The SAT®

Practice Test #5

ANSWER EXPLANATIONS

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

CollegeBoard SAT®

Math

Module 1

(27 questions)

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, 4×10, 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 D is correct. The y-intercept of a graph is the point where the graph intersects the y-axis. The graph of function f shown intersects the y-axis at the point $(0, 8)$. Therefore, the y-intercept of the graph of f is $(0, 8)$.

Choice A is incorrect. This is the point where the x-axis, not the graph of f, intersects the y-axis. *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 4

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 5

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 6

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 7

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 8

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 $x°$ and the angle with measure $145°$ 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 9

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 10

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 $\left(\frac{16}{20}\right)$ 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 $\left(\frac{80}{100}\right)(400)$, 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 11

Choice C is correct. Dividing all terms in the given equation by 4 yields $\frac{4x}{4} - \frac{28}{4} = -\frac{24}{4}$, or $x - 7 = -6$. Therefore, the value of $x - 7$ 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 12

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 13

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 $x>0$. Since 6 is greater than 0, it follows that the value of x is 6.

QUESTION 14

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 15

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 726π.

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 16

Choice D is correct. It's given that the graph of the rational function f is shown, where $y = f(x)$ and $x \geq 0$. The graph shown passes through the point $(3, 3)$. It follows that when the value of x is 3, the value of $f(x)$ is 3. When the value of $f(x)$ is 3, the value of $f(x) + 5$ is $3 + 5$, or 8. Therefore, the graph of $y = f(x) + 5$ passes through the point $(3, 8)$. Of the given choices, choice D is the only graph that passes through the point $(3, 8)$ and is therefore the graph of $y = f(x) + 5$.

Choice A is incorrect. This is the graph of $y = f(x) - 5$, rather than $y = f(x) + 5$.
Choice B is incorrect. This is the graph of $y = \frac{f(x)}{5}$, rather than $y = f(x) + 5$.
Choice C is incorrect and may result from conceptual or calculation errors.

QUESTION 17

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 18

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 19

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 2π radians in a circle. Dividing $\frac{92\pi}{3}$ by 2π 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 $\tan\left(\frac{92\pi}{3}\right)$ is equal to $\tan\left(\frac{2\pi}{3}\right)$. Since $\frac{2\pi}{3}$ is greater than $\frac{\pi}{2}$ and less than π, it follows that the terminal side of the angle is in quadrant II and forms an angle of $\frac{\pi}{3}$, or 60°, with the negative *x*-axis. Therefore, the terminal side of the angle intersects the unit circle at the point $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$. It follows that the value of $\tan\left(\frac{2\pi}{3}\right)$ is $\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$, which is equivalent to $-\sqrt{3}$. Therefore, the value of $\tan\left(\frac{92\pi}{3}\right)$ is $-\sqrt{3}$.

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

QUESTION 20

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 $x°$ is 11 units and the length of the hypotenuse is 28 units. Therefore, the value of $\cos x°$ is $\frac{11}{28}$. Note that 11/28, .3928, .3929, 0.392, and 0.393 are examples of ways to enter a correct answer.

QUESTION 21

The correct answer is 336. By the zero product property, if $(x+14)(t-x)=0$, 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 $g(x)=(x+14)(t-x)$ yields $g(x)=(x+14)(24-x)$. The value of $g(0)$ can be calculated by substituting 0 for x in this equation, which yields $g(0)=(0+14)(24-0)$, or $g(0)=336$.

QUESTION 22

Choice B is correct. An equation of the form $(x-h)^2+(y-k)^2=r^2$, where h, k, and r 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 23

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 24

Choice D is correct. A function of the form $f(x)=a(b)^x+c$, where $a<0$ 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.

QUESTION 25

Choice A is correct. It's given that the result of increasing the quantity x by 400% is 60. This can be written as $x+\left(\frac{400}{100}\right)x=60$, which is equivalent to $x+4x=60$, or $5x=60$. Dividing each side of this equation by 5 yields $x=12$. Therefore, the value of x is 12.

Choice B is incorrect. The result of increasing the quantity 15 by 400% is 75, not 60. *Choice C* is incorrect. The result of increasing the quantity 240 by 400% is 1,200, not 60. *Choice D* is incorrect. The result of increasing the quantity 340 by 400% is 1,700, not 60.

QUESTION 26

Choice A is correct. It's given that the graph of $y = f(x)$ in the xy-plane passes through the points $(7, 0)$ and $(-3, 0)$. It follows that when the value of x is either 7 or -3, the value of $f(x)$ is 0. It's also given that the function f is defined by $f(x) = ax^2 + bx + c$, where a, b, and c are constants. It follows that the function f is a quadratic function and, therefore, may be written in factored form as $f(x) = a(x - u)(x - v)$, where the value of $f(x)$ is 0 when x is either u or v. Since the value of $f(x)$ is 0 when the value of x is either 7 or -3, and the value of $f(x)$ is 0 when the value of x is either u or v, it follows that u and v are equal to 7 and -3. Substituting 7 for u and -3 for v in the equation $f(x) = a(x - u)(x - v)$ yields $f(x) = a(x - 7)(x - (-3))$, or $f(x) = a(x - 7)(x + 3)$. Distributing the right-hand side of this equation yields $f(x) = a(x^2 - 7x + 3x - 21)$, or $f(x) = ax^2 - 4ax - 21a$. Since it's given that $f(x) = ax^2 + bx + c$, it follows that $b = -4a$. Adding a to each side of this equation yields $a + b = -3a$. Since $a + b = -3a$, if a is an integer, the value of $a + b$ must be a multiple of 3. If a is an integer greater than 1, it follows that $a \geq 2$. Therefore, $-3a \leq -3(2)$. It follows that the value of $a + b$ is less than or equal to $-3(2)$, or -6. Of the given choices, only -6 is a multiple of 3 that's less than or equal to -6.

Choice B is incorrect. This is the value of $a + b$ if a is equal to, not greater than, 1.
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 25. The value of $g(7 - w)$ is the value of $g(x)$ when $x = 7 - w$, where w is a constant. Substituting $7 - w$ for x in the given equation yields $g(7 - w) = (7 - w)(7 - w - 2)(7 - w + 6)^2$, which is equivalent to $g(7 - w) = (7 - w)(5 - w)(13 - w)^2$. It's given that the value of $g(7 - w)$ is 0. Substituting 0 for $g(7 - w)$ in the equation $g(7 - w) = (7 - w)(5 - w)(13 - w)^2$ yields $0 = (7 - w)(5 - w)(13 - w)^2$. Since the product of the three factors on the right-hand side of this equation is equal to 0, at least one of these three factors must be equal to 0. Therefore, the possible values of w can be found by setting each factor equal to 0. Setting the first factor equal to 0 yields $7 - w = 0$. Adding w to both sides of this equation yields $7 = w$. Therefore, 7 is one possible value of w. Setting the second factor equal to 0 yields $5 - w = 0$. Adding w to both sides of this equation yields $5 = w$. Therefore, 5 is a second possible value of w. Setting the third factor equal to 0 yields $(13 - w)^2 = 0$. Taking the square root of both sides of this equation yields $13 - w = 0$. Adding w to both sides of this equation yields $13 = w$. Therefore, 13 is a third possible value of w. Adding the three possible values of w yields $7 + 5 + 13$, or 25. Therefore, the sum of all possible values of w is 25.

Math

Module 2

(27 questions)

QUESTION 1

Choice B is correct. 20% of 440 can be calculated as $\left(\frac{20}{100}\right)(440)$, 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 $2xy(8x^2y+7)$.

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

Choice D is correct. It's given that a veterinarian recommends that each day the rabbit should eat 25 calories per pound of the rabbit's weight, plus an additional 11 calories. If the rabbit's weight is x pounds, then multiplying 25 calories per pound by the rabbit's weight, x pounds, yields $25x$ calories. Adding the additional 11 calories that the rabbit should eat each day yields $25x+11$ calories. It's given that c is the total number of calories the veterinarian recommends the rabbit should eat each day if the rabbit's weight is x pounds. Therefore, this situation can be represented by the equation $c=25x+11$.

Choice A is incorrect. This equation represents a situation where a veterinarian recommends that each day the rabbit should eat 25 calories per pound of the rabbit's weight. *Choice B* is incorrect. This equation represents a situation where a veterinarian recommends that each day the rabbit should eat $25+11$, or 36, calories per pound of the rabbit's weight. *Choice C* is incorrect. This equation represents a situation where a veterinarian recommends that each day the rabbit should eat 11 calories per pound of the rabbit's weight, plus an additional 25 calories.

QUESTION 6

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 7

The correct answer is either -30 or 30. Adding 7 to each side of the given equation yields $(d-30)(d+30)=0$. Since a product of two factors is equal to 0 if and only if at least one of the factors is 0, either $d-30=0$ or $d+30=0$. Adding 30 to each side of the equation $d-30=0$ yields $d=30$. Subtracting 30 from each side of the equation $d+30=0$ yields $d=-30$. Therefore, the solutions to the given equation are -30 and 30. Note that -30 and 30 are examples of ways to enter a correct answer.

QUESTION 8

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 9

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 10

Choice A is correct. It's given that the kinetic energy, in joules, of an object with a mass of 9 kilograms traveling at a speed of v meters per second is given by the function K, where $K(v)=\frac{9}{2}v^2$. It follows that in the equation $K(34)=5{,}202$, 34 is the value of v, or the speed of the object, in meters per second, and $5{,}202$ is the kinetic energy, in joules, of the object at that speed. Therefore, the best interpretation of $K(34)=5{,}202$ in this context is the object traveling at 34 meters per second has a kinetic energy of $5{,}202$ joules.

Choice B is incorrect. The object traveling at 340 meters per second has a kinetic energy of $520{,}200$ joules. *Choice C* is incorrect. The object traveling at $5{,}202$ meters per second has a kinetic energy of $121{,}773{,}618$ joules. *Choice D* is incorrect. The object traveling at $23{,}409$ meters per second has a kinetic energy of $2{,}465{,}915{,}764.5$ joules.

QUESTION 11

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 12

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 $(0.48)(350)$, or 168, customers are located in theater A. If the probability of selecting a customer in theater B is 0.24, then $(0.24)(350)$, 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 13

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 $(0, b)$ 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 44/3, 14.66, and 14.67 are examples of ways to enter a correct answer.

QUESTION 14

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 $5(841)$, or 4,205, square inches.

QUESTION 15

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 16

Choice A is correct. The sum of the measures of the angles of a triangle is 180°. Therefore, the sum of the measures of $\angle R$, $\angle S$, and $\angle T$ is 180°. It's given that the measure of $\angle R$ is 63°. It follows that the sum of the measures of $\angle S$ and $\angle T$ is $(180-63)°$, or 117°. Therefore, the measure of $\angle S$, in degrees, must be less than 117. 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°, then the sum of the measures of the angles of the triangle is greater than, not equal to, 180°. *Choice C* is incorrect. If the measure of $\angle S$ is 126°, then the sum of the measures of the angles of the triangle is greater than, not equal to, 180°. *Choice D* is incorrect. This is the sum of the measures of the angles of a triangle, in degrees.

QUESTION 17

Choice B is correct. The given expression is equivalent to $8x^3+8-x^3-(-2)$, or $8x^3+8-x^3+2$. Combining like terms in this expression yields $7x^3+10$.

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 $(8x^3+8)-(-2)$, 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 18

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 19

Choice D is correct. All the tables in the choices have the same three values of x, 440, 441, and 442, so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 440 for x in the given inequality yields $2(440)-y>883$, or $880-y>883$. Subtracting 880 from both sides of this inequality yields $-y>3$. Dividing both sides of this inequality by -1 yields $y<-3$. Therefore, when $x=440$, the corresponding value of y must be less than -3. Substituting 441 for x in the given inequality yields $2(441)-y>883$, or $882-y>883$. Subtracting 882 from both sides of this inequality yields $-y>1$. Dividing both sides of this inequality by -1 yields $y<-1$. Therefore, when $x=441$, the corresponding value of y must be less than -1. Substituting 442 for x in the given inequality yields

$2(442)-y>883$, or $884-y>883$. Subtracting 884 from both sides of this inequality yields $-y>-1$. Dividing both sides of this inequality by -1 yields $y<1$. Therefore, when $x=442$, the corresponding value of y must be less than 1. For the table in choice D, when $x=440$, the corresponding value of y is -4, which is less than -3; when $x=441$, the corresponding value of y is -2, which is less than -1; when $x=442$, the corresponding value of y is 0, which is less than 1. Therefore, the table in choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. When $x=440$, the corresponding value of y in this table is 0, which isn't less than -3. *Choice B* is incorrect. When $x=440$, the corresponding value of y in this table is 0, which isn't less than -3. *Choice C* is incorrect. When $x=440$, the corresponding value of y in this table is -2, which isn't less than -3.

QUESTION 20

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 21

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 $s^2+b^2=(2s)^2$, or $s^2+b^2=4s^2$. 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 $1{,}089\sqrt{3}=s(s\sqrt{3})$, 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 22

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 $(6x)(6y)$, 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 $36(54)$, 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 $\sqrt{\frac{1}{6}}$, 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 $\sqrt{\frac{2}{3}}$, 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 $\sqrt{6}$, not 6, times the length of the corresponding side of $ABCD$.

QUESTION 23

Choice D is correct. Two fractions can be added together when they have a common denominator. Since $k > 0$, multiplying the second term in the given expression by $\frac{k}{k}$ yields $\frac{(42ak)k}{k}$, 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 $\frac{42a(1) + 42a(k^2)}{k}$, 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 24

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 25

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, $\left(\frac{6}{4}\right)t$. If the exponent is equal to 0, then $\left(\frac{6}{4}\right)t=0$. Multiplying both sides of this equation by $\left(\frac{4}{6}\right)$ yields $t=0$. If the exponent is equal to 1, then $\left(\frac{6}{4}\right)t=1$. Multiplying both sides of this equation by $\left(\frac{4}{6}\right)$ 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 $\left(\frac{2}{3}\right)(12)$, 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 $P(t)=260(1.04)^t$, not $P(t)=260(1.04)^{\left(\frac{6}{4}\right)t}$. *Choice C* is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model $P(t)=260(1.04)^{\left(\frac{4}{6}\right)t}$, not $P(t)=260(1.04)^{\left(\frac{6}{4}\right)t}$. *Choice D* is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model $P(t)=260(1.04)^{\left(\frac{1}{6}\right)t}$, not $P(t)=260(1.04)^{\left(\frac{6}{4}\right)t}$.

QUESTION 26

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 $\left(0, \frac{6}{5}\right)$ 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 $\frac{6}{5}$.

QUESTION 27

The correct answer is $4{,}176$. It's given that the side length of the larger square is 3 times the side length of the smaller square. This means that the area of the larger square is 3^2, or 9, times the area of the smaller square. If the area of the smaller square is represented by x, then the area of the larger square can be represented by $9x$. Therefore, the flat surface of the two adjacent squares has a total area of $x+9x$, or $10x$. It's given that an electric field with strength 29.00 volts per meter passes uniformly through this surface and the total electric flux of the electric field through this surface is $4{,}640$ volts · meters. Since it's given that the electric flux is the product of the electric field's strength and the area of the surface, the equation $29.00(10x)=4{,}640$, or $290x=4{,}640$, can be used to represent this situation. Dividing each side of this equation by 290 yields $x=16$. Substituting 16 for x in the expression for the area of the larger square, $9x$, yields $9(16)$, or 144, square meters. Since the area of the larger square is 144 square meters, the electric flux, in volts · meters, of the electric field through the larger square can be determined by multiplying the area of the larger square by the strength of the electric field. Thus, the electric flux is $(144 \text{ square meters})\left(\frac{29.00 \text{ volts}}{\text{meter}}\right)$, or $4{,}176$ volts · meters.