choice B is correct. The minimum value of the function corresponds to the y-coordinate of the point on the graph that is the lowest along the vertical or y-axis. Since the grid lines are spaced 1 unit apart on each axis, the lowest point along the y-axis has coordinates (−3, −2). Therefore, the value of x at the minimum of $f(x)$ is −3.

Choice A is incorrect; −5 is the smallest value for an x-coordinate of a point on the graph of f, not the lowest point on the graph of f. Choice C is incorrect; it is the minimum value of f, not the value of x that corresponds to the minimum of f. Choice D is incorrect; it is the value of x at the maximum value of f, not at the minimum value of f.

QUESTION 18.

Choice A is correct. Since (0, 0) is a solution to the system of inequalities, substituting 0 for x and 0 for y in the given system must result in two true inequalities. After this substitution, $y < -x + a$ becomes $0 < a$, and $y > x + b$ becomes $0 > b$. Hence, a is positive and b is negative. Therefore, $a > b$.

Choice B is incorrect because $b > a$ cannot be true if b is negative and a is positive. Choice C is incorrect because it is possible to find an example where (0, 0) is a solution to the system, but $|a| < |b|$; for example, if $a = 6$ and $b = -7$. Choice D is incorrect because the equation $a = -b$ could be true, but doesn't have to be true; for example, if $a = 1$ and $b = -2$.

QUESTION 19.

Choice B is correct. To determine the number of salads sold, write and solve a system of two equations. Let x equal the number of salads sold and let y equal the number of drinks sold. Since the number of salads plus the number of drinks sold equals 209, the equation $x + y = 209$ must hold. Since each

salad cost \$6.50, each soda cost \$2.00, and the total revenue was \$836.50, the equation $6.50x + 2.00y = 836.50$ must also hold. The equation $x + y = 209$ is equivalent to $2x + 2y = 418$, and subtracting each side of $2x + 2y = 418$ from the respective side of $6.50x + 2.00y = 836.50$ gives $4.5x = 418.50$. Therefore, the number of salads sold, x, was $x = \frac{418.50}{4.50} = 93$.

Choices A, C, and D are incorrect and could result from errors in writing the equations and solving the system of equations. For example, choice C could have been obtained by dividing the total revenue, \$836.50, by the total price of a salad and a soda, \$8.50, and then rounding up.

QUESTION 20.

Choice D is correct. Let x be the original price of the computer, in dollars. The discounted price is 20 percent off the original price, so $x - 0.2x = 0.8x$ is the discounted price, in dollars. The tax is 8 percent of the discounted price, so $0.08(0.8x)$ is the tax on the purchase, in dollars. The price p, in dollars, that Alma paid the cashiers is the sum of the discounted price and the tax: $p = 0.8x + (0.08)(0.8x)$ which can be rewritten as $p = 1.08(0.8x)$. Therefore, the original price, x, of the computer, in dollars, can be written as $\frac{p}{(0.8)(1.08)}$ in terms of p.

Choices A, B, and C are incorrect; each choice either switches the roles of the original price and the amount Alma paid, or incorrectly combines the results of the discount and the tax as $0.8 + 0.08 = 0.88$ instead of as $(0.8)(1.08)$.

QUESTION 21.

Choice C is correct. The probability that a person from Group Y who recalled at least 1 dream was chosen from the group of all people who recalled at least 1 dream is equal to the number of people in Group Y who recalled at least 1 dream divided by the total number of people in the two groups who recalled at least 1 dream. The number of people in Group Y who recalled at least 1 dream is the sum of the 11 people in Group Y who recalled 1 to 4 dreams and the 68 people in Group Y who recalled 5 or more dreams: $11 + 68 = 79$. The total number of people who recalled at least 1 dream is the sum of the 79 people in Group Y who recalled at least 1 dream, the 28 people in Group X who recalled 1 to 4 dreams, and the 57 people in Group X who recalled 5 or more dreams: $79 + 28 + 57 = 164$. Therefore, the probability is $\frac{79}{164}$.

Choice A is incorrect; it is the number of people in Group Y who recalled 5 or more dreams divided by the total number of people in Group Y. Choice B is incorrect; it uses the total number of people in Group Y as the denominator of the probability. Choice D is incorrect; it is the total number of people in the two groups who recalled at least 1 dream divided by the total number of people in the two groups.

QUESTION 22.

Choice B is correct. The average rate of change in the annual budget for agriculture/natural resources from 2008 to 2010 is the total change from to 2008 to 2010 divided by the number of years, which is 2. The total change in the annual budget for agriculture/natural resources from 2008 to 2010 is 488,106 − 358,708 = 129,398, in thousands of dollars, so the average change in the annual budget for agriculture/natural resources from 2008 to 2010 is $\frac{\$129{,}398{,}000}{2}$ = \$64,699,000 per year. Of the options given, this average rate of change is closest to \$65,000,000 per year.

Choices A and C are incorrect; they could result from errors in setting up or calculating the average rate of change. Choice D is incorrect; \$130,000,000 is the approximate total change from 2008 to 2010, not the average change from 2008 to 2010.

QUESTION 23.

Choice B is correct. The human resources budget in 2007 was 4,051,050 thousand dollars, and the human resources budget in 2010 was 5,921,379 thousand dollars. Therefore, the ratio of the 2007 budget to the 2010 budget is slightly greater than $\frac{4}{6} = \frac{2}{3}$. Similar estimates for agriculture/natural resources give a ratio of the 2007 budget to the 2010 budget of slightly greater than $\frac{3}{4}$; for education, a ratio of slightly greater than $\frac{2}{3}$; for highways and transportation, a ratio of slightly less than $\frac{5}{6}$; and for public safety, a ratio of slightly greater than $\frac{5}{9}$. Therefore, of the given choices, education's ratio of the 2007 budget to the 2010 budget is closest to that of human resources.

Choices A, C, and D are incorrect because the 2007 budget to 2010 budget ratio for each of these programs in these choices is further from the corresponding ratio for human resources than the ratio for education.

QUESTION 24.

Choice A is correct. The equation of a circle can be written as $(x - h)^2 + (y - k)^2 = r^2$ where (h, k) are the coordinates of the center of the circle and r is the radius of the circle. Since the coordinates of the center of the circle are (0, 4), the equation is $x^2 + (y - 4)^2 = r^2$, where r is the radius. The radius of the circle is the distance from the center, (0, 4), to the given endpoint of a radius, $\left(\frac{4}{3}, 5\right)$. By the distance formula, $r^2 = \left(\frac{4}{3} - 0\right)^2 + (5 - 4)^2 = \frac{25}{9}$. Therefore, an equation of the given circle is $x^2 + (y - 4)^2 = \frac{25}{9}$.

Choice B is incorrect; it results from the incorrect equation $(x + h)^2 + (y + k)^2 = r^2$. Choice C is incorrect; it results from using r instead of r^2 in the equation for the circle. Choice D is incorrect; it results from using the incorrect equation $(x + h)^2 + (y + k)^2 = \frac{1}{r}$.

QUESTION 25.

Choice D is correct. When the ball hits the ground, its height is 0 meters. Substituting 0 for h in $h = -4.9t^2 + 25t$ gives $0 = -4.9t^2 + 25t$, which can be rewritten as $0 = t(-4.9t + 25)$. Thus, the possible values of t are $t = 0$ and $t = \frac{25}{4.9} \approx 5.1$. The time $t = 0$ seconds corresponds to the time the ball is launched from the ground, and the time $t \approx 5.1$ seconds corresponds to the time after launch that the ball hits the ground. Of the given choices, 5.0 seconds is closest to 5.1 seconds, so the ball returns to the ground approximately 5.0 seconds after it is launched.

Choice A, B, and C are incorrect and could arise from conceptual or computation errors while solving $0 = -4.9t^2 + 25t$ for t.

QUESTION 26.

Choice B is correct. Let x represent the number of pears produced by the Type B trees. Then the Type A trees produce 20 percent more pears than x, which is $x + 0.20x = 1.20x$ pears. Since Type A trees produce 144 pears, the equation $1.20x = 144$ holds. Thus $x = \frac{144}{1.20} = 120$. Therefore, the Type B trees produced 120 pears.

Choice A is incorrect because while 144 is reduced by approximately 20 percent, increasing 115 by 20 percent gives 138, not 144. Choice C is incorrect; it results from subtracting 20 from the number of pears produced by the Type A trees. Choice D is incorrect; it results from adding 20 percent of the number of pears produced by Type A trees to the number of pears produced by Type A trees.

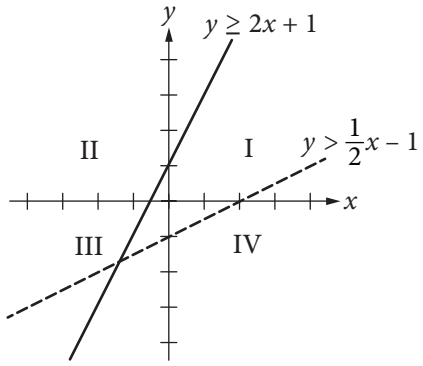
QUESTION 27.

Choice C is correct. The area of the field is 100 square meters. Each 1-meter-by-1-meter square has an area of 1 square meter. Thus, on average, the earthworm counts to a depth of 5 centimeters for each of the regions investigated by the students should be about $\frac{1}{100}$ of the total number of earthworms to a depth of 5 centimeters in the entire field. Since the counts for the smaller regions are from 107 to 176, the estimate for the entire field should be between 10,700 and 17,600. Therefore, of the given choices, 15,000 is a reasonable estimate for the number of earthworms to a depth of 5 centimeters in the entire field.

Choice A is incorrect; 150 is the approximate number of earthworms in 1 square meter. Choice B is incorrect; it results from using 10 square meters as the area of the field. Choice D is incorrect; it results from using 1,000 square meters as the area of the field.

QUESTION 28.

Choice C is correct. To determine which quadrant does not contain any solutions to the system of inequalities, graph the inequalities. Graph the inequality $y \geq 2x + 1$ by drawing a line through the y-intercept (0, 1) and the point (1, 3), and graph the inequality $y > \frac{1}{2}x - 1$ by drawing a dashed line through the y-intercept (0, −1) and the point (2, 0), as shown in the figure below.



The solution to the system of inequalities is the intersection of the shaded regions above the graphs of both lines. It can be seen that the solutions only include points in quadrants I, II, and III and do not include any points in quadrant IV.

Choices A and B are incorrect because quadrants II and III contain solutions to the system of inequalities, as shown in the figure above. Choice D is incorrect because there are no solutions in quadrant IV.

QUESTION 29.

Choice D is correct. If the polynomial $p(x)$ is divided by $x - 3$, the result can be written as $\frac{p(x)}{x-3} = q(x) + \frac{r}{x-3}$, where $q(x)$ is a polynomial and r is the remainder. Since $x - 3$ is a degree 1 polynomial, the remainder is a real number. Hence, $p(x)$ can be written as $p(x) = (x - 3)q(x) + r$, where r is a real number. It is given that $p(3) = -2$ so it must be true that $-2 = p(3) = (3 - 3)q(3) + r = (0)q(3) + r = r$. Therefore, the remainder when $p(x)$ is divided by $x - 3$ is −2.

Choice A is incorrect because $p(3) = -2$ does <u>not</u> imply that $p(5) = 0$. Choices B and C are incorrect because the remainder −2 or its negative, 2, need not be a root of $p(x)$.

QUESTION 30.

Choice D is correct. Any quadratic function q can be written in the form $q(x) = a(x - h)^2 + k$, where a, h, and k are constants and (h, k) is the vertex of the parabola when q is graphed in the coordinate plane. (Depending on the

sign of a, the constant k must be the minimum or maximum value of q, and h is the value of x for which $a(x - h)^2 = 0$ and $q(x)$ has value k.) This form can be reached by completing the square in the expression that defines q. The given equation is $y = x^2 - 2x - 15$, and since the coefficient of x is -2, the equation can be written in terms of $(x - 1)^2 = x^2 - 2x + 1$ as follows: $y = x^2 - 2x - 15 = (x^2 - 2x + 1) - 16 = (x - 1)^2 - 16$. From this form of the equation, the coefficients of the vertex can be read as $(1, -16)$

Choices A and C are incorrect because the coordinates of the vertex A do not appear as constants in these equations. Choice B is incorrect because it is not equivalent to the given equation.

QUESTION 31.

The correct answer is any number between 4 and 6, inclusive. Since Wyatt can husk at least 12 dozen ears of corn per hour, it will take him no more than $\frac{72}{12} = 6$ hours to husk 72 dozen ears of corn. On the other hand, since Wyatt can husk at most 18 dozen ears of corn per hour, it will take him at least $\frac{72}{18} = 4$ hours to husk 72 dozen ears of corn. Therefore, the possible times it could take Wyatt to husk 72 dozen ears of corn are 4 hours to 6 hours, inclusive. Any number between 4 and 6, inclusive, can be gridded as the correct answer.

QUESTION 32.

The correct answer is 107. Since the weight of the empty truck and its driver is 4500 pounds and each box weighs 14 pounds, the weight, in pounds, of the delivery truck, its driver, and x boxes is $4500 + 14x$. This weight is below the bridge's posted weight limit of 6000 pounds if $4500 + 14x < 6000$. That inequality is equivalent to $14x \leq 1500$ or $x < \frac{1500}{14} = 107\frac{1}{7}$. Since the number of packages must be an integer, the maximum possible value for x that will keep the combined weight of the truck, its driver, and the x identical boxes below the bridge's posted weight limit is 107.

QUESTION 33.

The correct answer is $\frac{5}{8}$ or .625. Based on the line graph, the number of portable media players sold in 2008 was 100 million, and the number of portable media players sold in 2011 was 160 million. Therefore, the number of portable media players sold in 2008 is $\frac{100 \text{ million}}{160 \text{ million}}$ of the portable media players sold in 2011. This fraction reduces to $\frac{5}{8}$. Either $\frac{5}{8}$ or its decimal equivalent, .625, may be gridded as the correct answer.

QUESTION 34.

The correct answer is 96. Since each day has a total of 24 hours of time slots available for the station to sell, there is a total of 48 hours of time slots

available to sell on Tuesday and Wednesday. Each time slot is a 30-minute interval, which is equal to a $\frac{1}{2}$-hour interval. Therefore, there are a total of $\frac{48 \text{ hours}}{\frac{1}{2} \text{ hours/time slot}} = 96$ time slots of 30 minutes for the station to sell on Tuesday and Wednesday.

QUESTION 35.

The correct answer is 6. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. Since the storage silo is a cylinder with volume 72π cubic yards and height 8 yards, it is true that $72\pi = \pi r^2(8)$, where r is the radius of the base of the cylinder, in yards. Dividing both sides of $72\pi = \pi r^2(8)$ by 8π gives $r^2 = 9$, and so the radius of base of the cylinder is 3 yards. Therefore, the diameter of the base of the cylinder is 6 yards.

QUESTION 36.

The correct answer is 3. The function $h(x)$ is undefined when the denominator of $\frac{1}{(x-5)^2 + 4(x-5) + 4}$ is equal to zero. The expression $(x-5)^2 + 4(x-5) + 4$ is a perfect square: $(x-5)^2 + 4(x-5) + 4 = ((x-5)+2)^2$, which can be rewritten as $(x-3)^2$. The expression $(x-3)^2$ is equal to zero if and only if $x = 3$. Therefore, the value of x for which $h(x)$ is undefined is 3.

QUESTION 37.

The correct answer is 1.02. The initial deposit earns 2 percent interest compounded annually. Thus at the end of 1 year, the new value of the account is the initial deposit of \$100 plus 2 percent of the initial deposit: $\$100 + \frac{2}{100}(\$100) = \$100(1.02)$. Since the interest is compounded annually, the value at the end of each succeeding year is the sum of the previous year's value plus 2 percent of the previous year's value. This is again equivalent to multiplying the previous year's value by 1.02. Thus, after 2 years, the value will be $\$100(1.02)(1.02) = \$100(1.02)^2$; after 3 years, the value will be $\$100(1.02)^3$; and after t years, the value will be $\$100(1.02)^t$. Therefore, in the formula for the value for Jessica's account after t years, $\$100(x)^t$, the value of x must be 1.02.

QUESTION 38.

The correct answer is 6.11. Jessica made an initial deposit of \$100 into her account. The interest on her account is 2 percent compounded annually, so after 10 years, the value of her initial deposit has been multiplied 10 times by the factor 1 + 0.02 = 1.02. Hence, after 10 years, Jessica's deposit is worth $\$100(1.02)^{10} = \$121.899$ to the nearest tenth of a cent. Tyshaun made an initial deposit of \$100 into his account. The interest on his account is 2.5 percent compounded annually, so after 10 years, the value of his initial deposit

has been multiplied 10 times by the factor 1 + 0.025 = 1.025. Hence, after 10 years, Tyshaun's deposit is worth $\$100(1.025)^{10} = \$128.008$ to the nearest tenth of a cent. Hence, Jessica's initial deposit earned \$21.899 and Tyshaun's initial deposit earned \$28.008. Therefore, to the nearest cent, Tyshaun's initial deposit earned \$6.11 more than Jessica's initial deposit.