FREE DIGITAL SAT MINI DIAGNOSTIC

Practice Test Answer Key

Mark each of your correct answers below, then add them up to get your raw score on each module.

Reading and Writing

QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS
1	B	
2	C	
3	D	
4	C	
5	C	
6	A	
7	C	
8	C	
9	C	
10	C	
11	B	
12	D	
13	A	
14	C	
15	C	
16	A	
17	D	
18	A	
19	C	
20	C	
21	D	
22	C	
23	A	
24	D	
25	A	
26	C	
27	D	
28	B	
29	C	
30	B	
31	D	
32	D	
33	C	

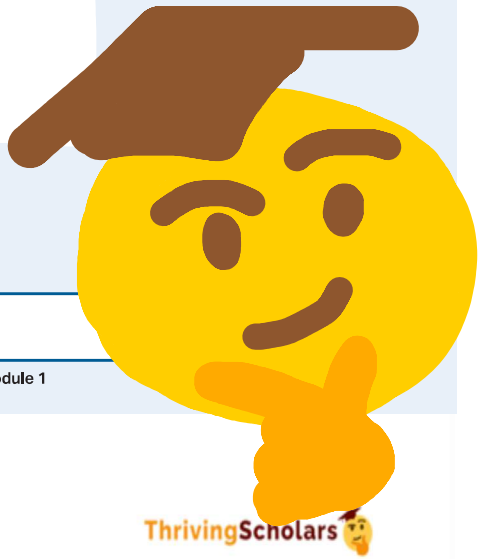
READING AND WRITING SECTION RAW SCORE
(Total # of Correct Answers)

Module 1 | Module 2

Math

QUESTION	CORRECT	MARK YOUR CORRECT ANSWERS
1	C	
2	D	
3	B	
4	A	
5	C	
6	54	
7	.25; 1/4	
8	B	
9	D	
10	A	
11	C	
12	D	
13	84	
14	99	
15	A	
16	A	
17	B	
18	C	
19	B	
20	27	
21	.5; 1/2	
22	C	
23	B	
24	B	
25	B	
26	B	
27	.0625; 1/16	

Module 1



ThrivingScholars

Reading and Writing

(33 questions)

QUESTION 1

Choice B is the best answer because it most logically completes the text's discussion of the archaeologists' study of the ancient amphitheater in Switzerland. In this context, "provide" means make available or supply. The text states that the archaeologists believe that the amphitheater dates to the fourth century CE. The text goes on to say that the archaeologists discovered a coin made between 337 and 341 CE (that is, made during the fourth century CE) and building materials appropriate to the era in question. This context suggests that these discoveries provide evidence for the archaeologists' theory about the dating of the amphitheater.

Choice A is incorrect because the archaeologists' discoveries are presented as supplying evidence in favor of their theory about the dating of the amphitheater, not something that would "dismiss," or reject serious consideration of, evidence for that theory. *Choice C* is incorrect because nothing in the text suggests that the archaeologists' discoveries would "regulate," or govern or bring order to, evidence for the archaeologists' theory about the dating of the amphitheater. The discoveries are presented as supplying evidence for the archaeologists' theory, not as changing how evidence for the theory is controlled or ordered. *Choice D* is incorrect because the archaeologists' discoveries are presented as supplying evidence in favor of their theory about the dating of the amphitheater, not something that would "refuse," or be unwilling to accept, evidence for the archaeologists' theory.

QUESTION 2

Choice C is the best answer because as used in the text, "simply" most nearly means easily, or involving minimal difficulty or effort. The text first provides Alice's reflections on her plan to gain access to a garden and then offers commentary on her plan by the novel's narrator. The text indicates that a reason Alice likes her plan despite not being fully thought through is that she nonetheless believes it can be efficiently arranged. In other words, the text indicates that one of the supposed benefits of Alice's plan is that it can be easily arranged.

Choice A is incorrect because the text describes how Alice's plan can be arranged, and it wouldn't make sense to say that it can be arranged "faintly," or with little strength or not strongly. Instead, the text indicates that the plan can be arranged with little difficulty. *Choice B* is incorrect. Although in some contexts "simply" can mean quickly, hastily, or hurriedly, the word "hastily" indicates that something is done too quickly. Although it may be true that Alice's plan was made in haste, the text doesn't focus on this aspect of her plan. Instead, the text focuses on the plan's seemingly good qualities, saying that Alice thinks of it as "the best," and the narrator refers to it as "excellent" and "neatly," or efficiently, arranged. *Choice D* is incorrect. Although in some contexts "simply" can mean foolishly, or lacking good sense, it doesn't have this meaning in this context. Although the text says that Alice doesn't know how to go about her plan, it begins by presenting her plan in a positive light: Alice describes her plan as "the best," and the narrator refers to the plan as "excellent" and "neatly," or efficiently, arranged.

QUESTION 3

Choice D is the best answer because it most logically completes the text's discussion of cucurbits. In this context, "ensuring" means guaranteeing, or making sure of, the cucurbits' survival. The text states that cucurbits faced extinction in the past because their means of seed dispersal disappeared, but the ancestors of Indigenous peoples in North America began farming cucurbits around that same time, so the crops were no longer threatened. Therefore, the context supports the idea that the ancestors of Indigenous peoples in North America helped with ensuring the cucurbits' survival.

Choice A is incorrect because in this context verifying means making sure that something is accurate. In the text, the ancestors of Indigenous peoples in North America were ensuring the survival, not the accuracy of, the cucurbits. *Choice B* is incorrect. Although the cucurbit crops themselves were multiplying, or growing in number, as a result of the work of the ancestors of Indigenous peoples in North America, it wouldn't make sense in context to say that the survival of the plants was multiplying. *Choice C* is incorrect because according to the text, in raising cucurbits as crops, the ancestors of Indigenous peoples in North America were attempting to help the plants grow and survive; they weren't attempting to comfort, or free the plants from pain.

QUESTION 4

Choice C is the best answer because it most logically completes the text's discussion of the discovery of a carved wooden figure dating to around 2,000 years ago. In this context, "rarely" means infrequently. The text states that the discovery of the figure was "truly surprising" and notes that wooden objects are highly prone to rot. This context conveys the idea that wooden objects infrequently survive for as long as the carved figure has survived.

Choice A is incorrect because "sturdily" means strongly, which wouldn't make sense in context. If wooden objects in general could strongly survive for long periods of time, then the discovery of a wooden figure that's around 2,000 years old wouldn't be surprising. *Choice B* is incorrect because "carelessly" means accidentally. The text conveys the idea that wooden objects in general don't survive for very long because they rot, not that wooden objects in general accidentally survive despite this. *Choice D* is incorrect because the text conveys the idea that wooden objects in general don't survive for very long because they rot, not that wooden objects in general "simply," or merely, survive for long periods of time. If wooden objects in general could merely survive for as long as the figure has survived, then the discovery of the figure wouldn't have been surprising.

QUESTION 5

Choice C is the best answer because it most logically completes the text's discussion of Ikeguchi's model of bicycle supply. In this context, "saturated with" means thoroughly or completely supplied with. The text explains a problem encountered by some bicycle-sharing programs: users can return bicycles to different locations than where the users picked up the bicycles to start, which can result in a mismatch between bicycle supply (that is, where the bicycles are currently located) and user demand (that is, the locations where users are hoping to pick up bicycles). The text goes on to explain that Ikeguchi developed a way to identify when this mismatch is likely to occur. This context suggests that Ikeguchi's method will show when it is likely that some locations have an insufficient supply and other locations, by implicit contrast, are saturated with bicycles.

Choice A is incorrect because nothing in the text suggests that some locations are "susceptible to," or sensitive to or easily influenced by, bicycles. The text describes the phenomenon of bicycles being redistributed away from locations where users want them, not anything about those locations being influenced by the bicycles. *Choice B* is incorrect because the text describes situations in which some locations have an insufficient supply of bicycles because the bicycles have been relocated elsewhere, which suggests that the other locations have many bicycles, not that the other locations are "contingent on," or dependent on, the bicycles. Nothing in the text suggests that the locations themselves depend on the bicycles for anything. *Choice D* is incorrect because it would not make sense in context to say that some locations are "depleted of," or empty of, bicycles while

others have an insufficient supply. The text describes situations in which bicycles have been relocated such that there is a mismatch between bicycle supply and user demand—the bicycles are no longer at the locations where users want to pick them up. This means that some locations do not have enough bicycles, while other locations must have many bicycles, not be depleted of bicycles.

QUESTION 6

Choice A is the best answer because it most accurately describes how the underlined sentence functions in the text as a whole. The first sentence explains that Bernabei and his team studied growth rings to obtain information about the ancient oak planks found during a construction project in Rome. The next sentence presents what the researchers learned: the wood from the planks came from France's Jura region, which is far from Rome. The underlined sentence then presents the implications of the findings about the planks: the wood must have been brought to Rome by boat, a difficult task that suggests Roman trade routes were complex. Thus, the underlined sentence mainly functions to present a conclusion about Roman trade routes based on the team's findings.

Choice B is incorrect because the text doesn't suggest that the team thought the ancient planks were used in the construction of a boat, nor does the underlined sentence question that conclusion. Instead, the text states that the wood could only have been transported from Jura to Rome in a boat. *Choice C* is incorrect because the underlined sentence simply offers a conclusion drawn from the team's findings about the likely place of origin of the ancient planks; the text never mentions why oak was chosen for the planks instead of other wood. *Choice D* is incorrect because neither the underlined sentence nor the text as a whole addresses any methods that Romans used in constructing subways. Instead, the underlined sentence offers a conclusion drawn from the team's findings about the likely place of origin of the ancient wooden planks discovered.

QUESTION 7

Choice C is the best answer because it most accurately describes the function of the underlined sentence in the text as a whole. The text's subject is Beverly Glenn-Copeland's 1986 album *Keyboard Fantasies*, notable for its innovative, experimental arrangements. According to the text, the album was not initially admired, but in recent years it has become popular among younger musicians. The underlined portion of the text mentions two of those musicians, Blood Orange and Moses Sumney, who "cite the album as an influence." Therefore, the underlined portion of the text offers examples of younger musicians whose work has been impacted by *Keyboard Fantasies*.

Choice A is incorrect because even though the underlined sentence states that Blood Orange and Moses Sumney were influenced by *Keyboard Fantasies*, it doesn't say that all other musicians should also embrace the album's experimental style. *Choice B* is incorrect. Although the text states that *Keyboard Fantasies* was not admired on its first release, the text doesn't present any criticism of the album by younger musicians: it only presents two younger musicians who cite it as an influence. *Choice D* is incorrect because the underlined sentence doesn't mention any differences between *Keyboard Fantasies* and the work of Blood Orange and Moses Sumney.

QUESTION 8

Choice C is the best answer because it most accurately describes the main purpose of the text, which is to illustrate two approaches that Indigenous politicians have taken to achieve political representation for their communities. The text begins by explaining that one approach is exemplified by Indigenous politicians in the United States who, in an effort to ensure that the interests of their communities are represented in government, joined preexisting political parties and were subsequently elected to Congress. The text goes on to highlight a second approach adopted by Indigenous leaders in Canada and several Latin American countries: rather than joining established political parties, many Indigenous politicians in these countries have instead formed their own parties to promote candidates for office who support causes that are important to their communities.

Choice A is incorrect because the text's focus is on the contrasting approaches adopted by different Indigenous political movements in different countries; thus, it isn't accurate to say that the text traces the history of one political movement. Moreover, the text only discusses examples from 2000 to 2021, a relatively short period of time; therefore, it provides very little in the way of discussion of larger historical developments, nor does it make any predictions about how these movements might continue to develop in the future. *Choice B* is incorrect because the text never urges Indigenous politicians in the US to alter their strategy of striving for representation through the established political parties, nor does it suggest that this strategy is inferior to that of Indigenous politicians in Canada and Latin America, who have formed their own parties. In fact, the text notes that both strategies have resulted in the election of Indigenous politicians to national governments. *Choice D* is incorrect because the text never suggests that Indigenous politicians in the US have influenced those in Canada and Latin America; instead, it stresses how Indigenous politicians' approach toward achieving representation in the US government has differed from the approach Indigenous politicians have taken to achieve representation in national governments elsewhere in the Americas.

QUESTION 9

Choice C is the best answer because it characterizes how Maddux would most likely respond to the conclusion Sharif reached after her research. Text 1 describes Sharif's study of the benefits of free time, saying that the reported sense of satisfaction plateaued at two hours per day and began to decline at five hours per day. Further research led Sharif to conclude that time spent doing tasks she defines as unproductive, such as watching TV or playing games, correlated with a drop in life satisfaction. However, in Text 2 Maddux says that there is no objective definition of what constitutes productive behavior, giving the example that reading a book might be considered productive by some but unproductive by others. It can be inferred that Maddux would also assert that whether watching TV or playing games is productive or unproductive is a matter of subjective judgment. Thus, Maddux would most likely caution against making an overly broad assumption, as there is no clear consensus in distinguishing between productive and unproductive activities.

Choice A is incorrect because Maddux asserts that individuals have unique needs for life satisfaction: some may want to spend that time productively, others unproductively, and what counts as productive is subjective. Therefore, Maddux would likely not consider it universally true that free time is more likely to enhance life satisfaction when it is spent productively. *Choice B* is incorrect because the study described in Text 1 concerns whether free time contributes to life satisfaction, not whether productivity contributes to life satisfaction. The dip in life satisfaction that Sharif claims to observe in Text 1 happens only after five hours, and mainly if the time is spent unproductively—that is, two hours of free time spent productively might increase life satisfaction just as much as two hours spent unproductively. *Choice D* is incorrect because Maddux holds the opinion that whether an activity is productive or unproductive is subjective and depends on the individual; therefore, he would most likely claim that watching TV or playing games might be productive for some and unproductive for others.

QUESTION 10

Choice C is the best answer because it gives the age for the fossil discovered by Wang and colleagues that is directly supported by the text. According to the text, Xin Wang and colleagues discovered a 164-million-year-old plant fossil. This plant fossil included a flower bud, which the researchers believe provides evidence that flowering plants emerged in the Jurassic period, which falls between 145 million and 201 million years ago.

Choice A is incorrect because the text states that Wang and colleagues discovered a 164-million-year-old flowering plant fossil in China, not one that is 150 million years old. Although 150 million years ago would fall within the Jurassic period, according to the text it isn't the age of the discovered fossil. *Choice B* is incorrect because the text states that Wang and colleagues discovered a 164-million-year-old flowering plant fossil in China, not one that is 145 million years old. Although 145 million years ago would fall at the end of the Jurassic

period, according to the text it isn't the age of the discovered fossil. *Choice D* is incorrect because the text states that Wang and colleagues discovered a 164-million-year-old flowering plant fossil in China, not one that is 201 million years old. Although 201 million years ago would fall at the beginning of the Jurassic period, according to the text it isn't the age of the discovered fossil.

QUESTION 11

Choice B is the best answer because it most accurately states the main idea of the text. The text indicates that dog owners typically claim that some dog breeds are "more likely than others to have particular personality traits." In other words, the text points out that a commonly held belief about dog breeds is that their personality traits are heritable. The text then states that Kathleen Morrill and colleagues undertook research about dog trait heritability and found that "behavior varies widely among dogs of the same breed." Because Morrill and colleagues found evidence for variability rather than consistency in the behavior of dogs of the same breed, the statement that research fails to uphold a commonly held belief about dog breeds and behavior accurately reflects the main idea of the text.

Choice A is incorrect. Although the text mentions that humans have long intervened in dogs' reproduction by intentionally crossbreeding certain dogs, it doesn't argue that such intervention is essential to the existence of dog breeds. *Choice C* is incorrect because the text doesn't discuss the popularity of any dog breeds; breeds are mentioned as having certain traits, but the text says nothing about the popularity of these breeds or traits. *Choice D* is incorrect. Although the text briefly mentions that Morrill and colleagues conducted a study about dog traits using both surveys and DNA sequencing, this is not the main focus of the text. The text concerns the study's results about the heritability of dog traits, not the particular methodology used by Morrill and colleagues.

QUESTION 12

Choice D is the best answer because it presents a statement about the site discovered by the researchers that is supported by the text. The text discusses Fiorelli and colleagues' discovery of egg clutches, single eggs, and eggshells in a Brazilian mine. According to the text, the presence of these eggs, which are from the Late Cretaceous period, led the researchers to conclude that the location was once a nesting and breeding site for titanosaurs. The text then explains that the finding is important because of the "previous lack of known nesting sites in northern regions of South America." If there haven't been any other discoveries of a nesting site in South America's northern regions and the site in the Brazilian mine is the first, then the text strongly suggests that the site is farther north than other nesting sites that have been discovered in South America.

Choice A is incorrect because the text doesn't suggest that the site discovered by Fiorelli and colleagues is the earliest titanosaur nesting and breeding site known to paleontologists but rather that it's the first nesting site found in northern regions of South America. Moreover, the text doesn't suggest how the timeline of the newly discovered site compares with that of other titanosaur nesting and

breeding sites. *Choice B* is incorrect because there is no mention in the text about any difficulties that Fiorelli and colleagues faced when they were excavating the nesting and breeding site in the Brazilian mine. *Choice C* is incorrect because the text doesn't support the idea that the nesting and breeding site in the Brazilian mine was occupied by sauropods other than titanosaurs. The text simply mentions that titanosaurs are sauropod dinosaurs and presents the researchers' conclusion that the site they discovered was for titanosaurs.

QUESTION 13

Choice A is the best answer because it most effectively uses data from the table to complete the example of the high cost and low popularity of world's fairs. The text presents Chow's argument that the United States hasn't hosted a world's fair since 1984 because people think these exhibitions are overly expensive and insufficiently popular. The text then cites the 1984 World's Fair as an example, noting that it cost $350 million. Since the example should illustrate both high cost and insufficient popularity, the best completion of the example is the information from the table that the 1984 World's Fair had 7.35 million visitors.

Choice B is incorrect because it misrepresents data from the table. The table indicates that the 1984 World's Fair, which is the world's fair used as an example in the text, had 7.35 million, not 9.60 million, visitors. *Choice C* is incorrect because it misrepresents data from the table. The table indicates that the 1984 World's Fair, which is the world's fair used as an example in the text, had 7.35 million, not 6.40 million, visitors. *Choice D* is incorrect because it misrepresents data from the table. The table indicates that the 1984 World's Fair, which is the world's fair used as an example in the text, had 7.35 million, not 5.60 million, visitors.

QUESTION 14

Choice C is the best answer because it most effectively uses data from the table to complete the statement. The table shows that on day 1, the menu for NASA's Gemini missions included sugar cookie cubes for meal B.

Choice A is incorrect because according to the table, shrimp cocktail was served on day 4, not day 1; moreover, the item was served for meal C, not meal B, as this choice claims. *Choice B* is incorrect because according to the table, hot cocoa was served on day 3, not on day 1; moreover, the item was served for meal A, not for meal C, as this choice claims. *Choice D* is incorrect because according to the table, chicken and vegetables were served on day 2, not on day 1; moreover, the item was served for meal B, not for meal A, as this choice claims.

QUESTION 15

Choice C is the best answer because it most effectively uses a quotation to illustrate the claim that Lady Gertrude Chiltern is perceived as "both extremely virtuous and unforgiving." In the quotation, a man describes Lady Chiltern as someone who "does not know what weakness or temptation is." In other words, the man regards her as someone who is strong and adheres to a strict definition of moral perfection. However, he ironically suggests that this definition excludes mercy and forgiveness—qualities that are also thought of as virtues; according to him, Lady Chiltern is "pitiless in her perfection—cold and stern and without mercy." This description supports the idea that Lady Chiltern is perceived by others as virtuous as well as unforgiving.

Choice A is incorrect. The quotation supports the claim that Lady Chiltern is perceived as virtuous, in that it describes her as "a woman of the very highest principles." However, it doesn't characterize her as unforgiving or being perceived as such. *Choice B* is incorrect. The quotation suggests that Lady Chiltern is concerned with morality, but it suggests that her interest in discussing it is fundamentally hypocritical and functions as a means by which to judge others. However, the quotation doesn't address the question of whether Lady Chiltern is unmerciful to those who seek forgiveness for harm they have caused. *Choice D* is incorrect because it doesn't address either Lady Chiltern's perceived virtuousness or her perceived lack of forgiveness; instead, it expresses the belief that she is sensible.

QUESTION 16

Choice A is the best answer because it most effectively uses data from the table to support the student's argument about the role of bufadienolide in the egg preferences of cane toad tadpoles. For each of five amphibian species included in the 2022 study, the table gives the percentage of available eggs that the cane toad tadpoles ate. According to the table, the tadpoles ate 10% of striped burrowing frog eggs and 1% of dainty green tree frog eggs, which suggests a preference for striped burrowing frog eggs over dainty green tree frog eggs. The table also indicates that neither of these species' eggs produces bufadienolide. Thus, these data suggest that something other than the presence or absence of bufadienolide is needed to adequately explain the tadpoles' egg preferences.

Choice B is incorrect. Although the table shows that for each of the five amphibian species, the cane toad tadpoles ate less than 100% of that species' eggs, which demonstrates that the tadpoles did indeed leave some eggs for each species unharmed, this fact alone is irrelevant to the tadpoles' preferences for some species' eggs over other species' eggs. *Choice C* is incorrect. Although the table indicates that the cane toad tadpoles ate 90% of the cane toad eggs and 7% of the short-footed frog eggs, which suggests that they prefer cane toad eggs over short-footed frog eggs, the table also indicates that cane toad eggs produce bufadienolide, whereas short-footed frog eggs do not. Therefore, these data are not sufficient to exclude that bufadienolide alone could explain the tadpoles'

QUESTION 4

Choice A is correct. 23% of 100 can be calculated by multiplying $\frac{23}{100}$ by 100, which yields $\left(\frac{23}{100}\right)100$, or 23.

Choice B is incorrect. This is 46%, not 23%, of 100. *Choice C* is incorrect. This is 23% less than 100, not 23% of 100. *Choice D* is incorrect. This is 23% greater than 100, not 23% of 100.

QUESTION 5

Choice D is correct. The given expression shows addition of two like terms. Therefore, the given expression is equivalent to $(50+5)x^2$, or $55x^2$.

Choice A is incorrect. This expression is equivalent to $(50)(5)x^2$, not $(50+5)x^2$.

Choice B is incorrect. This expression is equivalent to $\left(\frac{50}{5}\right)x^2$, not $(50+5)x^2$.

Choice C is incorrect. This expression is equivalent to $(50-5)x^2$, not $(50+5)x^2$.

QUESTION 6

The correct answer is 370. It's given that the population density of Cedar County is 230 people per square mile and the county has a population of 85,100 people. Based on the population density, it follows that the area of Cedar County is $(85{,}100 \text{ people})\left(\frac{1 \text{ square mile}}{230 \text{ people}}\right)$, or 370 square miles.

QUESTION 7

The correct answer is -9. Since w is in the denominator of a fraction in the given equation, w can't be equal to 0. Since w isn't equal to 0, multiplying both sides of the given equation by w yields an equivalent equation, $-54=6w$. Dividing both sides of this equation by 6 yields $-9=w$. Therefore, -9 is the solution to the given equation.

QUESTION 8

Choice B is correct. An equation defining a linear function can be written in the form $f(x)=mx+b$, where m and b are constants, m is the slope of the graph of $y=f(x)$ in the xy-plane, and $(0, b)$ is the y-intercept of the graph. It's given that for the function f, the graph of $y=f(x)$ in the xy-plane has a slope of 3. Therefore, $m=3$. It's also given that this graph passes through the point $(0, -8)$. Therefore, the y-intercept of the graph is $(0, -8)$, and it follows that $b=-8$. Substituting 3 for m and -8 for b in the equation $f(x)=mx+b$ yields $f(x)=3x-8$. Thus, the equation that defines f is $f(x)=3x-8$.

Choice A is incorrect. For this function, the graph of $y=f(x)$ in the xy-plane passes through the point $(0, 0)$, not $(0, -8)$. *Choice C* is incorrect. For this function, the graph of $y=f(x)$ in the xy-plane passes through the point $(0, 5)$, not $(0, -8)$. *Choice D* is incorrect. For this function, the graph of $y=f(x)$ in the xy-plane passes through the point $(0, 11)$, not $(0, -8)$.

QUESTION 9

Choice A is correct. The perimeter of a triangle is the sum of the lengths of its three sides. The triangle shown has side lengths x, y, and z. It's given that the triangle has a perimeter of 22 units. Therefore, $x+y+z=22$. If $x=9$ units and $y=7$ units, the value of z, in units, can be found by substituting 9 for x and 7 for y in the equation $x+y+z=22$, which yields $9+7+z=22$, or $16+z=22$. Subtracting 16 from both sides of this equation yields $z=6$. Therefore, if $x=9$ units and $y=7$ units, the value of z, in units, is 6.

Choice B is incorrect. This is the value of y, in units, not the value of z, in units. *Choice C* is incorrect. This is the value of x, in units, not the value of z, in units. *Choice D* is incorrect. This is the value of $x+y$, in units, not the value of z, in units.

QUESTION 10

Choice A is correct. The value of $h(-2)$ can be found by substituting -2 for x in the equation defining h. Substituting -2 for x in $h(x)=3x-7$ yields $h(-2)=3(-2)-7$, or $h(-2)=-13$. Therefore, the value of $h(-2)$ is -13.

Choice B is incorrect. This is the value of $h(-1)$, not $h(-2)$. *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 11

Choice C is correct. The tangent of an acute angle in a right triangle is defined as the ratio of the length of the side opposite the angle to the length of the shorter side adjacent to the angle. In the triangle shown, the length of the side opposite the angle with measure $x°$ is 26 units and the length of the side adjacent to the angle with measure $x°$ is 7 units. Therefore, the value of $\tan x°$ is $\frac{26}{7}$.

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

QUESTION 12

Choice C is correct. It's given that the scatterplot shows the relationship between two variables, x and y, and a line of best fit is shown. For the line of best fit shown, for each increase in the value of x by 1, the corresponding value of y increases by a constant rate. It follows that the relationship between the variables x and y has a positive linear trend. A line in the xy-plane that passes through the points (a, b) and (c, d) has a slope of $\frac{d-b}{c-a}$. The line of best fit shown passes approximately through the points $(0, 0.25)$ and $(4, 2)$. It follows that the slope of this line is approximately $\frac{2-0.25}{4-0}$, which is equivalent to 0.4375. Therefore, of the given choices, 0.44 is closest to the slope of the line of best fit shown.

Choice A is incorrect. This is the slope of a line of best fit for a relationship between x and y that has a negative, rather than a positive, linear trend. *Choice B*

is incorrect. This is the slope of a line of best fit for a relationship between x and y that has a negative, rather than a positive, linear trend. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 13

The correct answer is 9. It's given that the *y*-intercept of the graph of $12x+2y=18$ in the *xy*-plane is $(0, y)$. Substituting 0 for x in the equation $12x+2y=18$ yields $12(0)+2y=18$, or $2y=18$. Dividing both sides of this equation by 2 yields $y=9$. Therefore, the value of y is 9.

QUESTION 14

The correct answer is 241. For a certain animal, it's given that a model predicts the animal weighed 241 pounds when it was born and gained 3 pounds per day in its first year of life. It's also given that this model is defined by an equation in the form $f(x)=a+bx$, where $f(x)$ is the predicted weight, in pounds, of the animal x days after it was born, and a and b are constants. It follows that a represents the predicted weight, in pounds, of the animal when it was born and b represents the predicted rate of weight gain, in pounds per day, in its first year of life. Thus, the value of a is 241.

QUESTION 15

Choice A is correct. It's given that the graph shows the height above ground, in meters, of a ball x seconds after the ball was launched upward from a platform. In the graph shown, the *x*-axis represents time, in seconds, and the *y*-axis represents the height of the ball above ground, in meters. It follows that for the marked point $(1.0, 4.8)$, 1.00 represents the time, in seconds, after the ball was launched upward from a platform and 4.80 represents the height of the ball above ground, in meters. Therefore, the best interpretation of the marked point $(1.0, 4.8)$ is 1.00 second after being launched, the ball's height above ground is 4.80 meters.

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

QUESTION 16

Choice A is correct. It's given that based on a random sample from a population, the estimated mean value for a certain variable for the population is 20.5, with an associated margin of error of 1. This means that it is plausible that the actual mean value of the variable for the population is between $20.5-1$ and $20.5+1$. Therefore, the most appropriate conclusion is that it is plausible that the actual mean value of the variable for the population is between 19.5 and 21.5.

Choice B is incorrect. The estimated mean value and associated margin of error describe only plausible values, not all the possible values, for the actual mean value of the variable, so this is not an appropriate conclusion. *Choice C* is

incorrect. The estimated mean value and associated margin of error describe only plausible values for the actual mean value of the variable, not all the possible values of the variable, so this is not an appropriate conclusion. *Choice D* is incorrect. Since 20.5 is the estimated mean value of the variable based on a random sample, the actual mean value of the variable may not be exactly 20.5. Therefore, this is not an appropriate conclusion.

QUESTION 17

Choice B is correct. It's given that the equation $7m = 5(n + p)$ relates the positive numbers m, n, and p. Dividing both sides of the given equation by 5 yields $\frac{7m}{5} = n + p$. Subtracting p from both sides of this equation yields $\frac{7m}{5} - p = n$, or $n = \frac{7m}{5} - p$. It follows that the equation $n = \frac{7m}{5} - p$ correctly gives n in terms of m and p.

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

QUESTION 18

Choice A is correct. It's given that a rectangle has a length that is 15 times its width. It's also given that the function $y = (15w)(w)$ represents this situation, where y is the area, in square feet, of the rectangle and $y > 0$. The area of a rectangle can be calculated by multiplying the rectangle's length by its width. Since the rectangle has a length that is 15 times its width, it follows that w represents the width of the rectangle, in feet, and $15w$ represents the length of the rectangle, in feet. Therefore, the best interpretation of $15w$ in this context is that it's the length of the rectangle, in feet.

Choice B is incorrect. This is the best interpretation of y, not $15w$, in the given function. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect. This is the best interpretation of w, not $15w$, in the given function.

QUESTION 19

Choice B is correct. Adding the first equation to the second equation in the given system yields $(x + 2y) + (x - 2y) = 6 + 4$, or $(x + x) + (2y - 2y) = 10$. Combining like terms in this equation yields $2x = 10$. Dividing both sides of this equation by 2 yields $x = 5$. Thus, the value of x is 5.

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. This is the value of $2x$, not x.

QUESTION 20

The correct answer is 19. The minimum value of a data set is the least value in the data set. The frequency refers to the number of times a value occurs. The given table shows that for this data set, the value 19 occurs 7 times, the value 21 occurs 1 time, the value 23 occurs 7 times, and the value 25 occurs 4 times. Therefore, of the values 19, 21, 23, and 25 given in the data set, the minimum value of the data set is 19.

QUESTION 21

The correct answer is -2. It's given that a number x is at most 17 less than 5 times the value of y, or $x \leq 5y - 17$. Substituting 3 for y in this inequality yields $x \leq 5(3) - 17$, or $x \leq -2$. Thus, if the value of y is 3, the greatest possible value of x is -2.

QUESTION 22

Choice C is correct. The left-hand side of the given equation can be factored as $(5x + 3)(x - 8)$. Therefore, the given equation, $5x^2 - 37x - 24 = 0$, can be written as $(5x + 3)(x - 8) = 0$. Applying the zero product property to this equation yields $5x + 3 = 0$ and $x - 8 = 0$. Subtracting 3 from both sides of the equation $5x + 3 = 0$ yields $5x = -3$. Dividing both sides of this equation by 5 yields $x = -\frac{3}{5}$. Adding 8 to both sides of the equation $x - 8 = 0$ yields $x = 8$. Therefore, the two solutions to the given equation, $5x^2 - 37x - 24 = 0$, are $-\frac{3}{5}$ and 8. It follows that 8 is the positive solution to the given equation.

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 23

Choice B is correct. In the figure shown, the angle measuring $y°$ is congruent to its vertical angle formed by lines s and m, so the measure of the vertical angle is also $y°$. The vertical angle forms a same-side interior angle pair with the angle measuring $x°$. It's given that lines r and s are parallel. Therefore, same-side interior angles in the figure are supplementary, which means the sum of the measure of the vertical angle and the measure of the angle measuring $x°$ is 180°, or $x + y = 180$. Subtracting x from both sides of this equation yields $y = 180 - x$. Substituting $180 - x$ for y in the inequality $y < 65$ yields $180 - x < 65$. Adding x to both sides of this inequality yields $180 < 65 + x$. Subtracting 65 from both sides of this inequality yields $115 < x$, or $x > 115$. Thus, if $y < 65$, it must be true that $x > 115$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect. $x + y$ must be equal to, not less than, 180. *Choice D* is incorrect. $x + y$ must be equal to, not greater than, 180.

QUESTION 24

Choice B is correct. It's given that the graph of $y=g(x)$ is produced by translating the graph of $y=f(x)$ 3 units down and 4 units to the right in the *xy*-plane. Therefore, function g can be defined by an equation in the form $g(x)=f(x-4)-3$. Function f is defined by the equation $f(x)=\frac{a-19}{x}+5$, where a is a constant. Substituting $x-4$ for x in the equation $f(x)=\frac{a-19}{x}+5$ yields $f(x-4)=\frac{a-19}{x-4}+5$. Substituting $\frac{a-19}{x-4}+5$ for $f(x-4)$ in the equation $g(x)=f(x-4)-3$ yields $g(x)=\frac{a-19}{x-4}+5-3$, or $g(x)=\frac{a-19}{x-4}+2$. Therefore, the equation that defines function g is $g(x)=\frac{a-19}{x-4}+2$.

Choice A is incorrect. This equation defines a function whose graph is produced by translating the graph of $y=f(x)$ 3 units down and 4 units to the left, not 3 units down and 4 units to the right. *Choice C* is incorrect. This equation defines a function whose graph is produced by translating the graph of $y=f(x)$ 4 units to the left, not 3 units down and 4 units to the right. *Choice D* is incorrect. This equation defines a function whose graph is produced by translating the graph of $y=f(x)$ 4 units to the right, not 3 units down and 4 units to the right.

QUESTION 25

Choice D is correct. An equation representing the height above ground *h*, in meters, of a softball t seconds after it is launched by a machine from ground level can be written in the form $h=-a(t-b)^2+c$, where *a*, *b*, and *c* are positive constants. In this equation, *b* represents the time, in seconds, at which the softball reaches its maximum height of *c* meters above the ground. It's given that this softball reaches a maximum height of 51.84 meters above the ground at 1.8 seconds; therefore, $b=1.8$ and $c=51.84$. Substituting 1.8 for *b* and 51.84 for *c* in the equation $h=-a(t-b)^2+c$ yields $h=-a(t-1.8)^2+51.84$. It's also given that this softball hits the ground at 3.6 seconds; therefore, $h=0$ when $t=3.6$. Substituting 0 for *h* and 3.6 for *t* in the equation $h=-a(t-1.8)^2+51.84$ yields $0=-a(3.6-1.8)^2+51.84$, which is equivalent to $0=-a(1.8)^2+51.84$, or $0=-3.24a+51.84$. Adding $3.24a$ to both sides of this equation yields $3.24a=51.84$. Dividing both sides of this equation by 3.24 yields $a=16$. Substituting 16 for *a* in the equation $h=-a(t-1.8)^2+51.84$ yields $h=-16(t-1.8)^2+51.84$. Therefore, $h=-16(t-1.8)^2+51.84$ represents the height above ground *h*, in meters, of this softball t seconds after it is launched.

Choice A is incorrect. This equation represents a situation where the maximum height is 3.6 meters above the ground at 0 seconds, not 51.84 meters above the ground at 1.8 seconds. *Choice B* is incorrect. This equation represents a situation where the maximum height is 51.84 meters above the ground at 0 seconds, not 1.8 seconds. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 26

Choice D is correct. It's given that in triangle ABC, the measure of angle B is 90° and BD is an altitude of the triangle. Therefore, the measure of angle BDC is 90°. It follows that angle B is congruent to angle D and angle C is congruent to angle C. By the angle-angle similarity postulate, triangle ABC is similar to triangle BDC. Since triangles ABC and BDC are similar, it follows that $\frac{AC}{AB}=\frac{BC}{BD}$. It's also given that the length of $\overline{AB}$ is 15 and the length of $\overline{AC}$ is 23 greater than the length of $\overline{AB}$. Therefore, the length of $\overline{AC}$ is $15+23$, or 38. Substituting 15 for AB and 38 for AC in the equation $\frac{AC}{AB}=\frac{BC}{BD}$ yields $\frac{38}{15}=\frac{BC}{BD}$. Therefore, the value of $\frac{BC}{BD}$ is $\frac{38}{15}$.

Choice A is incorrect. This is the value of $\frac{BD}{BC}$. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 27

The correct answer is -7. For a quadratic function defined by an equation of the form $f(x)=a(x-h)^2+k$, where a, h, and k are constants and $a>0$, the function reaches its minimum when $x=h$. In the given function, $a=1$, $h=-7$, and $k=4$. Therefore, the value of x for which $f(x)$ reaches its minimum is -7.

Math

(27 questions)

QUESTION 1

Choice C is correct. The median of a data set represented in a box plot is given by the vertical line within the box. In the given box plot, the vertical line within the box occurs at 5. Therefore, the median of this data set is 5.

Choice A is incorrect. This is the minimum value of the data set. *Choice B* is incorrect and may result from conceptual errors. *Choice D* is incorrect. This is the maximum value of the data set.

QUESTION 2

Choice D is correct. The *x*-intercept of the graph shown is the point (x, y) on the graph where $y = 0$. At $y = 0$, the corresponding value of x is 4. Therefore, the *x*-intercept of the graph shown is $(4, 0)$.

Choice A is incorrect. This is the *x*-intercept of a graph in the *xy*-plane that intersects the *x*-axis at $x = -5$, not $x = 4$. *Choice B* is incorrect. This is the *x*-intercept of a graph in the *xy*-plane that intersects the *x*-axis at $x = 5$, not $x = 4$. *Choice C* is incorrect. This is the *x*-intercept of a graph in the *xy*-plane that intersects the *x*-axis at $x = -4$, not $x = 4$.

QUESTION 3

Choice B is correct. It's given that Henry uses his $\$60.00$ gift card to buy 3 movies for $\$7.50$ each. Therefore, Henry spends $3(\$7.50)$, or $\$22.50$, of his $\$60.00$ gift card to buy 3 movies. After buying 3 movies with his $\$60.00$ gift card, Henry has a gift card balance of $\$60.00 - \$22.50$, or $\$37.50$. It's also given that Henry spends the rest of his gift card balance on renting movies for $\$1.50$ each. Therefore, Henry can rent $\frac{\$37.50}{\$1.50}$, or 25, movies.

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

QUESTION 4

Choice A is correct. It's given that the graphs of the given equations intersect at the point (x, y) in the xy-plane. It follows that (x, y) represents a solution to the system consisting of the given equations. The first equation given is $x = 49$. Substituting 49 for x in the second equation given, $y = \sqrt{x} + 9$, yields $y = \sqrt{49} + 9$, which is equivalent to $y = 7 + 9$, or $y = 16$. It follows that the graphs of the given equations intersect at the point $(49, 16)$. Therefore, the value of y is 16.

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

QUESTION 5

Choice C is correct. It's given that the cherry pitting machine pits 12 pounds of cherries in 3 minutes. This rate can be written as $\frac{12 \text{ pounds of cherries}}{3 \text{ minutes}}$. If the number of minutes it takes the machine to pit 96 pounds of cherries is represented by x, the value of x can be calculated by solving the equation $\frac{12 \text{ pounds of cherries}}{3 \text{ minutes}} = \frac{96 \text{ pounds of cherries}}{x \text{ minutes}}$, which can be rewritten as $\frac{12}{3} = \frac{96}{x}$, or $4 = \frac{96}{x}$. Multiplying each side of this equation by x yields $4x = 96$. Dividing each side of this equation by 4 yields $x = 24$. Therefore, it takes the machine 24 minutes to pit 96 pounds of cherries.

Choice A is incorrect. This is the number of minutes it takes the machine to pit 32, not 96, pounds of cherries. *Choice B* is incorrect. This is the number of minutes it takes the machine to pit 60, not 96, pounds of cherries. *Choice D* is incorrect. This is the number of minutes it takes the machine to pit 144, not 96, pounds of cherries.

QUESTION 6

The correct answer is 54. Dividing both sides of the given equation by 2 yields $x = 6$. Multiplying both sides of this equation by 9 yields $9x = 54$. Thus, the value of $9x$ is 54.

QUESTION 7

The correct answer is $\frac{1}{4}$. It's given that line k is defined by $y = \frac{1}{4}x + 1$. It's also given that line j is parallel to line k in the xy-plane. A line in the xy-plane represented by an equation in slope-intercept form $y = mx + b$ has a slope of m and a y-intercept of $(0, b)$. Therefore, the slope of line k is $\frac{1}{4}$. Since parallel lines have equal slopes, the slope of line j is $\frac{1}{4}$. Note that 1/4 and .25 are examples of ways to enter a correct answer.

QUESTION 8

Choice B is correct. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since the data set shown has 7 data values and is in ascending order, it follows that the median is the fourth data value in the list, or 8. If a data set contains an even number of data values, the median is between the two middle data values when the values are listed in ascending or descending order. Since each of the choices consists of a data set with 6 data values in ascending order, it follows that the median is between the third and fourth data value. The third and fourth data values in choice B are 8 and 8. Thus, choice B represents a data set with a median of 8. Since the median of the data set shown is 8 and choice B represents a data set with a median of 8, it follows that choice B represents a data set that has the same median as the data set shown.

Choice A is incorrect. This list represents a data set with a median of 6, not 8. *Choice C* is incorrect. This list represents a data set with a median of 10, not 8. *Choice D* is incorrect. This list represents a data set with a median of 10, not 8.

QUESTION 9

Choice D is correct. It's given that the length of the base of the parallelogram is 89% of the height of the parallelogram. Since h is the height of the parallelogram, it follows that the length of the base of the parallelogram can be represented by the expression $\frac{89}{100}h$, or $0.89h$.

Choice A is incorrect. This expression represents 8,900%, not 89%, of the height of the parallelogram. *Choice B* is incorrect. This expression represents 8.9%, not 89%, of the height of the parallelogram. *Choice C* is incorrect. This expression represents 890%, not 89%, of the height of the parallelogram.

QUESTION 10

Choice A is correct. It's given that for a camping trip a group bought x one-liter bottles of water and y three-liter bottles of water. Since the group bought x one-liter bottles of water, the total number of liters bought from x one-liter bottles of water is represented as $1x$, or x. Since the group bought y three-liter bottles of water, the total number of liters bought from y three-liter bottles of water is represented as $3y$. It's given that the group bought a total of 240 liters; thus, the equation $x+3y=240$ represents this situation.

Choice B is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect. This equation represents a situation where the group bought x three-liter bottles of water and y one-liter bottles of water, for a total of 240 liters of water.

QUESTION 11

Choice C is correct. Each of the given choices gives three values of x: 0, 1, and 2. Substituting 0 for x in the given equation yields $y=-4(0)+40$, or $y=40$.

Therefore, when $x = 0$, the corresponding value of y for the given equation is 40. Substituting 1 for x in the given equation yields $y = -4(1) + 40$, or $y = 36$. Therefore, when $x = 1$, the corresponding value of y for the given equation is 36. Substituting 2 for x in the given equation yields $y = -4(2) + 40$, or $y = 32$. Therefore, when $x = 2$, the corresponding value of y for the given equation is 32. Choice C gives three values of x, 0, 1, and 2, and their corresponding values of y, 40, 36, and 32, respectively, for the given equation.

Choice A is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = -4x$. *Choice B* is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = 4x + 40$. *Choice D* is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = 4x$.

QUESTION 12

Choice D is correct. Since the shaded region shown represents solutions to an inequality, an ordered pair (x, y) is a solution to the inequality if it's represented by a point in the shaded region. Of the given choices, only $(4, 0)$ is represented by a point in the shaded region. Therefore, $(4, 0)$ is a solution to the inequality.

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

QUESTION 13

The correct answer is 84. The sum of the measures of the interior angles of a triangle is 180°. It's given that in triangle JKL, the measures of $\angle K$ and $\angle L$ are each 48°. Adding the measures, in degrees, of $\angle K$ and $\angle L$ gives $48 + 48$, or 96. Therefore, the measure of $\angle J$, in degrees, is $180 - 96$, or 84.

QUESTION 14

The correct answer is 99. In the given system of equations, the second equation is $x + 8 = 11$. Subtracting 8 from both sides of this equation yields $x = 3$. In the given system of equations, the first equation is $y = x^2 + 14x + 48$. Substituting 3 for x in this equation yields $y = (3)^2 + 14(3) + 48$, or $y = 99$. Therefore, the solution to the given system of equations is $(x, y) = (3, 99)$. Thus, the value of y is 99.

QUESTION 15

Choice A is correct. It's given that the cleaning service cleans both offices and homes, where f is the number of offices and h is the number of homes the cleaning service can clean per day. Therefore, the expression $f + h$ represents the number of places the cleaning service can clean per day. It's also given that the cleaning service can clean at most 14 places per day. Since $f + h$ represents the number of places the cleaning service can clean per day and the service can clean at most 14 places per day, it follows that the inequality $f + h \leq 14$ represents this situation.

Choice B is incorrect. This inequality represents a cleaning service that cleans at least 14 places per day. *Choice C* is incorrect. This inequality represents a cleaning service that cleans at most 14 more offices than homes per day. *Choice D* is incorrect. This inequality represents a cleaning service that cleans at least 14 more offices than homes per day.

QUESTION 16

Choice A is correct. Since 2 is a common factor of each of the terms in the given expression, the expression can be rewritten as $2\left(x^2+19x+5\right)$. Therefore, the factors of the given expression are 2 and $x^2+19x+5$. Of these two factors, only 2 is listed as a choice.

Choice B is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect. This is a term of the given expression, not a factor of the given expression. *Choice D* is incorrect. This is a term of the given expression, not a factor of the given expression.

QUESTION 17

Choice B is correct. It's given that the equation $40x+20y=160$ represents the number of sweaters, x, and the number of shirts, y, that Yesenia purchased for \$160. If Yesenia purchased 2 sweaters, the number of shirts she purchased can be calculated by substituting 2 for x in the given equation, which yields $40\left(2\right)+20y=160$, or $80+20y=160$. Subtracting 80 from both sides of this equation yields $20y=80$. Dividing both sides of this equation by 20 yields $y=4$. Therefore, if Yesenia purchased 2 sweaters, she purchased 4 shirts.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect. This is the number of shirts Yesenia purchased if she purchased 0 sweaters. *Choice D* is incorrect. This is the price, in dollars, for each sweater, not the number of shirts Yesenia purchased.

QUESTION 18

Choice C is correct. In the given equation, x represents the number of days after a new product launched, where $0\le x\le 20$, and y represents the estimated stock price, in dollars, for a certain company. Therefore, the best interpretation of $\left(x,y\right)=\left(1,83\right)$ in this context is that 1 day after the new product launched, the company's estimated stock price is \$83.

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

QUESTION 19

Choice B is correct. For the given linear function f, $f\left(x\right)$ must equal 39 for all values of x. Of the given choices, only choice B gives three values of x and their corresponding values of $f\left(x\right)$ for the given linear function f.

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

QUESTION 20

The correct answer is 27. It's given that a triangular prism has a volume of 216 cubic centimeters (cm^3) and the volume of a triangular prism is equal to Bh, where B is the area of the base and h is the height of the prism. Therefore, $216 = Bh$. It's also given that the triangular prism has a height of 8 cm. Therefore, $h = 8$. Substituting 8 for h in the equation $216 = Bh$ yields $216 = B(8)$. Dividing both sides of this equation by 8 yields $27 = B$. Therefore, the area, in cm^2, of the base of the prism is 27.

QUESTION 21

The correct answer is $\frac{1}{2}$. For the graph shown, x represents time, in seconds, and y represents momentum, in newton-seconds. Therefore, the average rate of change, in newton-seconds per second, in the momentum of the object between two x-values is the difference in the corresponding y-values divided by the difference in the x-values. The graph shows that at $x = 2$, the corresponding y-value is 6. The graph also shows that at $x = 6$, the corresponding y-value is 8. It follows that the average rate of change, in newton-seconds per second, from $x = 2$ to $x = 6$ is $\frac{8-6}{6-2}$, which is equivalent to $\frac{2}{4}$, or $\frac{1}{2}$. Note that 1/2 and .5 are examples of ways to enter a correct answer.

QUESTION 22

Choice C is correct. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions when the two linear equations are equivalent. Dividing both sides of the given equation by 5 yields $-3x + 5y = 13$. Dividing both sides of choice C by 4 also yields $-3x + 5y = 13$, so choice C is equivalent to the given equation. Thus, choice C could be the second equation in the system.

Choice A is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions. *Choice B* is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions. *Choice D* is incorrect. The system consisting of this equation and the given equation has no solution, not infinitely many solutions.

QUESTION 23

Choice B is correct. If the bus traveled at an average speed of 55 miles per hour (mph) on the highway for x hours, then the bus traveled $55x$ miles on the highway. If the bus traveled at an average speed of 25 mph on local roads for y hours, then the bus traveled $25y$ miles on local roads. It's given that the trip was 160 miles. This can be represented by the equation $55x + 25y = 160$. It's also given that the trip took 4 hours. This can be

represented by the equation $x+y=4$. Therefore, the system consisting of the equations $55x+25y=160$ and $x+y=4$ represents this situation.

Choice A is incorrect. This system of equations represents a situation where the trip was 4 miles and took 160 hours. *Choice C* is incorrect. This system of equations represents a situation where the trip was 4 miles and took 160 hours, and the bus traveled at an average speed of 25 mph on the highway and 55 mph on local roads. *Choice D* is incorrect. This system of equations represents a situation where the bus traveled at an average speed of 25 mph on the highway and 55 mph on local roads.

QUESTION 24

Choice B is correct. It's given that quadrilateral $P'Q'R'S'$ is similar to quadrilateral $PQRS$, where P, Q, R, and S correspond to P', Q', R', and S', respectively. Since corresponding angles of similar quadrilaterals are congruent, it follows that the measure of angle P is equal to the measure of angle P'. It's given that the measure of angle P is 30°. Therefore, the measure of angle P' is 30°.

Choice A is incorrect. This is $\frac{1}{3}$ the measure of angle P'. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is 3 times the measure of angle P'.

QUESTION 25

Choice B is correct. It's given that $f(x)=2x+244$ represents the perimeter, in centimeters (cm), of a rectangle with a length of x cm and a fixed width. If w represents a fixed width, in cm, then the perimeter, in cm, of a rectangle with a length of x cm and a fixed width of w cm can be given by the function $f(x)=2x+2w$. Therefore, $2x+2w=2x+244$. Subtracting $2x$ from both sides of this equation yields $2w=244$. Dividing both sides of this equation by 2 yields $w=122$. Therefore, the width, in cm, of the rectangle is 122.

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 26

Choice B is correct. Functions f and g are both exponential functions with a base of 0.40. Since 0.40 is less than 1, functions f and g are both decreasing exponential functions. This means that $f(x)$ and $g(x)$ decrease as x increases. Since $f(x)$ and $g(x)$ decrease as x increases, the maximum value of each function occurs at the least value of x for which the function is defined. It's given that functions f and g are defined for $x\geq 0$. Therefore, the maximum value of each function occurs at $x=0$. Substituting 0 for x in the equation defining f yields $f(0)=33(0.4)^{0+3}$, which is equivalent to $f(0)=33(0.4)^{3}$, or $f(0)=2.112$. Therefore, the maximum value of f is 2.112. Since the equation $f(x)=33(0.4)^{x+3}$ doesn't display the value 2.112, the equation defining f doesn't display the maximum value of f. Substituting 0 for x in the equation defining g yields

$g(0)=33(0.16)(0.4)^{0-2}$, which can be rewritten as $g(0)=33(0.16)\left(\frac{1}{0.4^2}\right)$, or $g(0)=33(0.16)\left(\frac{1}{0.16}\right)$, which is equivalent to $g(0)=33$. Therefore, the maximum value of g is 33. Since the equation $g(x)=33(0.16)(0.4)^{x-2}$ displays the value 33, the equation defining g displays the maximum value of g. Thus, only equation II displays, as a constant or coefficient, the maximum value of the function it defines.

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 27

The correct answer is $\frac{1}{16}$. Let p and q represent the solutions to the given equation. Then, the given equation can be rewritten as $64(x-p)(x-q)=0$, or $64x^2-64(p+q)+pq=0$. Since this equation is equivalent to the given equation, it follows that $-(16a+4b)=-64(p+q)$. Dividing both sides of this equation by -64 yields $\frac{16a+4b}{64}=p+q$, or $\frac{1}{16}(4a+b)=p+q$. Therefore, the sum of the solutions to the given equation, $p+q$, is equal to $\frac{1}{16}(4a+b)$. Since it's given that the sum of the solutions to the given equation is $k(4a+b)$, where k is a constant, it follows that $k=\frac{1}{16}$. Note that 1/16, .0625, 0.062, and 0.063 are examples of ways to enter a correct answer.

Alternate approach: The given equation can be rewritten as $64x^2-4(4a+b)x+ab=0$, where a and b are positive constants. Dividing both sides of this equation by 4 yields $16x^2-(4a+b)x+\frac{ab}{4}=0$. The solutions for a quadratic equation in the form $Ax^2+Bx+C=0$, where A, B, and C are constants, can be calculated using the quadratic formula, $x=\frac{-B+\sqrt{B^2-4AC}}{2A}$ and $x=\frac{-B-\sqrt{B^2-4AC}}{2A}$. It follows that the sum of the solutions to a quadratic equation in the form $Ax^2+Bx+C=0$ is $\frac{-B+\sqrt{B^2-4AC}}{2A}+\frac{-B-\sqrt{B^2-4AC}}{2A}$, which can be rewritten as $\frac{-B+-B+\sqrt{B^2-4AC}-\sqrt{B^2-4AC}}{2A}$, which is equivalent to $\frac{-2B}{2A}$, or $-\frac{B}{A}$. In the equation $16x^2-(4a+b)x+\frac{ab}{4}=0$, $A=16$, $B=-(4a+b)$, and $C=\frac{ab}{4}$. Substituting 16 for A and $-(4a+b)$ for B in $-\frac{B}{A}$ yields $-\frac{-(4a+b)}{16}$, which can be rewritten as $\frac{1}{16}(4a+b)$. Thus, the sum of the solutions to the given equation is $\frac{1}{16}(4a+b)$. Since it's given that the sum of the solutions to the given equation is $k(4a+b)$, where k is a constant, it follows that $k=\frac{1}{16}$.