

# The SAT<sup>®</sup>

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# Practice Test #5



## ANSWER EXPLANATIONS

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

**SAT<sup>®</sup>**

Reading and Writing Module 1			
1	A	16	B
2	B	17	A
3	B	18	B
4	D	19	C
5	B	20	A
6	D	21	D
7	B	22	B
8	C	23	B
9	B	24	B
10	B	25	D
11	D	26	A
12	A	27	C
13	D		
14	B		
15	C		

Reading and Writing Module 2			
1	C	16	A
2	D	17	A
3	A	18	B
4	A	19	A
5	C	20	C
6	C	21	A
7	B	22	C
8	A	23	C
9	A	24	B
10	D	25	D
11	A	26	A
12	D	27	D
13	D		
14	D		
15	B		

Math Module 1			
1	C	16	D
2	B	17	A
3	B	18	11/28
4	B	19	336
5	4	20	B
6	29	21	D
7	C	22	D
8	B		
9	B		
10	C		
11	D		
12	6		
13	4.51		
14	C		
15	B		

Math Module 2			
1	B	16	20
2	B	17	66
3	B	18	D
4	B	19	D
5	6	20	D
6	D	21	A
7	B	22	C
8	C		
9	D		
10	44/3		
11	4,205		
12	A		
13	A		
14	B		
15	B		

# Reading and Writing

## Module 1

(33 questions)

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### QUESTION 1

**Choice A** is the best answer because the text indicates that Fox-Foot doesn't let the group build a fire or create a canoe landing when it's time for supper. This context suggests that he doesn't want anyone who might be following the group to see any sign of them or their activities. In other words, Fox-Foot doesn't want there to be any trace, or evidence, of the group's movements ("their passing") through the area.

**Choice B** is incorrect because the text conveys that Fox-Foot doesn't want the group to be detected, not that he doesn't want their presence to create a blemish, or a spoiling flaw, in the area; human activity could disturb a natural environment, but the context emphasizes that Fox-Foot is instead focused on avoiding giving any sign of the group's movements through a place ("their passing") to anyone who might be following them. **Choice C** is incorrect because the text focuses on Fox-Foot's desire to avoid detection by those who might be following the group. This context conveys that Fox-Foot doesn't want to create any signs or evidence of the group moving through a place ("their passing"), not that he doesn't want to leave behind some quantity of their presence; indeed, it isn't clear what an amount of a group's movement would be. **Choice D** is incorrect because nothing in the text suggests that the group has a sketch, or rough drawing, of their movements through that area ("their passing") that might be left behind. Rather, the context emphasizes that Fox-Foot is focused on ensuring that the group doesn't give any kind of indication of their presence, as he wants to avoid detection by anyone who might be following the group.

### QUESTION 2

**Choice B** is the best answer because it most logically completes the text's discussion of noses on ancient sculptures. In this context, "fragile" means weak or delicate. This matches the text's description of noses on ancient sculptures, which are often missing from sculptures' heads because they are "especially easy to break." Therefore, this context indicates that noses on ancient sculptures are the most fragile part of the sculptures' heads.

*Choice A* is incorrect. In this context, “recognizable” would mean identifiable, and since the text indicates that noses are often missing from ancient statues, they therefore cannot be the most recognizable part of the statue. *Choice C* is incorrect because the text indicates that many ancient statues are missing noses, so noses wouldn’t be “common,” or frequent, aspects of ancient statues; they would conversely be uncommon. *Choice D* is incorrect because the text only indicates that noses on ancient statues often stick out and end up missing from the heads, which doesn’t relate to the noses being “sophisticated,” or knowledgeable or refined.

### QUESTION 3

**Choice B** is the best answer because it most logically completes the text’s discussion of advance indications of solar flares. In this context the word “impending” means imminent or approaching. The text mentions a study by Leka and colleagues that found that the Sun’s corona provides an advance indication of solar flares. The text then points out why such an advance indication would be useful—solar flares can interfere with communications on Earth—and concludes by describing the characteristic of the corona that gives warning of a solar flare. The text indicates that this characteristic—increased brightness in a particular region of the corona—comes before the appearance of the flare. Therefore, in context, the best answer would indicate that the flare is approaching, or impending.

*Choice A* is incorrect. The best answer would be one that indicates that the increased brightness of the Sun’s corona precedes the appearance of the flare. But if the flare were “antecedent,” or previous, then the flare would instead precede the appearance of the increased brightness of the corona, a statement that is logically inconsistent. *Choice C* is incorrect. The word “innocuous,” or harmless, does not logically complete the text; since solar flares can interfere with communications on Earth, they cannot reasonably be described as innocuous. *Choice D* is incorrect. If the solar flares have an advance indication of their appearance, then there must therefore be a time before the appearance of the flares when they do not exist. But the word “perpetual,” or never-ending, would in context indicate that the flare exists at the same time as the advance indication provided by the Sun’s corona, which would not make logical sense.

### QUESTION 4

**Choice D** is the best answer because it most logically completes the text’s discussion of using magnetism to detect stress in buried metal pipes. In this context, “exploited” means made productive use of. The text indicates that the magnetic fields of some metals change under stress and that Saleem and colleagues showed that it is possible to measure those changes from a distance, thereby demonstrating that the integrity of underground metal pipes can be evaluated without having to unearth them. This context thus indicates that Saleem and colleagues made productive use of, or exploited, this tendency of the metals’ magnetic fields.

*Choice A* is incorrect because in this context, “hypothesized” would mean made a tentative assumption to be evaluated in a study or experiment. Although Saleem and colleagues may have had one or more hypotheses for these experiments, the text presents the information about the tendency of some metals’ magnetic fields to change under stress as a known fact that the researchers made productive use of, not as a hypothesis to be evaluated. The text after the colon indicates that the researchers were not evaluating whether such changes occur but whether those changes can be measured at a distance. *Choice B* is incorrect because in this context, “discounted” would mean downplayed or ignored, but the text does not suggest that Saleem and colleagues minimized or ignored the tendency of the magnetic fields of some metals to change under stress. Rather, the text indicates that this tendency is the basis for Saleem and colleagues’ method of assessing the pipes’ integrity. *Choice C* is incorrect because nothing in the text indicates that Saleem and colleagues “redefined,” or reevaluated or reformulated, the tendency of some metals’ magnetic fields to change under stress. Instead, the text indicates that the researchers made use of that tendency to demonstrate that it is possible to evaluate the integrity of underground pipes without unearthing them.

## QUESTION 5

**Choice B** is the best answer because it most logically completes the text’s discussion of behavioral psychology studies. In this context, “ameliorate” means to help remedy or improve. The text states that many behavioral psychology studies are flawed because the subjects used are “highly unrepresentative.” It is then suggested that researchers should recruit subjects from “diverse backgrounds and locations” in order to help address the issue of unrepresentative subject pools. Thus, this context conveys that recruitment efforts focused on diversity would help ameliorate the problems outlined in the text.

*Choice A* is incorrect. In this context, “sanction” could have two meanings: to give official approval for something or to enact a penalty, neither of which makes sense in this context. The text describes a situation known to be problematic in behavioral psychology studies and then presents a potential remedy to that situation; the text does not suggest that the situation is officially approved or results in any type of penalty. *Choice C* is incorrect because rather than “rationalize,” or explain or justify, a situation, the text presents a situation and its potential remedy. *Choice D* is incorrect because the text is not attempting to “postulate,” or suggest a claim or theory, related to the situation described in the text but is rather presenting a potential remedy for the situation.

## QUESTION 6

**Choice D** is the best answer because it most accurately describes the main purpose of the text. In the first sentence of the text, the narrator states that she thinks there’s a chance she will become part of the basketball team at her college. She goes on to explain that she is “quick” and “tough.” Based on these characteristics, she thinks she has a chance to join the team. Thus, the main purpose of the text is to explain why the narrator thinks she might make the basketball team.

*Choice A* is incorrect because the text focuses solely on basketball and doesn't mention any other kinds of sports. *Choice B* is incorrect because the text doesn't describe aspects of the game of basketball. Instead, it provides the narrator's reasoning for thinking that she might make her school basketball team. *Choice C* is incorrect. Although the narrator explains why she thinks she will be chosen for the basketball team at her school, the text doesn't go into the general decision-making process or the requirements for being picked for the team.

## QUESTION 7

**Choice B** is the best answer because it most accurately describes the main purpose of the text. The text begins by stating that there were many Spanish-language newspapers in cities across Texas in the late 1800s, citing San Antonio as a city that produced eleven such newspapers. The text then goes on to note that in El Paso, there were twenty-two newspapers published in Spanish in the late 1800s, more than any other Texas city. The text then concludes by explaining that the reason for this large number of Spanish-language newspapers was likely El Paso's location near Mexico and its large population of Spanish speakers. Therefore, the main purpose of the text is to explain that Spanish-language newspapers thrived in Texas cities, especially in El Paso, in the late 1800s.

*Choice A* is incorrect because the text doesn't discuss Spanish-language newspapers published in Texas today, let alone compare them with newspapers that were published in the 1800s. *Choice C* is incorrect. Although the text characterizes El Paso as a particularly rich site for Spanish-language journalism in the late 1800s, the text doesn't discuss whether newspapers published in El Paso influenced the newspapers published in other cities across Texas, including San Antonio. *Choice D* is incorrect because the text doesn't mention whether Spanish-language newspapers published in Texas were also widely read in Mexico. The text only focuses on the popularity of Spanish-language newspapers within Texas, and especially in El Paso.

## QUESTION 8

**Choice C** is the best answer because it most accurately describes how the underlined sentence functions in the text as a whole. The first sentence describes a unique location on Earth, the Atacama Desert. The next sentence, which is the underlined sentence, states that the reason why astrobiologists study life, or its remains, in this unique location is that Atacama is a harsh environment that closely resembles the extreme environment of Mars. The remainder of the text explains that the researchers hope their work in Atacama will support inquiry into life on Mars. Thus, the underlined portion functions mainly to indicate why astrobiologists choose to conduct research in the Atacama Desert.

*Choice A* is incorrect because to contrast two things means to show the differences between them, and the phrase "closely mirrors" in the underlined sentence indicates that the extreme environment in the Atacama Desert is similar to, not different from, that on Mars. This similarity is why, according to the underlined sentence, astrobiologists conduct research in Atacama. *Choice B* is incorrect because the underlined sentence doesn't address forms of life that are unable to survive the harsh environment of the Atacama Desert. Instead, the

underlined sentence explains why astrobiologists study life, or its remains, in this environment. *Choice D* is incorrect because the underlined sentence doesn't suggest that the scientific research in the Atacama Desert is limited in any way; instead, the sentence explains that the similarity between the environments of Atacama and Mars is the reason why astrobiologists search for life, or its remains, in Atacama.

## QUESTION 9

**Choice B** is the best answer because it most accurately describes how the underlined portion functions in the text as a whole. The first sentence explains that reproducing the high ridership of Mexico City's public transit system in other cities by implementing some of its features, such as its low fares, is unlikely to guarantee significant ridership increases in those cities. The following sentence introduces a study by Guerra et al., whose findings—namely that choice of transportation mode in urban centers in Mexico is influenced by a variety of local contextual factors—support this claim. The first part of the last sentence concedes that features of transportation systems likely do have some effect on ridership numbers, but the underlined portion reiterates the study's conclusion by stating that there is an “irreducibly contextual dimension” to peoples' choice to use public transportation: that is, there is a complex mix of local contextual factors—including population density, spatial distribution of jobs, and demographics—whose influence over an urban center's transit ridership is unique to each location, and it is unlikely that simple changes to transit system characteristics could negate the influence of those contextual factors. Thus, the underlined portion explains why it is challenging to influence transit ridership solely by changing some of a transit system's characteristics.

*Choice A* is incorrect. Rather than objecting to the argument of Guerra et al., the underlined portion reiterates their argument by stating that there is an “irreducibly contextual dimension” involved in transportation mode choice; in other words, transportation mode choice in urban areas of Mexico is strongly dependent on contextual factors that are unique to each urban area. *Choice C* is incorrect because it mischaracterizes the text's central claim, which is that transit ridership is the product of a complex mix of contextual factors and transit system features, not that a characteristic associated with Mexico City's high transit ridership was found to have no association with high transit ridership elsewhere. Additionally, the underlined portion does not illustrate a claim, but instead restates the findings of Guerra et al. *Choice D* is incorrect. Although Guerra et al. demonstrate that population density, the spatial distribution of jobs, and demographic characteristics—factors that comprise the “contextual dimension of transportation mode choice”—influence transit ridership, the underlined portion does not substantiate—that is, provide evidence in support of—this assertion. Rather, the underlined portion merely restates a study finding that explains why simply altering a transit system's features would be unlikely to induce significant increases in transit ridership.



## QUESTION 10

**Choice B** is the best answer because it most accurately describes the overall structure of the text. The text begins by explaining that human activities influence carbon and nitrogen levels in soil, but how deeply these effects are seen in the soil remains an unresolved question. Next, the text summarizes Okolo and colleagues' hypothesis regarding this question—which is that the different effects on carbon and nitrogen levels associated with different types of land use would also be observed below the topsoil layer—and then briefly explains the methods they used to test this hypothesis. Finally, the text states that the researchers found that at depths below the topsoil layer, carbon and nitrogen decreased to similarly low levels across all land-use types, a finding that conflicts with the team's hypothesis presented earlier in the text. Thus, the text introduces an unresolved scientific question, presents a research team's hypothesis pertaining to that question, and then describes an observation that the team made that conflicted with their hypothesis.

**Choice A** is incorrect. Although the text introduces a phenomenon (the fact that human activities influence carbon and nitrogen levels in the soil) that isn't fully understood by scientists and explains a research team's hypothesis about the phenomenon, the text doesn't describe how the team refined their hypothesis when a research finding contradicted it. **Choice C** is incorrect because the text doesn't discuss a process at all; rather, it poses an unsolved scientific question and presents a hypothesis that Okolo and colleagues tested to answer that question. Moreover, the text only describes one hypothesis; it doesn't mention any competing hypotheses, nor does it suggest that Okolo's team was able to determine which hypothesis was correct. **Choice D** is incorrect because the text doesn't begin by presenting a hypothesis that is under scientific debate; rather, it presents a question that scientists have been unable to answer and then introduces a hypothesis formulated by Okolo and colleagues. While the text does explain how Okolo's team tested their hypothesis, the text goes on to say that their data conflicted with their hypothesis, not that the data validated, or supported, their hypothesis.

## QUESTION 11

**Choice D** is the best answer because it presents a statement about what surprised the scientists that is supported by the text. The text states that the marsquakes described in the data from NASA's InSight lander originated from the same location on Mars. The text goes on to say that because they had expected the opposite (that marsquakes would originate from all over the planet) this discovery surprised the scientists.

**Choice A** is incorrect because the text doesn't say that the data from NASA's InSight lander revealed any surprising information about the planet's surface temperature. Instead, the text mentions the cooling of Mars's surface as a reason the scientists expected that marsquakes had multiple origins. In addition, cooling would indicate that the temperature has been falling rather than rising. **Choice B** is incorrect. Although the text indicates that by studying seismic activity scientists found a possible explanation for what causes marsquakes, the text doesn't say

that they discovered that marsquakes are caused by different types of seismic waves. Rather, the text states that based on the data from NASA's InSight lander, scientists now believe that this seismic activity happens because of areas of active magma that flow below the planet's surface. *Choice C* is incorrect because the text doesn't discuss the amount of data NASA's InSight lander collected or whether scientists who studied the data found the amount to be as expected. Instead, the text focuses on what the data revealed about where on Mars the marsquakes originated.

## QUESTION 12

**Choice A** is the best answer because it presents information about Maya civilization that is supported by the text. The text states that the writing system used in the Maya kingdoms had a symbol for the number zero. It goes on to say that at the time of the zero symbol's earliest example, more than 2,000 years ago, almost no other writing systems in the world featured such a symbol. The text also points out that some historians suggest that Maya mathematicians inherited the use of zero from the Olmec civilization, which existed in the same area as the Maya civilization at an earlier date. Thus, according to the text, some historians suggest that the Maya civilization acquired the use of zero from the Olmec civilization.

*Choice B* is incorrect because although the text mentions present-day historians and Maya mathematicians, it does not say anything about how much the Maya civilization respected its historians and mathematicians. *Choice C* is incorrect because the text does not indicate that the Maya civilization treated its use of the zero symbol, or any other intellectual achievements, as secrets to be kept from other civilizations. *Choice D* is incorrect because although the text mentions historians who suggest that the writing system of the Maya civilization inherited some features from the earlier Olmec civilization, the text does not describe any attempts of Maya civilization to introduce its writing system to other civilizations.

## QUESTION 13

**Choice D** is the best answer because it most effectively uses a quotation from "The Bet" to illustrate the claim that the banker was very upset about something. The quotation indicates that the banker shed tears, which suggests that he was likely unhappy about something, and that his emotions were so strong that they kept him from sleeping for hours. These details suggest that the banker was very upset.

*Choice A* is incorrect because this quotation mainly describes the banker cautiously unlocking a door; it doesn't suggest that he was particularly upset about anything. *Choice B* is incorrect because this quotation doesn't mention whether the banker was experiencing any particularly strong negative feelings; instead, the quotation focuses on the quietness of the setting. *Choice C* is incorrect because this quotation states that the banker was feeling "delighted," not that he was upset.

## QUESTION 14

**Choice B** is the best answer because it uses data from the table to complete the statement regarding a species for which the problem of finding a suitable habitat would be especially concerning. For each candidate species, the table lists its common name, scientific name, and when the species became extinct. The text explains that scientists pursuing de-extinction for the candidate species also consider the length of time that has passed since the species' extinction, noting that the longer the animal has been extinct, the less likely it is that a suitable habitat would exist for the species today. The possibility of not having a suitable habitat would be especially concerning for the candidate species for which the most time has passed since its extinction. According to the table this species would be the saber-toothed cat, which became extinct 11,000 years before present.

**Choice A** is incorrect because it compares the time since the extinction of the passenger pigeon to the time since the extinction of the huia instead of citing the species listed in the table that has been extinct the longest (the saber-toothed cat). The text indicates that the longer a species has been extinct, the lower the chances are that a suitable habitat exists for it today. Neither the table nor the text supports the claim that the passenger pigeon is especially vulnerable to this problem. **Choice C** is incorrect because the text states that the longer a species has been extinct, the less likely it is that there would be a suitable habitat available for the species today. So, the problem would be especially concerning for the saber-toothed cat, which became extinct several thousand years before the woolly mammoth did—not the other way around. **Choice D** is incorrect because the text states that the longer a species has been extinct, the lower the chances are that a suitable habitat would be available for that species today. According to the table, the Caribbean monk seal became extinct in 1952, which is the most recent extinction listed for a candidate species in the table.

## QUESTION 15

**Choice C** is the best answer because it most effectively illustrates the claim that the narrator of “The Yellow Wallpaper” has mixed feelings about her surroundings. She says she is “really getting quite fond of the big room,” a positive sentiment, but also describes the room’s wallpaper as “horrid,” a negative sentiment. Since some of her feelings about her surroundings are positive and others are negative, they are best described as mixed.

**Choice A** is incorrect because though the narrator describes the room’s wallpaper as “irritating,” a negative sentiment, she does not mention a positive sentiment. Thus, the quotation does not effectively illustrate the claim that the narrator has mixed feelings about her surroundings. **Choice B** is incorrect because it describes how the appearance of the room’s wallpaper changes at night but does not mention the narrator’s feelings about her surroundings. **Choice D** is incorrect because though the narrator describes the room’s wallpaper as “repellent,” a negative sentiment, she does not mention a positive sentiment. Thus, the quotation does not effectively illustrate the claim that the narrator has mixed feelings about her surroundings.

## QUESTION 16

**Choice B** is the best answer because it effectively uses data from the graph to complete the statement about Rodrigo da Costa Portilho-Ramos and colleagues' conclusion. The graph shows the ratio of manganese to calcium in *L. pertusa* coral samples from the Alboran Sea and the Mauritanian coast. The graph reflects time in approximate years before present: in other words, the greater the number in years noted on the graph's horizontal axis, the farther that moment is in the past. The text indicates that the researchers tested the samples to determine whether oxygenation played a role in the decline of *L. pertusa*. The text goes on to note that a change in the ratio of manganese to calcium would signal an inverse, or opposite, change in oxygenation. According to the graph, the ratio of manganese to calcium in samples from the Alboran Sea increased from about 30 micromoles per mole 10,000 years ago to about 80 micromoles per mole 8,000 years ago, which means that oxygenation decreased between 10,000 and 8,000 years ago. Meanwhile, there was almost no discernible change in the ratio of manganese to calcium in samples from the Mauritanian coast between 12,000 and 10,000 years ago. According to the text, the population of *L. pertusa* declined significantly around 9,000 years ago in the Alboran Sea and around 11,000 years ago near the Mauritanian coast. Thus, the increase in the ratio of manganese to calcium around 9,000 years ago in the Alboran Sea coincides with the decline in the *L. pertusa* population, suggesting an association between the decrease in oxygenation and the decline in population of the coral. No such relationship is suggested around 11,000 years ago near the Mauritanian coast. So, oxygenation likely played a role in the *L. pertusa* decline in the Alboran Sea but not in the coral's decline near the Mauritanian coast.

**Choice A** is incorrect because it asserts the opposite of what the graph indicates regarding oxygenation in the Alboran Sea, and it misrepresents what the graph indicates about oxygenation near the Mauritanian coast. The graph indicates that at the time of the decline in *L. pertusa* (approximately 9,000 years ago), the samples from the Alboran Sea contained a ratio of manganese to calcium that was increasing. According to the text, this ratio inversely correlates with ocean oxygenation levels, so if the ratio was increasing, oxygenation was decreasing, not substantially increasing. Furthermore, the graph shows that the ratio of manganese to calcium remained relatively stable in coral samples from the Mauritanian coast during the period studied, which suggests that there was no discernible relationship between oxygenation and the coral's population decline in that location, not that there was a substantial decrease in oxygenation corresponding to the coral's decline. **Choice C** is incorrect. Although the graph suggests that the level of oxygenation in the Alboran Sea was higher before the decline in *L. pertusa* than after—because the ratio of manganese to calcium inversely correlates with ocean oxygenation levels and this ratio was lower before the decline than after—the graph doesn't support the claim that oxygenation near the Mauritanian coast was consistently low before and after the coral's decline there. Rather, the graph indicates that relative to coral samples from the Alboran Sea, the ratio of manganese to calcium in samples from near the Mauritanian coast was consistently low, which suggests that oxygenation levels were relatively high both before and after the decline of *L. pertusa*. **Choice D** is incorrect because it states the opposite of what the graph indicates: the graph

shows that throughout the period studied, the ratio of manganese to calcium was higher in coral samples from the Alboran Sea than it was in samples from near the Mauritanian coast. Since the text indicates that the ratio of manganese to calcium inversely correlates with ocean oxygenation levels, oxygenation in the Alboran Sea was therefore lower than, not higher than, oxygenation near the Mauritanian coast during the period studied. Moreover, even if choice D did accurately represent the graph, it wouldn't effectively complete the statement since a comparison of the ocean oxygenation levels at the two locations is not relevant to the claim that a decline in oxygenation levels was associated with the decline of *L. pertusa* in the Alboran Sea but not near the Mauritanian coast.

## QUESTION 17

**Choice A** is the best answer because it most logically completes the text's discussion of a crater's connection to the start of the Younger Dryas. According to the text, some scientists believe that a comet fragment hitting Earth caused the cooling of the Younger Dryas period to come about. The text then indicates that a team of scientists found a crater in Greenland, which some believe supports the theory of a comet fragment hitting Earth to initiate the Younger Dryas. However, the text also notes that the team was unable to determine the age of the crater. If the age of the crater can't be determined, then its connection to the Younger Dryas period of time can't be confirmed either. Thus, it can't be concluded that the impact that made the crater was connected to the beginning of the Younger Dryas.

**Choice B** is incorrect because though the text suggests that the age of the comet crater found by a team of scientists is uncertain, it doesn't address whether a comet fragment can make a crater as large as 19 miles wide. The text doesn't consider the size of comet fragments and how they relate to the size of craters they might make. **Choice C** is incorrect because the debate in the text centers on the age of the crater found, not the cause of the crater. The text doesn't indicate uncertainty about what caused the discovered crater. **Choice D** is incorrect because the text suggests that the age of the crater found by the team of scientists is uncertain, not that the dates of the Younger Dryas are uncertain or incorrect. The text states that "the Younger Dryas was a period of extreme cooling from 11,700 to 12,900 years ago" but doesn't indicate any debate about the timing of the period.

## QUESTION 18

**Choice B** is the best answer because it most logically completes the text's discussion of Smith and colleagues' investigation of the evolution and biological role of the appendix. The text indicates that the team found several instances of the appendix emerging and not disappearing in the lineages of various mammal species the team examined. Furthermore, the text states that species that possess an appendix also tend to have relatively high amounts of lymphoid tissue—a type of tissue that supports immune system function. Taken together, these details strongly support the hypothesis that the appendix has persisted in some species because it has a function that contributes to effective immune responses in those species.

*Choice A* is incorrect because the text doesn't address any nonmammalian species. *Choice C* is incorrect because the text doesn't make predictions about the evolutionary future of the species Smith and colleagues examined, and although the implication of the text is that the appendix likely does serve a function for the immune system, nothing in the text indicates that the appendix will become more widespread in the future. *Choice D* is incorrect. Although the text does suggest an association between having an appendix and relatively high concentrations of lymphoid tissue, it doesn't claim that the appendix causes the tissue to grow, nor does it address the relative production of the tissue at different periods of time.

## QUESTION 19

**Choice C** is the best answer. The convention being tested is pronoun-antecedent agreement. The singular pronoun "this" agrees in number with the singular antecedent "Lê Lương Minh became the thirteenth secretary-general of the Association of Southeast Asian Nations (ASEAN) in January 2013." The pronoun "this" is referring back to the singular event described earlier in the sentence in which Minh became secretary-general of ASEAN.

*Choice A* is incorrect because the plural pronoun "these" doesn't agree in number with the singular antecedent "Lê Lương Minh became the thirteenth secretary-

general of the Association of Southeast Asian Nations (ASEAN) in January 2013.” *Choice B* is incorrect because the plural pronoun “those” doesn’t agree in number with the singular antecedent “Lê Lương Minh became the thirteenth secretary-general of the Association of Southeast Asian Nations (ASEAN) in January 2013.” *Choice D* is incorrect because the indefinite pronoun “some” is ambiguous in this context; the resulting sentence leaves unclear what marks the first time the organization appointed a Vietnamese leader.

## QUESTION 20

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. A main clause requires a finite (tensed) verb to perform the action of the subject (in this case, Land), and this choice supplies the finite past tense verb “used” to indicate what Land did with the technology he had invented.

*Choice B* is incorrect because it results in an ungrammatical sentence. The nonfinite perfect infinitive “to have used” doesn’t supply the main clause with a finite verb. *Choice C* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to use” doesn’t supply the main clause with a finite verb. *Choice D* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “using” doesn’t supply the main clause with a finite verb.

## QUESTION 21

**Choice D** is the best answer. The convention being tested is subject-verb agreement. The singular verb “ensures” agrees in number with the singular subject “using.”

*Choice A* is incorrect because the plural verb “are ensuring” doesn’t agree in number with the singular subject “using.” *Choice B* is incorrect because the plural verb “have ensured” doesn’t agree in number with the singular subject “using.” *Choice C* is incorrect because the plural verb “ensure” doesn’t agree in number with the singular subject “using.”

## QUESTION 22

**Choice B** is the best answer. The convention being tested is the use of plural nouns in a sentence. The plural noun “hands” and the plural noun “antennas” correctly indicate that two hands are placed between two antennas when playing the theremin.

*Choice A* is incorrect because the context requires the plural nouns “hands” and “antennas,” not the singular possessive nouns “hand’s” and “antenna’s.” *Choice C* is incorrect because the context requires the plural nouns “hands” and “antennas,” not the plural possessive nouns “hands’” and “antennas’.” *Choice D* is incorrect because the context requires the plural noun “hands,” not the plural possessive noun “hands’.”

## QUESTION 23

**Choice B** is the best answer. The convention being tested is the use of punctuation between titles and proper nouns. No punctuation is needed to set off the proper noun “Marie-Denise Villers” from the title that describes Villers, “little-known French portrait artist.”

*Choice A* is incorrect because no punctuation is needed. *Choice C* is incorrect because no punctuation is needed. *Choice D* is incorrect because no punctuation is needed.

## QUESTION 24

**Choice B** is the best answer. The convention being tested is the punctuation of supplementary elements within a sentence. The comma after “described” separates the first supplementary element (“both of interviewees and the items they described”) from the second supplementary element (“from hair to grass to sculptures”). Furthermore, the dash after “sculptures” pairs with the dash after “photographs” to separate these two supplementary elements from the rest of the sentence. The pair of dashes, which operate at a higher organizing level than the comma, indicates that the elements between the dashes function together—in this case, the second supplement (“from...sculptures”) describes the range of items mentioned in the first supplement—and could be removed without affecting the grammatical coherence of the sentence.

*Choice A* is incorrect because it fails to appropriately punctuate the supplementary elements in the sentence. A dash is needed after “sculptures” to separate the supplementary elements (“both...sculptures”) from the rest of the sentence. *Choice C* is incorrect because it fails to appropriately punctuate the supplementary elements in the sentence. The two supplementary elements “both...described” and “from...sculptures” function together to describe the photographs, and placing a dash between them would make this relationship less clear, suggesting that the supplement “both...described” is a standalone element that could be removed without affecting the grammatical coherence of the sentence, which isn’t the case. *Choice D* is incorrect because it fails to appropriately punctuate the supplementary elements in the sentence. A colon isn’t conventionally used in this way to separate a supplementary element (“from hair to grass to sculptures”) from the noun phrase it is modifying (“items they described”). Additionally, a dash is needed after “sculptures” to separate the supplementary elements (“both...sculptures”) from the rest of the sentence.



## QUESTION 25

**Choice D** is the best answer. “As a result” logically signals that the information in this sentence—the vessel turning black—is a result of the heating technique discussed in the previous sentence.

**Choice A** is incorrect because “on the contrary” illogically signals that the information in this sentence directly opposes the heating technique in the previous sentence. Instead, the vessel turns black as a result of that technique.

**Choice B** is incorrect because “for example” illogically signals that the information in this sentence is an example of the heating technique in the previous sentence. Instead, the vessel turns black as a result of that technique. **Choice C** is incorrect because “previously” illogically signals that the information in this sentence occurs earlier in a chronological series of events than does the heating technique discussed in the first two sentences. Instead, the vessel turns black as a result of that technique.

## QUESTION 26

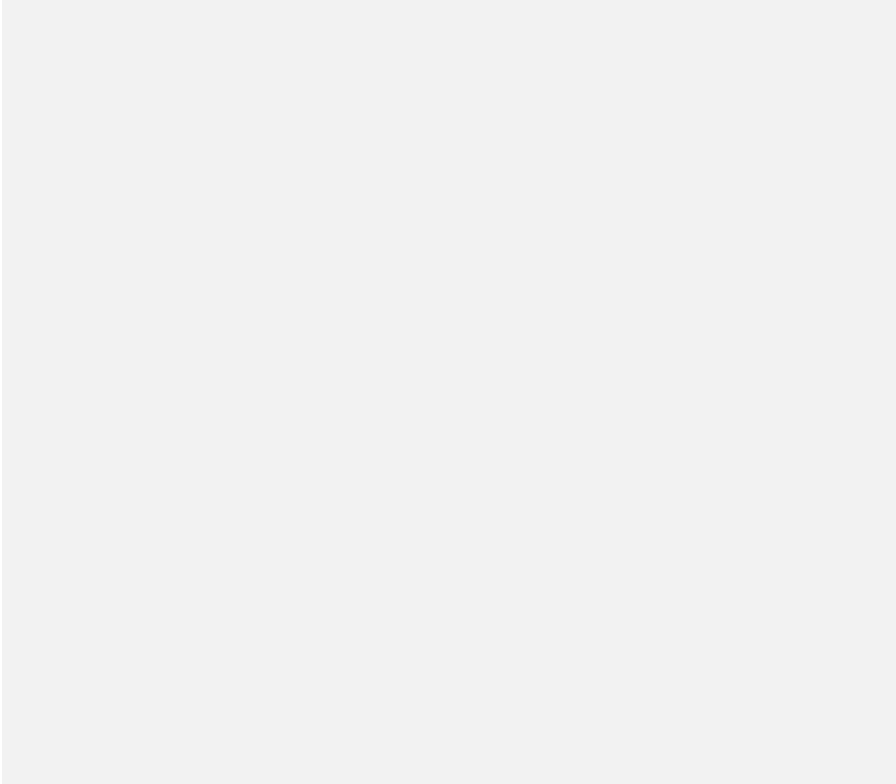
**Choice A** is the best answer. The sentence identifies the novel's real author, explaining that Mary Ann Evans published the novel under the pseudonym of George Eliot.

**Choice B** is incorrect. The sentence explains that George Eliot was assumed to be a pseudonym; it doesn't identify the novel's real author. **Choice C** is incorrect. The sentence specifies the pseudonym used on the novel's title page; it doesn't identify the novel's real author. **Choice D** is incorrect. While the sentence indicates that the novel's real author used a pseudonym, it doesn't identify that author as Mary Ann Evans.

## QUESTION 27

**Choice C** is the best answer. The sentence specifies how the salt in a freeze-thaw battery enables energy storage, explaining that energy stops flowing and can be stored when the salt solidifies at room temperature.

**Choice A** is incorrect. The sentence explains some properties of molten salt; it doesn't specify how that salt enables energy storage. **Choice B** is incorrect. The sentence indicates how the energy in a freeze-thaw battery can be released; it doesn't specify how the salt in the battery enables energy storage. **Choice D** is incorrect. The sentence specifies how much charge the freeze-thaw battery retains when storing energy; it doesn't specify how the salt in the battery enables energy storage.



# Reading and Writing

## Module 2

(33 questions)

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### QUESTION 1

**Choice C** is the best answer because as used in the text “reaching across to” most nearly means stretching toward. The text begins with Mrs. Wilkins stating that she wants to have one of the oranges that she’s admiring. The text then indicates that Mrs. Wilkins, staying where she is, holds out a big orange to her friend. This context suggests that when the text describes Mrs. Wilkins as reaching across to the bowl of oranges, it means that she is stretching toward the bowl.

**Choice A** is incorrect because the text never suggests that Mrs. Wilkins is joining with, or becoming attached to, the bowl of oranges. Rather, the text indicates that she is stretching toward the bowl so she can pick out oranges for herself and her friend Rose to eat. **Choice B** is incorrect because the text never suggests that Mrs. Wilkins is gaining on, or overtaking in a competition or race, the bowl of oranges. The text suggests instead that the bowl is sitting still on a surface and that Mrs. Wilkins is extending her arm toward the bowl so she can pick out oranges for herself and her friend Rose to eat. **Choice D** is incorrect because the text doesn’t indicate that Mrs. Wilkins is arriving at the bowl of oranges. In fact, the text states that Mrs. Wilkins stays where she is when reaching across to the bowl, meaning that she remains at a distance from it.

### QUESTION 2

**Choice D** is the best answer because it most logically completes the text’s discussion of the fossil deposit. In this context, “obtain” means gain or acquire. According to the text, a team of paleontologists has found fossils that are very well preserved. For this reason, the text suggests, the paleontologists have been able to gain detailed information from the fossils, such as the color patterns of the life forms that left them behind.

**Choice A** is incorrect because “occupy” means engage or inhabit, neither of which would make sense in context. It’s unclear what it would mean for detailed

information revealed by fossils to be engaged or inhabited. *Choice B* is incorrect because the text gives no indication that the paleontologists wanted to “hoard,” or collect and hide, the detailed information revealed by the well-preserved fossils. *Choice C* is incorrect because the text gives no indication that the paleontologists wanted to “reserve,” or withhold, the detailed information revealed by the well-preserved fossils.

### QUESTION 3

**Choice A** is the best answer because it most logically completes the text’s discussion of how the flow of information between two regions of the brain may affect the ease of people’s decision making. In this context, “reduced” means decreased. The text presents the finding from a team of neuroeconomists that decision making may be connected to communication between the prefrontal cortex and the parietal cortex. In presenting this finding, the text suggests a contrast between people who tend to be more decisive and people who make decisions more slowly. According to the text, people tend to be more decisive when the flow of information between the two brain regions is intensified, or strengthened. On the other hand, this context suggests that people make choices more slowly when the flow of information between the two brain regions is decreased.

*Choice B* is incorrect because “evaluated” means assessed, which wouldn’t make sense in context. According to the text, people tend to be more decisive when the flow of information between two brain regions is intensified, or strengthened. This suggests that people’s ease of decision making varies based on the rate of information traveling between the regions, not based on an effort to assess the information. *Choice C* is incorrect because “determined” means judged or influenced, neither of which would make sense in context. According to the text, people tend to be more decisive when the flow of information between two brain regions is intensified, or strengthened. This suggests that people’s ease of decision making varies based on the rate of information traveling between the regions, not based on an effort to judge or influence the information. *Choice D* is incorrect because “acquired” means developed or attained, neither of which would make sense in context. According to the text, people tend to be more decisive when the flow of information between two brain regions is intensified, or strengthened. This suggests that people’s ease of decision making varies based on the rate of information traveling between the regions, not based on the development or attainment of the information.

### QUESTION 4

**Choice A** is the best answer because it most logically completes the text’s discussion of the significance of the War of 1812 in British historical memory. In this context, “tenuous” means vulnerable or uncertain. The text indicates that the War of 1812 was both smaller, and less prominent, than the conflict with France, and resulted in no significant geopolitical changes. These details imply that the War of 1812 is less likely than other British historical events to be remembered, giving the War of 1812 a tenuous place in British historical memory.

*Choice B* is incorrect because in this context “enduring” would mean lasting or durable, but the text describes the War of 1812 as being overshadowed by, and smaller than, the simultaneous conflict with France. This seems to conflict with the notion that the War of 1812 has an enduring place in British historical memory. *Choice C* is incorrect because in this context “contentious” would mean likely to cause disagreement, and while there likely are contentious issues related to the War of 1812, nothing in the text discusses or implies any such disagreement. *Choice D* is incorrect because in this context “conspicuous” would mean obvious, but the text describes the War of 1812 as being overshadowed by, and smaller than, the simultaneous conflict with France. Rather than suggesting that the War of 1812 has a conspicuous place in British historical memory, these descriptions suggest that its place is not particularly obvious.

## QUESTION 5

**Choice C** is the best answer because it most logically completes the text’s discussion of Minoan bull-leaping rituals. In this context, “defend” means support in the face of argument. The overall focus of the text is on the difficulty of determining what bull-leaping rituals meant to the Minoans, about whom, the text indicates, we know very little. The text states that because of this scarcity of information, assertions about the meaning of the rituals, which took place a very long time ago (in the second millennium BCE), are highly likely to be based on speculation and guesswork. This context suggests that claims about the meaning of the rituals are difficult to successfully support, or defend.

*Choice A* is incorrect because “imagine” in this context would mean form a mental image of something. Although it’s possible to imagine what Minoan bull-leaping rituals might have looked like, the focus of the text isn’t on how the rituals looked but rather on claims about them, which the text suggests are difficult to support because very little is known about the Minoans. *Choice B* is incorrect because “summarize” in this context would mean recap or outline, neither of which makes sense. The text indicates that claims about the significance of Minoan bull-leaping rituals will inevitably rely on speculation and guesswork because very little is known about the Minoans. This suggests that claims about the Minoan rituals are difficult to support in the face of argument, not that they’re difficult to recap or outline. *Choice D* is incorrect because “adjust” in this context would mean modify or correct. Although a claim about a ritual’s meaning could be modified or corrected based on newly discovered evidence, the text doesn’t focus on any specific claims made about the significance of Minoan bull-leaping rituals. Rather, the text focuses on the feasibility of making valid claims about the rituals in general, suggesting that the scarcity of information about the Minoans makes it difficult to support any claims about the rituals.

## QUESTION 6

**Choice C** is the best answer because it most accurately describes how the underlined sentence functions in the text as a whole. In the text, Harris tells stories about his previous boat trip across the English Channel, when conditions were so rough that others onboard became seasick. According to the text, Harris’s accounts vary somewhat but generally involve him and only one other

man not growing ill. The underlined sentence then adds that if it was “not [Harris] and another man” who didn’t develop seasickness, “then it was [Harris] by himself.” That is, some versions of the story even involve Harris being the only person onboard who resisted seasickness. Therefore, the underlined sentence emphasizes that Harris always boasts about his own constitution, or physical well-being, when speaking of a previous boat trip.

*Choice A* is incorrect because the text doesn’t portray Harris as being eager to resume traveling; instead, it shows Harris boasting of how he didn’t become seasick on a previous boat trip when most or all of the other people onboard did. *Choice B* is incorrect because there’s nothing in the text to suggest that Harris felt excluded from activities during an earlier boat trip. The text suggests that Harris experienced isolation during that trip because others onboard had grown ill, not because Harris had wanted to join certain activities but felt left out. *Choice D* is incorrect because the text doesn’t portray Harris as either enjoying company or claiming to prefer solitude. The text suggests that Harris experienced some degree of isolation during a previous boat trip, but the reason provided by the text has nothing to do with a preference for either solitude or the opposite; rather, the reason, according to Harris, is that most or all of the other people onboard were sick.

## QUESTION 7

**Choice B** is the best answer because it best describes how the underlined sentence functions in the text as a whole. The underlined sentence explains that contrary to what several studies would suggest, recent European governments suffered electorally after the launch of fiscal austerity programs. The text goes on to indicate that the researchers generated their findings from data that didn’t reveal the true political risk of austerity measures because the data were based on cases in which governments had set austerity programs to take effect after the next election, a practice the European governments that recently suffered electorally didn’t adhere to, thus introducing a complicating factor resulting in a conflict between the research findings and recent events.

*Choice A* is incorrect because the underlined sentence doesn’t indicate that the discrepancy described in the text is between observations made in study settings and observations made in real-world settings. Rather, the underlined sentence indicates that the outcome of recent events is contrary to what would be expected based on the findings of several studies. Additionally, there is nothing in the text to suggest that the studies mentioned did not use real-world data; instead, the text indicates that the data used was generated under potentially different circumstances than the recent events. *Choice C* is incorrect because the underlined sentence doesn’t present a long-standing divergence in research findings but rather a discrepancy between past research findings and recent events that the text goes on to attribute to researchers’ use of data that didn’t reveal the true political risk of austerity measures. *Choice D* is incorrect because while the underlined sentence notes that there have been some recent exceptions to a general pattern observed in several research studies, it does not go on to attribute this exception to the researchers underestimating inconsistencies in the data. Rather, the text goes on to attribute this to a

circumstance (fiscal austerity measures being implemented before an election rather than after) which adds a complicating factor into the data not accounted for in past studies.

## QUESTION 8

**Choice A** is the best answer because it most accurately states how the author of Text 2 would most likely respond to the argument presented in Text 1. In arguing that graphic novels shouldn't be classified as literature and are more comparable to film, Text 1 claims that language plays a relatively limited role in graphic novels: images, not language, are the primary means by which graphic novels tell their stories, and language is used "only sparingly"—that is, comparatively very little—in the form of captions and dialogue. However, the author of Text 2 asserts that language in graphic novels is as equally vital for conveying meaning as images are, since without captions and dialogue, readers wouldn't be able to make sense of the narrative. Moreover, the author of Text 2 argues that there are many graphic novels that are "beautifully written" and whose use of language is as accomplished as any standard novel. Because Text 1 argues that language is subordinate to images in graphic novels, whereas Text 2 highlights how language is an essential component of a graphic novel's storytelling, it can reasonably be inferred that the author of Text 2 would say that language plays a more important role in graphic novels than the author of Text 1 recognizes.

**Choice B** is incorrect. Although Text 1 indicates that graphic novels shouldn't be classified as literature based on their limited use of language, there's no indication that the author of Text 1 considers this limited use of language as a flaw, just that it doesn't fit the particular definition of "literature" proposed in the text. Even if Text 1 had suggested that their use of language was a common flaw of graphic novels, the author of Text 2 emphasizes how many graphic novels are "beautifully written," and would therefore say that their use of language is exemplary, not that it is flawed. **Choice C** is incorrect because Text 1 doesn't claim that the story lines of graphic novels are generally relatively easy to understand; in addition, Text 2 argues that given their dependence on the interaction of image and text, the stories of graphic novels would be incomprehensible if their captions and dialogue were removed, not that the story lines of some graphic novels are more difficult to understand than Text 1 acknowledges. **Choice D** is incorrect because the author of Text 1 doesn't imply that graphic novels aren't well crafted, only that they use language too sparingly to fit the definition of "literature," and that their use of images to convey stories makes them more comparable to film than to literature. Even if the author of Text 1 had implied that most graphic novels aren't well crafted, Text 2 refers to the fact that many graphic novels are as beautifully written—that is, well crafted—as many standard novels; thus, it wouldn't be accurate to say that the author of Text 2 would agree with the author of Text 1 that most graphic novels aren't well crafted.



## QUESTION 9

**Choice A** is the best answer because it most accurately states what is happening in the text. The narrator notes that Lutie thinks the street looks nice in the light of the sunset. The narrator goes on to describe what Lutie can see in the street: children playing ball or tag and girls skipping rope. Thus, what is happening in the text is that Lutie is observing the appearance of the street at a particular time of day and the events occurring on it.

**Choice B** is incorrect. Although Lutie is observing children playing games on her street, the text doesn't suggest that she is annoyed by the noise of the games. Instead, the text says that Lutie thinks the street looks nice in the light of the sunset. **Choice C** is incorrect. Although Lutie is observing children playing games on her street, the text doesn't suggest that she is puzzled by the rules of the games. **Choice D** is incorrect because there is no evidence in the text that Lutie doesn't want to interact with her neighbors or that she is in her apartment alone. All the text indicates about Lutie is that she is watching the events on the street and thinks the street looks nice in the light of the sunset.

## QUESTION 10

**Choice D** is the best answer because it presents a statement about critics' skepticism of Bosco Verticale that is supported by the text. The text states that Boeri's design for Bosco Verticale features hundreds of trees on balconies and is intended to serve as a model for promoting urban biodiversity. But the text goes on to state that some critics believe that it is too early to determine if the trees planted on Bosco Verticale can thrive there. Therefore, according to the text, critics are skeptical of the concept behind Bosco Verticale because it is unclear whether Bosco Verticale can support the plant life included in its design.

**Choice A** is incorrect. Although the text states that one of Boeri's goals was for Bosco Verticale to serve as a model for promoting biodiversity in architecture, which suggests that Boeri would likely support the idea of reproducing the same concept in other locations, the text does not discuss whether it is feasible to adapt the design to locations other than Milan. Instead, the text describes critics' concerns that the plant life that currently exists on Bosco Verticale might not thrive in its current setting. **Choice B** is incorrect. Although the text states that one of Boeri's goals in creating Bosco Verticale was to promote biodiversity, which implies a goal of including varied plant life in the design, it does not mention whether the hundreds of trees that were planted on its balconies failed to meet this goal. Rather, the text states that some critics are concerned that the trees on Bosco Verticale's balconies may not thrive in this setting. **Choice C** is incorrect because the text does not mention how Bosco Verticale was constructed, let alone how environmentally destructive its construction may have been relative to the construction of more conventional buildings.

## QUESTION 11

**Choice A** is the best answer because it most accurately states the main idea of the text. The text begins by explaining that many literary theorists rely on the concepts of *fabula* (a narrative's content) and *syuzhet* (a narrative's arrangement and presentation of events) and illustrates these concepts by explaining how they can be applied to the film *The Godfather Part II*. The text then discusses how Mikhail Bakhtin, a literary theorist, argued that *fabula* and *syuzhet* can't fully describe a narrative, since systematic categorizations such as these fail to account for all the ways in which interactions between the artist, the work, and the audience produce meaning. Thus, the main idea is that Bakhtin argued that there are important characteristics of narratives that are not fully encompassed by two concepts that other theorists have used to analyze narratives.

**Choice B** is incorrect because according to the text, Mikhail Bakhtin believed that meaning was created through the interactions of the artist, narrative, and audience, not simply through the interaction between the audience and narrative; moreover, the text doesn't address whether Bakhtin focused on the ways in which different people interpret narratives differently. **Choice C** is incorrect. Although the text implies that the storytelling methods used in *The Godfather Part II* are complicated, it discusses the film only to illustrate how the concepts of *fabula* and *syuzhet* may be applied to a narrative. The film's storytelling methods aren't the primary focus of the text. **Choice D** is incorrect. The text discusses *The Godfather Part II*, whose narrative doesn't adhere to a single chronological order, only to illustrate the concepts of *fabula* (a narrative's content) and *syuzhet* (narrative's arrangement and presentation of events). The primary focus of this text isn't the structure of this film or of other narratives that are told out of chronological order; moreover, the text doesn't consider whether such structures make it harder for audiences to understand narratives.

## QUESTION 12

**Choice D** is the best answer because it effectively uses data from the graph to support the underlined claim that more medicine and health topics were submitted to a national science fair in 2019 than in any of the other years shown. This choice indicates that the approximately 285 medicine and health topics submitted in 2019 are more than the number of medicine and health submissions in any other year shown—a description that is supported by information in the graph, which shows that medicine and health topic submissions were below 250 in 2016, 2017, and 2018, but above 250 (approximately 285 submissions) in 2019.

**Choice A** is incorrect because it doesn't support the underlined claim or accurately reflect the information in the graph. This choice refers to 2016 and discusses cellular and molecular biology and animal science, whereas the underlined claim refers to 2019 and discusses medicine and health. Moreover, the claim that in 2016 there were equal numbers of submissions in the cellular and molecular biology category and in the animal science category is contradicted by the graph, which shows approximately 200 submissions and 50 submissions, respectively, for those categories in 2016. **Choice B** is incorrect because it doesn't accurately reflect the information in the graph. This choice claims that in

2019 there were more physics and space submissions than there were medicine and health submissions, but the graph shows that there were approximately 100 space and science submissions that year and approximately 285 medicine and health submissions. *Choice C* is incorrect because it doesn't accurately reflect the information in the graph or support the underlined claim about medicine and health research topics. This choice claims that there were approximately 95 submissions for the animal science category in 2016, but the graph shows that the number was closer to 50 in 2016.

## QUESTION 13

**Choice D** is the best answer because this quotation would best support the student's assertion that the escape of transgenic fish from Brazilian fish farms into the wild may have significant negative long-term ecological effects. The text explains that transgenic fish have DNA that includes genetic material from other species, that some transgenic fish have genes from jellyfish that make them glow in the dark, and that glow-in-the-dark transgenic fish can now be found in the wild in Brazilian creeks. The quotation indicates why the escape of these fish may have negative long-term ecological effects: glow-in-the-dark transgenic fish might introduce fluorescence into wild fish populations by breeding with wild fish, causing wild fish to glow in the dark and thereby allowing predators to prey on them much more easily.

*Choice A* is incorrect because this quotation doesn't mention any negative effects of the introduction of fluorescent transgenic fish into the wild. The quotation merely compares the ratio of females to males at two sites in the wild where transgenic fish have been observed. *Choice B* is incorrect because this quotation doesn't support the idea that the escape of fluorescent transgenic fish from Brazilian fish farms may have significant negative long-term ecological effects. Rather, the quotation suggests that more research is needed to understand the effects. *Choice C* is incorrect because this quotation supports the idea that transgenic fish may be present in more ecosystems than has been observed; it doesn't address whether the presence of fluorescent transgenic fish affects these ecosystems.

## QUESTION 14

**Choice D** is the best answer because it describes data from the graph that support Ibáñez and colleagues' conclusion that increasing anthropogenic nitrogen deposition can compensate for the negative effect of climate change on tree growth if that change is moderate but not if it's extreme. The bar graph shows the growth of sugar maple trees with and without nitrogen fertilization under three different climate-change scenarios: current conditions, a moderate change, and an extreme change. According to the graph, radial growth without nitrogen fertilization is projected to be about 0.16 centimeters (cm) under current conditions, 0.15 cm under a moderate change, and 0.04 cm under an extreme change. The graph also shows that with nitrogen fertilization, growth is projected to be about 0.18 centimeters under a moderate change but only about 0.06 centimeters under an extreme change. Thus, the data in the graph support the researchers' conclusion by showing greater growth for a moderate change using nitrogen fertilization than they do either under current conditions without nitrogen fertilization or under an extreme change with nitrogen fertilization.

*Choice A* is incorrect. Although it accurately represents the data in the graph, this fact pattern doesn't support Ibáñez and colleagues' conclusion that the decline in radial growth due to climate change will be partly offset by higher levels of anthropogenic nitrogen, but only if change to the climate is moderate and not if it's extreme. To support this would require comparing radial growth without nitrogen fertilization under current climate conditions to the growth with nitrogen fertilization under both moderate and extreme changes. This choice mentions only growth with nitrogen fertilization under current climate conditions and moderate change and growth without nitrogen fertilization under an extreme change, which don't provide a basis to determine whether higher nitrogen in the future will be able to offset reduced growth due to climate change. *Choice B* is incorrect. Although it accurately represents the data in the graph, this fact pattern doesn't support Ibáñez and colleagues' conclusion that the decline in radial growth due to climate change will be partly offset by higher levels of atmospheric nitrogen, but only if change to the climate is moderate and not if it's extreme. The support needed would compare radial growth under current climate conditions without nitrogen fertilization to the growth with nitrogen fertilization under moderate and extreme changes. This choice mentions only growth without nitrogen fertilization under current conditions and moderate change and growth with nitrogen fertilization under extreme change, which don't provide a basis to determine whether higher nitrogen in the future will be able to offset reduced growth due to climate change. *Choice C* is incorrect. Although it accurately represents the data in the graph, this fact pattern doesn't support Ibáñez and colleagues' conclusion that the decline in radial growth due to climate change will be partly offset by higher levels of atmospheric nitrogen, but only if change to the climate is moderate and not if it's extreme. The support needed would compare radial growth without adding nitrogen under current climate conditions to the growth with nitrogen fertilization under moderate and extreme changes. This choice mentions only the growth with and without nitrogen fertilization under moderate climate change and growth without nitrogen fertilization under extreme change, which don't provide a basis to determine whether higher nitrogen in the future will be able to offset reduced growth due to climate change.

## QUESTION 15

**Choice B** is the best answer because it describes data from the table that support Persad and her colleagues' conclusion. The text explains that, according to some climate models, precipitation in the western United States will become concentrated into fewer, more intense rain and snow events. According to the text, Persad and her colleagues concluded that more irrigation will consequently be needed but that the change in irrigation output will be highly sensitive to, or greatly affected by, the baseline concentration of precipitation in an area. This conclusion is supported by data from the researchers' simulations of changes in annual irrigation output in two different scenarios—one in which an area's annual precipitation is already somewhat concentrated and one in which its annual precipitation is evenly distributed. The table shows that if baseline precipitation is somewhat concentrated, water use for irrigation will increase only slightly, whereas if baseline precipitation is evenly distributed, water use for irrigation will increase much more—9.0% for surface water and 7.9% for groundwater. This difference illustrates the researchers' conclusion that the amount of additional water needed for irrigation will vary greatly depending on how concentrated or spread out the annual precipitation in an area already is.

**Choice A** is incorrect because it compares changes in the amount of water being used for irrigation to changes in the amount of water entering aquifers. Persad and her colleagues' conclusion doesn't focus on changes to the amount of water entering aquifers; rather, the researchers' conclusion focuses on changes to irrigation output relative to how concentrated or spread out the annual precipitation in an area is. **Choice C** is incorrect because it supports only part of Persad and her colleagues' conclusion. According to the text, the researchers concluded that the concentration of precipitation into fewer events will trigger more irrigation but that this change in irrigation output will be highly sensitive to an area's baseline concentration of annual precipitation. The data in this choice support the idea that more irrigation will be needed, but to support the rest of the researchers' conclusion, additional data from the table are required to show that the increases in water use for irrigation will vary depending on how concentrated or spread out the annual precipitation in an area already is. **Choice D** is incorrect because data in the table indicate no declines in water use for irrigation, showing only increases in the form of positive values.

## QUESTION 16

**Choice A** is the best answer because it most logically completes the text's discussion of English dialects spoken in Scotland and the Upland South. The text indicates that these dialects share a feature: putting emphasis on the "r" sound when it appears in certain positions in words. The text goes on to state that records indicate the Upland South was colonized largely by people of Scottish ancestry. It is reasonable to assume that the English dialects spoken by these colonizers were influenced by the English dialects spoken by their ancestors in Scotland. It follows, then, that the emphasis on the "r" sound in the dialects in Scotland carried over into the Upland South dialects as they developed—that is, that the Upland South dialects likely acquired it from dialects spoken in Scotland.

*Choice B* is incorrect because the text suggests that Scottish ancestry explains the origin of the emphasis on the “r” sound in English dialects spoken in the Upland South, since that linguistic feature is also found in dialects spoken in Scotland; the text doesn’t address any other dialects or suggest that the feature will spread elsewhere. *Choice C* is incorrect because the text indicates that many Upland South colonizers were the descendants of Scottish people, suggesting that the English dialects spoken by these colonizers had been influenced by the English dialects spoken by the colonizers’ ancestors in Scotland and had acquired their emphasis on the “r” sound from those ancestors’ dialects—not the other way around. *Choice D* is incorrect because the text indicates that the emphasis on the “r” sound is part of English dialects spoken in the Upland South today, which almost certainly wouldn’t be the case if people from Scotland, who were the main colonizers of the Upland South, had eliminated that linguistic feature from their dialects.

## QUESTION 17

**Choice A** is the best answer. The convention being tested is the use of verb forms within a sentence. A main clause requires a finite (tensed) verb to perform the action of the subject (in this case, Nery and her colleagues), and this choice supplies the finite past tense verb “published” to indicate that these biologists shared their findings about changes in whale genes associated with body size.

*Choice B* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “publishing” doesn’t supply the main clause with a finite verb. *Choice C* is incorrect because it results in an ungrammatical sentence. The nonfinite participle “having published” doesn’t supply the main clause with a finite verb. *Choice D* is incorrect because it results in an ungrammatical sentence. The nonfinite to-infinitive “to publish” doesn’t supply the main clause with a finite verb.

## QUESTION 18

**Choice B** is the best answer. The convention being tested is punctuation use between a subject and a verb. When, as in this case, a subject (“the strings inside the instrument”) is immediately followed by a main verb (“are plucked”), no punctuation is needed.

*Choice A* is incorrect because no punctuation is needed between the subject and the verb. *Choice C* 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 19

**Choice A** is the best answer. The convention being tested is pronoun-antecedent agreement. The plural pronoun “them” agrees in number with the plural antecedent “utensils.”

*Choice B* is incorrect because the singular pronoun “this” doesn’t agree in number with the plural antecedent “utensils.” *Choice C* is incorrect because the singular pronoun “that” doesn’t agree in number with the plural antecedent “utensils.” *Choice D* is incorrect because the singular pronoun “it” doesn’t agree in number with the plural antecedent “utensils.”

## QUESTION 20

**Choice C** is the best answer. The convention being tested is the punctuation of a supplementary element within a sentence. The comma after “sisters” pairs with the comma after “*Butterflies*” to separate the supplementary element “a fictionalized account of the lives of the Mirabal sisters” from the rest of the sentence. This supplementary element functions to describe the novel *In the Time of the Butterflies*, and the pair of commas indicates that this element could be removed without affecting the grammatical coherence of the sentence.

**Choice A** is incorrect because a comma and conjunction can’t be used in this way to separate the supplementary element from the rest of the sentence.

**Choice B** is incorrect because it fails to use appropriate punctuation to separate the supplementary element from the rest of the sentence. **Choice D** is incorrect because it fails to use appropriate punctuation to separate the supplementary element from the rest of the sentence.

## QUESTION 21

**Choice A** is the best answer. The convention being tested is the use of punctuation around noun phrases. No punctuation is needed because the noun phrase “Tamatoa the crab” is a restrictive appositive, meaning that it provides essential identifying information about the noun phrase before it, “the character.” Additionally, no punctuation is needed between the noun phrase “the deep and humorous voice...crab” and the verb “belongs” that indicates whom the voice belongs to.

**Choice B** is incorrect because no punctuation is needed. **Choice C** is incorrect because no punctuation is needed. **Choice D** is incorrect because no punctuation is needed.

## QUESTION 22

**Choice C** is the best answer. The convention being tested is subject-verb agreement. The plural verb “underlie” agrees in number with the plural subject “frameworks.”

*Choice A* is incorrect because the singular verb “underlies” doesn’t agree in number with the plural subject “frameworks.” *Choice B* is incorrect because the singular verb “is underlying” doesn’t agree in number with the plural subject “frameworks.” *Choice D* is incorrect because the singular verb “has been underlying” doesn’t agree in number with the plural subject “frameworks.”

## QUESTION 23

**Choice C** is the best answer. The convention being tested is the use of verb forms within a sentence. This choice pairs the comma after “Serra” with the comma after “environment” and uses the nonfinite present participle “intending” to correctly form a supplementary phrase describing the reaction Serra intends his sculptures to provoke. This supplementary phrase appears between the noun phrase that it modifies (“American abstract artist Richard Serra”) and the finite present tense verb (“assembles”), which functions as the sentence’s main verb and describes what Serra does.

*Choice A* is incorrect because it results in an ungrammatical sentence. The finite present continuous tense verb “is intending” can’t be used in this way in conjunction with the finite present tense verb “assembles,” which already functions as the main verb in the sentence. *Choice B* is incorrect because it results in an ungrammatical sentence. The finite present tense verb “intends” can’t be used in this way to supplement the noun phrase “American abstract artist Richard Serra.” *Choice D* is incorrect because it results in an ungrammatical sentence. The finite present tense verb “intends” can’t be used in this way in conjunction with the finite present tense verb “assembles,” which already functions as the main verb in the sentence.

## QUESTION 24

**Choice B** is the best answer. “Next” logically signals that the action in this sentence—the water spraying—is the next step in the resurfacing process, following the ice scraping mentioned in the previous sentence.

*Choice A* is incorrect because “for example” illogically signals that the action in this sentence is an example of the action in the previous sentence. Instead, the water spraying is the next step in a process that begins with the ice scraping. *Choice C* is incorrect because “similarly” illogically signals that the action in this sentence is similar to the action in the previous sentence. Instead, the water spraying is the next step in a process that begins with the ice scraping. *Choice D* is incorrect because “in contrast” illogically signals that the action in this sentence contrasts with the action in the previous sentence. Instead, the water spraying is the next step in a process that begins with the ice scraping.



## QUESTION 25

**Choice D** is the best answer. “Accordingly” logically signals that this sentence states a result or consequence of the previous information about the 2003 Human Genome Project. Taking into account an important lesson of the 2003 project (that a gene is affected by interactions with the protein products of other genes), research has begun to consider the human proteome instead of just the genome.

*Choice A* is incorrect because “in other words” illogically signals that the information in this sentence is a paraphrase or restatement of the previous information about the 2003 Human Genome Project. Instead, this sentence states a result or consequence of that information. *Choice B* is incorrect because “that said” illogically signals that the information in this sentence qualifies or contrasts with the previous information about the 2003 Human Genome Project. Instead, this sentence states a result or consequence of that information. *Choice C* is incorrect because “for example” illogically signals that this sentence provides an example supporting the previous information about the 2003 Human Genome Project. Instead, this sentence states a result or consequence of that information.

## QUESTION 26

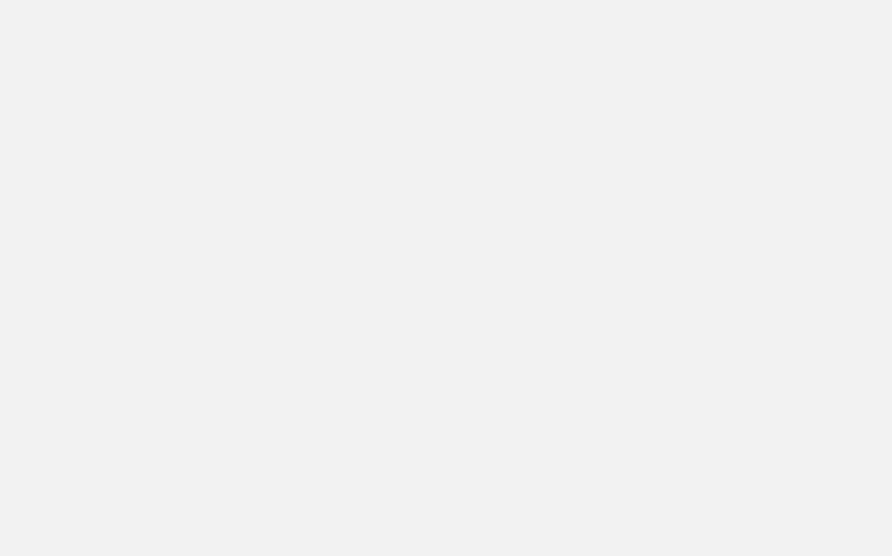
**Choice A** is the best answer. The sentence specifies when al-Biruni published his landmass theory, indicating that it was published in the year 1037 CE.

*Choice B* is incorrect. While the sentence notes that al-Biruni published a landmass theory, it doesn’t specify when the theory was published. *Choice C* is incorrect. The sentence identifies al-Biruni as a scholar of Earth’s physical features; it doesn’t specify when he published his landmass theory. *Choice D* is incorrect. The sentence describes al-Biruni’s landmass theory; it doesn’t specify when the theory was published.

## QUESTION 27

**Choice D** is the best answer. The sentence emphasizes the mass of Sirius A, noting that it has a mass of 2.063 solar masses and that it is larger than the Sun.

*Choice A* is incorrect. The sentence makes a generalization about how the mass of stars can be measured; it doesn’t emphasize the mass of Sirius A. *Choice B* is incorrect. The sentence introduces solar masses as a unit of measurement; it doesn’t emphasize the mass of Sirius A. *Choice C* is incorrect. The sentence emphasizes the mass of Proxima Centauri, not the mass of Sirius A.



# Math

## Module 1

(27 questions)

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### QUESTION 1

**Choice C** is correct. The solution to the system of two equations corresponds to the point where the graphs of the equations intersect. The graphs of the linear equation and the nonlinear equation shown intersect at the point  $(4, 5)$ . Thus, the solution to the system is  $(4, 5)$ .

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

### QUESTION 2

**Choice B** is correct. It's given that the film club has 90 members on the first day of a semester, and 10 new members join the film club each day after the first day of the semester. This means that after 4 days,  $4 \times 10$ , or 40, new members will have joined the club. Adding 40 members to the original 90 club members yields 130 members. Thus, the film club will have 130 total members 4 days after the first day of the semester.

**Choice A** is incorrect. This is the number of members that will have joined the film club 4 days after the first day of the semester if 100 new members, not 10, join the film club each day. **Choice C** is incorrect. This is the number of members the film club will have 4 days after the first day of the semester if 1 new member, not 10, joins the film club each day. **Choice D** is incorrect. This is the number of members the film club has on the first day of the semester.

### QUESTION 3

**Choice B** is correct. The second equation in the given system is  $r=3$ .

Substituting 3 for  $r$  in the first equation in the given system yields  $s+7(3)=27$ , or  $s+21=27$ . Subtracting 21 from both sides of this equation yields  $s=6$ .

Therefore, the solution  $(r, s)$  to the given system of equations is  $(3, 6)$ .

**Choice A** is incorrect. This is the solution  $(s, r)$ , not  $(r, s)$ , to the given system of equations. **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 B** is correct. The given values show that as  $x$  increases,  $f(x)$  also increases, which means that  $f$  is an increasing function. Furthermore,  $f(x)$  increases at a constant rate of 1 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. For a decreasing linear function, as  $x$  increases,  $f(x)$  decreases rather than increases. **Choice C** is incorrect. For a decreasing exponential function, for each increase of  $x$  by 1,  $f(x)$  decreases by a fixed percentage rather than increases at a constant rate. **Choice D** is incorrect. For an increasing exponential function, for each increase of  $x$  by 1,  $f(x)$  increases by a fixed percentage rather than at a constant rate.

### QUESTION 5

The correct answer is 4. A solution to a system of equations must satisfy each equation in the system. It follows that if  $(x, y)$  is a solution to the system, the point  $(x, y)$  lies on the graph in the  $xy$ -plane of each equation in the system. According to the graph, the point  $(x, y)$  that lies on the graph of each equation in the system is  $(4, 1)$ . Therefore, the solution to the system is  $(4, 1)$ . It follows that the value of  $x$  is 4.

### QUESTION 6

The correct answer is 29. The range of a data set is the difference between its maximum value and its minimum value. For the data set shown, the maximum score is 52 and the minimum score is 23. The difference between those scores is  $52 - 23$ , or 29. Therefore, the range of the 7 scores shown is 29.

## QUESTION 7

**Choice C** is correct. Vertical angles, or angles that are opposite each other when two lines intersect, are congruent. It's given that line  $k$  intersects line  $n$ . Based on the figure, the angle with measure  $x^\circ$  and the angle with measure  $145^\circ$  are vertical angles. Therefore, the value of  $x$  is equal to 145.

**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 8

**Choice B** is correct. It's given that the equation  $x+y=1,440$  represents the number of minutes of daylight,  $x$ , and the number of minutes of non-daylight,  $y$ , on a particular day in Oak Park, Illinois. It's also given that this day has

670 minutes of daylight. Substituting 670 for  $x$  in the equation  $x+y=1,440$  yields  $670+y=1,440$ . Subtracting 670 from both sides of this equation yields  $y=770$ . Therefore, this day has 770 minutes of non-daylight.

**Choice A** is incorrect. This is the number of minutes of daylight, not non-daylight, on this day. **Choice C** is incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect. This is the total number of minutes of daylight and non-daylight.

## QUESTION 9

**Choice B** is correct. It's given that from the sample of 20 employees at the company, 16 of the employees are enrolled in exactly three professional development courses this year. Since  $\frac{16}{20}$  is equal to 0.80, or  $\frac{80}{100}$ , it follows that 80% of the employees in the sample are enrolled in exactly three professional development courses this year. Therefore, the best estimate for the percentage of employees at the company who are enrolled in exactly three professional development courses this year is 80%. It's given that there are a total of 400 employees at the company. Therefore, the best estimate of the number of employees at the company who are enrolled in exactly three professional development courses this year is  $\frac{80}{100} \cdot 400$ , or 320.

**Choice A** is incorrect. This is the number of employees from the sample who aren't enrolled in exactly three professional development courses this year.

**Choice C** is incorrect. This is the number of employees who weren't selected for the sample. **Choice D** is incorrect and may result from conceptual or calculation errors.

## QUESTION 10

**Choice C** is correct. Dividing all terms in the given equation by 4 yields

$$\frac{4x}{4} - \frac{28}{4} = -\frac{24}{4}, \text{ or } x - 7 = -6. \text{ Therefore, the value of } x - 7 \text{ is } -6.$$

**Choice A** is incorrect. This is the value of  $4x - 28$ , not  $x - 7$ . **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 11

**Choice D** is correct. It's given that for a snowstorm in a certain town, the minimum rate of snowfall recorded was 0.6 inches per hour, the maximum rate of snowfall recorded was 1.8 inches per hour, and  $s$  represents a rate of snowfall, in inches per hour, recorded for this snowstorm. It follows that the inequality  $0.6 \leq s \leq 1.8$  is true for all values of  $s$ .

**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 12

The correct answer is 6. It's given that  $y = 4x$  and  $y = x^2 - 12$ . Since  $y = 4x$ , substituting  $4x$  for  $y$  in the second equation of the given system yields  $4x = x^2 - 12$ . Subtracting  $4x$  from both sides of this equation yields  $0 = x^2 - 4x - 12$ . This equation can be rewritten as  $0 = (x - 6)(x + 2)$ . By the zero product property,  $x - 6 = 0$  or  $x + 2 = 0$ . Adding 6 to both sides of the equation  $x - 6 = 0$  yields  $x = 6$ . Subtracting 2 from both sides of the equation  $x + 2 = 0$  yields  $x = -2$ . Therefore, solutions to the given system of equations occur when  $x = 6$  and when  $x = -2$ . It's given that a solution to the given system of equations is  $(x, y)$ , where  $x \geq 0$ . Since 6 is greater than 0, it follows that the value of  $x$  is 6.

## QUESTION 13

The correct answer is 4.51. It's given that the equation  $4.51x + 6.07y = 896.86$  represents this situation, where  $x$  is the number of smaller containers sold,  $y$  is the number of larger containers sold, and 896.86 is the store's total sales, in dollars, of blueberries last month. Therefore,  $4.51x$  represents the store's sales, in dollars, of smaller containers, and  $6.07y$  represents the store's sales, in dollars, of larger containers. Since  $x$  is the number of smaller containers sold, the price, in dollars, of each smaller container is 4.51.

## QUESTION 14

**Choice C** is correct. The volume,  $V$ , of a right circular cylinder is given by the formula  $V = \pi r^2 h$ , where  $r$  is the radius of the base of the cylinder and  $h$  is the height of the cylinder. It's given that a right circular cylinder has a height of 6 centimeters. Therefore,  $h = 6$ . It's also given that the cylinder has a base diameter of 22 centimeters. The radius of a circle is half the diameter of the circle. Since the base of a right circular cylinder is a circle, it follows that the radius of the base of the right circular cylinder is  $\frac{22}{2}$ , or 11, centimeters. Therefore,  $r = 11$ . Substituting 11 for  $r$  and 6 for  $h$  in the formula  $V = \pi r^2 h$  yields  $V = \pi (11)^2 (6)$ , which is equivalent to  $V = \pi (121)(6)$ , or  $V = 726\pi$ . Therefore, the volume, in cubic centimeters, of the cylinder is  $726\pi$ .

**Choice A** is incorrect. This is the volume of a right circular cylinder that has a base diameter of  $2\sqrt{22}$ , not 22, centimeters and a height of 6 centimeters. **Choice B** is incorrect. This is the volume of a right circular cylinder that has a base diameter of  $4\sqrt{11}$ , not 22, centimeters and a height of 6 centimeters. **Choice D** is incorrect. This is the volume of a right circular cylinder that has a base diameter of 44, not 22, centimeters and a height of 6 centimeters.

## QUESTION 15

**Choice B** is correct. It's given that at a particular track meet, the ratio of coaches to athletes is 1 to 26. If one number in a ratio is multiplied by a value, the other number must be multiplied by the same value in order to maintain the same ratio. If there are  $x$  coaches at the track meet, multiplying both numbers in the ratio by  $x$  yields 1  $x$  to 26  $x$ , or  $x$  to  $26x$ . Therefore, the expression  $26x$  represents the number of athletes at the track meet.

**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 16

**Choice D** is correct. It's given that the equation  $y = 5x + 6$  represents the relationship between the number of suits that Kaylani made,  $x$ , and the total length of fabric she purchased,  $y$ , in yards. Adding  $5x$  to both sides of the given equation yields  $y = 5x + 6$ . Since Kaylani made  $x$  suits and used 5 yards of fabric to make each suit, the expression  $5x$  represents the total amount of fabric she used to make the suits. Since  $y$  represents the total length of fabric Kaylani purchased, in yards, it follows from the equation  $y = 5x + 6$  that Kaylani purchased  $5x$  yards of fabric to make the suits, plus an additional 6 yards of fabric. Therefore, the best interpretation of 6 in this context is that Kaylani purchased 6 yards more fabric than she used to make the suits.

**Choice A** is incorrect. Kaylani made a total of  $x$  suits, not 6 suits. **Choice B** is incorrect. Kaylani purchased a total of  $y$  yards of fabric, not a total of 6 yards of fabric. **Choice C** is incorrect. Kaylani used a total of  $5x$  yards of fabric to make the suits, not a total of 6 yards of fabric.

## QUESTION 17

**Choice A** is correct. A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. If a central angle of a unit circle in the  $xy$ -plane centered at the origin has its starting side on the positive  $x$ -axis and its terminal side intersects the circle at a point  $(x, y)$ , then the value of the tangent of the



central angle is equal to the  $y$ -coordinate divided by the  $x$ -coordinate. There are  $2\pi$  radians in a circle. Dividing  $\frac{92\pi}{3}$  by  $2\pi$  yields  $\frac{92}{6}$ , which is equivalent to  $15 + \frac{2}{3}$ . It follows that on the unit circle centered at the origin in the  $xy$ -plane, the angle  $\frac{92\pi}{3}$  is the result of 15 revolutions from its starting side on the positive  $x$ -axis followed by a rotation through  $\frac{2\pi}{3}$  radians. Therefore, the angles  $\frac{92\pi}{3}$  and  $\frac{2\pi}{3}$  are coterminal angles and  $\tan \frac{92\pi}{3}$  is equal to  $\tan \frac{2\pi}{3}$ . Since  $\frac{2\pi}{3}$  is greater than  $\frac{\pi}{2}$  and less than  $\pi$ , it follows that the terminal side of the angle is in quadrant II and forms an angle of  $\frac{\pi}{3}$ , or  $60^\circ$ , with the negative  $x$ -axis. Therefore, the terminal side of the angle intersects the unit circle at the point  $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$ . It follows that the value of  $\tan \frac{92\pi}{3}$  is  $-\frac{\sqrt{3}}{1/2}$ , which is equivalent to  $-\sqrt{3}$ . Therefore, the value of  $\tan \frac{92\pi}{3}$  is  $-\sqrt{3}$ .

**Choice B** is incorrect. This is the value of  $\frac{1}{\tan \frac{92\pi}{3}}$ , not  $\tan \frac{92\pi}{3}$ . **Choice C** is

incorrect. This is the value of  $\frac{1}{\tan \frac{\pi}{3}}$ , not  $\tan \frac{92\pi}{3}$ . **Choice D** is incorrect. This is the

value of  $\tan \frac{\pi}{3}$ , not  $\tan \frac{92\pi}{3}$ .

## QUESTION 18

The correct answer is  $\frac{11}{28}$ . The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to the angle to the length of the hypotenuse. In the triangle shown, the length of the leg adjacent to the angle with measure  $x^\circ$  is 11 units and the length of the hypotenuse is 28 units. Therefore, the value of  $\cos x^\circ$  is  $\frac{11}{28}$ . Note that  $\frac{11}{28}$ , .3928, .3929, 0.392, and 0.393 are examples of ways to enter a correct answer.

## QUESTION 19

The correct answer is 336. By the zero product property, if  $x+14$  or  $t-x=0$ , then  $x+14=0$ , which gives  $x=-14$ , or  $t-x=0$ , which gives  $x=t$ . Therefore,  $g(x)=0$  when  $x=-14$  and when  $x=t$ . Since the graph of  $y=g(x)$  passes through the point  $(24, 0)$ , it follows that  $g(24)=0$ , so  $t=24$ . Substituting 24 for  $t$  in the equation  $g(x)=x+14$  or  $t-x$  yields  $g(x)=x+14$  or  $24-x$ . The value of  $g(0)$  can be calculated by substituting 0 for  $x$  in this equation, which yields  $g(0)=0+14$  or  $24-0$ , or  $g(0)=336$ .

## QUESTION 20

**Choice B** is correct. An equation of the form  $x^2 + y^2 - 2hx - 2ky + c = 0$ , where  $h$ ,  $k$ , and  $c$  are constants, represents a circle in the  $xy$ -plane with center  $(h, k)$  and radius  $r$ . Therefore, the circle represented by the given equation has center  $(-4, 19)$  and radius 11. Since the center of the circle has an  $x$ -coordinate of  $-4$  and the radius of the circle is 11, the least possible  $x$ -coordinate for any point on the circle is  $-4-11$ , or  $-15$ . Similarly, the greatest possible  $x$ -coordinate for any point on the circle is  $-4+11$ , or 7. Therefore, if the point  $(a, b)$  lies on the circle, it must be true that  $-15 \leq a \leq 7$ . Of the given choices, only  $-14$  satisfies this inequality.

*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 21

**Choice D** is correct. The volume of a right rectangular prism can be represented by a function  $V$  that gives the volume of the prism, in cubic inches, in terms of the length of the prism's base. The volume of a right rectangular prism is equal to the area of its base times its height. It's given that the length of the prism's base is  $x$  inches, which is 7 inches more than the width of the prism's base. This means that the width of the prism's base is  $x - 7$  inches. It follows that the area of the prism's base, in square inches, is  $x(x - 7)$  and the volume, in cubic inches, of the prism is  $x(x - 7)(9)$ . Thus, the function  $V$  that gives the volume of this right rectangular prism, in cubic inches, in terms of the length of the prism's base,  $x$ , is  $V(x) = 9x(x - 7)$ .

*Choice A* is incorrect. This function would give the volume of the prism if the height were 9 inches more than the length of its base and the width of the base were 7 inches more than its length. *Choice B* is incorrect. This function would give the volume of the prism if the height were 9 inches more than the length of its base. *Choice C* is incorrect. This function would give the volume of the prism if the width of the base were 7 inches more than its length, rather than the length of the base being 7 inches more than its width.

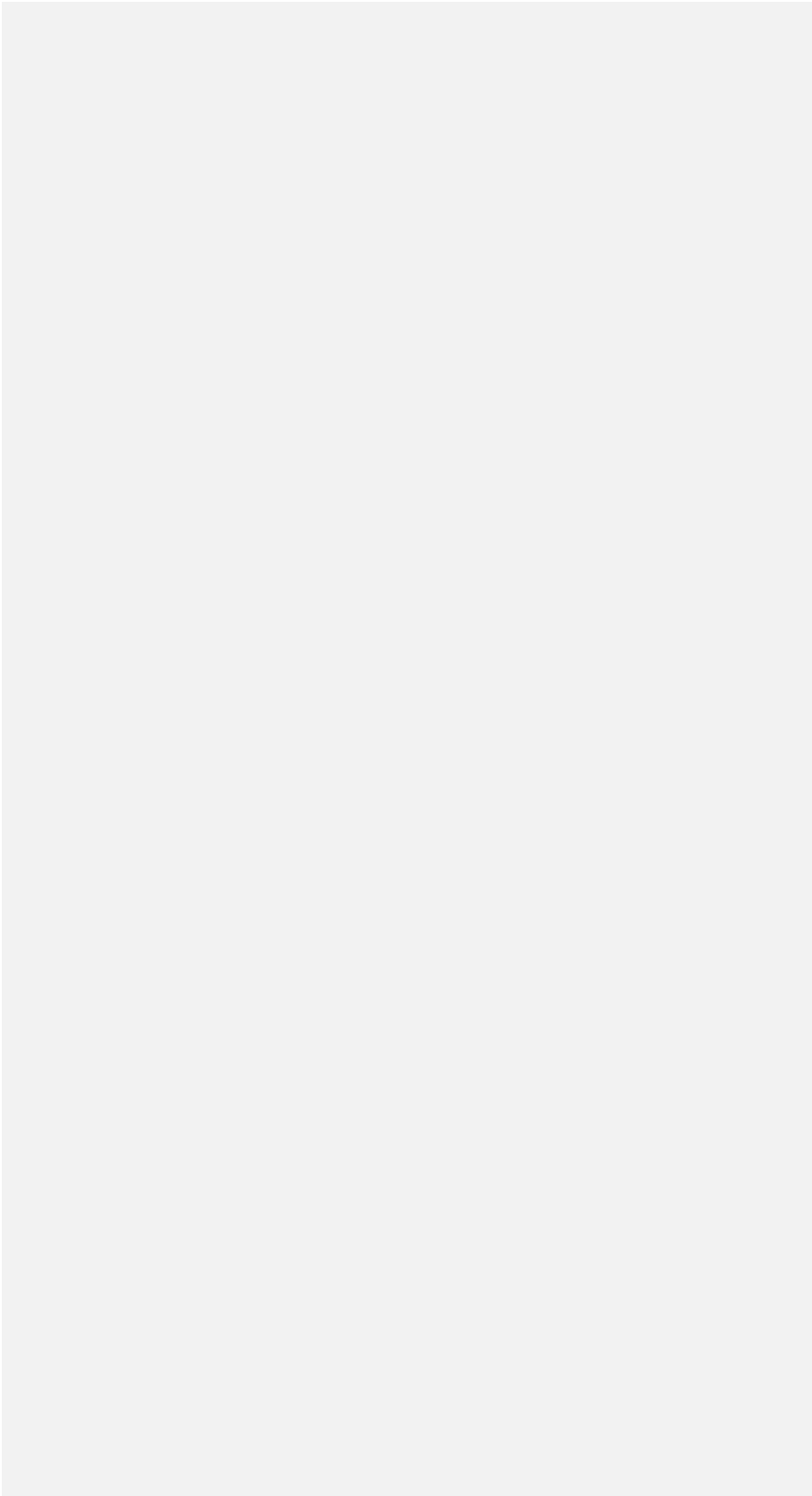
## QUESTION 22

**Choice D** is correct. A function of the form  $f(x) = a(b)^x + c$ , where  $a \neq 0$  and  $b > 1$ , is a decreasing function. Both of the given functions are of this form; therefore, both are decreasing functions. If a function  $f$  is decreasing, as the value of  $x$  increases, the corresponding value of  $f(x)$  decreases; therefore, the function doesn't have a minimum value. Thus, neither of the given functions has a minimum value.

*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.



# Math

## Module 2

(27 questions)

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### QUESTION 1

**Choice B** is correct. 20% of 440 can be calculated as  $440 \times \frac{20}{100}$ , which is equivalent to  $\frac{8,800}{100}$ , or 88.

**Choice A** is incorrect. This is 10%, not 20%, of 440. **Choice C** is incorrect. This is 200%, not 20%, of 440. **Choice D** is incorrect. This is 400%, not 20%, of 440.

### QUESTION 2

**Choice B** is correct. For the graph shown, the  $x$ -axis represents temperature, in kelvins, and the  $y$ -axis represents the estimated pressure, in pounds per square inch (psi). The estimated pressure of the argon when the temperature is 600 kelvins can be found by locating the point on the graph where the value of  $x$  is equal to 600. The graph passes through the point (600, 12). This means that when the temperature is 600 kelvins, the estimated pressure is 12 psi.

**Choice A** is incorrect. This is the estimated pressure, in psi, of the argon when the temperature is 300 kelvins, not 600 kelvins. **Choice C** is incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect. This is the temperature, in kelvins, of the argon.

### QUESTION 3

**Choice B** is correct. It's given that the function  $f$  is defined by  $f(x) = 4x - 3$ . Substituting 10 for  $x$  in the given function yields  $f(10) = 4(10) - 3$ , which is equivalent to  $f(10) = 40 - 3$ , or  $f(10) = 37$ . Therefore, the value of  $f(10)$  is 37.

**Choice A** is incorrect and may result from conceptual or calculation errors. **Choice C** is incorrect. This is the value of  $f(10)$  for the function  $f(x) = 4x$ , not  $f(x) = 4x - 3$ . **Choice D** is incorrect. This is the value of  $f(10)$  for the function  $f(x) = 4x + 3$ , not  $f(x) = 4x - 3$ .

## QUESTION 4

**Choice B** is correct. Since  $2xy$  is a common factor of each term in the given expression, the expression can be rewritten as  $2xy^8x^2y+7h$ .

**Choice A** is incorrect. This expression is equivalent to  $16x^2y^2+14xy$ . **Choice C** is incorrect. This expression is equivalent to  $28x^3y^2+14xy$ . **Choice D** is incorrect. This expression is equivalent to  $112x^3y^2+14xy$ .

## QUESTION 5

The correct answer is 6. Dividing both sides of the equation  $6n=12$  by 6 yields  $n=2$ . Substituting 2 for  $n$  in the expression  $n+4$  yields  $2+4$ , or 6.

## QUESTION 6

**Choice D** is correct. A line in the  $xy$ -plane with a slope of  $m$  and a  $y$ -intercept of  $0, b$  can be defined by an equation in the form  $y=mx+b$ . It's given that line  $r$  has a slope of 4 and passes through the point  $0, 6$ . It follows that  $m=4$  and  $b=6$ . Substituting 4 for  $m$  and 6 for  $b$  in the equation  $y=mx+b$  yields  $y=4x+6$ . Therefore, the equation  $y=4x+6$  defines line  $r$ .

*Choice A* is incorrect. This equation defines a line that has a slope of  $-6$ , not  $4$ , and passes through the point  $(0, 4)$ , not  $(0, 6)$ . *Choice B* is incorrect. This equation defines a line that has a slope of  $6$ , not  $4$ , and passes through the point  $(0, 4)$ , not  $(0, 6)$ . *Choice C* is incorrect. This equation defines a line that passes through the point  $(0, -6)$ , not  $(0, 6)$ .

## QUESTION 7

**Choice B** is correct. It's given that the graph shows the height above the water  $y$ , in meters, of a diver  $x$  seconds after diving from a platform. The  $x$ -intercept of a graph is the point at which the graph intersects the  $x$ -axis, or when the value of  $y$  is  $0$ . The graph shown intersects the  $x$ -axis between  $x = 1$  and  $x = 2$ . In other words, the diver is  $0$  meters above the water, or hits the water, between  $1$  and  $2$  seconds after diving from the platform. Of the given choices, only choice B includes an interpretation where the diver hits the water between  $1$  and  $2$  seconds. Therefore, the best interpretation of the  $x$ -intercept of the graph is the diver hits the water at  $1.6$  seconds.

*Choice A* is incorrect and may result from conceptual errors. *Choice C* is incorrect. This is the best interpretation of the maximum value, not the  $x$ -intercept, of the graph. *Choice D* is incorrect and may result from conceptual errors.

## QUESTION 8

**Choice C** is correct. Any data point that's located above the line of best fit has a  $y$ -value that's greater than the  $y$ -value predicted by the line of best fit. For the scatterplot shown,  $6$  of the data points are above the line of best fit. Therefore,  $6$  of the data points have an actual  $y$ -value that's greater than the  $y$ -value predicted by the line of best fit.

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

*Choice B* is incorrect. This is the number of data points that have an actual  $y$ -value that's less than the  $y$ -value predicted by the line of best fit. *Choice D* is incorrect and may result from conceptual or calculation errors.

## QUESTION 9

**Choice D** is correct. It's given that at a movie theater, there are a total of 350 customers and that each customer is located in either theater A, theater B, or theater C. If the probability of selecting a customer in theater A is 0.48, then  $0.48 \cdot 350$ , or 168, customers are located in theater A. If the probability of selecting a customer in theater B is 0.24, then  $0.24 \cdot 350$ , or 84, customers are located in theater B. It follows that there are  $168 + 84$ , or 252, customers in theater A and theater B. Therefore, there are  $350 - 252$ , or 98, customers in theater C.

**Choice A** is incorrect. This is the percent, not the number, of the customers that are located in theater C. **Choice B** is incorrect and may result from conceptual or calculation errors. **Choice C** is incorrect. This is the number of customers that are located in theater B, not theater C.

## QUESTION 10

The correct answer is  $\frac{44}{3}$ . A linear equation can be written in the form  $y = mx + b$ , where  $m$  is the slope of the graph of the equation in the  $xy$ -plane and  $b$  is the  $y$ -intercept. Distributing the  $\frac{1}{3}$  in the equation  $y = \frac{1}{3}(29x + 10) + 5x$  yields  $y = \frac{29}{3}x + \frac{10}{3} + 5x$ . Combining like terms on the right-hand side of this equation yields  $y = \frac{44}{3}x + \frac{10}{3}$ . This equation is in the form  $y = mx + b$ , where  $m = \frac{44}{3}$  and  $b = \frac{10}{3}$ . Therefore, the slope of the graph of the given equation in the  $xy$ -plane is  $\frac{44}{3}$ . Note that  $\frac{44}{3}$ , 14.66, and 14.67 are examples of ways to enter a correct answer.

## QUESTION 11

The correct answer is 4,205. The exterior surface area of a figure is the sum of the areas of all its faces. It's given that the box does not have a lid and that each side of the box is in the shape of a square. Therefore, the box consists of 5 congruent square faces. It's also given that the length of each edge is 29 inches. Let  $s$  represent the length of an edge of a square. It follows that the area of a square is equal to  $s^2$ . Therefore, the area of each of the 5 square faces is equal to  $29^2$ , or 841, square inches. Since the box consists of 5 congruent square faces, it follows that the sum of the areas of all its faces, or the exterior surface area of this box without a lid, is  $5 \cdot 841$ , or 4,205, square inches.

## QUESTION 12

**Choice A** is correct. It's given that the table shows an original data set of 5 values. It's also given that a sixth value is added to create a new data set. The new data set consists of the 5 values in the original data set and one additional value, 121. Since the additional value, 121, is less than any value in the original data set, the mean of the original data set is greater than the mean of the new data set.

*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 13

**Choice A** is correct. The sum of the measures of the angles of a triangle is  $180^\circ$ . Therefore, the sum of the measures of  $\angle R$ ,  $\angle S$ , and  $\angle T$  is  $180^\circ$ . It's given that the measure of  $\angle R$  is  $63^\circ$ . It follows that the sum of the measures of  $\angle S$  and  $\angle T$  is  $180^\circ - 63^\circ$ , or  $117^\circ$ . Therefore, the measure of  $\angle S$ , in degrees, must be less than  $117^\circ$ . Of the given choices, only  $116$  is less than  $117$ . Thus, the measure, in degrees, of  $\angle S$  could be  $116$ .

*Choice B* is incorrect. If the measure of  $\angle S$  is  $118^\circ$ , then the sum of the measures of the angles of the triangle is greater than, not equal to,  $180^\circ$ . *Choice C* is incorrect. If the measure of  $\angle S$  is  $126^\circ$ , then the sum of the measures of the angles of the triangle is greater than, not equal to,  $180^\circ$ . *Choice D* is incorrect. This is the sum of the measures of the angles of a triangle, in degrees.

## QUESTION 14

**Choice B** is correct. The given expression is equivalent to  $8x^3 + 8 - x^3 - 2h$ , or  $7x^3 + 8 - 2h$ . Combining like terms in this expression yields  $7x^3 + 8 - 2h$ .

*Choice A* is incorrect. This expression is equivalent to  $8x^3 + 8 - 2$ , not  $8x^3 + 8 - x^3 - 2$ . *Choice C* is incorrect. This expression is equivalent to  $8x^3 + 8h - 2h$ , not  $8x^3 + 8 - x^3 - 2$ . *Choice D* is incorrect. This expression is equivalent to  $8x^3 + 8 - x^3 + 2$ , not  $8x^3 + 8 - x^3 - 2$ .

## QUESTION 15

**Choice B** is correct. Dividing each side of the given equation by 4 yields  $\sqrt{2x} = 4$ . Squaring both sides of this equation yields  $2x = 16$ . Multiplying each side of this equation by 3 yields  $6x = 48$ . Therefore, the value of  $6x$  is 48.

*Choice A* is incorrect. This is the value of  $3x$ , not  $6x$ . *Choice C* is incorrect. This is the value of  $9x$ , not  $6x$ . *Choice D* is incorrect. This is the value of  $12x$ , not  $6x$ .



## QUESTION 16

The correct answer is 20. Adding the first equation to the second equation in the given system yields  $5y - 5y = 10x + 5x + 11 - 21$ , or  $0 = 15x - 10$ . Adding 10 to both sides of this equation yields  $10 = 15x$ . Multiplying both sides of this equation by 2 yields  $20 = 30x$ . Therefore, the value of  $30x$  is 20.

## QUESTION 17

The correct answer is 66. It's given that each vertex of the rectangle lies on the circumference of the circle. Therefore, the length of the diameter of the circle is equal to the length of the diagonal of the rectangle. The diagonal of a rectangle forms a right triangle with the shortest and longest sides of the rectangle, where the shortest side and the longest side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. Let  $s$  represent the length, in units, of the shortest side of the rectangle. Since it's given that the diagonal is twice the length of the shortest side,  $2s$  represents the length, in units, of the diagonal of the rectangle. By the Pythagorean theorem, if a right triangle has a hypotenuse with length  $c$  and legs with lengths  $a$  and  $b$ , then  $a^2 + b^2 = c^2$ . Substituting  $s$  for  $a$  and  $2s$  for  $c$  in this equation yields  $s^2 + b^2 = 4s^2$ , or  $b^2 = 3s^2$ . Subtracting  $s^2$  from both sides of this equation yields  $b^2 = 3s^2$ . Taking the positive square root of both sides of this equation yields  $b = s\sqrt{3}$ . Therefore, the length, in units, of the rectangle's longest side is  $s\sqrt{3}$ . The area of a rectangle is the product of the length of the shortest side and the length of the longest side. The lengths, in units, of the shortest and longest sides of the rectangle are represented by  $s$  and  $s\sqrt{3}$ , and it's given that the area of the rectangle is  $1,089\sqrt{3}$  square units. It follows that  $1,089\sqrt{3} = s^2\sqrt{3}$ , or  $1,089\sqrt{3} = s^2\sqrt{3}$ . Dividing both sides of this equation by  $\sqrt{3}$  yields  $1,089 = s^2$ . Taking the positive square root of both sides of this equation yields  $33 = s$ . Since the length, in units, of the diagonal is represented by  $2s$ , it follows that the length, in units, of the diagonal is  $2(33)$ , or 66. Since the length of the diameter of the circle is equal to the length of the diagonal of the rectangle, the length, in units, of the diameter of the circle is 66.

## QUESTION 18

**Choice D** is correct. The area of a rectangle is given by  $bh$ , where  $b$  is the length of the base of the rectangle and  $h$  is its height. Let  $x$  represent the length, in units, of the base of rectangle  $ABCD$ , and let  $y$  represent its height, in units. Substituting  $x$  for  $b$  and  $y$  for  $h$  in the formula  $bh$  yields  $xy$ . Therefore, the area, in square units, of  $ABCD$  can be represented by the expression  $xy$ . It's given that the length of each side of  $EFGH$  is 6 times the length of the corresponding side of  $ABCD$ . Therefore, the length, in units, of the base of  $EFGH$  can be represented by the expression  $6x$ , and its height, in units, can be represented by the expression  $6y$ . Substituting  $6x$  for  $b$  and  $6y$  for  $h$  in the formula  $bh$  yields  $6x \cdot 6y$ , which is equivalent to  $36xy$ . Therefore, the area, in square units, of  $EFGH$  can be represented by the expression  $36xy$ . It's given that the area of  $ABCD$  is 54 square units. Since  $xy$  represents the area, in square units, of  $ABCD$ , substituting 54 for  $xy$  in the expression  $36xy$  yields  $36 \cdot 54$ , or 1,944. Therefore, the area, in square units, of  $EFGH$  is 1,944.

**Choice A** is incorrect. This is the area of a rectangle where the length of each side of the rectangle is  $\frac{1}{6}$ , not 6, times the length of the corresponding side of  $ABCD$ . **Choice B** is incorrect. This is the area of a rectangle where the length of each side of the rectangle is  $\frac{2}{3}$ , not 6, times the length of the corresponding side of  $ABCD$ . **Choice C** is incorrect. This is the area of a rectangle where the length of each side of the rectangle is  $\frac{1}{6}$ , not 6, times the length of the corresponding side of  $ABCD$ .

## QUESTION 19

**Choice D** is correct. Two fractions can be added together when they have a common denominator. Since  $k \neq 0$ , multiplying the second term in the given expression by  $\frac{k}{k}$  yields  $\frac{42akh^2}{k}$ , which is equivalent to  $\frac{42ak^2}{k}$ . Therefore, the expression  $\frac{42a}{k} + 42ak$  can be written as  $\frac{42a}{k} + \frac{42ak^2}{k}$ , which is equivalent to  $\frac{42a + 42ak^2}{k}$ . Since each term in the numerator of this expression has a factor of  $42a$ , the expression  $\frac{42a + 42ak^2}{k}$  can be rewritten as  $\frac{42a(1 + 42ak)}{k}$ , or  $\frac{42a(1 + k^2)}{k}$ , which is equivalent to  $\frac{42a(k^2 + 1)}{k}$ .

**Choice A** is incorrect. This expression is equivalent to  $\frac{42a}{k} + \frac{42a}{k}$ . **Choice B** is incorrect and may result from conceptual or calculation errors. **Choice C** is incorrect. This expression is equivalent to  $\frac{42a}{k} + 42a$ .

## QUESTION 20

**Choice D** is correct. The number of solutions to a quadratic equation in the form  $ax^2 + bx + c = 0$ , where  $a$ ,  $b$ , and  $c$  are constants, can be determined by the value of the discriminant,  $b^2 - 4ac$ . If the value of the discriminant is greater than zero, then the quadratic equation has two distinct real solutions. If the value of the discriminant is equal to zero, then the quadratic equation has exactly one real solution. If the value of the discriminant is less than zero, then the quadratic equation has no real solutions. For the quadratic equation in choice D,  $5x^2 - 14x + 49 = 0$ ,  $a = 5$ ,  $b = -14$ , and  $c = 49$ . Substituting 5 for  $a$ ,  $-14$  for  $b$ , and 49 for  $c$  in  $b^2 - 4ac$  yields  $(-14)^2 - 4(5)(49)$ , or  $-784$ . Since  $-784$  is less than zero, it follows that the quadratic equation  $5x^2 - 14x + 49 = 0$  has no real solutions.

**Choice A** is incorrect. The value of the discriminant for this quadratic equation is 392. Since 392 is greater than zero, it follows that this quadratic equation has two real solutions. **Choice B** is incorrect. The value of the discriminant for this quadratic equation is 0. Since zero is equal to zero, it follows that this quadratic equation has exactly one real solution. **Choice C** is incorrect. The value of the discriminant for this quadratic equation is 1,176. Since 1,176 is greater than zero, it follows that this quadratic equation has two real solutions.

## QUESTION 21

**Choice A** is correct. It's given that the function  $P$  models the population, in thousands, of a certain city  $t$  years after 2003. The value of the base of the given exponential function, 1.04, corresponds to an increase of 4% for every increase of 1 in the exponent,  $b_{\frac{6}{4}}|t$ . If the exponent is equal to 0, then  $b_{\frac{6}{4}}|t=0$ . Multiplying both sides of this equation by  $b_{\frac{4}{6}}|$  yields  $t=0$ . If the exponent is equal to 1, then  $b_{\frac{6}{4}}|t=1$ . Multiplying both sides of this equation by  $b_{\frac{4}{6}}|$  yields  $t=\frac{4}{6}$  or  $t=\frac{2}{3}$ . Therefore, the population is predicted to increase by 4% every  $\frac{2}{3}$  of a year. It's given that the population is predicted to increase by 4% every  $n$  months. Since there are 12 months in a year,  $\frac{2}{3}$  of a year is equivalent to  $b_{\frac{2}{3}}|12$ , or 8, months. Therefore, the value of  $n$  is 8.

**Choice B** is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model  $P^{\wedge}t h=260^{\wedge}1.04 h^t$ , not  $P^{\wedge}t h=260^{\wedge}1.04 h^{\frac{6}{4} m t}$ . **Choice C** is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model  $P^{\wedge}t h=260^{\wedge}1.04 h^{\frac{4}{6} m t}$ , not  $P^{\wedge}t h=260^{\wedge}1.04 h^{\frac{6}{4} m t}$ . **Choice D** is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model  $P^{\wedge}t h=260^{\wedge}1.04 h^{\frac{1}{6} m t}$ , not  $P^{\wedge}t h=260^{\wedge}1.04 h^{\frac{6}{4} m t}$ .

## QUESTION 22

**Choice C** is correct. It's given that the circle has its center at  $(-1, 1)$  and that line  $t$  is tangent to this circle at the point  $(5, -4)$ . Therefore, the points  $(-1, 1)$  and  $(5, -4)$  are the endpoints of the radius of the circle at the point of tangency. The slope of a line or line segment that contains the points  $(a, b)$  and  $(c, d)$  can be calculated as  $\frac{d-b}{c-a}$ . Substituting  $(-1, 1)$  for  $(a, b)$  and  $(5, -4)$  for  $(c, d)$  in the expression  $\frac{d-b}{c-a}$  yields  $\frac{-4-1}{5-(-1)}$ , or  $-\frac{5}{6}$ . Thus, the slope of this radius is  $-\frac{5}{6}$ . A line that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. It follows that line  $t$  is perpendicular to the radius at the point  $(5, -4)$ , so the slope of line  $t$  is the negative reciprocal of the slope of this radius. The negative reciprocal of  $-\frac{5}{6}$  is  $\frac{6}{5}$ . Therefore, the slope of line  $t$  is  $\frac{6}{5}$ . Since the slope of line  $t$  is the same between any two points on line  $t$ , a point lies on line  $t$  if the slope of the line segment connecting the point and  $(5, -4)$  is  $\frac{6}{5}$ . Substituting choice C,  $(10, 2)$ , for  $(a, b)$  and  $(5, -4)$  for  $(c, d)$  in the expression  $\frac{d-b}{c-a}$  yields  $\frac{-4-2}{5-10}$ , or  $\frac{6}{5}$ . Therefore, the point  $(10, 2)$  lies on line  $t$ .

*Choice A* is incorrect. The slope of the line segment connecting  $(0, \frac{6}{5})$  and  $(5, -4)$  is  $\frac{-4 - \frac{6}{5}}{5 - 0}$ , or  $-\frac{26}{25}$ , not  $\frac{6}{5}$ . *Choice B* is incorrect. The slope of the line segment connecting  $(4, 7)$  and  $(5, -4)$  is  $\frac{-4 - 7}{5 - 4}$ , or  $-11$ , not  $\frac{6}{5}$ . *Choice D* is incorrect. The slope of the line segment connecting  $(11, 1)$  and  $(5, -4)$  is  $\frac{-4 - 1}{5 - 11}$ , or  $\frac{5}{6}$ , not  $\frac{6}{5}$ .