The SAT®

Practice Test #4

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 B is correct. The height of each bar in the bar graph given represents the number of students that voted for the activity specified at the bottom of the bar. The bar for activity 3 has a height that is between 35 and 40. In other words, the number of students that chose activity 3 is between 35 students and 40 students. Of the given choices, 39 is the only value between 35 and 40. Therefore, 39 students chose activity 3.

Choice A is incorrect and may result from conceptual errors. *Choice C* is incorrect. This is the number of students that chose activity 5, not activity 3. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 2

Choice A is correct. Let x represent the percentage of 300 that is 75. This can be written as $\frac{x}{100}(300)=75$, or $3x=75$. Dividing both sides of this equation by 3 yields $x=25$. Therefore, 25% of 300 is 75.

Choice B is incorrect. 50% of 300 is 150, not 75. *Choice C* is incorrect. 75% of 300 is 225, not 75. *Choice D* is incorrect. 225% of 300 is 675, not 75.

QUESTION 3

Choice B is correct. Multiplying the left- and right-hand sides of the given equation by 25 yields $x^2=900$. Taking the square root of the left- and right-hand sides of this equation yields $x=30$ or $x=-30$. Of these two solutions, only 30 is given as a choice.

Choice A is incorrect. This is a solution to the equation $x^2=36$. *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 D is correct. The given phrase "8 times a number x" can be represented by the expression $8x$. The given phrase "3 more than" indicates an increase of 3 to a quantity. Therefore "3 more than 8 times a number x" can be represented by the expression $8x+3$. Since it's given that 3 more than 8 times a number x is equal to 83, it follows that $8x+3$ is equal to 83, or $8x+3=83$. Therefore, the equation that represents this situation is $8x+3=83$.

Choice A is incorrect. This equation represents 3 times the quantity 8 times a number x is equal to 83. *Choice B* is incorrect. This equation represents 8 times a number x is equal to 3 more than 83. *Choice C* is incorrect. This equation represents 8 more than 3 times a number x is equal to 83.

QUESTION 5

Choice A is correct. It's given that t represents the number of monthly deposits. In the given function $f(t)=100+25t$, the coefficient of t is 25. This means that for every increase in the value of t by 1, the value of $f(t)$ increases by 25. It follows that with each monthly deposit, the amount in Hana's bank account increased by $\$25$.

Choice B is incorrect. Before Hana made any monthly deposits, the amount in her bank account was $\$100$. *Choice C* is incorrect. After 1 monthly deposit, the amount in Hana's bank account was $\$125$. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 6

The correct answer is 9. It's given that the customer spent $\$27$ to purchase oranges at $\$3$ per pound. Therefore, the number of pounds of oranges the customer purchased is $\$27\left(\frac{1\text{ pound}}{\$3}\right)$, or 9 pounds.

QUESTION 7

The correct answer is 10. It's given that the cost for the entire purchase was $\$27$ after a coupon was used for $\$63$ off the entire purchase. Adding the amount of the coupon to the purchase price yields $27+63=90$. Thus, the cost for the entire purchase before using the coupon was $\$90$. It's given that Nasir bought 9 storage bins. The original price for 1 storage bin can be found by dividing the total cost by 9. Therefore, the original price, in dollars, for 1 storage bin is $\frac{90}{9}$, or 10.

QUESTION 8

Choice A is correct. An equation that defines a linear function f can be written in the form $f(x)=mx+b$, where m and b are constants. It's given in the table that when $x=0$, $f(x)=29$. Substituting 0 for x and 29 for $f(x)$ in the equation $f(x)=mx+b$ yields $29=m(0)+b$, or $29=b$. Substituting 29 for b in the equation $f(x)=mx+b$ yields $f(x)=mx+29$. It's also given in the table that when $x=1$, $f(x)=32$. Substituting 1 for x and 32 for $f(x)$ in the equation

$f(x)=mx+29$ yields $32=m(1)+29$, or $32=m+29$. Subtracting 29 from both sides of this equation yields $3=m$. Substituting 3 for m in the equation $f(x)=mx+29$ yields $f(x)=3x+29$.

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 9

Choice B is correct. In similar triangles, corresponding angles are congruent. It's given that right triangles PQR and STU are similar, where angle P corresponds to angle S. It follows that angle P is congruent to angle S. In the triangles shown, angle R and angle U are both marked as right angles, so angle R and angle U are corresponding angles. It follows that angle Q and angle T are corresponding angles, and thus, angle Q is congruent to angle T. It's given that the measure of angle Q is $18°$, so the measure of angle T is also $18°$. Angle U is a right angle, so the measure of angle U is $90°$. The sum of the measures of the interior angles of a triangle is $180°$. Thus, the sum of the measures of the interior angles of triangle STU is 180 degrees. Let s represent the measure, in degrees, of angle S. It follows that $s+18+90=180$, or $s+108=180$. Subtracting 108 from both sides of this equation yields $s=72$. Therefore, if the measure of angle Q is 18 degrees, then the measure of angle S is 72 degrees.

Choice A is incorrect. This is the measure of angle T. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is the sum of the measures of angle S and angle U.

QUESTION 10

Choice D is correct. The data points suggest that as the variable x increases, the variable y decreases, which implies that an appropriate linear model for the data has a negative slope. The data points also show that when x is close to 0, y is greater than 9. Therefore, the y-intercept of the graph of an appropriate linear model has a y-coordinate greater than 9. The graph of an equation of the form $y=a+bx$, where a and b are constants, has a y-intercept with a y-coordinate of a and has a slope of b. Of the given choices, only choice D represents a graph that has a negative slope, -0.9, and a y-intercept with a y-coordinate greater than 9, 9.4.

Choice A is incorrect. The graph of this equation has a positive slope, not a negative slope, and a y-intercept with a y-coordinate less than 1, not greater than 9. *Choice B* is incorrect. The graph of this equation has a y-intercept with a y-coordinate less than 1, not greater than 9. *Choice C* is incorrect. The graph of this equation has a positive slope, not a negative slope.

QUESTION 11

Choice A is correct. The number of birds can be found by calculating the value of b when $r=16$ in the given equation. Substituting 16 for r in the given equation yields $2.5b+5(16)=80$, or $2.5b+80=80$. Subtracting 80 from both sides of this equation yields $2.5b=0$. Dividing both sides of this equation by 2.5 yields $b=0$. Therefore, if the business cares for 16 reptiles on a given day, it can care for 0 birds on this day.

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 12

Choice C is correct. An equation of a line can be written in the form $y=mx+b$, where m is the slope of the line and $(0, b)$ is the *y*-intercept of the line. The line shown passes through the point $(0, -8)$, so $b=-8$. The line shown also passes through the point $(-8, 0)$. The slope, m, of a line passing through two points (x_1, y_1) and (x_2, y_2) can be calculated using the equation $m=\frac{y_2-y_1}{x_2-x_1}$. For the points $(0, -8)$ and $(-8, 0)$, this gives $m=\frac{(-8)-0}{0-(-8)}$, or $m=-1$. Substituting -8 for b and -1 for m in $y=mx+b$ yields $y=(-1)x+(-8)$, or $y=-x-8$. Therefore, an equation of the graph shown is $y=-x-8$.

Choice A is incorrect. This is an equation of a line with a slope of -2, not -1.
Choice B is incorrect. This is an equation of a line with a slope of 1, not -1.
Choice D is incorrect. This is an equation of a line with a slope of 2, not -1.

QUESTION 13

The correct answer is $\frac{1}{5}$. Since the number 5 can also be written as $\frac{5}{1}$, the given equation can also be written as $\frac{x}{8}=\frac{5}{1}$. This equation is equivalent to $\frac{8}{x}=\frac{1}{5}$. Therefore, the value of $\frac{8}{x}$ is $\frac{1}{5}$. Note that 1/5 and .2 are examples of ways to enter a correct answer.

Alternate approach: Multiplying both sides of the equation $\frac{x}{8}=5$ by 8 yields $x=40$. Substituting 40 for x into the expression $\frac{8}{x}$ yields $\frac{8}{40}$, or $\frac{1}{5}$.

QUESTION 14

The correct answer is 80. Subtracting the second equation in the given system from the first equation yields $(24x+y)-(6x+y)=48-72$, which is equivalent to $24x-6x+y-y=-24$, or $18x=-24$. Dividing each side of this equation by 3 yields $6x=-8$. Substituting -8 for $6x$ in the second equation yields $-8+y=72$. Adding 8 to both sides of this equation yields $y=80$.

Alternate approach: Multiplying each side of the second equation in the given system by 4 yields $24x+4y=288$. Subtracting the first equation in the given system from this equation yields $(24x+4y)-(24x+y)=288-48$, which is equivalent to $24x - 24x + 4y - y = 240$, or $3y = 240$. Dividing each side of this equation by 3 yields $y = 80$.

QUESTION 15

Choice D is correct. The equation that defines line t in the *xy*-plane can be written in slope-intercept form $y = mx + b$, where m is the slope of line t and $(0, b)$ is its *y*-intercept. It's given that line t has a slope of $-\frac{1}{3}$. Therefore, $m = -\frac{1}{3}$. Substituting $-\frac{1}{3}$ for m in the equation $y = mx + b$ yields $y = -\frac{1}{3}x + b$, or $y = -\frac{x}{3} + b$. It's also given that line t passes through the point $(9, 10)$. Substituting 9 for x and 10 for y in the equation $y = -\frac{x}{3} + b$ yields $10 = -\frac{9}{3} + b$, or $10 = -3 + b$. Adding 3 to both sides of this equation yields $13 = b$. Substituting 13 for b in the equation $y = -\frac{x}{3} + b$ yields $y = -\frac{x}{3} + 13$.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. This equation defines a line that has a slope of 9, not $-\frac{1}{3}$, and passes through the point $(0, 10)$, not $(9, 10)$. *Choice C* is incorrect. This equation defines a line that passes through the point $(0, 10)$, not $(9, 10)$.

QUESTION 16

Choice B is correct. It's given that the function $f(x) = 206(1.034)^x$ models the value, in dollars, of a certain bank account by the end of each year from 1957 through 1972, where x is the number of years after 1957. It follows that $f(x)$ represents the estimated value, in dollars, of the bank account x years after 1957. Since the value of $f(5)$ is the value of $f(x)$ when $x = 5$, it follows that "$f(5)$ is approximately equal to 243" means that $f(x)$ is approximately equal to 243 when $x = 5$. In the given context, this means that the value of the bank account is estimated to be approximately 243 dollars 5 years after 1957. Therefore, the best interpretation of the statement "$f(5)$ is approximately equal to 243" in this context is the value of the bank account is estimated to be approximately 243 dollars in 1962.

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 17

Choice B is correct. It's given that the ratio of the rectangular region's length to its width is 35 to 10. This can be written as a proportion: $\frac{\text{length}}{\text{width}} = \frac{35}{10}$, or $\frac{\ell}{w} = \frac{35}{10}$. This proportion can be rewritten as $10\ell = 35w$, or $\ell = 3.5w$. If the width of the rectangular region increases by 7, then the length will increase by some number x in order to maintain this ratio. The value of x can be found by replacing ℓ with $\ell + x$ and w with $w + 7$ in the equation, which gives $\ell + x = 3.5(w + 7)$. This equation can be rewritten using the distributive property as $\ell + x = 3.5w + 24.5$.

Since $\ell = 3.5w$, the right-hand side of this equation can be rewritten by substituting ℓ for $3.5w$, which gives $\ell + x = \ell + 24.5$, or $x = 24.5$. Therefore, if the width of the rectangular region increases by 7 units, the length must increase by 24.5 units in order to maintain the given ratio.

Choice A is incorrect. If the width of the rectangular region increases, the length must also increase, not decrease. *Choice C* is incorrect. If the width of the rectangular region increases, the length must also increase, not decrease. *Choice D* is incorrect. Since the ratio of the length to the width of the rectangular region is 35 to 10, if the width of the rectangular region increases by 7 units, the length would have to increase by a proportional amount, which would have to be greater than 7 units.

QUESTION 18

Choice A is correct. Let x represent the side length, in inches, of square P. It follows that the perimeter of square P is $4x$ inches. It's given that square Q has a perimeter that is 176 inches greater than the perimeter of square P. Thus, the perimeter of square Q is 176 inches greater than $4x$ inches, or $4x + 176$ inches. Since the perimeter of a square is 4 times the side length of the square, each side length of Q is $\frac{4x+176}{4}$, or $x + 44$ inches. Since the area of a square is calculated by multiplying the length of two sides, the area of square Q is $(x+44)(x+44)$, or $(x+44)^2$ square inches. It follows that function f is defined by $f(x) = (x+44)^2$.

Choice B is incorrect. This function represents a square with side lengths $(x+176)$ inches. *Choice C* is incorrect. This function represents a square with side lengths $(176x+44)$ inches. *Choice D* is incorrect. This function represents a square with side lengths $(176x+176)$ inches.

QUESTION 19

Choice C is correct. Dividing each side of the given equation by 2 yields $\frac{14x}{14y} = \frac{2\sqrt{w+19}}{2}$, or $\frac{x}{y} = \sqrt{w+19}$. Because it's given that each of the variables is positive, squaring each side of this equation yields the equivalent equation $\left(\frac{x}{y}\right)^2 = w + 19$. Subtracting 19 from each side of this equation yields $\left(\frac{x}{y}\right)^2 - 19 = w$, or $w = \left(\frac{x}{y}\right)^2 - 19$.

Choice A is incorrect. This equation isn't equivalent to the given equation. *Choice B* is incorrect. This equation isn't equivalent to the given equation. *Choice D* is incorrect. This equation isn't equivalent to the given equation.

QUESTION 20

The correct answer is 100. It's given that point O is the center of a circle and the measure of arc RS on the circle is $100°$. It follows that points R and S lie on the circle. Therefore, $\overline{OR}$ and $\overline{OS}$ are radii of the circle. A central angle is an angle formed by two radii of a circle, with its vertex at the center of the circle. Therefore, $\angle ROS$ is a central angle. Because the degree measure of an arc is equal to the measure of its associated central angle, it follows that the measure, in degrees, of $\angle ROS$ is 100.

QUESTION 21

The correct answer is $\frac{361}{8}$. The rational exponent property is $\sqrt[n]{y^m} = y^{\frac{m}{n}}$, where $y > 0$, m and n are integers, and $n > 0$. This property can be applied to rewrite the given expression $6\sqrt[5]{3^5 x^{45}} \cdot \sqrt[8]{2^8 x}$ as $6\left(3^{\frac{5}{5}}\right)\left(x^{\frac{45}{5}}\right)\left(2^{\frac{8}{8}}\right)\left(x^{\frac{1}{8}}\right)$, or $6(3)(x^9)(2)\left(x^{\frac{1}{8}}\right)$. This expression can be rewritten by multiplying the constants, which gives $36(x^9)\left(x^{\frac{1}{8}}\right)$. The multiplication exponent property is $y^n \cdot y^m = y^{n+m}$, where $y > 0$. This property can be applied to rewrite the expression $36(x^9)\left(x^{\frac{1}{8}}\right)$ as $36x^{9+\frac{1}{8}}$, or $36x^{\frac{73}{8}}$. Therefore, $6\sqrt[5]{3^5 x^{45}} \cdot \sqrt[8]{2^8 x} = 36x^{\frac{73}{8}}$. It's given that $6\sqrt[5]{3^5 x^{45}} \cdot \sqrt[8]{2^8 x}$ is equivalent to ax^b; therefore, $a = 36$ and $b = \frac{73}{8}$. It follows that $a + b = 36 + \frac{73}{8}$. Finding a common denominator on the right-hand side of this equation gives $a + b = \frac{288}{8} + \frac{73}{8}$, or $a + b = \frac{361}{8}$. Note that 361/8, 45.12, and 45.13 are examples of ways to enter a correct answer.

QUESTION 22

Choice B is correct. The area, A, of a triangle can be found using the formula $A = \frac{1}{2}bh$, where b is the length of the base of the triangle and h is the height of the triangle. It's given that the triangle is a right triangle. Therefore, its base and height can be represented by the two legs. It's also given that the triangle has sides of length $2\sqrt{2}$, $6\sqrt{2}$, and $\sqrt{80}$ units. Since $\sqrt{80}$ units is the greatest of these lengths, it's the length of the hypotenuse. Therefore, the two legs have lengths $2\sqrt{2}$ and $6\sqrt{2}$ units. Substituting these values for b and h in the formula $A = \frac{1}{2}bh$ gives $A = \frac{1}{2}\left(2\sqrt{2}\right)\left(6\sqrt{2}\right)$, which is equivalent to $A = 6\sqrt{4}$ square units, or $A = 12$ square units.

Choice A is incorrect. This expression represents the perimeter, rather than the area, of the triangle. *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. It's given that $4x^2 + bx - 45$ can be rewritten as $\left(hx + k\right)\left(x + j\right)$. The expression $\left(hx + k\right)\left(x + j\right)$ can be rewritten as $hx^2 + jhx + kx + kj$, or $hx^2 + \left(jh + k\right)x + kj$. Therefore, $hx^2 + \left(jh + k\right)x + kj$ is equivalent to $4x^2 + bx - 45$. It follows that $kj = -45$. Dividing each side of this equation by k yields $j = \frac{-45}{k}$. Since j is an integer, $-\frac{45}{k}$ must be an integer. Therefore, $\frac{45}{k}$ must also be an integer.

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 24

Choice C is correct. It's given that the graphs of the equations in the given system intersect at exactly one point, (x, y), in the xy-plane. Therefore, (x, y) is the only solution to the given system of equations. The given system of equations can be solved by subtracting the second equation, $y = 3x + a$, from the first equation, $y = 2x^2 - 21x + 64$. This yields $y - y = (2x^2 - 21x + 64) - (3x + a)$, or $0 = 2x^2 - 24x + 64 - a$. Since the given system has only one solution, this equation has only one solution. A quadratic equation in the form $rx^2 + sx + t = 0$, where r, s, and t are constants, has one solution if and only if the discriminant, $s^2 - 4rt$, is equal to zero. Substituting 2 for r, -24 for s, and $-a + 64$ for t in the expression $s^2 - 4rt$ yields $(-24)^2 - (4)(2)(64 - a)$. Setting this expression equal to zero yields $(-24)^2 - (4)(2)(64 - a) = 0$, or $8a + 64 = 0$. Subtracting 64 from both sides of this equation yields $8a = -64$. Dividing both sides of this equation by 8 yields $a = -8$. Substituting -8 for a in the equation $0 = 2x^2 - 24x + 64 - a$ yields $0 = 2x^2 - 24x + 64 + 8$, or $0 = 2x^2 - 24x + 72$. Factoring 2 from the right-hand side of this equation yields $0 = 2(x^2 - 12x + 36)$. Dividing both sides of this equation by 2 yields $0 = x^2 - 12x + 36$, which is equivalent to $0 = (x - 6)(x - 6)$, or $0 = (x - 6)^2$. Taking the square root of both sides of this equation yields $0 = x - 6$. Adding 6 to both sides of this equation yields $x = 6$.

Choice A is incorrect. This is the value of a, not x. *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 25

Choice C is correct. Since the triangle is an isosceles right triangle, the two sides that form the right angle must be the same length. Let x be the length, in inches, of each of those sides. The Pythagorean theorem states that in a right triangle, $a^2 + b^2 = c^2$, where c is the length of the hypotenuse and a and b are the lengths of the other two sides. Substituting x for a, x for b, and 58 for c in this equation yields $x^2 + x^2 = 58^2$, or $2x^2 = 58^2$. Dividing each side of this equation by 2 yields $x^2 = \frac{58^2}{2}$, or $x^2 = \frac{2 \cdot 58^2}{4}$. Taking the square root of each side of this equation yields two solutions: $x = \frac{58\sqrt{2}}{2}$ and $x = -\frac{58\sqrt{2}}{2}$. The value of x must be positive because it represents a side length. Therefore, $x = \frac{58\sqrt{2}}{2}$, or $x = 29\sqrt{2}$. The perimeter, in inches, of the triangle is $58 + x + x$, or $58 + 2x$. Substituting $29\sqrt{2}$ for x in this expression gives a perimeter, in inches, of $58 + 2(29\sqrt{2})$, or $58 + 58\sqrt{2}$.

Choice A is incorrect. This is the length, in inches, of each of the congruent sides of the triangle, not the perimeter, in inches, of the triangle. *Choice B* is incorrect. This is the sum of the lengths, in inches, of the congruent sides of the triangle, not the perimeter, in inches, of the triangle. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 26

Choice D is correct. The equation of a parabola in the *xy*-plane can be written in the form $y=a(x-h)^2+k$, where a is a constant and (h, k) is the vertex of the parabola. If a is positive, the parabola will open upward, and if a is negative, the parabola will open downward. It's given that the parabola has vertex $(9, -14)$. Substituting 9 for h and -14 for k in the equation $y=a(x-h)^2+k$ gives $y=a(x-9)^2-14$, which can be rewritten as $y=a(x-9)(x-9)-14$, or $y=a(x^2-18x+81)-14$. Distributing the factor of a on the right-hand side of this equation yields $y=ax^2-18ax+81a-14$. Therefore, the equation of the parabola, $y=ax^2-18ax+81a-14$, can be written in the form $y=ax^2+bx+c$, where $a=a$, $b=-18a$, and $c=81a-14$. Substituting $-18a$ for b and $81a-14$ for c in the expression $a+b+c$ yields $(a)+(-18a)+(81a-14)$, or $64a-14$. Since the vertex of the parabola, $(9, -14)$, is below the *x*-axis, and it's given that the parabola intersects the *x*-axis at two points, the parabola must open upward. Therefore, the constant a must have a positive value. Setting the expression $64a-14$ equal to the value in choice D yields $64a-14=-12$. Adding 14 to both sides of this equation yields $64a=2$. Dividing both sides of this equation by 64 yields $a=\frac{2}{64}$, which is a positive value. Therefore, if the equation of the parabola is written in the form $y=ax^2+bx+c$, where a, b, and c are constants, the value of $a+b+c$ could be -12.

Choice A is incorrect. If the equation of a parabola with a vertex at $(9, -14)$ is written in the form $y=ax^2+bx+c$, where a, b, and c are constants and $a+b+c=-23$, then the value of a will be negative, which means the parabola will open downward, not upward, and will intersect the *x*-axis at zero points, not two points. *Choice B* is incorrect. If the equation of a parabola with a vertex at $(9, -14)$ is written in the form $y=ax^2+bx+c$, where a, b, and c are constants and $a+b+c=-19$, then the value of a will be negative, which means the parabola will open downward, not upward, and will intersect the *x*-axis at zero points, not two points. *Choice C* is incorrect. If the equation of a parabola with a vertex at $(9, -14)$ is written in the form $y=ax^2+bx+c$, where a, b, and c are constants and $a+b+c=-14$, then the value of a will be 0, which is inconsistent with the equation of a parabola.

QUESTION 27

The correct answer is 5. It's given that $f(x) = -a^x + b$. Substituting $-a^x + b$ for $f(x)$ in the equation $y = f(x) - 15$ yields $y = -a^x + b - 15$. It's given that the *y*-intercept of the graph of $y = f(x) - 15$ is $\left(0, -\frac{99}{7}\right)$. Substituting 0 for x and $-\frac{99}{7}$ for y in the equation $y = -a^x + b - 15$ yields $-\frac{99}{7} = -a^0 + b - 15$, which is equivalent to $-\frac{99}{7} = -1 + b - 15$, or $-\frac{99}{7} = b - 16$. Adding 16 to both sides of this equation yields $\frac{13}{7} = b$. It's given that the product of a and b is $\frac{65}{7}$, or $ab = \frac{65}{7}$. Substituting $\frac{13}{7}$ for b in this equation yields $(a)\left(\frac{13}{7}\right) = \frac{65}{7}$. Dividing both sides of this equation by $\frac{13}{7}$ yields $a = 5$.

Math

Module 2

(27 questions)

QUESTION 1

Choice B is correct. For the given line graph, the estimated number of chipmunks is represented on the vertical axis. The greatest estimated number of chipmunks in the state park is indicated by the greatest height in the line graph. This height is achieved when the year is 1994.

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 2

Choice B is correct. It's given that the fish swam $5{,}104$ yards and that 1 mile is equal to $1{,}760$ yards. Therefore, the fish swam $5{,}104 \text{ yards}\left(\frac{1 \text{ mile}}{1{,}760 \text{ yards}}\right)$, which is equivalent to $\frac{5{,}104}{1{,}760}$ miles, or 2.9 miles.

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

QUESTION 3

Choice C is correct. The given expression shows subtraction of two like terms. The two terms can be subtracted as follows: $12x^3 - 5x^3 = (12 - 5)x^3$, or $7x^3$.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. This is the result of adding, not subtracting, the two like terms. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 4

Choice A is correct. The second equation in the given system defines the value of x as $5y$. Substituting $5y$ for x into the first equation yields $5y + y = 18$ or $6y = 18$. Dividing each side of this equation by 6 yields $y = 3$. Substituting 3 for y in the second equation yields $5(3) = x$ or $x = 15$. Therefore, the solution (x, y) to the given system of equations is $(15, 3)$.

Choice B is incorrect. Substituting 16 for x and 2 for y in the second equation yields $5(2) = 16$, which is not true. Therefore, $(16, 2)$ is not a solution to the given system of equations. *Choice C* is incorrect. Substituting 17 for x and 1 for y in the second equation yields $5(1) = 17$, which is not true. Therefore, $(17, 1)$ is not a solution to the given system of equations. *Choice D* is incorrect. Substituting 18 for x and 0 for y in the second equation yields $5(0) = 18$, which is not true. Therefore, $(18, 0)$ is not a solution to the given system of equations.

QUESTION 5

Choice A is correct. The given point, $(8, 2)$, is located in the first quadrant in the *xy*-plane. The system of inequalities in choice A represents all the points in the first quadrant in the *xy*-plane. Therefore, $(8, 2)$ is a solution to the system of inequalities in choice A.

Alternate approach: Substituting 8 for x in the first inequality in choice A, $x > 0$, yields $8 > 0$, which is true. Substituting 2 for y in the second inequality in choice A, $y > 0$, yields $2 > 0$, which is true. Since the coordinates of the point $(8, 2)$ make the inequalities $x > 0$ and $y > 0$ true, the point $(8, 2)$ is a solution to the system of inequalities consisting of $x > 0$ and $y > 0$.

Choice B is incorrect. This system of inequalities represents all the points in the fourth quadrant, not the first quadrant, in the *xy*-plane. *Choice C* is incorrect. This system of inequalities represents all the points in the second quadrant, not the first quadrant, in the *xy*-plane. *Choice D* is incorrect. This system of inequalities represents all the points in the third quadrant, not the first quadrant, in the *xy*-plane.

QUESTION 6

The correct answer is 15 or -5. By the definition of absolute value, if $|x - 5| = 10$, then $x - 5 = 10$ or $x - 5 = -10$. Adding 5 to both sides of the first equation yields $x = 15$. Adding 5 to both sides of the second equation yields $x = -5$. Thus, the given equation has two possible solutions, 15 and -5. Note that 15 and –5 are examples of ways to enter a correct answer.

QUESTION 7

The correct answer is 50. It's given that the function f gives the total number of people on a company retreat with x managers. It's also given that 7 managers are on the company retreat. Substituting 7 for x in the given function yields $f(7) = 7(7) + 1$, or $f(7) = 50$. Therefore, there are a total of 50 people on a company retreat with 7 managers.

QUESTION 8

Choice B is correct. It's given that $h(x)=x^2-3$. Each table gives 1, 2, and 3 as the three given values of x. Substituting 1 for x in the equation $h(x)=x^2-3$ yields $h(1)=(1)^2-3$, or $h(1)=-2$. Substituting 2 for x in the equation $h(x)=x^2-3$ yields $h(2)=(2)^2-3$, or $h(2)=1$. Finally, substituting 3 for x in the equation $h(x)=x^2-3$ yields $h(3)=(3)^2-3$, or $h(3)=6$. Therefore, $h(x)$ is -2 when x is 1, $h(x)$ is 1 when x is 2, and $h(x)$ is 6 when x is 3. Choice B is a table with these values of x and their corresponding values of $h(x)$.

Choice A is incorrect. This is a table of values for the function $h(x)=x+3$, not $h(x)=x^2-3$. *Choice C* is incorrect. This is a table of values for the function $h(x)=2x-3$, not $h(x)=x^2-3$. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 9

Choice D is correct. The value of $f(0)$ is the value of $f(x)$ when $x=0$. Substituting 0 for x in the given function yields $f(0)=270(0.1)^0$, or $f(0)=270(1)$, which is equivalent to $f(0)=270$. Therefore, the value of $f(0)$ is 270.

Choice A is incorrect. This is the value of x, not $f(x)$. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect. This is the value of $f(1)$, not $f(0)$.

QUESTION 10

Choice A is correct. It's given that the estimate for the proportion of the population that has the characteristic is 0.49 with an associated margin of error of 0.04. Subtracting the margin of error from the estimate and adding the margin of error to the estimate gives an interval of plausible values for the true proportion of the population that has the characteristic. Therefore, it's plausible that the proportion of the population that has this characteristic is between 0.45 and 0.53.

Choice B is incorrect. A value less than 0.45 is outside the interval of plausible values for the proportion of the population that has the characteristic. *Choice C* is incorrect. The value 0.49 is an estimate for the proportion based on this sample. However, since the margin of error for this estimate is known, the most appropriate conclusion is not that the proportion is exactly one value but instead lies in an interval of plausible values. *Choice D* is incorrect. A value greater than 0.53 is outside the interval of plausible values for the proportion of the population that has the characteristic.

QUESTION 11

Choice A is correct. It's given that the truck can tow a trailer if the combined weight of the trailer and the boxes it contains is no more than $4{,}600$ pounds. If the trailer has a weight of 500 pounds and each box weighs 120 pounds, the expression $500+120b$, where b is the number of boxes, gives the combined weight of the trailer and the boxes. Since the combined weight must be no more than 4,600 pounds, the possible numbers of boxes the truck can tow are given by the inequality $500+120b \leq 4{,}600$. Subtracting 500 from both sides of this inequality yields $120b \leq 4{,}100$. Dividing both sides of this inequality by 120 yields $b \leq \frac{205}{6}$, or b is less than or equal to approximately 34.17. Since the number of boxes, b, must be a whole number, the maximum number of boxes the truck can tow is the greatest whole number less than 34.17, which is 34.

Choice B is incorrect. Towing the trailer and 35 boxes would yield a combined weight of 4,700 pounds, which is greater than 4,600 pounds. *Choice C* is incorrect. Towing the trailer and 38 boxes would yield a combined weight of 5,060 pounds, which is greater than 4,600 pounds. *Choice D* is incorrect. Towing the trailer and 39 boxes would yield a combined weight of 5,180 pounds, which is greater than 4,600 pounds.

QUESTION 12

Choice B is correct. Multiplying each side of the given equation by -16 yields $64x^2+112x=576$. To complete the square, adding 49 to each side of this equation yields $64x^2+112x+49=576+49$, or $(8x+7)^2=625$. Taking the square root of each side of this equation yields two equations: $8x+7=25$ and $8x+7=-25$. Subtracting 7 from each side of the equation $8x+7=25$ yields $8x=18$. Dividing each side of this equation by 8 yields $x=\frac{18}{8}$, or $x=\frac{9}{4}$. Therefore, $\frac{9}{4}$ is a solution to the given equation. Subtracting 7 from each side of the equation $8x+7=-25$ yields $8x=-32$. Dividing each side of this equation by 8 yields $x=-4$. Therefore, the given equation has two solutions, $\frac{9}{4}$ and -4. Since $\frac{9}{4}$ is positive, it follows that $\frac{9}{4}$ is the positive solution to the given equation.

Alternate approach: Adding $4x^2$ and $7x$ to each side of the given equation yields $0=4x^2+7x-36$. The right-hand side of this equation can be rewritten as $4x^2+16x-9x-36$. Factoring out the common factor of $4x$ from the first two terms of this expression and the common factor of -9 from the second two terms yields $4x(x+4)-9(x+4)$. Factoring out the common factor of $(x+4)$ from these two terms yields the expression $(4x-9)(x+4)$. Since this expression is equal to 0, it follows that either $4x-9=0$ or $x+4=0$. Adding 9 to each side of the equation $4x-9=0$ yields $4x=9$. Dividing each side of this equation by 4 yields $x=\frac{9}{4}$. Therefore, $\frac{9}{4}$ is a positive solution to the given equation. Subtracting 4 from each side of the equation $x+4=0$ yields $x=-4$. Therefore, the given equation has two solutions, $\frac{9}{4}$ and -4. Since $\frac{9}{4}$ is positive, it follows that $\frac{9}{4}$ is the positive solution to the given equation.

Choice A is incorrect. Substituting $\frac{7}{4}$ for x in the given equation yields $-\frac{49}{2}=-36$, which is false. *Choice C* is incorrect. Substituting 4 for x in the given equation yields $-92=-36$, which is false. *Choice D* is incorrect. Substituting 7 for x in the given equation yields $-245=-36$, which is false.

QUESTION 13

The correct answer is $\frac{3}{10}$. It's given that there are a total of 100 tiles of equal area, which is the total number of possible outcomes. According to the table, there are a total of 30 red tiles. The probability of an event occurring is the ratio of the number of favorable outcomes to the total number of possible outcomes. By definition, the probability of selecting a red tile is given by $\frac{30}{100}$, or $\frac{3}{10}$. Note that 3/10 and .3 are examples of ways to enter a correct answer.

QUESTION 14

The correct answer is 2. It's given that function f is defined by $f(x)=2x+3$. Therefore, the equation representing the graph of $y=f(x)$ in the *xy*-plane is $y=2x+3$, and the graph is a line. For a linear equation in the form $y=mx+b$, m represents the slope of the line. Since the value of m in the equation $y=2x+3$ is 2, the slope of the line defined by function f is 2. It's given that line j is parallel to the line defined by function f. The slopes of parallel lines are equal. Therefore, the slope of line j is also 2.

QUESTION 15

Choice A is correct. It's given that a radio show stated that 3 times as many people voted in favor of the proposal as people who voted against it. Let x represent the number of people who voted against the proposal. It follows that $3x$ is the number of people who voted in favor of the proposal and $3x-x$, or $2x$, is how many more people voted in favor of the proposal than voted against it. It's also given that a social media post reported that $15{,}000$ more people voted in favor of the proposal than voted against it. Thus, $2x=15{,}000$. Since $2x=15{,}000$, the value of x must be half of $15{,}000$, or $7{,}500$. Therefore, $7{,}500$ people voted against the proposal.

Choice B is incorrect. This is how many more people voted in favor of the proposal than voted against it, not the number of people who voted against the proposal. *Choice C* is incorrect. This is the number of people who voted in favor of the proposal, not the number of people who voted against the proposal. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 16

Choice C is correct. Vertical angles, which are angles that are opposite each other when two lines intersect, are congruent. The figure shows that lines t and m intersect. It follows that the angle with measure $x°$ and the angle with measure $y°$ are vertical angles, so $x=y$. It's given that $x=6k+13$ and $y=8k-29$. Substituting $6k+13$ for x and $8k-29$ for y in the equation $x=y$ yields $6k+13=8k-29$. Subtracting $6k$ from both sides of this equation yields $13=2k-29$. Adding 29 to both sides of this equation yields $42=2k$, or $2k=42$. Dividing both sides of this equation by 2 yields $k=21$. It's given that lines m and n are parallel, and the figure shows that lines m and n are intersected by a transversal, line t. If two parallel lines are intersected by a transversal, then the same-side interior angles are supplementary. It follows that the same-side interior angles with measures $y°$ and $z°$ are supplementary, so $y+z=180$. Substituting $8k-29$ for y in this equation yields $8k-29+z=180$. Substituting 21 for k in this equation yields $8(21)-29+z=180$, or $139+z=180$. Subtracting 139 from both sides of this equation yields $z=41$. Therefore, the value of z is 41.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. This is the value of k, not z. *Choice D* is incorrect. This is the value of x or y, not z.

QUESTION 17

Choice B is correct. A linear equation in one variable has no solution if and only if the equation is false; that is, when there is no value of x that produces a true statement. It's given that in the equation $-3x+21px=84$, p is a constant and the equation has no solution for x. Therefore, the value of the constant p is one that results in a false equation. Factoring out the common factor of $-3x$ on the left-hand side of the given equation yields $-3x(1-7p)=84$. Dividing both sides of this equation by -3 yields $x(1-7p)=-28$. Dividing both sides of this equation by $(1-7p)$ yields $x=\frac{-28}{1-7p}$. This equation is false if and only if $1-7p=0$. Adding $7p$ to both sides of $1-7p=0$ yields $1=7p$. Dividing both sides of this equation by 7 yields $\frac{1}{7}=p$. It follows that the equation $x=\frac{-28}{1-7p}$ is false if and only if $p=\frac{1}{7}$. Therefore, the given equation has no solution if and only if the value of p is $\frac{1}{7}$.

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 $f(x)=(x-10)(x+13)$, which can be rewritten as $f(x)=x^2+3x-130$. Since the coefficient of the x^2-term is positive, the graph of $y=f(x)$ in the *xy*-plane opens upward and reaches its minimum value at its vertex. The *x*-coordinate of the vertex is the value of x such that $f(x)$ reaches its minimum. For an equation in the form $f(x)=ax^2+bx+c$, where a, b, and c are constants, the *x*-coordinate of the vertex is $-\frac{b}{2a}$. For the equation $f(x)=x^2+3x-130$, $a=1$, $b=3$, and $c=-130$. It follows that the *x*-coordinate of the vertex is $-\frac{3}{2(1)}$, or $-\frac{3}{2}$. Therefore, $f(x)$ reaches its minimum when the value of x is $-\frac{3}{2}$.

Alternate approach: The value of x for the vertex of a parabola is the *x*-value of the midpoint between the two *x*-intercepts of the parabola. Since it's given that $f(x)=(x-10)(x+13)$, it follows that the two *x*-intercepts of the graph of $y=f(x)$ in the *xy*-plane occur when $x=10$ and $x=-13$, or at the points $(10, 0)$ and $(-13, 0)$. The midpoint between two points, (x_1, y_1) and (x_2, y_2), is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$. Therefore, the midpoint between $(10, 0)$ and $(-13, 0)$ is $\left(\frac{10+(-13)}{2}, \frac{0+0}{2}\right)$, or $\left(-\frac{3}{2}, 0\right)$. It follows that $f(x)$ reaches its minimum when the value of x is $-\frac{3}{2}$.

Choice A is incorrect. This is the *y*-coordinate of the *y*-intercept of the graph of $y = f(x)$ in the *xy*-plane. *Choice B* is incorrect. This is one of the *x*-coordinates of the *x*-intercepts of the graph of $y = f(x)$ in the *xy*-plane. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 19

Choice A is correct. The graph of a quadratic equation in the form $y = a(x-h)^2 + k$, where a, h, and k are positive constants, is a parabola that opens upward with vertex (h, k). The given function $f(x) = \frac{1}{9}(x-7)^2 + 3$ is in the form $y = a(x-h)^2 + k$, where $y = f(x)$, $a = \frac{1}{9}$, $h = 7$, and $k = 3$. Therefore, the graph of $y = f(x)$ is a parabola that opens upward with vertex $(7, 3)$. Since the parabola opens upward, the vertex is the lowest point on the graph. It follows that the *y*-coordinate of the vertex of the graph of $y = f(x)$ is the minimum value of $f(x)$. Therefore, the minimum value of $f(x)$ is 3. It's given that $f(x) = \frac{1}{9}(x-7)^2 + 3$ represents the metal ball's height above the ground, in inches, x seconds after it started moving on a track. Therefore, the best interpretation of the vertex of the graph of $y = f(x)$ is that the metal ball's minimum height was 3 inches above the ground.

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 20

The correct answer is $\frac{15}{17}$. It's given that angle J is the right angle in triangle JKL. Therefore, the acute angles of triangle JKL are angle K and angle L. The hypotenuse of a right triangle is the side opposite its right angle. Therefore, the hypotenuse of triangle JKL is side KL. The cosine of an acute angle in a right triangle is the ratio of the length of the side adjacent to the angle to the length of the hypotenuse. It's given that $\cos(K) = \frac{24}{51}$. This can be written as $\cos(K) = \frac{8}{17}$. Since the cosine of angle K is a ratio, it follows that the length of the side adjacent to angle K is $8n$ and the length of the hypotenuse is $17n$, where n is a constant. Therefore, $JK = 8n$ and $KL = 17n$. The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides. For triangle JKL, it follows that $(JK)^2 + (JL)^2 = (KL)^2$. Substituting $8n$ for JK and $17n$ for KL yields $(8n)^2 + (JL)^2 = (17n)^2$. This is equivalent to $64n^2 + (JL)^2 = 289n^2$. Subtracting $64n^2$ from each side of this equation yields $(JL)^2 = 225n^2$. Taking the square root of each side of this equation yields $JL = 15n$. Since $\cos(L) = \frac{JL}{KL}$, it follows that $\cos(L) = \frac{15n}{17n}$, which can be rewritten as $\cos(L) = \frac{15}{17}$. Note that 15/17, .8824, .8823, and 0.882 are examples of ways to enter a correct answer.

QUESTION 21

The correct answer is 51. A quadratic equation of the form $ax^2+bx+c=0$, where a, b, and c are constants, has no real solution if and only if its discriminant, $-4ac+b^2$, is negative. In the given equation, $a=-1$ and $c=-676$. Substituting -1 for a and -676 for c in this expression yields a discriminant of $b^2-4(-1)(-676)$, or $b^2-2{,}704$. Since this value must be negative, $b^2-2{,}704<0$, or $b^2<2{,}704$. Taking the positive square root of each side of this inequality yields $b<52$. Since b is a positive integer, and the greatest integer less than 52 is 51, the greatest possible value of b is 51.

QUESTION 22

Choice A is correct. A solution to a system of equations must satisfy each equation in the system. It follows that if an ordered pair (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. The only point that lies on each graph of the system of two linear equations shown is their intersection point $(8, 2)$. It follows that if a new graph of three linear equations is created using the system of equations shown and the graph of $x+4y=-16$, this system has either zero solutions or one solution, the point $(8, 2)$. Substituting 8 for x and 2 for y in the equation $x+4y=-16$ yields $8+4(2)=-16$, or $16=-16$. Since this equation is not true, the point $(8, 2)$ does not lie on the graph of $x+4y=-16$. Therefore, $(8, 2)$ is not a solution to the system of three equations. It follows that there are zero solutions to this system.

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 23

Choice C is correct. For a function of the form $f(x)=a(r)^{\frac{x}{k}}$, where a, r, and k are constants and $r<1$, the value of $f(x)$ decreases by $100(1-r)\%$ for every increase of x by k. In the given function, $a=5{,}470$, $r=0.64$, and $k=12$. Therefore, for the given function, the value of $f(x)$ decreases by $100(1-0.64)\%$, or 36%, for every increase of x by 12. Since $f(x)$ represents the value, in dollars, of the equipment after x months of use, it follows that the value of the equipment decreases every 12 months by 36% of its value the preceding 12 months. Since there are 12 months in a year, the value of the equipment decreases each year by 36% of its value the preceding year. Thus, the value of p is 36.

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 24

Choice C is correct. The median of a data set with an odd number of values, in ascending or descending order, is the middle value of the data set, and the range of a data set is the positive difference between the maximum and minimum values in the data set. Since the dot plot shown gives the values in data set A in ascending order and there are 15 values in the data set, the eighth value in data set A, 23, is the median. The maximum value in data set A is 26 and the minimum value is 22, so the range of data set A is $26-22$, or 4. It's given that data set B is created by adding 56 to each of the values in data set A. Increasing each of the 15 values in data set A by 56 will also increase its median value by 56 making the median of data set B 79. Increasing each value of data set A by 56 does not change the range, since the maximum value of data set B is $26+56$, or 82, and the minimum value is $22+56$, or 78, making the range of data set B $82-78$, or 4. Therefore, the median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.

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 25

Choice D is correct. The graph in the *xy*-plane of an equation of the form $(x-h)^2+(y-k)^2=r^2$ is a circle with center (h, k) and a radius of length r. It's given that circle A is represented by $x^2+(y-1)^2=49$, which can be rewritten as $x^2+(y-1)^2=7^2$. Therefore, circle A has center $(0, 1)$ and a radius of length 7. Shifting circle A down two units is a rigid vertical translation of circle A that does not change its size or shape. Since circle B is obtained by shifting circle A down two units, it follows that circle B has the same radius as circle A, and for each point (x, y) on circle A, the point $(x, y-2)$ lies on circle B. Moreover, if (h, k) is the center of circle A, then $(h, k-2)$ is the center of circle B. Therefore, circle B has a radius of 7 and the center of circle B is $(0, 1-2)$, or $(0, -1)$. Thus, circle B can be represented by the equation $x^2+(y+1)^2=7^2$, or $x^2+(y+1)^2=49$.

Choice A is incorrect. This is the equation of a circle obtained by shifting circle A right 2 units. *Choice B* is incorrect. This is the equation of a circle obtained by shifting circle A up 2 units. *Choice C* is incorrect. This is the equation of a circle obtained by shifting circle A left 2 units.

QUESTION 26

Choice B is correct. Let x represent the side length, in cm, of each square base. If the two prisms are glued together along a square base, the resulting prism has a surface area equal to twice the surface area of one of the prisms, minus the area of the two square bases that are being glued together, which yields $2K-2x^2$ cm^2. It's given that this resulting surface area is equal to $\frac{92}{47}K$ cm^2, so $2K-2x^2=\frac{92}{47}K$. Subtracting $\frac{92}{47}K$ from both sides of this equation yields $2K-\frac{92}{47}K-2x^2=0$. This equation can be rewritten by multiplying $2K$ on the left-hand side by $\frac{47}{47}$, which yields $\frac{94}{47}K-\frac{92}{47}K-2x^2=0$, or $\frac{2}{47}K-2x^2=0$. Adding $2x^2$ to both sides of this equation yields $\frac{2}{47}K=2x^2$. Multiplying both sides of this equation by $\frac{47}{2}$ yields $K=47x^2$. The surface area K, in cm^2, of each rectangular prism is equivalent to the sum of the areas of the two square bases and the areas of the four lateral faces. Since the height of each rectangular prism is 90 cm and the side length of each square base is x cm, it follows that the area of each square base is x^2 cm^2 and the area of each lateral face is $90x$ cm^2. Therefore, the surface area of each rectangular prism can be represented by the expression $2x^2+4(90x)$, or $2x^2+360x$. Substituting this expression for K in the equation $K=47x^2$ yields $2x^2+360x=47x^2$. Subtracting $2x^2$ and $360x$ from both sides of this equation yields $0=45x^2-360x$. Factoring x from the right-hand side of this equation yields $0=x(45x-360)$. Applying the zero product property, it follows that $x=0$ and $45x-360=0$. Adding 360 to both sides of the equation $45x-360=0$ yields $45x=360$. Dividing both sides of this equation by 45 yields $x=8$. Since a side length of a rectangular prism can't be 0, the length of each square base is 8 cm.

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 600. It's given that 210 is $p\%$ greater than 30. It follows that $210=\left(1+\frac{p}{100}\right)(30)$. Dividing both sides of this equation by 30 yields $7=1+\frac{p}{100}$. Subtracting 1 from both sides of this equation yields $6=\frac{p}{100}$. Multiplying both sides of this equation by 100 yields $p=600$. Therefore, the value of p is 600.