# The SAT®

# Practice Test #9

## ANSWER EXPLANATIONS

These answer explanations are for students taking the digital SAT in nondigital format.

# Reading and Writing

## Module 1
**(33 questions)**

### QUESTION 1

**Choice A** is the best answer because as used in the text, "arranged" most nearly means "organized." The text states that a welcome feature of Manchester's art galleries (as opposed to others) is that the titles of the paintings are easy to see and that a catalogue is therefore unneeded while visitors browse the art galleries. This suggests that the paintings are displayed in a systematic, or organized, way.

*Choice B* is incorrect. "Ranked" might mean either classified or placed in orderly rows. Neither of these meanings would necessarily imply that the names of the paintings are easy to see (even if the paintings are placed in rows, their labels might be obscured). *Choice C* is incorrect because it would not make sense in context to describe the paintings as "scheduled," or planned to take place at a certain time. *Choice D* is incorrect because if the paintings were "discussed," or talked about, this would have no bearing on whether the names of the paintings could be easily seen.

### QUESTION 2

**Choice D** is the best answer because it most logically completes the text's discussion of the challenge of generating electricity from ocean waves. In this context, "consistent" means steady or unchanging over time. The text introduces a challenge and then explains that wave power varies, or changes, unpredictably in ways that cause problems for electricity generation. This context conveys that the challenge being described is a lack of consistency.

*Choice A* is incorrect because the text introduces a challenge and then elaborates on it by emphasizing that the unpredictable nature of variations in ocean waves causes problems, which doesn't indicate that wave power isn't "accidental," or isn't happening unintentionally. It wouldn't make sense to describe waves—a natural occurrence—as happening intentionally. *Choice B* is incorrect because "confident" means having a feeling of self-assurance, and it wouldn't make sense to describe wave power itself in terms of either having or lacking a sense of

confidence. *Choice C* is incorrect because the text introduces a challenge and then elaborates on it by emphasizing that the unpredictable nature of variations in ocean waves causes problems, which doesn't indicate that wave power isn't "expensive," or isn't costly. If anything, technological and planning problems might actually increase the expense of generating electricity from waves.

## QUESTION 3

**Choice C** is the best answer because it most logically completes the text's discussion of John Ashbery's poems. As used in this context, "interpret" would mean decipher the meaning of. The text indicates that Ashbery's poems have many unusual features, that it's difficult to tell what exactly the poems' subject matter is, and that scholars strongly disagree about the poems. This context conveys the idea that it's difficult to interpret Ashbery's poems.

*Choice A* is incorrect because "delegate" means to assign someone as a representative of another person or to entrust something to someone else, neither of which would make sense in context. The text is focused only on the difficulty that readers have interpreting Ashbery's poems due to their many unusual features; it doesn't suggest anything about the poems being difficult to delegate. *Choice B* is incorrect because describing Ashbery's poems as difficult to "compose," or put together or produce, would make sense only if the text were about Ashbery's experience of writing the poems. It could be true that it was difficult for Ashbery to compose his poems, but the text doesn't address this; it instead discusses how readers interpret and engage with the poems. *Choice D* is incorrect because describing Ashbery's poems as being difficult to "renounce," or give up or refuse, wouldn't make sense in context. The text focuses on the idea that features of Ashbery's poems are odd or unclear and have caused heated scholarly debate. This context suggests that the poems are difficult to interpret, not that the poems are difficult to renounce.

## QUESTION 4

**Choice C** is the best answer because it most logically completes the discussion of the artist Diego Velázquez's influence outside Spain. As used in this context, "confined to" means restricted to. The text says that Velázquez was the leading artist in the Spanish court during the seventeenth century, but it also notes that other painters around the world were influenced by his techniques and style. Thus, Velázquez's influence was hardly (or almost not) confined to, or restricted to, Spain.

*Choice A* is incorrect because if Velázquez was a leading artist in Spain, it doesn't make logical sense to claim that his influence was hardly (or almost not) derived from, or obtained from, Spain. Moreover, the other painters around the world who employed Velázquez's techniques would by definition be influenced by Spanish style. *Choice B* is incorrect because if Velázquez was a leading artist in the court of King Philip IV of Spain, then his influence must have been widely recognized, or acknowledged, rather than being hardly (or almost not) recognized. *Choice D* is incorrect because the text gives no indication that deliberately limiting Velázquez's influence outside Spain was ever considered by anyone. Thus, even if it is true that his influence was not repressed, or restrained, it doesn't make logical sense to say so in this context.

## QUESTION 5

**Choice B** is the best answer because it most logically completes the discussion of Octavia Butler's career. In this context, "impenetrable" means impossible to enter. The text indicates that the field of science fiction was dominated by white males when Butler, a Black woman, started writing, but she published several science fiction short stories and a novel and later won a prestigious award; that is, Butler pursued science fiction writing and had success. This context suggests that Butler didn't view the genre as impossible to enter.

*Choice A* is incorrect. In this context, "legitimate" would mean genuinely good or valid. Nothing in the text suggests that Butler didn't think the science fiction genre was good or valid; in fact, it indicates that she pursued and made a successful career of publishing work in that field. *Choice C* is incorrect. In this context, "compelling" would mean attracting or demanding attention. The text indicates that Butler chose to write science fiction, so it wouldn't make sense to say that she didn't see the field as drawing her attention. *Choice D* is incorrect. To say that Butler didn't consider science fiction "indecipherable," or impossible to understand, would suggest that Butler did understand it. However, the text doesn't address Butler's ability to interpret works in the genre; rather, it focuses on Butler's successful pursuit of writing science fiction.

## QUESTION 6

**Choice C** is the best answer because it most accurately describes how the underlined sentence functions in the text as a whole. The underlined sentence establishes a difference between Uncle Katsuhisa and the narrator's father by describing Uncle Katsuhisa as "loud" and the narrator's father as "quiet." The text then elaborates on that contrast, describing some ways Uncle Katsuhisa is very noisy even when he isn't speaking.

*Choice A* is incorrect because the text doesn't indicate what kinds of topics Uncle Katsuhisa enjoys discussing, only that he is loud even when he isn't speaking. *Choice B* is incorrect because the text never indicates how Uncle Katsuhisa feels about meeting new people, only how loud he is. *Choice D* is incorrect because the text never describes a conversation occurring between any people; it refers to talking only when stating that Uncle Katsuhisa is loud even when he isn't speaking.

## QUESTION 7

**Choice A** is the best answer because it best describes how the underlined sentence functions in the text as a whole. According to the text, it was hard for Yamauchi to adapt her short story into the play *And the Soul Shall Dance* because the story had included little dialogue, instead describing the characters' silent thoughts. The underlined sentence offers information about how Yamauchi ultimately succeeded in adapting the story into a play: it explains that Yamauchi created situations where the characters of the play could reveal their internal thoughts while speaking with each other.

*Choice B* is incorrect because neither the underlined sentence nor the text as a whole makes any mention of playwrights other than Yamauchi or how the play

might have influenced them. *Choice C* is incorrect because the text states that Yamauchi is best known for her play *And the Soul Shall Dance*, which conveys that the play is better known than the short story it's based on is. *Choice D* is incorrect because neither the underlined sentence nor the text as a whole mentions the actors who performed in the play or Yamauchi's approach to choosing them.

## QUESTION 8

**Choice A** is the best answer because it most accurately describes the function of the underlined portion in the text as a whole. The text establishes that many countries have adopted risk-disclosure requirements for financial products due to concerns that consumers don't understand the risks associated with the products. According to the text, Seira et al. found that the effects of such messaging on consumer behavior were small and temporary. The text then adds that the researchers assert that because the cost of the messaging is negligible, the approach may be worth doing even if the effects are limited. Thus, the underlined portion notes a factor—very low cost—that led the researchers to not completely dismiss risk-disclosure messaging despite their evidence of its limited utility.

*Choice B* is incorrect because the underlined portion doesn't refer to a particular type of risk-disclosure messaging, whether Seira et al. considered it or not; the underlined portion simply indicates that the cost of the messaging (broadly) is very low, which makes the approach worth pursuing even if its effects are limited. *Choice C* is incorrect. Although the underlined portion does describe a consideration that led the researchers to recommend risk-disclosure messaging despite the messaging's small effects on consumer behavior, it directly states that the cost of such messaging is negligible, or very low—meaning that both the effects and the costs are small, not that the effects are small only relative to the costs. *Choice D* is incorrect because there's no indication that Seira et al. suggest that risk-disclosure messaging could be more effective if it had lower costs; rather, the underlined portion indicates that Seira et al. believe the already negligible cost of messaging makes the approach worth pursuing even if its effects are limited.

## QUESTION 9

**Choice C** is the best answer because, based on the information presented in the texts, it represents how Focarelli and Panetta would most likely respond to Fan's findings. Text 1 indicates that Fan found that a newspaper merger would result in a rise in subscription prices. This rise wouldn't benefit customers, who would have to pay more for news after a merger. Text 2 presents Focarelli and Panetta's argument that merger research tends to focus too much on what happens immediately after the merger. Text 2 goes on to describe their finding that mergers can be economically beneficial for consumers over the long term. This suggests that Focarelli and Panetta would encourage Fan to investigate the long-term effect of the hypothetical newspaper merger on subscription prices.

*Choice A* is incorrect because Text 2 doesn't indicate that Focarelli and Panetta connect the effects of mergers to specific locations. Instead, Focarelli and Panetta focus on the length of time over which the effects of mergers should be evaluated. *Choice B* is incorrect because Text 2 indicates that Focarelli and Panetta found that merged companies experience "efficiency gains" over the long term, meaning that their expenses go down relative to their output, not that their expenses increase. *Choice D* is incorrect because there's no indication in Text 2 that Focarelli and Panetta believe that the newspaper industry is different from any other industry when it comes to the effects of mergers. Although their own research was about consumer banking, Text 2 suggests that they view their conclusions as applicable to mergers in general.

## QUESTION 10

**Choice A** is the best answer because it presents an explanation that is directly stated in the text for why ecologists are worried about Pando. The text states that Pando is a colony of about 47,000 quaking aspen trees that represents one of the largest organisms on Earth. According to the text, ecologists are worried that Pando's growth is declining, partly because animals are feeding on the trees. In other words, the ecologists are worried that Pando isn't growing at the same rate it used to.

*Choice B* is incorrect. Rather than indicating that Pando isn't producing young trees anymore, the text reveals that Pando is indeed producing young trees, stating that those trees can be protected from grazing deer by strong fences. *Choice C* is incorrect because the text states that fences can be used to prevent deer from eating Pando's young trees, not that Pando itself can't grow in new areas because it's blocked by fences. *Choice D* is incorrect because the text offers no evidence that Pando's root system is incapable of supporting new trees or is otherwise a cause of worry for ecologists.

## QUESTION 11

**Choice D** is the best answer because it accurately reflects the data in the table. According to the table, the dolphin with ID FB43 has a recording year of 1992.

*Choice A* is incorrect. None of the dolphins in the table have a recording year of 1999. *Choice B* is incorrect. The table shows 2012 as the recording year for the dolphin with ID FB07, not ID FB43. *Choice C* is incorrect. None of the dolphins in the table have a recording year of 2020.

## QUESTION 12

**Choice C** is the best answer because it most effectively uses data from the table to complete the statement about the forestry student's project. The table shows five types of maple trees, each tree's maximum height, and whether each tree is native to North America. The text indicates that the student needs to recommend a maple tree that's native to North America and won't reach a height greater than 60 feet. The red maple is the only tree listed in the table that meets these criteria: its maximum height is 60 feet—meaning that it won't grow higher than 60 feet—and it's native to North America.

*Choice A* is incorrect because the text states that the student needs to recommend a tree that's native to North America and won't grow higher than 60 feet, but the table shows that the maximum height of the silver maple is 70 feet. *Choice B* is incorrect because the text states that the student needs to recommend a tree that's native to North America and won't grow higher than 60 feet, but the table shows that the maximum height of the sugar maple is 75 feet. *Choice D* is incorrect because the text states that the student needs to recommend a tree that's native to North America and won't grow higher than 60 feet, but the table shows that the Norway maple isn't native to North America.

## QUESTION 13

**Choice D** is the best answer because it best describes data in the graph supporting Ayalew and her colleagues' hypothesis that plants' response to kanamycin exposure involves altering their uptake of metals. The graph compares the metal content of two groups of plants, one with kanamycin exposure and a control group without such exposure. The amount of zinc in plants without kanamycin exposure is around 400 parts per million, while the amount of zinc in plants with kanamycin exposure is lower, at around 300 parts per million. Similarly, the amount of iron in plants without kanamycin exposure is a little over 600 parts per million, while the amount of iron in plants with kanamycin exposure is lower, at a little over 200 parts per million. Thus, the graph shows that plants with kanamycin exposure have significantly lower levels of both iron and zinc than the plants without kanamycin exposure. This is evidence supporting the hypothesis that kanamycin exposure results in plants altering their uptake of metals.

*Choice A* is incorrect because the graph shows that control plants contained higher levels of iron than zinc, not higher levels of zinc than iron; similarly, the plants exposed to kanamycin contained higher levels of zinc than iron, not higher levels of iron than zinc. *Choice B* is incorrect. Though the claim that both groups of plants contained more than 200 parts per million of both iron and zinc is supported by the graph, this alone does not state whether plants with kanamycin exposure have a different metal content than plants without kanamycin exposure. *Choice C* is incorrect. The graph shows that the zinc levels for the control plants (those without kanamycin exposure) were around 400 parts per million, not 300 parts per million, and that the zinc levels for plants with kanamycin exposure were around 300 parts per million, not 400 parts per million.

## QUESTION 14

**Choice C** is the best answer because it describes data from the table that support the researcher's hypothesis. According to the text, the researcher hypothesized that Arctic ground squirrels would exhibit longer torpor bouts and shorter arousal episodes than Alaska marmots do—or, put the other way, that the marmots would show shorter torpor bouts and longer arousal episodes than the ground squirrels do. The table shows data about torpor bouts and arousal episodes for the two species from 2008 to 2011. According to the table, the average duration of torpor bouts was 13.81 days for Alaska marmots, shorter than the average of 16.77 days for Arctic ground squirrels, and the average duration of arousal episodes was 21.2 hours for Alaska marmots, longer than the average of 14.2 hours for Arctic

ground squirrels. Thus, the table supports the researcher's hypothesis by showing that Alaska marmots had shorter bouts of torpor and longer arousal episodes than Arctic ground squirrels did.

*Choice A* is incorrect because it inaccurately describes data from the table and doesn't support the researcher's hypothesis. The table shows that the average duration of arousal episodes was less than a day for both Alaska marmots (21.2 hours) and Arctic ground squirrels (14.2 hours). Additionally, information about arousal episodes for Alaska marmots and Arctic ground squirrels isn't sufficient to support a hypothesis involving comparisons of both arousal episodes and torpor bouts for those animals. *Choice B* is incorrect because it doesn't support the researcher's hypothesis, which involves comparisons of arousal episodes as well as torpor bouts for Alaska marmots and Arctic ground squirrels. Noting that both animals had torpor bouts lasting several days, on average, doesn't address arousal episodes at all, nor does it reveal how the animals' torpor bouts compared. *Choice D* is incorrect because it doesn't support the researcher's hypothesis. Although the table does show that Alaska marmots had more torpor bouts (12) than arousal episodes (11) and that their arousal episodes were much shorter than their torpor bouts (21.2 hours and 13.81 days, respectively), comparing data across only Alaska marmot behaviors isn't sufficient to support a hypothesis about torpor and arousal behaviors of both Alaska marmots and Arctic ground squirrels.

## QUESTION 15

**Choice A** is the best answer because it most effectively uses data from the graph to complete the student's conclusion about beehive structure. The text explains that in the hives of honeybees, the hexagonal cells housing drone eggs are larger than the hexagonal cells housing worker eggs, and that this size difference results in a construction problem that the bees address by using nonhexagonal cells to fill gaps between sections of drone-egg cells and worker-egg cells. The text also states that the size difference between drone-egg cells and worker-egg cells varies by species of honeybee. The graph displays data on the percentage of nonhexagonal cells in the hives of three species. In the hives of the western honeybee, the percentages of five-sided, seven-sided, and eight-sided cells are all less than 0.5%. But in the hives of the black dwarf honeybee, the percentages of five-sided and seven-sided cells are higher than those for the western honeybee: about 2.5% for both. And for the dwarf honeybee, the percentages of five-sided and seven-sided cells are also higher than those for the western honeybee: slightly over 2.5% and slightly over 2.0%, respectively; additionally, the dwarf honeybee possesses a higher percentage of eight-sided cells than the western honeybee does. Taken altogether, the graph shows that the hives of the western honeybee consist of a smaller percentage of nonhexagonal cells than the hives of the two other species do. Since the nonhexagonal cells exist only to solve the construction problem arising from the difference in size between drone-egg cells and worker-egg cells, a smaller percentage of nonhexagonal cells would be associated with a smaller size difference between the two types of cells. Therefore, it can be concluded from the data that worker-egg cells are probably closer in size to drone-egg cells in the hives of the western honeybee than in the hives of the other two species.

*Choice B* is incorrect because, as the text states, honeybee species deposit their eggs in hexagonal cells, not in nonhexagonal ones. Thus, the western honeybee and black dwarf honeybee wouldn't deposit drone eggs in eight-sided cells, and the dwarf honeybee wouldn't deposit drone eggs in seven-sided cells. *Choice C* is incorrect. The text explains that honeybees rely mainly on one geometric shape, the hexagon, when constructing their hives, and the graph shows that the western honeybee relies on the same nonhexagonal shapes as the dwarf honeybee does: five-sided, seven-sided, and eight-sided cells. In other words, the western honeybee and dwarf honeybee rely on the same number of geometric shapes. For the black dwarf honeybee, the graph displays data only for five-sided and seven-sided cells, which suggests a total absence of eight-sided cells. Yet this would be only one less nonhexagonal shape than is seen in the western honeybee. Thus, based on the graph, it would be inaccurate to say that the western honeybee relies on "many more" geometrical shapes than the other two species do. *Choice D* is incorrect. As the text explains, honeybee hives consist mainly of hexagonal cells, and sections of nonhexagonal cells are used to connect sections of hexagonal cells of different sizes. Since the graph indicates that the percentage of nonhexagonal cells is lower for the western honeybee than it is for the dwarf honeybee or black dwarf honeybee, the western honeybee would conversely have a higher percentage of hexagonal cells than the either the dwarf honeybee or black dwarf honeybee does, not a lower percentage.

## QUESTION 16

**Choice D** is the best answer because it presents a finding that, if true, would most directly support Barboza and Trejos's claim that rural female entrepreneurs who have received small loans from ALSOL are strategic in selling their goods less frequently than they could, even if it means missing payments. The text explains that borrowers in the ALSOL program use proceeds from their businesses to repay loans in equal weekly payments, with almost no penalty for missed payments. According to the text, Barboza and Trejos found that rural borrowers miss weekly payments in part because they don't sell their goods as often as they could, a move the researchers claim allows the entrepreneurs to help increase profits for the goods they sell. Finding that the cost of bringing goods to towns with marketplaces is high for rural entrepreneurs but is largely independent of how many goods are brought would support the researchers' claim: traveling to marketplaces less frequently would mean that a rural entrepreneur spends less on travel overall, and taking a large load of goods to a marketplace for essentially the same cost as taking a small load would allow the entrepreneur to more substantially offset the cost of travel with greater overall sales at the marketplace, resulting in more profit per good sold—even if those profits are earned less frequently and don't support weekly loan payments.

*Choice A* is incorrect because the finding that many marketplaces require entrepreneurs to pay the operators of the marketplace a fixed percentage of proceeds to be able to sell goods there wouldn't explain why rural entrepreneurs strategically choose to sell their goods less frequently than they could in order to increase their profits per unit sold. With a fixed percentage of proceeds due to operators, the amount entrepreneurs have to pay operators would also be fixed

regardless of frequency of selling. *Choice B* is incorrect because the finding that rural entrepreneurs can usually sell their goods for higher prices in cities than in their local areas but also face higher competition to sell goods in cities wouldn't explain why rural entrepreneurs strategically choose to sell their goods less frequently than they could in order to increase their profits per unit sold. This is because both the higher prices and higher competition in cities would be stable factors—meaning there would be no clear reason for the rural entrepreneurs not to take every available chance to sell their goods in cities and to instead sell their goods in cities only sometimes. *Choice C* is incorrect because the finding that rural entrepreneurs have lower costs and thus tend to require smaller initial loans than urban entrepreneurs do has no bearing on rural borrowers strategically choosing to sell their goods less frequently than they could specifically to increase their profits per unit sold. The cost of producing goods doesn't depend on the frequency with which an entrepreneur sells those goods, so lower frequency alone wouldn't affect profits, and the initial loan amount is set and has nothing to do with how much profit is earned from each sale.

## QUESTION 17

**Choice B** is the best answer because it most logically completes the text's discussion of Anita Allen's argument about judges citing philosophers in their judicial opinions. The text indicates that judges sometimes cite philosophers when writing their judicial opinions and that, according to Allen, judges tend to cite philosophers whose views are in agreement with those of the judges themselves. Allen claims, however, that the best judicial opinions consider potential objections and rebut them, which suggests that judges may be able to strengthen their opinions by including discussions of philosophers with views contrary to their own.

*Choice A* is incorrect because Allen's claim is that judges could improve their judicial opinions by citing philosophers who disagree with the views expressed in the opinions, which would necessarily require judges to consult philosophical works. *Choice C* is incorrect because there's no discussion in the text about making judicial opinions more easily understood by any particular group of readers. The focus of the text is on Allen's claim that judicial opinions could be strengthened by the inclusion of discussions of philosophers whose views disagree with those of the judges authoring the opinions. *Choice D* is incorrect because the text presents Allen's argument that discussing philosophers whose views judges disagree with could strengthen judicial opinions, not that doing so could bring those opinions into line with views that are popular among philosophers.

## QUESTION 18

**Choice A** is the best answer because it presents the conclusion that most logically follows from the text's discussion of military veterans working in civilian government jobs in the United States. The text indicates that the proportion of military veterans working in civilian government jobs is considerably higher than the proportion of military veterans in the population as a whole. The text also notes that the unusually high representation of military veterans in these jobs may

be a result of the organizational structures shared by civilian government entities and the military. Hence, it's reasonable to infer that it's the familiarity of the structures of civilian government that makes jobs there particularly attractive to military veterans.

*Choice B* is incorrect because the text doesn't address what a typical relationship between military service and later career preferences would be, and there's no indication that it's atypical for veterans to work in civilian government jobs after they've left the military. On the contrary, the text suggests that many military veterans are drawn to such jobs. *Choice C* is incorrect because the text is focused on the high representation of military veterans in civilian government jobs and doesn't address nonveterans or their possible interest in military service. *Choice D* is incorrect because the text conveys that military veterans may be particularly interested in civilian government jobs due to the familiarity of organizational structures that are already in place, but there's no reason to think that this interest would mean that more civilian government jobs will start to require military experience.

## QUESTION 19

**Choice A** is the best answer. The convention being tested is the use of finite verbs in a relative clause. Relative clauses, such as the one beginning with "which," require a finite verb, a verb that can function as the main verb of a clause. This choice correctly supplies the clause with the finite past tense verb "provided."

*Choice B* is incorrect because the non-finite participle "having provided" doesn't supply the clause with a finite verb. *Choice C* is incorrect because the non-finite to-infinitive "to provide" doesn't supply the clause with a finite verb. *Choice D* is incorrect because the non-finite participle "providing" doesn't supply the clause with a finite verb.

## QUESTION 20

**Choice A** is the best answer. The convention being tested is subject–verb agreement. The singular verb "allows" agrees in number with the singular subject "landing."

*Choice B* is incorrect because the plural verb "are allowing" doesn't agree in number with the singular subject "landing." *Choice C* is incorrect because the plural verb "have allowed" doesn't agree in number with the singular subject "landing." *Choice D* is incorrect because the plural verb "allow" doesn't agree in number with the singular subject "landing."

## QUESTION 21

**Choice B** is the best answer. The convention being tested is pronoun–antecedent agreement. The plural pronoun "they" agrees in number with the plural antecedent "woodcuts" and clearly identifies what was exhibited at the Smithsonian American Art Museum.

*Choice A* is incorrect because the singular pronoun "it" doesn't agree in number with the plural antecedent "woodcuts." *Choice C* is incorrect because the singular pronoun "this" doesn't agree in number with the plural antecedent "woodcuts." *Choice D* is incorrect because the plural pronoun "some" is illogical in this context (referring to "some" of two woodcuts).

## QUESTION 22

**Choice C** is the best answer. The convention being tested is punctuation use between a main clause and two supplementary elements. In this choice, the commas after "nickname" and "however" are correctly used to separate the supplementary adverb "however" from the main clause ("Scott-Heron… nickname") on one side and the supplementary participial phrase ("feeling… bluesologist") on the other.

*Choice A* is incorrect because it fails to mark the boundary between the supplementary adverb "however" and the supplementary phrase ("feeling… bluesologist"). *Choice B* is incorrect because a semicolon can't be used in this way to join the supplementary adverb "however" and the supplementary phrase ("feeling…bluesologist"). *Choice D* is incorrect because a semicolon can't be used in this way to join the main clause ("Scott-Heron…nickname") and the supplementary word and phrase ("however" and "feeling…bluesologist"). Moreover, placing the semicolon after "nickname" illogically signals that the following information (Scott-Heron's feeling that the nickname didn't encapsulate his devotion to the blues tradition) is contrary to the information in the previous clause (Scott-Heron's resistance to the nickname).

## QUESTION 23

**Choice C** is the best answer. The convention being tested is the use of punctuation between titles and proper nouns. No punctuation is needed to offset the proper noun "Yuree Lee" from the title "plant cell biologist" that describes Lee.

*Choice A* is incorrect because no punctuation is needed. *Choice B* is incorrect because no punctuation is needed. *Choice D* is incorrect because no punctuation is needed around the proper noun "Yuree Lee." Setting the phrase off with punctuation suggests that it could be removed without affecting the coherence of the sentence, which isn't the case.

## QUESTION 24

**Choice C** is the best answer. The convention being tested is punctuation use within a sentence. A colon can be used between two main clauses to signal that what follows is an elaboration of what came before. In this choice, the colon correctly introduces the following explanation of the divergent milk preservation strategies that emerged.

*Choice A* is incorrect because it results in a run-on sentence. The main clause ("As…emerged") and the subordinate clause followed by another main clause ("whereas…steppe") are fused without punctuation and/or a conjunction. *Choice B* is incorrect. Without a comma preceding it, the conjunction "and" can't be used in

this way to join a main clause ("As…emerged") and a subordinate clause followed by another main clause ("whereas…steppe"). *Choice D* is incorrect because it results in a comma splice. A comma can't be used in this way to join a main clause ("As…emerged") and a subordinate clause followed by another main clause ("whereas…steppe").

# QUESTION 25

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. The nonfinite present participle "suggesting" is correctly used to form a restrictive participial phrase ("suggesting…Holocene") within the main clause ("This hypothesis…cannot stand…"). This participial phrase functions as part of the sentence's subject ("This…Holocene"), providing essential identifying information about what the hypothesis states—namely, that certain trees survived without interruption or human intervention throughout the Holocene.

*Choice B* is incorrect because it results in an ungrammatical sentence. The finite verb "suggested" can't be used in this way within the subject of the sentence. *Choice C* is incorrect because it results in an ungrammatical sentence. The finite verb "suggests" can't be used in this way within the subject of the sentence. *Choice D* is incorrect because it results in an ungrammatical sentence. The finite verb "has suggested" can't be used in this way within the subject of the sentence.

# QUESTION 26

**Choice B** is the best answer. The convention being tested is subject-verb agreement. The singular verb "is" agrees in number with the singular subject "the shape."

*Choice A* is incorrect because the plural verb "are" doesn't agree in number with the singular subject "the shape." *Choice C* is incorrect because the plural verb "were" doesn't agree in number with the singular subject "the shape." *Choice D* is incorrect because the plural verb "have been" doesn't agree in number with the singular subject "the shape."

# QUESTION 27

**Choice A** is the best answer. "Meanwhile" logically signals that the action described in this sentence (Obinze's move to London to pursue a career) is simultaneous with the action described in the previous sentence (Ifemelu's move to the United States). The first sentence establishes that the actions take place around the same time, referring to the characters' "divergent experiences" following high school.

*Choice B* is incorrect because "nevertheless" illogically signals that the information in this sentence about Obinze's move to London is true despite the previous information about Ifemelu's move to the United States. Instead, as the first sentence establishes, Obinze's move and Ifemelu's move are related, parallel experiences that occur around the same time. *Choice C* is incorrect because "secondly" illogically signals that the information in this sentence is a second point or reason separate from the previous information about Ifemelu's move to

the United States. Instead, as the first sentence establishes, Obinze's move and Ifemelu's move are related, parallel experiences that occur around the same time. *Choice D* is incorrect because "in fact" illogically signals that the information in this sentence emphasizes, modifies, or contradicts the previous information about Ifemelu's move to the United States. Instead, as the first sentence establishes, Obinze's move and Ifemelu's move are related, parallel experiences that occur around the same time.

## QUESTION 28

**Choice B** is the best answer. "Additionally" logically signals that the claim in this sentence—that some Supreme Court justices worry that viewers (of televised court arguments) would watch only short, misleading clips—adds to the information in the previous sentence. Specifically, the previous sentence indicates one concern raised by those opposed to televising the court's oral arguments, and the claim that follows indicates a second, additional concern.

*Choice A* is incorrect because "however" illogically signals that the claim in this sentence contrasts with the information in the previous sentence. Instead, the claim adds to the information, indicating a second, additional concern that some Supreme Court justices have about televising the court's arguments. *Choice C* is incorrect because "in comparison" illogically signals that the claim in this sentence is being compared to the information in the previous sentence. Instead, the claim adds to the information, indicating a second, additional concern that some Supreme Court justices have about televising the court's arguments. *Choice D* is incorrect because "for example" illogically signals that the claim in this sentence exemplifies the information in the previous sentence. Instead, the claim adds to the information, indicating a second, additional concern that some Supreme Court justices have about televising the court's arguments.

## QUESTION 29

**Choice D** is the best answer. "Thus" logically signals that the claim in this sentence—that animals performing only basic actions should allocate relatively few resources to their brain tissue—is a consequence of the previous sentence's claim about the energy demands of animal brains (namely, that the more diverse an animal's behaviors, the more energy its brain needs).

*Choice A* is incorrect because "subsequently" illogically signals that the claim in this sentence occurs later in a chronological sequence of events than the previous sentence's claim about the energy demands of animal brains. Instead, the second claim is a consequence of the first. *Choice B* is incorrect because "besides" illogically signals that the claim in this sentence provides a separate point in addition to, or apart from, the previous sentence's claim about the energy demands of animal brains. Instead, the second claim is a consequence of the first. *Choice C* is incorrect because "nevertheless" illogically signals that the claim in this sentence is true in spite of the previous sentence's claim about the energy demands of animal brains. Instead, the second claim is a consequence of the first.

## QUESTION 30

**Choice B** is the best answer. "By contrast" logically signals that the information in this sentence—that a firefly's glow ceases when it stops drawing in oxygen—contrasts with the previous sentence's discussion of the processes that cause a firefly to begin to glow.

*Choice A* is incorrect because "for instance" illogically signals that the information in the sentence exemplifies the previous sentence's discussion of how a firefly begins to glow. Instead, it contrasts with the previous sentence's discussion. *Choice C* is incorrect because "specifically" illogically signals that the information in the sentence provides specific details elaborating on the previous sentence's discussion of how a firefly begins to glow. Instead, it contrasts with the previous sentence's discussion. *Choice D* is incorrect because "in conclusion" illogically signals that the information in the sentence sums up the previous sentence's discussion of how a firefly begins to glow. Instead, it contrasts with the previous sentence's discussion.

## QUESTION 31

**Choice B** is the best answer. The sentence explains an advantage of microprobes, noting that because microprobes weigh as little as 50 milligrams, they can explore areas inaccessible to rovers.

*Choice A* is incorrect. The sentence indicates that rovers can land successfully on Mars despite their weight; it doesn't explain an advantage of microprobes. *Choice C* is incorrect. While the sentence mentions that microprobes have been proposed as an alternative to rovers, it doesn't explain an advantage of microprobes. *Choice D* is incorrect. The sentence emphasizes a similarity between microprobes and rovers; it doesn't explain an advantage of microprobes.

## QUESTION 32

**Choice A** is the best answer. The sentence emphasizes the significance of Ochoa's discovery, noting that it proved critical to deciphering the human genetic code, which resulted in a better understanding of how genetic variations affect human health.

*Choice B* is incorrect. While the sentence explains what Ochoa discovered, it doesn't emphasize the significance of the discovery. *Choice C* is incorrect. While the sentence explains what Ochoa discovered, it doesn't emphasize the significance of the discovery. *Choice D* is incorrect. While the sentence mentions that Ochoa's discovery was crucial, it emphasizes Ochoa's incorrect hypothesis, not the significance of the discovery.

## QUESTION 33

**Choice C** is the best answer. The sentence effectively introduces the poetry collection *Precario/Precarious*, noting that it is a collection by Vicuña that was published in 1983 by Tanam Press.

*Choice A* is incorrect. While the sentence mentions the 1983 poetry collection *Precario/Precarious*, it focuses mainly on Vicuña's visual art. *Choice B* is incorrect. The sentence doesn't introduce the 1983 poetry collection *Precario/Precarious*; instead, it introduces Vicuña. *Choice D* is incorrect. The sentence emphasizes the location of Vicuña's 1971 exhibition *Pinturas, poemas y explicaciones*; it doesn't introduce the 1983 poetry collection *Precario/Precarious*.

# Reading and Writing
## Module 2
**(33 questions)**

### QUESTION 1

**Choice B** is the best answer because as used in the text, "completing" most nearly means finishing. In the text, the narrator conveys that the task of translating a novel has been an all-consuming one and that she hopes things will "be normal again" once she has "sent off the manuscript." In other words, the narrator is looking forward to finishing her work on the manuscript and returning to other things.

*Choice A* is incorrect because in this context, "completing" doesn't mean destroying, or ruining. The narrator addresses her desire to send off the manuscript she's focused on and her hope that things will be "normal again" once she does, conveying that she is looking forward to finishing the work, not to ruining it. *Choice C* is incorrect because in this context, "completing" doesn't mean advertising, or publicly promoting. The narrator addresses her complete focus on the translation and her hope that things will be "normal again" once she has "sent off the manuscript," conveying that she is looking forward to finishing the task, not to promoting the resulting manuscript. *Choice D* is incorrect because in this context, "completing" doesn't mean rejecting, or refusing or repelling. The narrator makes it clear that she is absorbed in working on the translation and plans to send off the manuscript, suggesting that instead of refusing to do the work, she is continuing to do it (even if she looks forward to things being "normal again" when she's done).

### QUESTION 2

**Choice C** is the best answer because it most logically completes the text's discussion of how predators feed their young. As used in this context, "provide" means supply or make something that's needed available. The text indicates that some predators supply prey for their young by either leaving dead prey nearby or by bringing live prey to them. Other predators, the text states, feed their young directly from their own mouths. This context supports the idea that predatory animals have various ways to provide food for their young.

*Choice A* is incorrect because in this context, "avoid" would mean keep away from or refrain from, neither of which would make sense in context. Nothing in the text suggests that predators refrain from food for their young. *Choice B* is incorrect because in this context, "guess" would mean speculate or suppose, and it's unclear what it would mean for predators to speculate food for their young. *Choice D* is incorrect because in this context, "describe" would mean explain, and it's unclear what it would mean for predators to explain food for their young.

## QUESTION 3

**Choice B** is the best answer because it most logically completes the text's discussion of Cole's book *Blind Spot*. In this context, "enthusiasm for" means excitement about. The text explains that *Blind Spot* consists of original photographs as well as poetic prose—two elements that correspond to Cole's passions, identified in the text, for photography and the written word. This context suggests that Cole's excitement about photography and writing led him to create a book that successfully combines the two mediums.

*Choice A* is incorrect because describing Cole as feeling "indifference to" his two passions wouldn't make sense in context. If Cole is indifferent to his passions, that would mean he doesn't care about photography or writing—in which case they wouldn't be his passions at all. *Choice C* is incorrect because there's nothing in the text to suggest that Cole feels "concern about," or uneasiness about, his passions. The text's use of the word "culminates" indicates that *Blind Spot* represents a triumphant climax of Cole's passions, not a work that results from his sense of discomfort with photography and writing. *Choice D* is incorrect because there's nothing in the text to suggest that Cole feels "surprise at," or astonished by, his passions. The text indicates that Cole's feeling about his passions "culminates" in a book that "evocatively" combines photographs and writing, suggesting that Cole has a long-standing and skillful relationship to his passions, not that he is startled by them.

## QUESTION 4

**Choice B** is the best answer because it most logically completes the text's discussion of Marilyn Dingle's baskets. In this context, to say that Dingle's baskets are "handmade from" particular plants means that Dingle creates baskets herself using those plants but without using machines. The text says that Dingle "skillfully winds" parts of palmetto palm plants around sweetgrass plants to make baskets with an appearance that "no factory can reproduce." This context suggests that Dingle's baskets are handmade from sweetgrass and palmetto palm.

*Choice A* is incorrect because the text describes how Dingle uses sweetgrass and palmetto palm to create her baskets, not how her baskets are "indicated by," or signified by, sweetgrass and palmetto palm. *Choice C* is incorrect. Although Dingle's baskets are described as being made using sweetgrass and palm, there's nothing in the text to suggest that the baskets are "represented by," or exemplified or portrayed by, sweetgrass and palmetto palm. Instead, the focus of the text is on Dingle's use of sweetgrass and palmetto palm and the impossibility of replicating the appearance of her baskets using machines. *Choice D* is

incorrect because there's nothing in the text to suggest that Dingle's baskets are "collected with," or brought together in a group with, sweetgrass and palmetto palm. Instead, the text describes how Dingle uses those plants to make her baskets.

## QUESTION 5

**Choice C** is the best answer because it most logically completes the text's discussion of Annie Dodge Wauneka's work as a Navajo Nation legislator. As used in this context, "persistent" means existing continuously. The text states that Wauneka "continuously worked to promote public health," traveling extensively and authoring a medical dictionary; this indicates that Wauneka's effort was persistent.

*Choice A* is incorrect because describing Wauneka's effort related to public health as "impartial," or not partial or biased and treating all things equally, wouldn't make sense in context. The text suggests that Wauneka's continuous work was partial in one way, as she focused specifically on promoting public health throughout the Navajo homeland and to speakers of the Navajo language. *Choice B* is incorrect because the text emphasizes that Wauneka's effort to promote public health as a Navajo Nation legislator was continuous and extensive, involving wide travels and the authoring of a medical dictionary. Because this work clearly involved care and dedication, it wouldn't make sense to describe it as "offhand," or casual and informal. *Choice D* is incorrect because nothing in the text suggests that Wauneka's effort to promote public health was "mandatory," or required by law or rule, even though Wauneka was a Navajo Nation legislator. Rather than suggesting that Wauneka's effort was required for any reason, the text emphasizes the continuous and extensive nature of her work.

## QUESTION 6

**Choice D** is the best answer because it most accurately describes how the underlined sentence functions in the text as a whole. The text begins by pointing out one of the advantages of oral histories: that they allow researchers to document the daily experiences of people. The text then goes on to describe how Karida Brown utilized interviews with coal miners and their families for her book about twentieth-century coal mining in Kentucky. The underlined sentence affirms that the general advantages of oral histories mentioned earlier in the text were also benefits in Brown's particular case. Thus, the underlined sentence describes how Karida Brown benefited from incorporating oral history in her book.

*Choice A* is incorrect because though the text mentions coal miners who live in Kentucky, the underlined sentence does not offer a geographical fact about Kentucky. *Choice B* is incorrect because the underlined sentence does not mention United States politics or that Brown is an expert in this particular area. *Choice C* is incorrect. Although the text mentions that Brown's book revolved around coal miners during the twentieth century, the underlined sentence does not focus on a major historical event during this time.

## QUESTION 7

**Choice D** is the best answer because it accurately states the text's main purpose. The poem begins with the speaker urging a child to "go forth" with her encouragement ("my heart's desire"). The speaker goes on to suggest that new experiences ("Great reaches, yet unknown") lie ahead for the son that "life is calling" him to seek out. Thus, the main purpose is to encourage a child to embrace the experiences available to him in his life.

*Choice A* is incorrect because the speaker encourages the child to pursue new experiences ("Great reaches") without knowing exactly what those experiences will be ("yet unknown") or suggesting that they should match the speaker's own accomplishments. *Choice B* is incorrect because the speaker focuses on positive possibilities for her son ("Great reaches, yet unknown") and her enthusiastic encouragement to embrace those possibilities ("life is calling you!"), while there is no mention of raising a child or associated struggles. *Choice C* is incorrect because the speaker frames the possibilities for her son in a positive light when she says that "great reaches, yet unknown" are waiting for him, and this positive outlook for the son is consistent throughout the text.

## QUESTION 8

**Choice D** is the best answer because it best describes how the underlined sentence functions in the text as a whole. The first sentence of the text establishes that Lily can be "keenly sensitive to" scenes that serve as a "fitting background" for her feelings—that is, she's very aware of when a setting seems to reflect her mood. The next sentence, which is underlined, then demonstrates this awareness: Lily views the landscape she's in as a large-scale reflection of her current mood, identifying with elements such as its calmness. Thus, the function of the underlined sentence is to illustrate an idea introduced in the previous sentence.

*Choice A* is incorrect because the underlined sentence describes the scene only in very general terms, referring to its calmness, breadth, and long stretches of land. It's the next sentence that adds specific details about colors, light, and various trees nearby. *Choice B* is incorrect because nothing in the underlined sentence suggests that Lily is experiencing an internal conflict. In fact, the sentence indicates that Lily thinks the landscape reflects her own feeling of calmness. *Choice C* is incorrect because the only assertion in the underlined sentence is that Lily feels that broad aspects of the landscape, such as its calmness, reflect her current mood, and that assertion isn't expanded on in the next sentence. Instead, the next sentence describes specific details of the scene without connecting them to Lily's feelings.

## QUESTION 9

**Choice A** is the best answer because it most accurately describes how the underlined statement functions in the text as a whole. The underlined statement mentions a category of animals that have a feature in common: they tend to have fixed geographic ranges throughout their lifetimes. The text then presents the speculation of some researchers that the Arctic woolly mammoth might also

share this characteristic. However, an examination of the content of strontium in the strata (or layers) of a woolly mammoth tusk indicated that contrary to the researchers' hypothesis, the mammoth had an expanding range in its environment that contracted in its last 1.5 years of life. Thus, the underlined statement discusses a characteristic shared by certain animals in order to explain why researchers raised a possibility that turned out not to be supported by data described later in the text.

*Choice B* is incorrect. Though the underlined statement presents a pattern of behavior (the habit of certain animals of staying within a fixed geographic range), the rest of the text does not present a theory of exceptions to that pattern; rather, the researchers are merely concerned with whether one particular animal has behavior consistent with the pattern. *Choice C* is incorrect. Though the underlined statement does describe a similarity in the behavior of certain animals (their tendency to stay within a fixed geographic range), this is not done in order to show why a method described later in the text failed to show whether another animal showed that behavior; rather, the method of analysis of strata of a woolly mammoth tusk showed that the mammoth's behavior was different from that of the animals mentioned in the underlined statement. *Choice D* is incorrect. Though the underlined statement mentions a trait shared by a number of animals (their fixed geographic range), the rest of the text does not present a hypothesis regarding the origin of that trait; rather, the researchers are concerned with whether another particular animal shares that trait.

## QUESTION 10

**Choice A** is the best answer because it presents information about Gloria Richardson that is supported by the text. The text provides a number of details about Gloria's involvement in efforts to promote racial equality, including that she was the leader of what became known as the Cambridge movement.

*Choice B* is incorrect because the text never indicates that Gloria Richardson led her daughter Donna's high school. The text says only that Gloria was inspired by her daughter to become involved in efforts to promote racial equality. *Choice C* is incorrect because the text doesn't mention protests related to environmental protections. Rather, the text discusses Gloria Richardson's involvement in efforts to promote racial equality. *Choice D* is incorrect because the text doesn't indicate that Gloria Richardson led a new business in Cambridge, Maryland. Rather, the text states that she led what became known as the Cambridge movement.

## QUESTION 11

**Choice D** is the best answer because it provides a detail about Elinor that is established in the text. The text indicates that although Elinor is "only nineteen," she gives good advice and exhibits such a high level of understanding and judgment that she serves as "the counsellor of her mother." Thus, Elinor is mature beyond her years.

*Choice A* is incorrect because it isn't supported by the text: although the text says that Elinor advises her mother and often counteracts her mother's impulses, there's no mention of Elinor arguing with her mother or failing to change her

mother's mind. *Choice B* is incorrect because it isn't supported by the text: although the text mentions that Elinor has strong feelings, it doesn't indicate that she's excessively sensitive when it comes to family issues. *Choice C* is incorrect because it isn't supported by the text: there's no mention of what Elinor thinks about her mother and no suggestion that she thinks her mother is a bad role model. Because she's described as having "an excellent heart," Elinor likely doesn't think ill of her mother.

## QUESTION 12

**Choice A** is the best answer because it most accurately states the main idea of the text. The text describes the book *Vibration Cooking: or, the Travel Notes of a Geechee Girl* as Smart-Grosvenor's "most influential project" and as "unusual for its time." The text also notes that the book and author have influenced contemporary approaches to writing about food and cooking. Therefore, the text mainly conveys that *Vibration Cooking: or, the Travel Notes of a Geechee Girl* is an unconventional and important contribution to food writing.

*Choice B* is incorrect. Although the text mentions that Smart-Grosvenor worked in national public television and radio and was a food writer, these details aren't the main focus. Rather than focusing on Smart-Grosvenor's various jobs, the text focuses specifically on one specific book she wrote. *Choice C* is incorrect. Although the text suggests that *Vibration Cooking: or, the Travel Notes of a Geechee Girl* was groundbreaking, it doesn't suggest that the book didn't receive praise when it was published. In fact, the text states that the book is "long admired." *Choice D* is incorrect because the text states that Smart-Grosvenor was a culinary anthropologist and that her book influenced later approaches to food writing but doesn't indicate that Smart-Grosvenor or her book influenced people to begin cooking for themselves.

## QUESTION 13

**Choice D** is the best answer because it presents a statement about Mrs. Ochiltree's acquaintances that is supported by the text. The text indicates that Mrs. Ochiltree makes comments about her acquaintances that are frank, or direct and blunt, and sometimes startling. It also states that because of this behavior, the acquaintances tend to avoid Mrs. Ochiltree. Together, these details suggest that the acquaintances choose not to be around Mrs. Ochiltree because they are offended by the things she has said about them.

*Choice A* is incorrect because the text doesn't suggest that Mrs. Ochiltree's acquaintances avoid discussing topics that would upset Mrs. Ochiltree; instead, it states that they avoid being around Mrs. Ochiltree at all. *Choice B* is incorrect because the text makes it clear that Mrs. Ochiltree knows her acquaintances often avoid her and is pleased about it (she "rather exulted in it"), not that she wants to spend more time with them. *Choice C* is incorrect because the text doesn't suggest that Mrs. Ochiltree's acquaintances don't speak with Mrs. Ochiltree because they are too focused on their own concerns, but rather because they don't like the frank comments she makes.

## QUESTION 14

**Choice C** is the best answer because it presents a quotation that illustrates the claim that Mrs. Spring Fragrance demonstrates concern for what's happening at home while she's in California. By giving reminders to "care for the cat, the birds, and the flowers," "not eat too quickly," and avoid engaging in strenuous activity in the heat, Mrs. Spring Fragrance shows that she's thinking about what's happening at home and wants to ensure everything is taken care of.

*Choice A* is incorrect because the quotation, while it does suggest that Mrs. Spring Fragrance has made fudge at home before, is focused on preparations for an upcoming festival, not on concerns for anything happening at home while Mrs. Spring Fragrance is away. *Choice B* is incorrect because the quotation has to do with an upcoming event during Mrs. Spring Fragrance's trip—visiting San José and meeting someone new—rather than her concern for what's happening at home. *Choice D* is incorrect because the quotation is focused on how Mrs. Spring Fragrance feels about her trip and the friends she's seeing, not on her concern for what's happening at home.

## QUESTION 15

**Choice C** is the best answer because it presents a finding that, if true, would weaken Foster's hypothesis that damage to eelgrass roots improves the health of eelgrass meadows by boosting genetic diversity. The text indicates that sea otters damage eelgrass roots but that eelgrass meadows near Vancouver Island, where there's a large otter population, are comparatively healthy. When Foster and her colleagues compared the Vancouver Island eelgrass meadows to those that don't have established otter populations, the researchers found that the Vancouver Island meadows are more genetically diverse than the other meadows are. This finding led Foster to hypothesize that damage to the eelgrass roots encourages eelgrass reproduction, thereby improving genetic diversity and the health of the meadows. If, however, other meadows not included in the study are less healthy the larger the local otter population is and the longer the otters have been in residence, that would suggest that damage to the eelgrass roots, which would be expected to increase with the size and residential duration of the otter population, isn't leading meadows to be healthier. Such a finding would therefore weaken Foster's hypothesis.

*Choice A* is incorrect because finding that small, recently introduced otter populations are near other eelgrass meadows in the study wouldn't weaken Foster's hypothesis. If otter populations were small and only recently established, they wouldn't be expected to have caused much damage to eelgrass roots, so even if those eelgrass meadows were less healthy than the Vancouver Island meadows, that wouldn't undermine Foster's hypothesis. In fact, it would be consistent with Foster's hypothesis since it would suggest that the greater damage caused by larger, more established otter populations is associated with healthier meadows. *Choice B* is incorrect because the existence of areas with otters but without eelgrass meadows wouldn't reveal anything about whether the damage that otters cause to eelgrass roots ultimately benefits eelgrass meadows. *Choice D* is incorrect because the health of plants other than eelgrass would have no bearing on Foster's hypothesis that damage to eelgrass roots

leads to greater genetic diversity and meadow health. It would be possible for otters to have a negative effect on other plants while nevertheless improving the health of eelgrass meadows by damaging eelgrass roots.

## QUESTION 16

**Choice D** is the best answer because it presents a finding that, if true, would support Paredes's argument about the origin of Mexican American folklore. The text describes a disagreement among scholars about whether Mexican American folklore mostly derived from the folklore of Spain (the view held by Espinosa and others) or originated in Mexico and the United States through ongoing cultural interactions there (the view held by Paredes and others). If Mexican American folklore collected in the twentieth century mostly consists of ballads about history and social life that originated recently, then that would support Paredes's argument by suggesting that the folklore mostly arose after Spanish rule ended in the early nineteenth century and that the folklore reflects cultural interactions in Mexico and the United States rather than traditions from Spain.

*Choice A* is incorrect because the inclusion of songs influenced by sixteenth-century Spanish poetry among Mexican American folklore collected in the twentieth century would not support Paredes's view that the folklore was the result of cultural interactions in Mexico and the United States rather than an offshoot of Spanish folklore. If anything, the presence of such songs among the folklore collected in the twentieth century would weaken Paredes's argument, since it would reflect the influence of Spanish culture on the folklore. *Choice B* is incorrect because the mere presence of similarities in Mexican American folklore across regions would not be sufficient to draw a conclusion about where the folklore originated, let alone to support Paredes's argument that the folklore reflects various cultural interactions in Mexico and the United States. In fact, Paredes would likely expect there to be regional variations in folklore as different cultures have interacted in different places. *Choice C* is incorrect because scholars' previous ignorance of the folklore would have no bearing on Paredes's argument that Mexican American folklore mostly reflects cultural interactions in Mexico and the United States; the folklore's actual origins exist regardless of the scholars' awareness.

## QUESTION 17

**Choice B** is the best answer because it presents the conclusion that most logically follows from the text's discussion of the study by Versace and colleagues. The text indicates that newborn animals of some species are attracted to faces and to stimuli that resemble faces. These species, the text says, share two characteristics: they're social and they practice parental care, meaning that parents care for their young. The text goes on to describe Versace and colleagues' experiment, which showed that *Testudo* tortoises, which aren't social and don't practice parental care, were attracted to a stimulus that resembles a face. Since Versace and colleagues have shown that a species that isn't social and doesn't practice parental care nevertheless has the innate characteristic of being attracted to face-like stimuli, it follows that this characteristic shouldn't be assumed to be an adaptation related to social interaction or parental care.

*Choice A* is incorrect because the text indicates that the tortoise hatchlings, which are solitary and don't practice parental care, were attracted to the face-like stimuli, not that they perceived the stimuli as threatening. *Choice C* is incorrect because the phenomenon discussed in the text is an attraction to faces and face-like stimuli on the part of newborn animals, which can't show any learned characteristics since they were just born. Additionally, the text tells us that the tortoises Versace and colleagues studied aren't social and don't practice parental care, so any findings about those tortoises wouldn't be relevant to the question of whether an attraction to faces in social species that practice parental care is innate or learned. *Choice D* is incorrect because the text gives no indication that adult tortoises were tested on face-like stimuli and, if adults were in fact tested, no information about how they responded is provided. Since no information about adult tortoises' responses is provided, no conclusion comparing those responses to the responses of newly hatched tortoises can be supported.

## QUESTION 18

**Choice D** is the best answer because it most logically completes the text's discussion of aptamers' capacity to test for pathogens in food. The text explains that although synthetic aptamer molecules can be used to test for foodborne bacterial pathogens because they bind to target molecules, it hasn't been clear how likely it is that they will indicate a negative result when a target pathogen is absent in real-world foods. The text then indicates that Somvanshi et al. created test paper that changes from pink to purple when aptamers in it bind to a particular strain of *E. coli* bacteria, O157:H7, and tested it with store-bought pear juice (that is, a real-world food); the paper changed to purple when exposed to juice to which the target pathogen *E. coli* O157:H7 had been added, but it remained pink when exposed to juice treated with other *E. coli* strains or other bacteria species. Based on this result, it seems the aptamers in the paper successfully bound to the target (O157:H7) and the tests had a high degree of specificity (providing negative results for samples where the target was absent even though other bacteria were present) when applied to a real-world food.

*Choice A* is incorrect because nothing in the text suggests that *E. coli* O157:H7 differs from other pathogens in a way that makes it more suitable for aptamer-based testing of any kind and that specificity is likely to be lower when aptamer-based tests target other bacteria; the text simply indicates that Somvanshi et al. used O157:H7 as the target for aptamer-based test paper in their study and suggests that the paper had a high degree of specificity. *Choice B* is incorrect because the text indicates that the specificity of aptamer-based tests in real-world foods is uncertain for pathogens broadly, not just for *E. coli*, and similarity between strains (of *E. coli* or of other pathogens) isn't mentioned. Moreover, the results presented in the text suggest that aptamers are actually capable of distinguishing between strains of *E. coli*, since Somvanshi et al.'s paper turned purple when exposed to *E. coli* O157:H7 and remained pink when exposed to other strains. *Choice C* is incorrect because the text suggests that the aptamers in the test papers didn't bind to different strains of *E. coli*. The text explains that the test papers turn purple when the aptamers bind to the targeted pathogen and that in the pear juice tests, the test papers turned purple when exposed to

samples with the targeted strain of *E. coli* (O157:H7) but remained pink when exposed to samples with other strains of *E. coli*. In other words, the aptamers bound only to the targeted strain, not to the other strains. Further, specificity would be affected if the aptamers had bound to multiple strains and not just the targeted one; that result would cause the specificity to be low.

## QUESTION 19

**Choice C** is the best answer. The convention being tested is the use of possessive determiners. The plural possessive determiner "their" agrees in number with the plural conjoined noun phrase "Watson and Crick" and thus indicates that the findings were those of Watson and Crick.

*Choice A* is incorrect because "they're" is the contraction for "they are," not a possessive determiner. *Choice B* is incorrect because "it's" is the contraction for "it is" or "it has," not a possessive determiner. *Choice D* is incorrect because the singular possessive determiner "its" doesn't agree in number with the plural conjoined noun phrase "Watson and Crick."

## QUESTION 20

**Choice D** is the best answer. The convention being tested is the use of finite and nonfinite verb forms within a sentence. The nonfinite to-infinitive "to tell" is correctly used to form a nonfinite (infinitive) clause that explains the reason Engle uses poetry in her novel.

*Choice A* is incorrect because the finite present tense verb "tells" can't be used in this way to explain the reason that Engle uses poetry in her novel. *Choice B* is incorrect because the finite past tense verb "told" can't be used in this way to explain the reason that Engle uses poetry in her novel. *Choice C* is incorrect because the finite present progressive tense verb "is telling" can't be used in this way to explain the reason that Engle uses poetry in her novel.

## QUESTION 21

**Choice C** is the best answer. The convention being tested is the use of verb forms within a sentence. The plural verb "study" agrees in number with the plural subject "many."

*Choice A* is incorrect because the singular verb "is studying" doesn't agree in number with the plural subject "many." *Choice B* is incorrect because the singular verb "has studied" doesn't agree in number with the plural subject "many." *Choice D* is incorrect because the singular verb "studies" doesn't agree in number with the plural subject "many."

## QUESTION 22

**Choice C** is the best answer. The convention being tested is punctuation between a subject and a verb. When, as in this case, a subject ("her 2019 novel *Gingerbread*") is immediately followed by a verb ("offers"), no punctuation is needed.

*Choice A* is incorrect because no punctuation is needed between the subject and the verb. *Choice B* is incorrect because no punctuation is needed between the subject and the verb. *Choice D* is incorrect because no punctuation is needed between the subject and the verb.

## QUESTION 23

**Choice B** is the best answer. The convention being tested is the use of punctuation within a sentence. This choice uses a semicolon in a conventional way to join the first main clause ("Gitlin's…content") and the second main clause beginning with a supplementary phrase ("in…audiences"). Further, placing a comma after "era" separates the supplementary phrase "in that era" from the rest of the main clause that follows ("even…audiences").

*Choice A* is incorrect because it results in a comma splice. Without a conjunction following it, a comma can't be used in this way to join two main clauses. Further, this choice fails to mark the boundary between the supplementary phrase "in that era" and the rest of the main clause that follows ("even…audiences"). *Choice C* is incorrect because it results in a run-on sentence. The two main clauses ("Gitlin's… content" and "in…audiences") are fused without punctuation and/or a conjunction. *Choice D* is incorrect because it results in a comma splice. Without a conjunction following it, a comma can't be used in this way to join two main clauses.

## QUESTION 24

**Choice D** is the best answer. The convention being tested is the use of punctuation around noun phrases. No punctuation is needed because the noun phrase "aluminum oxide" is a restrictive appositive, meaning that it provides essential identifying information about the noun phrase before it, "the chemical compound," and thus doesn't require punctuation around it.

*Choice A* is incorrect because no punctuation is needed. *Choice B* is incorrect because no punctuation is needed. *Choice C* is incorrect because the noun phrase "aluminum oxide" is a restrictive appositive. Setting the phrase off with punctuation suggests that it could be removed without affecting the coherence of the sentence, which isn't the case.

## QUESTION 25

**Choice C** is the best answer. The convention being tested is the use of verb forms in a sentence. The nonfinite past participle phrase "highly prized" is correctly used to form a supplementary element that modifies the main clause "this…artistry," describing memorable features of Brass Era automotive design.

*Choice A* is incorrect because it results in a comma splice. Using the finite present tense verb phrase "are highly prized" creates a second main clause in the sentence, and two main clauses can't be joined in this way with only a comma after "artistry." *Choice B* is incorrect because it results in a comma splice. Using the finite past perfect tense verb phrase "had been highly prized" creates a second main clause in the sentence, and two main clauses can't be joined in this way with only a comma after "artistry." *Choice D* is incorrect because it results in a

comma splice. Using the finite past tense verb phrase "were highly prized" creates a second main clause in the sentence, and two main clauses can't be joined in this way with only a comma after "artistry."

## QUESTION 26

**Choice C** is the best answer. The convention being tested is the use of punctuation within a sentence. This choice correctly uses a comma to separate the supplementary adverb "though" from the preceding main clause ("Economists…conservation") and uses a semicolon to join the next main clause ("efficiency gains…rises") to the rest of the sentence. Further, placing the semicolon after "though" indicates that the information in the preceding main clause ("improvements in efficiency often correlate negatively with resource conservation") is contrary to what might be assumed from the information in the previous sentence (resource consumption would be expected to decrease with the development of new, more efficient technologies).

*Choice A* is incorrect because it results in a comma splice. Commas can't be used in this way to punctuate a supplementary word or phrase between two main clauses. *Choice B* is incorrect because it fails to mark the boundary between the two main clauses ("Economists…though" and "efficiency gains…rises") with appropriate punctuation. Moreover, placing the semicolon after "conservation" illogically indicates that the information in the next clause (gains in efficiency may lead to an increase in resource consumption) is contrary to the information in the previous clause ("improvements in efficiency often correlate negatively with resource conservation"). *Choice D* is incorrect because placing a comma after "conservation" illogically indicates that the information in the next clause (gains in efficiency may lead to an increase in resource consumption) is contrary to the information in the previous clause ("improvements in efficiency often correlate negatively with resource conservation").

## QUESTION 27

**Choice C** is the best answer. "Similarly" logically signals that the activity described in this sentence (Nancy Tuttle Craig distributing Votes for Women Tea in her Los Angeles grocery stores) is like the activity described in the previous sentence (the Woman's Suffrage Party selling Equality Tea at fairs in San Francisco). Together, the two examples support the preceding claim that "activists across the state sold tea to promote the cause of suffrage."

*Choice A* is incorrect because "for example" illogically signals that the activity described in this sentence exemplifies the activity described in the previous sentence. Instead, the two activities are similar, and both support the preceding claim about selling tea to promote women's right to vote. *Choice B* is incorrect because "to conclude" illogically signals that the activity described in this sentence concludes or summarizes the information in the previous sentences. Instead, the activity is similar to the one described in the previous sentence, and both support the preceding claim about selling tea to promote women's right to vote. *Choice D* is incorrect because "in other words" illogically signals that the activity described in this sentence paraphrases the activity described in the previous sentence. Instead, the two activities are similar, and both support the preceding claim about selling tea to promote women's right to vote.

## QUESTION 28

**Choice A** is the best answer. "Specifically" logically signals that the information in this sentence—that the Sun releases charged particles that later collide with atoms, resulting in auroral light—provides specific, precise details about how auroras result from the Sun's activity.

*Choice B* is incorrect because "similarly" illogically signals that the information in this sentence is similar to the general information about auroras in the previous sentence. Instead, this sentence provides specific, precise details about how auroras form. *Choice C* is incorrect because "nevertheless" illogically signals that the information in this sentence is despite the general information about auroras in the previous sentence. Instead, this sentence provides specific, precise details about how auroras form. *Choice D* is incorrect because "hence" illogically signals that the information in this sentence is a result of the general information about auroras in the previous sentence. Instead, this sentence provides specific, precise details about how auroras form.

## QUESTION 29

**Choice B** is the best answer. The sentence compares the lengths of the two rail tunnels, noting that the Channel Tunnel (about 31 miles long) is slightly shorter than the Seikan Tunnel (roughly 33 miles long).

*Choice A* is incorrect. The sentence makes a generalization about the length of some rail tunnels; it doesn't compare the lengths of the two rail tunnels. *Choice C* is incorrect. The sentence describes a single rail tunnel; it doesn't compare the lengths of the two rail tunnels. *Choice D* is incorrect. While the sentence mentions the two rail tunnels, it doesn't compare their lengths.

## QUESTION 30

**Choice C** is the best answer. The sentence effectively emphasizes the fossil's significance, explaining that the fossil is rare and illustrates an early stage in the evolution of pinnipeds from their land-dwelling ancestors.

*Choice A* is incorrect. The sentence describes the fossil Rybczynski found; it doesn't emphasize the fossil's significance. *Choice B* is incorrect. The sentence mentions that a fossil resembling both pinnipeds and their ancestors was found; it doesn't emphasize the fossil's significance. *Choice D* is incorrect. The sentence notes a term used to describe the fossil Rybczynski found; it doesn't emphasize the fossil's significance.

## QUESTION 31

**Choice D** is the best answer. The sentence uses "whereas" to contrast the emissivities of the two fibers, noting that the emissivity of the reflective metal fibers was just 0.02, far lower than that of the silicon carbide fibers (0.74).

*Choice A* is incorrect. The sentence emphasizes the ability of reflective metal fibers and silicon carbide fibers to emit heat; it doesn't contrast the emissivities of the two fibers. *Choice B* is incorrect. The sentence states a law of

thermodynamics: the amount of heat a material absorbs is equal to the amount it emits. The sentence doesn't contrast the emissivity of reflective metal fibers with that of silicon carbide fibers. *Choice C* is incorrect. While the sentence includes a generalization about the emissivities of reflective metal fibers and silicon carbide fibers, it emphasizes Abebe's plans for their use in a garment; it doesn't contrast the emissivities of the two fibers.

## QUESTION 32

**Choice C** is the best answer. The sentence explains an advantage of the "Women and the Vote" format, noting that the format appealed to audiences because it allowed them to control the experience.

*Choice A* is incorrect. The sentence describes a digital drawing on the "Women and the Vote" website; it doesn't explain an advantage of the play's format. *Choice B* is incorrect. The sentence explains how audiences interacted with the "Women and the Vote" website; it doesn't explain an advantage of the play's format. *Choice D* is incorrect. While the sentence mentions that "Women and the Vote" had an interactive format, it doesn't explain what advantage this format might have.

## QUESTION 33

**Choice B** is the best answer. The sentence presents both the study and its methodology (that is, the researcher's approach to the problem), explaining that Yuan used computer simulations to study the effect of the mother duck's wake on the ducklings' energy expenditure.

*Choice A* is incorrect. The sentence describes the findings of Yuan's study; it doesn't present the study and its methodology. *Choice C* is incorrect. While the sentence provides general information about Yuan's study, it doesn't present the study's methodology. *Choice D* is incorrect. The sentence describes the findings of Yuan's study; it doesn't present the study and its methodology.

# Math

## Module 1
**(27 questions)**

### QUESTION 1

**Choice B** is correct. The perimeter of a triangle is the sum of the lengths of all three of its sides. It's given that the lengths of two sides of a triangle are 4 centimeters and 6 centimeters. Let $x$ represent the length, in centimeters, of the third side of this triangle. The sum of the lengths, in centimeters, of all three sides of the triangle can be represented by the expression $4 + 6 + x$. Since it's given that the perimeter of the triangle is 18 centimeters, it follows that $4 + 6 + x = 18$, or $10 + x = 18$. Subtracting 10 from both sides of this equation yields $x = 8$. Therefore, the length, in centimeters, of the third side of this triangle is 8.

*Choice A* is incorrect. If the length of the third side of this triangle were 2 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 2$, or 12, not 18. *Choice C* is incorrect. If the length of the third side of this triangle were 10 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 10$, or 20, not 18. *Choice D* is incorrect. If the length of the third side of this triangle were 24 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 24$, or 34, not 18.

### QUESTION 2

**Choice C** is correct. It's given that $16x + 30 = 190$. Subtracting 30 from each side of this equation yields $16x = 160$. Therefore, the equation $16x = 160$ is equivalent to the given equation and has the same solution.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 3

**Choice B** is correct. It's given that Ty plans to walk at an average speed of 4 kilometers per hour. The number of kilometers Ty will walk is determined by the expression $4s$, where $s$ is the number of hours Ty walks. The given goal of at least 24 kilometers means that the inequality $4s \geq 24$ represents the situation. Dividing both sides of this inequality by 4 gives $s \geq 6$, which corresponds to a minimum of 6 hours Ty must walk.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 4

**Choice A** is correct. It's given that $g(x) = x^2 + 9$. Substituting 25 for $g(x)$ in this equation yields $25 = x^2 + 9$. Subtracting 9 from both sides of this equation yields $16 = x^2$. Taking the square root of each side of this equation yields $x = \pm 4$. It follows that $g(x) = 25$ when the value of $x$ is 4 or $-4$. Only 4 is listed among the choices.

*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 5

**Choice A** is correct. Since $x$ is a factor of each term in the given expression, the expression is equivalent to $x(9x) + x(5)$, or $x(9x + 5)$.

*Choice B* is incorrect. This expression is equivalent to $45x^2 + 5x$, not $9x^2 + 5x$.
*Choice C* is incorrect. This expression is equivalent to $9x^2 + 45x$, not $9x^2 + 5x$.
*Choice D* is incorrect. This expression is equivalent to $9x^3 + 5x^2$, not $9x^2 + 5x$.

## QUESTION 6

The correct answer is 9. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. It follows that the mean height, in centimeters, of these plants is the sum of the heights, in centimeters, of each plant, $6 + 10 + 13 + 2 + 15 + 22 + 10 + 4 + 4 + 4$, or 90, divided by the number of plants in the data set, 10. Therefore, the mean height, in centimeters, of these plants is $\frac{90}{10}$, or 9.

## QUESTION 7

The correct answer is 224. It's given that a student council group uses the function $p(x) = 5x - 220$ to determine their profit $p(x)$, in dollars, for selling $x$ school posters. Substituting 900 for $p(x)$ in the given function yields $900 = 5x - 220$. Adding 220 to each side of this equation yields $1,120 = 5x$. Dividing each side of this equation by 5 yields $224 = x$. Therefore, in order to earn a profit of $900, they must sell 224 school posters.

## QUESTION 8

**Choice A** is correct. Since Jay walks at a speed of 3 miles per hour for $w$ hours, Jay walks a total of $3w$ miles. Since Jay runs at a speed of 5 miles per hour for $r$ hours, Jay runs a total of $5r$ miles. Therefore, the total number of miles Jay travels can be represented by $3w + 5r$. Since the combined total number of miles is 14, the equation $3w + 5r = 14$ represents this situation.

*Choice B* is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

## QUESTION 9

**Choice C** is correct. It's given that John made a $16 payment each month for $p$ months. The total amount of these payments can be represented by the expression $16p$. The down payment can be added to that amount to find the total amount John paid, yielding the expression $16p + 37$. It's given that John paid a total of $165. Therefore, the expression for the total amount John paid can be set equal to that amount, yielding the equation $16p + 37 = 165$.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 10

**Choice B** is correct. Adding 57 to each side of the given equation yields $y = px + 57$. Therefore, the equation $y = px + 57$ correctly expresses $y$ in terms of $p$ and $x$.

*Choice A* is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

## QUESTION 11

**Choice A** is correct. Since it's given that the account balance, $A(t)$, in dollars, after $t$ years can be modeled by an exponential function, it follows that function $A$ can be written in the form $A(t) = Nr^t$, where $N$ is the initial value of the function and $r$ is a constant related to the growth of the function. It's given that the initial balance of the account is $36,100.00, so it follows that the initial value of the function, or $N$, must be 36,100.00. Substituting 36,100.00 for $N$ in the equation $A(t) = Nr^t$ yields $A(t) = 36,100.00r^t$. It's given that the account balance after 13 years, or when $t = 13$, is $68,071.93. It follows that $A(13) = 68,071.93$, or $36,100.00r^{13} = 68,071.93$. Dividing each side of the equation $36,100.00r^{13} = 68,071.93$ by 36,100.00 yields $r^{13} = \frac{68,071.93}{36,100.00}$. Taking the 13th root of both sides of this equation yields $r = \sqrt[13]{\frac{68,071.93}{36,100.00}}$, or $r$ is approximately equal to 1.05. Substituting 1.05 for $r$ in the equation $A(t) = 36,100.00r^t$ yields $A(t) = 36,100.00(1.05)^t$, so the equation $A(t) = 36,100.00(1.05)^t$ could define $A$.

*Choice B* is incorrect. Substituting 0 for $t$ in this function indicates an initial balance of $31,971.93, rather than $36,100.00. *Choice C* is incorrect. Substituting 0 for $t$ in this function indicates an initial balance of $31,971.93, rather than $36,100.00. Additionally, this function indicates the account balance is decreasing, rather than increasing, over time. *Choice D* is incorrect. This function indicates the account balance is decreasing, rather than increasing, over time.

## QUESTION 12

**Choice B** is correct. Since $\overline{PR}$ and $\overline{QS}$ are diameters of the circle shown, $\overline{OS}$, $\overline{OR}$, $\overline{OP}$, and $\overline{OQ}$ are radii of the circle and are therefore congruent. Since $\angle SOP$ and $\angle ROQ$ are vertical angles, they are congruent. Therefore, arc $PS$ and arc $QR$ are formed by congruent radii and have the same angle measure, so they are congruent arcs. Similarly, $\angle SOR$ and $\angle POQ$ are vertical angles, so they are congruent. Therefore, arc $SR$ and arc $PQ$ are formed by congruent radii and have the same angle measure, so they are congruent arcs. Let $x$ represent the length of arc $SR$. Since arc $SR$ and arc $PQ$ are congruent arcs, the length of arc $PQ$ can also be represented by $x$. It's given that the length of arc $PS$ is twice the length of arc $PQ$. Therefore, the length of arc $PS$ can be represented by the expression $2x$. Since arc $PS$ and arc $QR$ are congruent arcs, the length of arc $QR$ can also be represented by $2x$. This gives the expression $x + x + 2x + 2x$. Since it's given that the circumference is $144\pi$, the expression $x + x + 2x + 2x$ is equal to $144\pi$. Thus $x + x + 2x + 2x = 144\pi$, or $6x = 144\pi$. Dividing both sides of this equation by 6 yields $x = 24\pi$. Therefore, the length of arc $QR$ is $2(24\pi)$, or $48\pi$.

*Choice A* is incorrect. This is the length of arc $PQ$, not arc $QR$. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 13

The correct answer is 40. It's given in the first equation of the system that $y = -2x$. Substituting $-2x$ for $y$ in the second equation of the system yields $3x + (-2x) = 40$. Combining like terms on the left-hand side of this equation yields $x = 40$. Therefore, the value of $x$ is 40.

## QUESTION 14

The correct answer is 14. The maximum value is the largest value in the data set. The frequency refers to the number of times a data value occurs. The given frequency table shows that for this data set, the data value 6 occurs three times, the data value 7 occurs three times, the data value 8 occurs eight times, the data value 9 occurs eight times, the data value 10 occurs nine times, the data value 11 occurs eleven times, the data value 12 occurs nine times, the data value 13 occurs zero times, and the data value 14 occurs six times. Therefore, the maximum data value in the data set is 14.

## QUESTION 15

**Choice C** is correct. The Pythagorean theorem states that for a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that one leg of a right triangle has a length of 43.2 millimeters. It's also given that the hypotenuse of the triangle has a length of 196.8 millimeters. Let $b$ represent the length of the other leg of the triangle, in millimeters. Therefore, by the Pythagorean theorem, $43.2^2 + b^2 = 196.8^2$, or $1{,}866.24 + b^2 = 38{,}730.24$. Subtracting $1{,}866.24$ from both sides of this equation yields $b^2 = 36{,}864$. Taking the positive square root of both sides of this equation yields $b = 192$. Therefore, the length of the other leg of the triangle, in millimeters, is 192.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 16

**Choice D** is correct. It's given that a wire with a length of 106 inches is cut into two parts. It's also given that one part has a length of $x$ inches and the other part has a length of $y$ inches. This can be represented by the equation $x + y = 106$. It's also given that the value of $x$ is 6 more than 4 times the value of $y$. This can be represented by the equation $x = 4y + 6$. Substituting $4y + 6$ for $x$ in the equation $x + y = 106$ yields $4y + 6 + y = 106$, or $5y + 6 = 106$. Subtracting 6 from each side of this equation yields $5y = 100$. Dividing each side of this equation by 5 yields $y = 20$. Substituting 20 for $y$ in the equation $x = 4y + 6$ yields $x = 4(20) + 6$, or $x = 86$.

*Choice A* is incorrect. This value represents less than half of the total length of 106 inches; however, $x$ represents the length of the longer part of the wire, since it's given that the value of $x$ is 6 more than 4 times the value of $y$. *Choice B* is incorrect. This value represents less than half of the total length of 106 inches; however, $x$ represents the length of the longer part of the wire, since it's given that the value of $x$ is 6 more than 4 times the value of $y$. *Choice C* is incorrect. This represents a part that is 6 more than the length of the other part, rather than 6 more than 4 times the length of the other part.

## QUESTION 17

**Choice B** is correct. It's given that $f(x) = (x+6)(x+5)(x-4)$ and $y = f(x) - 3$. Substituting $(x+6)(x+5)(x-4)$ for $f(x)$ in the equation $y = f(x) - 3$ yields $y = (x+6)(x+5)(x-4) - 3$. Substituting $-6$ for $x$ in this equation yields $y = (-6+6)(-6+5)(-6-4) - 3$, or $y = -3$. Substituting $-5$ for $x$ in the equation $y = (x+6)(x+5)(x-4) - 3$ yields $y = (-5+6)(-5+5)(-5-4) - 3$, or $y = -3$. Substituting 4 for $x$ in the equation $y = (x+6)(x+5)(x-4) - 3$ yields $y = (4+6)(4+5)(4-4) - 3$, or $y = -3$. Therefore, when $x = -6$ then $y = -3$, when $x = -5$ then $y = -3$, and when $x = 4$ then $y = -3$. Thus, the table of values in choice B represents $y = f(x) - 3$.

*Choice A* is incorrect. This table represents $y=x-3$ rather than $y=f(x)-3$.
*Choice C* is incorrect. This table represents $y=x+3$ rather than $y=f(x)-3$.
*Choice D* is incorrect. This table represents $y=f(x)+3$ rather than $y=f(x)-3$.

## QUESTION 18

**Choice D** is correct. It's given that a hose puts $88x$ ounces of water in a bucket in $5y$ minutes. Therefore, the rate at which the hose puts water in the bucket, in ounces per minute, can be represented by the expression $\frac{88x}{5y}$. Let $w$ represent the number of ounces of water the hose puts in the bucket in $9y$ minutes at this rate. It follows that the rate at which the hose puts water in the bucket, in ounces per minute, can be represented by the expression $\frac{w}{9y}$. The expressions $\frac{88x}{5y}$ and $\frac{w}{9y}$ represent the same rate, so it follows that $\frac{88x}{5y}=\frac{w}{9y}$. Multiplying both sides of this equation by $9y$ yields $\frac{792xy}{5y}=w$, or $\frac{792x}{5}=w$. Therefore, the number of ounces of water the hose puts in the bucket in $9y$ minutes can be represented by the expression $\frac{792x}{5}$.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 19

**Choice D** is correct. A system of two linear equations in two variables, $x$ and $y$, has no solution if the lines represented by the equations in the $xy$-plane are distinct and parallel. The graphs of two lines in the $xy$-plane represented by equations in the form $Ax+By=C$, where $A$, $B$, and $C$ are constants, are parallel if the coefficients for $x$ and $y$ in one equation are proportional to the corresponding coefficients in the other equation. The first equation in the given system can be written in the form $Ax+By=C$ by subtracting $9y$ from both sides of the equation to yield $4x-18y=5$. The second equation in the given system can be written in the form $Ax+By=C$ by subtracting $4x$ from both sides of the equation to yield $-4x+hy=2$. The coefficient of $x$ in this second equation, $-4$, is $-1$ times the coefficient of $x$ in the first equation, $4$. For the lines to be parallel, the coefficient of $y$ in the second equation, $h$, must also be $-1$ times the coefficient of $y$ in the first equation, $-18$. Thus, $h=-1(-18)$, or $h=18$. Therefore, if the given system has no solution, the value of $h$ is 18.

*Choice A* is incorrect. If the value of $h$ is $-9$, then the given system would have one solution, rather than no solution. *Choice B* is incorrect. If the value of $h$ is 0, then the given system would have one solution, rather than no solution. *Choice C* is incorrect. If the value of $h$ is 9, then the given system would have one solution, rather than no solution.

## QUESTION 20

The correct answer is 52. It's given that 13 is $p\%$ of 25. It follows that $\frac{13}{25}=\frac{p}{100}$. Multiplying both sides of this equation by 100 gives $52=p$. Therefore, the value of $p$ is 52.

## QUESTION 21

The correct answer is $-3$. Squaring both sides of the given equation yields $(x-2)^2=3x+34$, which can be rewritten as $x^2-4x+4=3x+34$. Subtracting $3x$ and $34$ from both sides of this equation yields $x^2-7x-30=0$. This quadratic equation can be rewritten as $(x-10)(x+3)=0$. According to the zero product property, $(x-10)(x+3)$ equals zero when either $x-10=0$ or $x+3=0$. Solving each of these equations for $x$ yields $x=10$ or $x=-3$. Therefore, the given equation has two solutions, $10$ and $-3$. Of these two solutions, $-3$ is the smallest solution to the given equation.

## QUESTION 22

**Choice B** is correct. It's given that $g(x)=f(x-1)$. Since $f(x)=(x+6)(x+5)(x+1)$, it follows that $f(x-1)=(x-1+6)(x-1+5)(x-1+1)$. Combining like terms yields $f(x-1)=(x+5)(x+4)(x)$. Therefore, $g(x)=x(x+5)(x+4)$. The $x$-intercepts of a graph in the $xy$-plane are the points where $y=0$. The $x$-coordinates of the $x$-intercepts of the graph of $y=g(x)$ in the $xy$-plane can be found by solving the equation $0=x(x+5)(x+4)$. Applying the zero product property to this equation yields three equations: $x=0$, $x+5=0$, and $x+4=0$. Solving each of these equations for $x$ yields $x=0$, $x=-5$, and $x=-4$, respectively. Therefore, the $x$-intercepts of the graph of $y=g(x)$ are $(0, 0)$, $(-5, 0)$, and $(-4, 0)$. It follows that the values of $a$, $b$, and $c$ are $0$, $-5$, and $-4$. Thus, the value of $a+b+c$ is $0+(-5)+(-4)$, which is equal to $-9$.

*Choice A* is incorrect. This is the value of $a+b+c$ if $g(x)=f(x+1)$. *Choice C* is incorrect. This is the value of $a+b+c-1$ if $g(x)=(x-6)(x-5)(x-1)$. *Choice D* is incorrect. This is the value of $a+b+c$ if $f(x)=(x-6)(x-5)(x-1)$.

## QUESTION 23

**Choice D** is correct. It's given that for $x>0$, $f(x)$ is equal to 201% of $x$. This is equivalent to $f(x)=\frac{201}{100}x$, or $f(x)=2.01x$, for $x>0$. This function indicates that as $x$ increases, $f(x)$ also increases, which means $f$ is an increasing function. Furthermore, $f(x)$ increases at a constant rate of $2.01$ for each increase of $x$ by $1$. A function with a constant rate of change is linear. Thus, the function $f$ can be described as an increasing linear function.

*Choice A* is incorrect and may result from conceptual errors. *Choice B* is incorrect and may result from conceptual errors. *Choice C* is incorrect. This could describe the function $f(x)=(2.01)^x$, where $f(x)$ is equal to 201% of $f(x-1)$, not $x$, for $x>0$.

## QUESTION 24

**Choice A** is correct. It's given that $g(x)=f(x+5)$. Since $f(x)=4x^2+64x+262$, it follows that $f(x+5)=4(x+5)^2+64(x+5)+262$. Expanding the quantity $(x+5)^2$ in this equation yields $f(x+5)=4(x^2+10x+25)+64(x+5)+262$. Distributing the $4$ and the $64$ yields $f(x+5)=4x^2+40x+100+64x+320+262$. Combining like terms yields $f(x+5)=4x^2+104x+682$. Therefore, $g(x)=4x^2+104x+682$. For a quadratic function defined by an equation of the form $g(x)=a(x-h)^2+k$, where $a$, $h$, and $k$ are constants and $a$ is positive, $g(x)$ reaches its minimum, $k$,

when the value of $x$ is $h$. The equation $g(x) = 4x^2 + 104x + 682$ can be rewritten in this form by completing the square. This equation is equivalent to $g(x) = 4(x^2 + 26x) + 682$, or $g(x) = 4(x^2 + 26x + 169 - 169) + 682$. This equation can be rewritten as $g(x) = 4((x + 13)^2 - 169) + 682$, or $g(x) = 4(x + 13)^2 - 4(169) + 682$, which is equivalent to $g(x) = 4(x + 13)^2 + 6$. This equation is in the form $g(x) = a(x - h)^2 + k$, where $a = 4$, $h = -13$, and $k = 6$. Therefore, $g(x)$ reaches its minimum when the value of $x$ is $-13$.

*Choice B* is incorrect. This is the value of $x$ for which $f(x)$, rather than $g(x)$, reaches its minimum. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is the value of $x$ for which $f(x - 5)$, rather than $f(x + 5)$, reaches its minimum.

## QUESTION 25

**Choice D** is correct. It's given that $w$ represents the total fence area, in square feet. Since the fence will be stained twice, the amount of stain, in gallons, will need to cover $2w$ square feet. It's also given that one gallon of stain will cover 170 square feet. Dividing the total area, in square feet, of the surface to be stained by the number of square feet covered by one gallon of stain gives the number of gallons of stain that will be needed. Dividing $2w$ by 170 yields $\frac{2w}{170}$, or $\frac{w}{85}$.

Therefore, the equation that represents the total amount of stain $S$, in gallons, needed to stain the fence of the yard twice is $S = \frac{w}{85}$.

*Choice A* is incorrect. This equation represents the total amount of stain, in gallons, needed to stain the fence once, not twice. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 26

**Choice B** is correct. It's given that 483 out of 803 voters responded that they would vote for Angel Cruz. Therefore, the proportion of voters from the poll who responded they would vote for Angel Cruz is $\frac{483}{803}$. It's also given that there are a total of 6,424 voters in the election. Therefore, the total number of people who would be expected to vote for Angel Cruz is $6,424\left(\frac{483}{803}\right)$, or 3,864. Since 3,864 of the 6,424 total voters would be expected to vote for Angel Cruz, it follows that $6,424 - 3,864$, or 2,560 voters would be expected not to vote for Angel Cruz. The difference in the number of votes for and against Angel Cruz is $3,864 - 2,560$, or 1,304 votes. Therefore, if 6,424 people vote in the election, Angel Cruz would be expected to win by 1,304 votes.

*Choice A* is incorrect. This is the difference in the number of voters from the poll who responded that they would vote for and against Angel Cruz. *Choice C* is incorrect. This is the total number of people who would be expected to vote for Angel Cruz. *Choice D* is incorrect. This is the difference between the total number of people who vote in the election and the number of voters from the poll.

## QUESTION 27

The correct answer is 1,260. Since it's given that prisms X and Y are similar, all the linear measurements of prism Y are $k$ times the respective linear measurements of prism X, where $k$ is a positive constant. Therefore, the surface area of prism Y is $k^2$ times the surface area of prism X and the volume of prism Y is $k^3$ times the volume of prism X. It's given that the surface area of prism Y is 1,450 cm$^2$, and the surface area of prism X is 58 cm$^2$, which implies that $1,450 = 58k^2$. Dividing both sides of this equation by 58 yields $\frac{1,450}{58} = k^2$, or $k^2 = 25$. Since $k$ is a positive constant, $k = 5$. It's given that the volume of prism Y is 1,250 cm$^3$. Therefore, the volume of prism X is equal to $\frac{1,250}{k^3}$ cm$^3$, which is equivalent to $\frac{1,250}{5^3}$ cm$^3$, or 10 cm$^3$. Thus, the sum of the volumes, in cm$^3$, of the two prisms is $1,250 + 10$, or 1,260.

# Math

## Module 2
**(27 questions)**

### QUESTION 1

**Choice B** is correct. Subtracting $7$ from each side of the given equation yields $w = 350$. Therefore, the value of $w$ that is the solution to the given equation is $350$.

*Choice A* is incorrect. This is the value of $w$ that is the solution to the equation $7w = 357$, not $w + 7 = 357$. *Choice C* is incorrect. This is the value of $w$ that is the solution to the equation $w - 7 = 357$, not $w + 7 = 357$. *Choice D* is incorrect and may result from conceptual or calculation errors.

### QUESTION 2

**Choice B** is correct. The expression $16(x + 15)$ can be rewritten as $16(x) + 16(15)$, which is equivalent to $16x + 240$.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

### QUESTION 3

**Choice D** is correct. If a member of the organization is selected at random, the probability that the selected member is at least $40$ years old is equal to the number of members who are at least $40$ years old divided by the total number of members. According to the table, there are a total of $135$ members of the organization, and $107$ of these members are at least $40$ years old. Therefore, the probability that the selected member is at least $40$ years old is $\frac{107}{135}$.

*Choice A* is incorrect. This is the probability that the selected member is less than $40$ years old. *Choice B* is incorrect. This is the probability that the selected member lives east of the river. *Choice C* is incorrect. This is the probability that the selected member lives west of the river.

## QUESTION 4

**Choice B** is correct. Adding the second equation in the given system to the first equation in the given system yields $3x + (-3x + y) = 12 + (-6)$, which is equivalent to $y = 6$.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 5

**Choice D** is correct. The equation of a line in the $xy$-plane can be written as $y = mx + b$, where $m$ represents the slope of the line and $(0, b)$ represents the $y$-intercept of the line. It's given that the slope of the line is $\frac{1}{9}$. It follows that $m = \frac{1}{9}$. It's also given that the line passes through the point $(0, 14)$. It follows that $b = 14$. Substituting $\frac{1}{9}$ for $m$ and 14 for $b$ in $y = mx + b$ yields $y = \frac{1}{9}x + 14$. Thus, the equation $y = \frac{1}{9}x + 14$ represents this line.

*Choice A* is incorrect. This equation represents a line with a slope of $-\frac{1}{9}$ and a $y$-intercept of $(0, -14)$. *Choice B* is incorrect. This equation represents a line with a slope of $-\frac{1}{9}$ and a $y$-intercept of $(0, 14)$. *Choice C* is incorrect. This equation represents a line with a slope of $\frac{1}{9}$ and a $y$-intercept of $(0, -14)$.

## QUESTION 6

The correct answer is 70. Based on the figure, the angle with measure 110° and the angle vertical to the angle with measure $x°$ are same side interior angles. Since vertical angles are congruent, the angle vertical to the angle with measure $x°$ also has measure $x°$. It's given that lines $s$ and $t$ are parallel. Therefore, same side interior angles between lines $s$ and $t$ are supplementary. It follows that $x + 110 = 180$. Subtracting 110 from both sides of this equation yields $x = 70$.

## QUESTION 7

The correct answer is 1. It's given that the function $f$ is defined by $f(x) = x + \frac{8}{11}$. Substituting $\frac{3}{11}$ for $x$ in the given function yields $f\left(\frac{3}{11}\right) = \frac{3}{11} + \frac{8}{11}$, which gives $f\left(\frac{3}{11}\right) = \frac{11}{11}$, or $f\left(\frac{3}{11}\right) = 1$. Therefore, when $x = \frac{3}{11}$, the value of $f(x)$ is 1.

## QUESTION 8

**Choice D** is correct. A linear relationship can be represented by an equation of the form $y = mx + b$, where $m$ and $b$ are constants. It's given in the table that when $x = 0$, $y = 18$. Substituting 0 for $x$ and 18 for $y$ in $y = mx + b$ yields $18 = m(0) + b$, or $18 = b$. Substituting 18 for $b$ in the equation $y = mx + b$ yields $y = mx + 18$. It's also given in the table that when $x = 1$, $y = 13$. Substituting 1 for $x$ and 13 for $y$ in the equation $y = mx + 18$ yields $13 = m(1) + 18$, or $13 = m + 18$. Subtracting 18 from both sides of this equation yields $-5 = m$. Therefore, the equation $y = -5x + 18$ represents the relationship between $x$ and $y$.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 9

**Choice A** is correct. The solution to a system of equations is the ordered pair $(x, y)$ that satisfies all equations in the system. It's given by the first equation in the system that $x + 7 = 10$. Substituting 10 for $x + 7$ into the second equation yields $10^2 = y$, or $y = 100$. The *x*-coordinate of the solution to the system of equations can be found by subtracting 7 from both sides of the equation $x + 7 = 10$, which yields $x = 3$. Therefore, the ordered pair $(3, 100)$ is a solution to the given system of equations.

*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 10

**Choice D** is correct. The given function $f$ is a linear function. Therefore, the graph of $y = f(x)$ in the *xy*-plane has one *x*-intercept at the point $(k, 0)$, where $k$ is a constant. Substituting 0 for $f(x)$ and $k$ for $x$ in the given function yields $0 = 7k - 84$. Adding 84 to both sides of this equation yields $84 = 7k$. Dividing both sides of this equation by 7 yields $12 = k$. Therefore, the *x*-intercept of the graph of $y = f(x)$ in the *xy*-plane is $(12, 0)$.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 11

**Choice C** is correct. It's given that the relationship between $t$ and $n$ is exponential. The table shows that the value of $n$ increases as the value of $t$ increases. Therefore, the relationship between $t$ and $n$ can be represented by an increasing exponential equation of the form $n = a(1 + b)^t$, where $a$ and $b$ are positive constants. The table shows that when $t = 0$, $n = 604$. Substituting 0 for $t$ and 604 for $n$ in the equation $n = a(1 + b)^t$ yields $604 = a(1 + b)^0$, which is equivalent to $604 = a(1)$, or $604 = a$. Substituting 604 for $a$ in the equation $n = a(1 + b)^t$ yields $n = 604(1 + b)^t$. The table also shows that when $t = 1$, $n = 606.42$. Substituting 1 for $t$ and 606.42 for $n$ in the equation $n = 604(1 + b)^t$ yields $606.42 = 604(1 + b)^1$, or $606.42 = 604(1 + b)$. Dividing both sides of this equation by 604 yields approximately $1.004 = 1 + b$. Subtracting 1 from both sides of this equation yields that the value of $b$ is approximately 0.004. Substituting 0.004 for $b$ in the equation $n = 604(1 + b)^t$ yields $n = 604(1 + 0.004)^t$. Therefore, of the choices, choice C best represents the relationship between $t$ and $n$.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 12

**Choice D** is correct. It's given that the function $w$ models the volume of liquid, in milliliters, in a container $t$ seconds after it begins draining from a hole at the bottom. The given function $w(t)=300-4t$ can be rewritten as $w(t)=-4t+300$. Thus, for each increase of $t$ by 1, the value of $w(t)$ decreases by $4(1)$, or 4. Therefore, the predicted volume, in milliliters, draining from the container each second is 4 milliliters.

*Choice A* is incorrect. This is the amount of liquid, in milliliters, in the container before the liquid begins draining. *Choice B* is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors.

## QUESTION 13

The correct answer is 45. It's given that $h(0)=45$. Therefore, for the given function $h$, when $x=0$, $h(x)=45$. Substituting 0 for $x$ and 45 for $h(x)$ in the given function, $h(x)=x+b$, yields $45=0+b$, or $45=b$. Therefore, the value of $b$ is 45.

## QUESTION 14

The correct answer is either 2 or $-12$. The left-hand side of the given equation can be rewritten by factoring. The two values that multiply to $-24$ and add to 10 are 12 and $-2$. It follows that the given equation can be rewritten as $(z+12)(z-2)=0$. Setting each factor equal to 0 yields two equations: $z+12=0$ and $z-2=0$. Subtracting 12 from both sides of the equation $z+12=0$ results in $z=-12$. Adding 2 to both sides of the equation $z-2=0$ results in $z=2$. Note that 2 and -12 are examples of ways to enter a correct answer.

## QUESTION 15

**Choice B** is correct. If two triangles are similar, then their corresponding angles are congruent. It's given that right triangle $FGH$ is similar to right triangle $JKL$ and angle $F$ corresponds to angle $J$. It follows that angle $F$ is congruent to angle $J$ and, therefore, the measure of angle $F$ is equal to the measure of angle $J$. The sine ratios of angles of equal measure are equal. Since the measure of angle $F$ is equal to the measure of angle $J$, $\sin(F)=\sin(J)$. It's given that $\sin(F)=\frac{308}{317}$. Therefore, $\sin(J)$ is $\frac{308}{317}$.

*Choice A* is incorrect. This is the value of $\cos(J)$, not the value of $\sin(J)$. *Choice C* is incorrect. This is the reciprocal of the value of $\sin(J)$, not the value of $\sin(J)$. *Choice D* is incorrect. This is the reciprocal of the value of $\cos(J)$, not the value of $\sin(J)$.

## QUESTION 16

**Choice C** is correct. Let $x$ be the 2015 population of Greenville. It's given that the population increased by 7% from 2015 to 2016. The increase in population can be written as $(0.07)x$. The 2016 population of Greenville is given as the sum of the 2015 population of Greenville and the increase in population from 2015 to 2016. This can be rewritten as $x + (0.07)x$, or $1.07x$. Therefore, the value of $k$ is 1.07.

*Choice A* is incorrect. This is the percent, represented as a decimal, that the population increased from 2015 to 2016, not the value of $k$. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is the value of $k$ if the population increased by 70%, not 7%, from 2015 to 2016.

## QUESTION 17

**Choice B** is correct. Standard deviation is a measure of the spread of a data set from its mean. The dot plot for class A and the dot plot for class B have the same shape. Thus, the frequency distributions for both class A and class B are the same. Since both class A and class B have the same frequency distribution of glue sticks brought in by each student, it follows that both class A and class B have the same spread of the number of glue sticks brought in by each student from their respective means. Therefore, the standard deviation of the number of glue sticks brought in by each student for class A is equal to the standard deviation of the number of glue sticks brought in by each student for class B.

*Choice A* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 18

**Choice B** is correct. In the statement "$m(330)$ is approximately equal to 362," the input of the function, 330, is the value of $t$, the elapsed time, in days, since the animal was born. The approximate value of the function, 362, is the predicted body mass, in kilograms, of the animal after that time has elapsed. Therefore, the predicted body mass of the animal was approximately 362 kg 330 days after it was born.

*Choice A* is incorrect. This would be the best interpretation of the statement "$m(362)$ is approximately equal to 330." *Choice C* is incorrect. The number $\frac{330}{7}$ is the number of weeks, not the number of days, after the animal was born. *Choice D* is incorrect. This would be the best interpretation of the statement "$m(362)$ is approximately equal to $\frac{330}{7}$."

## QUESTION 19

**Choice C** is correct. It's given that triangle $XYZ$ is similar to triangle $RST$, such that $X$, $Y$, and $Z$ correspond to $R$, $S$, and $T$, respectively. Since corresponding angles of similar triangles are congruent, it follows that the measure of $\angle Z$ is congruent to the measure of $\angle T$. It's given that the measure of $\angle Z$ is 20°. Therefore, the measure of $\angle T$ is 20°.

*Choice A* is incorrect and may result from a conceptual error. *Choice B* is incorrect. This is half the measure of $\angle Z$. *Choice D* is incorrect. This is twice the measure of $\angle Z$.

## QUESTION 20

The correct answer is 410. It's given that $t$ minutes after an initial observation, the number of bacteria in a population is $60,000(2)^{\frac{t}{410}}$. This expression consists of the initial number of bacteria, 60,000, multiplied by the expression $2^{\frac{t}{410}}$. The time it takes for the number of bacteria to double is the increase in the value of $t$ that causes the expression $2^{\frac{t}{410}}$ to double. Since the base of the expression $2^{\frac{t}{410}}$ is 2, the expression $2^{\frac{t}{410}}$ will double when the exponent increases by 1. Since the exponent of the expression $2^{\frac{t}{410}}$ is $\frac{t}{410}$, the exponent will increase by 1 when $t$ increases by 410. Therefore the time, in minutes, it takes for the number of bacteria in the population to double is 410.

## QUESTION 21

The correct answer is $-19$. It's given that function $f$ is defined by $f(x)=a^x+b$, where $a$ and $b$ are constants and $a>0$. It's also given that the graph of $y=f(x)$ in the *xy*-plane has a *y*-intercept at $(0, -25)$ and passes through the point $(2, 23)$. Since the graph has a *y*-intercept at $(0, -25)$, $f(0)=-25$. Substituting 0 for $x$ in the given equation yields $f(0)=a^0+b$, or $f(0)=1+b$, and substituting $-25$ for $f(0)$ in this equation yields $-25=1+b$. Subtracting 1 from each side of this equation yields $-26=b$. Substituting $-26$ for $b$ in the equation $f(x)=a^x+b$ yields $f(x)=a^x-26$. Since the graph also passes through the point $(2, 23)$, $f(2)=23$. Substituting 2 for $x$ in the equation $f(x)=a^x-26$ yields $f(2)=a^2-26$, and substituting 23 for $f(2)$ yields $23=a^2-26$. Adding 26 to each side of this equation yields $49=a^2$. Taking the square root of both sides of this equation yields $\pm 7=a$. Since it's given that $a>0$, the value of $a$ is 7. It follows that the value of $a+b$ is $7-26$, or $-19$.

## QUESTION 22

**Choice D** is correct. All the tables in the choices have the same three values of $x$, so each of the three values of $x$ can be substituted in the given inequality to compare the corresponding values of $y$ in each of the tables. Substituting 3 for $x$ in the given inequality yields $y>13(3)-18$, or $y>21$. Therefore, when $x=3$, the corresponding value of $y$ is greater than 21. Substituting 5 for $x$ in the given inequality yields $y>13(5)-18$, or $y>47$. Therefore, when $x=5$, the corresponding value of $y$ is greater than 47. Substituting 8 for $x$ in the given inequality yields $y>13(8)-18$, or $y>86$. Therefore, when $x=8$, the corresponding value of $y$ is greater than 86. For the table in choice D, when $x=3$, the corresponding value of $y$ is 26, which is greater than 21; when $x=5$, the corresponding value of $y$ is 52, which is greater than 47; when $x=8$, the corresponding value of $y$ is 91, which is greater than 86. Therefore, the table in choice D gives values of $x$ and their corresponding values of $y$ that are all solutions to the given inequality.

*Choice A* is incorrect. In the table for choice A, when $x=3$, the corresponding value of $y$ is 21, which is not greater than 21; when $x=5$, the corresponding value of $y$ is 47, which is not greater than 47; when $x=8$, the corresponding value of $y$ is 86, which is not greater than 86. *Choice B* is incorrect. In the table for choice B, when $x=5$, the corresponding value of $y$ is 42, which is not greater than 47; when $x=8$, the corresponding value of $y$ is 86, which is not greater than 86. *Choice C* is incorrect. In the table for choice C, when $x=3$, the corresponding value of $y$ is 16, which is not greater than 21; when $x=5$, the corresponding value of $y$ is 42, which is not greater than 47; when $x=8$, the corresponding value of $y$ is 81, which is not greater than 86.

## QUESTION 23

**Choice D** is correct. Since the number of yards in 1 mile is 1,760, the number of square yards in 1 square mile is $(1,760)(1,760)=3,097,600$. Therefore, if the area of the town is 4.36 square miles, it is $4.36(3,097,600)=13,505,536$, in square yards.

*Choice A* is incorrect and may result from dividing the number of yards in a mile by the square mileage of the town. *Choice B* is incorrect and may result from multiplying the number of yards in a mile by the square mileage of the town. *Choice C* is incorrect and may result from dividing the number of square yards in a square mile by the square mileage of the town.

## QUESTION 24

**Choice A** is correct. When a square is inscribed in a circle, a diagonal of the square is a diameter of the circle. It's given that a square is inscribed in a circle and the length of a radius of the circle is $\frac{20\sqrt{2}}{2}$ inches. Therefore, the length of a diameter of the circle is $2\left(\frac{20\sqrt{2}}{2}\right)$ inches, or $20\sqrt{2}$ inches. It follows that the length of a diagonal of the square is $20\sqrt{2}$ inches. A diagonal of a square separates the square into two right triangles in which the legs are the sides of the square and the hypotenuse is a diagonal. Since a square has 4 congruent sides, each of these two right triangles has congruent legs and a hypotenuse of length $20\sqrt{2}$ inches. Since each of these two right triangles has congruent legs, they are both 45-45-90 triangles. In a 45-45-90 triangle, the length of the hypotenuse is $\sqrt{2}$ times the length of a leg. Let $s$ represent the length of a leg of one of these 45-45-90 triangles. It follows that $20\sqrt{2}=\sqrt{2}(s)$. Dividing both sides of this equation by $\sqrt{2}$ yields $20=s$. Therefore, the length of a leg of one of these 45-45-90 triangles is 20 inches. Since the legs of these two 45-45-90 triangles are the sides of the square, it follows that the side length of the square is 20 inches.

*Choice B* is incorrect. This is the length of a radius, in inches, of the circle. *Choice C* is incorrect. This is the length of a diameter, in inches, of the circle. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 25

**Choice C** is correct. Factoring the denominator in the second term of the given expression gives $\frac{y+12}{x-8} + \frac{y(x-8)}{xy(x-8)}$. This expression can be rewritten with common denominators by multiplying the first term by $\frac{xy}{xy}$, giving $\frac{xy(y+12)}{xy(x-8)} + \frac{y(x-8)}{xy(x-8)}$. Adding these two terms yields $\frac{xy(y+12)+y(x-8)}{xy(x-8)}$. Using the distributive property to rewrite this expression gives $\frac{xy^2+12xy+xy-8y}{x^2y-8xy}$. Combining the like terms in the numerator of this expression gives $\frac{xy^2+13xy-8y}{x^2y-8xy}$.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 26

**Choice D** is correct. A $y$-intercept of a graph in the $xy$-plane is a point where the graph intersects the $y$-axis, or a point where $x=0$. Substituting 0 for $x$ in the equation defining function $f$ yields $f(0)=a(2.2^0+2.2^b)$, or $f(0)=a(1+2.2^b)$. So, the $y$-coordinate of the $y$-intercept of the graph is $a(1+2.2^b)$, or equivalently, $a+a(2.2)^b$. It's given that function $g$ is equivalent to function $f$, where $0<a<b$. It follows that $k=2.2^b$. Since $a(2.2)^b$ can't be equal to 0, the coefficient $a$ can't be equal to $a+a(2.2)^b$. Since $0<a$, the constant $k$, which is equal to $2.2^b$, can't be equal to $a+a(2.2)^b$. Therefore, function $g$ doesn't display the $y$-coordinate of the $y$-intercept of the graph of $y=f(x)$ in the $xy$-plane as a constant or coefficient. It's also given that function $h$ is equivalent to function $f$, where $0<a<b$. The equation defining $f$ can be rewritten as $f(x)=a(2.2)^x+a(2.2)^b$. It follows that $m=a(2.2)^b$. Since $a(2.2)^b$ can't be equal to 0, the coefficient $a$ can't be equal to $a+a(2.2)^b$. Since $0<a$, the constant $m$, which is equal to $a(2.2)^b$, can't be equal to $a+a(2.2)^b$. Therefore, function $h$ doesn't display the $y$-coordinate of the $y$-intercept of the graph of $y=f(x)$ in the $xy$-plane as a constant or coefficient. Thus, neither function $g$ nor function $h$ displays the $y$-coordinate of the $y$-intercept of the graph of $y=f(x)$ in the $xy$-plane as a constant or coefficient.

*Choice A* is incorrect and may result from conceptual or calculation errors.
*Choice B* is incorrect and may result from conceptual or calculation errors.
*Choice C* is incorrect and may result from conceptual or calculation errors.

## QUESTION 27

The correct answer is 50. An equation of the form $ax^2+bx+c=0$, where $a$, $b$, and $c$ are constants, has no real solutions if and only if its discriminant, $b^2-4ac$, is negative. Applying the distributive property to the left-hand side of the equation $x(kx-56)=-16$ yields $kx^2-56x=-16$. Adding 16 to each side of this equation yields $kx^2-56x+16=0$. Substituting $k$ for $a$, $-56$ for $b$, and 16 for $c$ in $b^2-4ac$ yields a discriminant of $(-56)^2-4(k)(16)$, or $3,136-64k$. If the given equation has no real solution, it follows that the value of $3,136-64k$ must be negative. Therefore, $3,136-64k<0$. Adding $64k$ to both sides of this inequality yields $3,136<64k$. Dividing both sides of this inequality by 64 yields $49<k$, or $k>49$. Since it's given that $k$ is an integer, the least possible value of $k$ is 50.