QUESTION 22

The correct answer is $\frac{59}{9}$. When the graph of an equation in the form $Ax + By = C$, where A, B, and C are constants, is translated down k units in the xy-plane, the resulting graph can be represented by the equation $Ax + B(y + k) = C$. It's given that the graph of $9x - 10y = 19$ is translated down 4 units in the xy-plane. Therefore, the resulting graph can be represented by the equation $9x - 10(y + 4) = 19$, or $9x - 10y - 40 = 19$. Adding 40 to both sides of this equation yields $9x - 10y = 59$. The x-coordinate of the x-intercept of the graph of an equation in the xy-plane is the value of x in the equation when $y = 0$. Substituting 0 for y in the equation $9x - 10y = 59$ yields $9x - 10(0) = 59$, or $9x = 59$. Dividing both sides of this equation by 9 yields $x = \frac{59}{9}$. Therefore, the x-coordinate of the x-intercept of the resulting graph is $\frac{59}{9}$. Note that 59/9, 6.555, and 6.556 are examples of ways to enter a correct answer.

Math

Module 2

(22 questions)

QUESTION 1

Choice A is correct. It's given that 20% of the students surveyed responded that they intend to enroll in the study program. Therefore, the proportion of students in Spanish club who intend to enroll in the study program, based on the survey, is 0.20. Since there are 55 total students in Spanish club, the best estimate for the total number of these students who intend to enroll in the study program is 55(0.20), or 11.

Choice B is incorrect. This is the best estimate for the percentage, rather than the total number, of students in Spanish club who intend to enroll in the study program. *Choice C* is incorrect. This is the best estimate for the total number of Spanish club students who do not intend to enroll in the study program. *Choice D* is incorrect. This is the total number of students in Spanish club.

QUESTION 2

Choice B is correct. It's given that it takes the machine 10 minutes to make a large box. It's also given that x represents the possible number of large boxes the machine can make each day. Multiplying 10 by x gives $10x$, which represents the amount of time spent making large boxes. It's given that it takes the machine 5 minutes to make a small box. It's also given that y represents the possible number of small boxes the machine can make each day. Multiplying 5 by y gives $5y$, which represents the amount of time spent making small boxes. Combining the amount of time spent making x large boxes and y small boxes yields $10x + 5y$. It's given that the machine makes boxes for a total of 700 minutes each day. Therefore $10x + 5y = 700$ represents the possible number of large boxes, x, and small boxes, y, the machine can make each day.

Choice A is incorrect and may result from associating the time of 10 minutes with small, rather than large, boxes and the time of 5 minutes with large, rather than small, boxes. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 3

Choice B is correct. The line of best fit shown intersects the y-axis at a positive y-value and has a negative slope. The graph of an equation of the form $y = a + bx$, where a and b are constants, intersects the y-axis at a y-value of a and has a slope of b. Of the given choices, only choice B represents a line that intersects the y-axis at a positive y-value, 13.5, and has a negative slope, −0.8.

Choice A is incorrect. This equation represents a line that has a positive slope, not a negative slope. *Choice C* is incorrect. This equation represents a line that intersects the y-axis at a negative y-value, not a positive y-value, and has a positive slope, not a negative slope. *Choice D* is incorrect. This equation represents a line that intersects the y-axis at a negative y-value, not a positive y-value.

QUESTION 4

Choice C is correct. It's given from the graph that the points (0, 7) and (8, 0) lie on the line. For two points on a line, (x_1, y_1) and (x_2, y_2), the slope of the line can be calculated using the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting (0, 7) for (x_1, y_1) and (8, 0) for (x_2, y_2) in this formula, the slope of the line can be calculated as $m = \frac{0 - 7}{8 - 0}$, or $m = -\frac{7}{8}$. It's also given that the point (d, 4) lies on the line. Substituting (d, 4) for (x_1, y_1), (8, 0) for (x_2, y_2), and $-\frac{7}{8}$ for m in the slope formula yields $-\frac{7}{8} = \frac{0 - 4}{8 - d}$, or $-\frac{7}{8} = \frac{-4}{8 - d}$. Multiplying both sides of this equation by $8 - d$ yields $-\frac{7}{8}(8 - d) = -4$. Expanding the left-hand side of this equation yields $-7 + \frac{7}{8}d = -4$. Adding 7 to both sides of this equation yields $\frac{7}{8}d = 3$. Multiplying both sides of this equation by $\frac{8}{7}$ yields $d = \frac{24}{7}$. Thus, the value of d is $\frac{24}{7}$.

Choice A is incorrect. This is the value of y when $x = 4$. *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 5

Choice D is correct. The equation of a quadratic function can be written in the form $f(x) = a(x - h)^2 + k$, where a, h, and k are constants. It's given in the table that when $x = -1$, the corresponding value of $f(x)$ is 10. Substituting -1 for x and 10 for $f(x)$ in the equation $f(x) = a(x - h)^2 + k$ gives $10 = a(-1 - h)^2 + k$, which is equivalent to $10 = a(1 + 2h + h^2) + k$, or $10 = a + 2ah + ah^2 + k$. It's given in the table that when $x = 0$, the corresponding value of $f(x)$ is 14. Substituting 0 for x and 14 for $f(x)$ in the equation $f(x) = a(x - h)^2 + k$ gives $14 = a(0 - h)^2 + k$, or $14 = ah^2 + k$. It's given in the table that when $x = 1$, the corresponding value of $f(x)$ is 20. Substituting 1 for x and 20 for $f(x)$ in the equation $f(x) = a(x - h)^2 + k$ gives $20 = a(1 - h)^2 + k$, which is equivalent to $20 = a(1 - 2h + h^2) + k$, or $20 = a - 2ah + ah^2 + k$. Adding $20 = a - 2ah + ah^2 + k$ to the equation $10 = a + 2ah + ah^2 + k$ gives $30 = 2a + 2ah^2 + 2k$. Dividing both sides of this equation by 2 gives $15 = a + ah^2 + k$. Since $14 = ah^2 + k$, substituting 14 for $ah^2 + k$ into the equation $15 = a + ah^2 + k$ gives $15 = a + 14$. Subtracting 14 from both sides of this equation gives $a = 1$. Substituting 1 for a in the equations $14 = ah^2 + k$ and $20 = ah^2 - 2ah + a + k$ gives $14 = h^2 + k$ and $20 = 1 - 2h + h^2 + k$, respectively. Since $14 = h^2 + k$, substituting 14 for $h^2 + k$ in the equation $20 = 1 - 2h + h^2 + k$ gives $20 = 1 - 2h + 14$, or $20 = 15 - 2h$. Subtracting 15 from both sides of this equation gives $5 = -2h$. Dividing both sides of this equation by -2 gives $-\frac{5}{2} = h$. Substituting $-\frac{5}{2}$ for h into the equation $14 = h^2 + k$ gives $14 = \left(-\frac{5}{2}\right)^2 + k$, or $14 = \frac{25}{4} + k$. Subtracting $\frac{25}{4}$ from both sides of this equation gives $\frac{31}{4} = k$. Substituting 1 for a, $-\frac{5}{2}$ for h, and $\frac{31}{4}$ for k

in the equation $f(x) = a(x - h)^2 + k$ gives $f(x) = \left(x + \frac{5}{2}\right)^2 + \frac{31}{4}$, which is equivalent to $f(x) = x^2 + 5x + \frac{25}{4} + \frac{31}{4}$, or $f(x) = x^2 + 5x + 14$. Therefore, $f(x) = x^2 + 5x + 14$ defines f.

Choice A is incorrect. If $f(x) = 3x^2 + 3x + 14$, then when $x = -1$, the corresponding value of $f(x)$ is 14, not 10. *Choice B* is incorrect. If $f(x) = 5x^2 + x + 14$, then when $x = -1$, the corresponding value of $f(x)$ is 18, not 10. *Choice C* is incorrect. If $f(x) = 9x^2 - x + 14$, then when $x = -1$, the corresponding value of $f(x)$ is 24, not 10, and when $x = 1$, the corresponding value of $f(x)$ is 22, not 20.

QUESTION 6

Choice C is correct. It's given that $f(x) = \frac{x + 15}{5}$ and $f(a) = 10$, where a is a constant. Therefore, for the given function f, when $x = a$, $f(x) = 10$. Substituting a for x and 10 for $f(x)$ in the given function f yields $10 = \frac{a + 15}{5}$. Multiplying both sides of this equation by 5 yields $50 = a + 15$. Subtracting 15 from both sides of this equation yields $35 = a$. Therefore, the value of a is 35.

Choice A is incorrect. This is the value of a if $f(a) = 4$. *Choice B* is incorrect. This is the value of a if $f(a) = 5$. *Choice D* is incorrect. This is the value of a if $f(a) = 16$.

QUESTION 7

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 8

Choice C is correct. It's given that line r is perpendicular to line p in the xy-plane. This means that the slope of line r is the negative reciprocal of the slope of line p. If the equation for line p is rewritten in slope-intercept form $y = mx + b$, where m and b are constants, then m is the slope of the line and $(0, b)$ is its y-intercept. Subtracting $18x$ from both sides of the equation $2y + 18x = 9$ yields $2y = -18x + 9$. Dividing both sides of this equation by

2 yields $y = -9x + \frac{9}{2}$. It follows that the slope of line p is -9. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of -9 is $\frac{-1}{-9}$, or $\frac{1}{9}$. Thus, the slope of line r is $\frac{1}{9}$.

Choice A is incorrect. This is the slope of line p, not line r. *Choice B* is incorrect. This is the reciprocal, not the negative reciprocal, of the slope of line p. *Choice D* is incorrect. This is the negative, not the negative reciprocal, of the slope of line p.

QUESTION 9

Choice A is correct. It's given that the sample is in the shape of a cube with edge lengths of 0.9 meters. Therefore, the volume of the sample is 0.90^3, or 0.729, cubic meters. It's also given that the sample has a density of 807 kilograms per 1 cubic meter. Therefore, the mass of this sample is 0.729 cubic meters $\left(\frac{807 \text{ kilograms}}{1 \text{ cubic meter}}\right)$, or 588.303 kilograms. Rounding this mass to the nearest whole number gives 588 kilograms. Therefore, to the nearest whole number, the mass, in kilograms, of this sample is 588.

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

QUESTION 10

Choice C is correct. It's given that the function P models the population of the city t years after 2005. Since there are 12 months in a year, 18 months is equivalent to $\frac{18}{12}$ years. Therefore, the expression $\frac{18}{12}x$ can represent the number of years in x 18-month periods. Substituting $\frac{18}{12}x$ for t in the given equation yields $P\left(\frac{18}{12}x\right) = 290(1.04)^{\left(\frac{4}{6}\right)\left(\frac{18}{12}x\right)}$, which is equivalent to $P\left(\frac{18}{12}x\right) = 290(1.04)^x$. Therefore, for each 18-month period, the predicted population of the city is 1.04 times, or 104% of, the previous population. This means that the population is predicted to increase by 4% every 18 months.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. Each year, the predicted population of the city is 1.04 times the previous year's predicted population, which is not the same as an increase of 1.04%. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 11

The correct answer is $-\frac{14}{15}$. A linear equation in the form $ax + b = cx + d$ has no solution only when the coefficients of x on each side of the equation are equal and the constant terms are not equal. Dividing both sides of the given equation by 2 yields $kx - n = -\frac{28}{30}x - \frac{36}{38}$, or $kx - n = -\frac{14}{15}x - \frac{18}{19}$. Since it's given that the equation has no solution, the coefficient of x on both sides of this equation must be equal, and the constant terms on both sides of this equation must not be equal. Since $\frac{18}{19} < 1$, and it's given that $n > 1$, the second condition is true. Thus, k must be equal to $-\frac{14}{15}$. Note that −14/15, −.9333, and −0.933 are examples of ways to enter a correct answer.

QUESTION 12

The correct answer is 4.06. It's given that the retail price is 290% of the wholesale price of \$7.00. Thus, the retail price is $\$7.00\left(\frac{290}{100}\right)$, which is equivalent to \$7.00(2.9), or \$20.30. It's also given that the discounted price is 80% off the retail price. Thus, the discounted price is $\$20.30\left(1-\frac{80}{100}\right)$, which is equivalent to \$20.30(0.20), or \$4.06.

QUESTION 13

The correct answer is 289. A quadratic equation of the form $ax^2 + bx + c = 0$, where a, b, and c are constants, has no real solutions when the value of the discriminant, $b^2 - 4ac$, is less than 0. In the given equation, $x^2 - 34x + c = 0$, $a = 1$ and $b = -34$. Therefore, the discriminant of the given equation can be expressed as $(-34)^2 - 4(1)(c)$, or $1{,}156 - 4c$. It follows that the given equation has no real solutions when $1{,}156 - 4c < 0$. Adding $4c$ to both sides of this inequality yields $1{,}156 < 4c$. Dividing both sides of this inequality by 4 yields $289 < c$, or $c > 289$. It's given that the equation $x^2 - 34x + c = 0$ has no real solutions when $c > n$. Therefore, the least possible value of n is 289.

QUESTION 14

The correct answer is 44. The mean of a data set is computed by dividing the sum of the values in the data set by the number of values in the data set. It's given that data set A consists of the heights of 75 buildings and has a mean of 32 meters. This can be represented by the equation $\frac{x}{75} = 32$, where x represents the sum of the heights of the buildings, in meters, in data set A. Multiplying both sides of this equation by 75 yields $x = 75(32)$, or $x = 2{,}400$ meters. Therefore, the sum of the heights of the buildings in data set A is 2,400 meters. It's also given that data set B consists of the heights of 50 buildings and has a mean of 62 meters. This can be represented by the equation $\frac{y}{50} = 62$, where y represents the sum of the heights of the buildings, in meters, in data set B. Multiplying both sides of this equation by 50 yields $y = 50(62)$, or $y = 3{,}100$ meters. Therefore, the sum of the heights of the buildings in data set B is 3,100 meters. Since it's given that data set C consists of the heights of the 125 buildings from data sets A and B, it follows that the mean of data set C is the sum of the heights of the buildings, in meters, in data sets A and B divided by the number of buildings represented in data sets A and B, or $\frac{2{,}400 + 3{,}100}{125}$, which is equivalent to 44 meters. Therefore, the mean, in meters, of data set C is 44.

QUESTION 15

Choice D is correct. It's given that $4x^2 + bx - 45$ can be rewritten as $(hx + k)(x + j)$. The expression $(hx + k)(x + j)$ can be rewritten as $hx^2 + jhx + kx + kj$, or $hx^2 + (jh + k)x + kj$. Therefore, $hx^2 + (jh + k)x + kj$ 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 16

The correct answer is $\frac{29}{2}$. According to the first equation in the given system, the value of y is -1.5. Substituting -1.5 for y in the second equation in the given system yields $-1.5 = x^2 + 8x + a$. Adding 1.5 to both sides of this equation yields $0 = x^2 + 8x + a + 1.5$. If the given system has exactly one distinct real solution, it follows that $0 = x^2 + 8x + a + 1.5$ has exactly one distinct real solution. A quadratic equation in the form $0 = px^2 + qx + r$, where p, q, and r are constants, has exactly one distinct real solution if and only if the discriminant, $q^2 - 4pr$, is equal to 0. The equation $0 = x^2 + 8x + a + 1.5$ is in this form, where $p = 1$, $q = 8$, and $r = a + 1.5$. Therefore, the discriminant of the equation $0 = x^2 + 8x + a + 1.5$ is $(8)^2 - 4(1)(a + 1.5)$, or $58 - 4a$. Setting the discriminant equal to 0 to solve for a yields $58 - 4a = 0$. Adding $4a$ to both sides of this equation yields $58 = 4a$. Dividing both sides of this equation by 4 yields $\frac{58}{4} = a$, or $\frac{29}{2} = a$. Therefore, if the given system of equations has exactly one distinct real solution, the value of a is $\frac{29}{2}$. Note that 29/2 and 14.5 are examples of ways to enter a correct answer.

QUESTION 17

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 18

Choice C is correct. It's given that $f(x) = \frac{a}{x+b}$ and that the graph shown is a partial graph of $y = f(x)$. Substituting y for $f(x)$ in the equation $f(x) = \frac{a}{x+b}$ yields $y = \frac{a}{x+b}$. The graph passes through the point $(-7, -2)$. Substituting -7 for x and -2 for y in the equation $y = \frac{a}{x+b}$ yields $-2 = \frac{a}{-7+b}$. Multiplying each side of this equation by $-7 + b$ yields $-2(-7 + b) = a$, or $14 - 2b = a$. The graph also passes through the point $(-5, -6)$. Substituting -5 for x and -6 for y in the equation $y = \frac{a}{x+b}$ yields $-6 = \frac{a}{-5+b}$. Multiplying each side of this equation by $-5 + b$ yields $-6(-5 + b) = a$, or $30 - 6b = a$. Substituting $14 - 2b$ for a in this equation yields $30 - 6b = 14 - 2b$. Adding $6b$ to each side of this equation yields $30 = 14 + 4b$. Subtracting 14 from each side of this equation yields $16 = 4b$. Dividing each side of this equation by 4 yields $4 = b$. Substituting 4 for b in the equation $14 - 2b = a$ yields $14 - 2(4) = a$, or $6 = a$. Substituting 6 for a and 4 for b in the equation $f(x) = \frac{a}{x+b}$ yields $f(x) = \frac{6}{x+4}$. It's given that $g(x) = f(x + 4)$. Substituting $x + 4$ for x in the equation $f(x) = \frac{6}{x+4}$ yields $f(x + 4) = \frac{6}{x+4+4}$, which is equivalent to $f(x + 4) = \frac{6}{x+8}$. It follows that $g(x) = \frac{6}{x+8}$.

Choice A is incorrect. This could define function g if $g(x) = f(x - 4)$. *Choice B* is incorrect. This could define function g if $g(x) = f(x)$. *Choice D* is incorrect. This could define function g if $g(x) = f(x) \cdot (x + 4)$.

QUESTION 19

Choice A is correct. The left-hand side of the given equation is the expression $57x^2 + (57b + a)x + ab$. Applying the distributive property to this expression yields $57x^2 + 57bx + ax + ab$. Since the first two terms of this expression have a common factor of $57x$ and the last two terms of this expression have a common factor of a, this expression can be rewritten as $57x(x + b) + a(x + b)$. Since the two terms of this expression have a common factor of $(x + b)$, it can be rewritten as $(x + b)(57x + a)$. Therefore, the given equation can be rewritten as $(x + b)(57x + a) = 0$. By the zero product property, it follows that $x + b = 0$ or $57x + a = 0$. Subtracting b from both sides of the equation $x + b = 0$ yields $x = -b$. Subtracting a from both sides of the equation $57x + a = 0$ yields $57x = -a$. Dividing both sides of this equation by 57 yields $x = \frac{-a}{57}$. Therefore, the solutions to the given equation are $-b$ and $\frac{-a}{57}$. It follows that the product of the solutions of the given equation is $(-b)\left(\frac{-a}{57}\right)$, or $\frac{ab}{57}$. It's given that the product of the solutions of the given equation is kab. It follows that $\frac{ab}{57} = kab$, which can also be written as $ab\left(\frac{1}{57}\right) = ab(k)$. It's given that a and b are positive constants. Therefore, dividing both sides of the equation $ab\left(\frac{1}{57}\right) = ab(k)$ by ab yields $\frac{1}{57} = k$. Thus, the value of k is $\frac{1}{57}$.

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 10. It's given that the graph of $x^2 + x + y^2 + y = \frac{199}{2}$ in the xy-plane is a circle. The equation of a circle in the xy-plane can be written in the form $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the length of the radius of the circle is r. The term $(x - h)^2$ in this equation can be obtained by adding the square of half the coefficient of x to both sides of the given equation to complete the square. The coefficient of x is 1. Half the coefficient of x is $\frac{1}{2}$. The square of half the coefficient of x is $\frac{1}{4}$. Adding $\frac{1}{4}$ to each side of $(x^2 + x) + (y^2 + y) = \frac{199}{2}$ yields $\left(x^2 + x + \frac{1}{4}\right) + (y^2 + y) = \frac{199}{2} + \frac{1}{4}$, or $\left(x + \frac{1}{2}\right)^2 + (y^2 + y) = \frac{199}{2} + \frac{1}{4}$. Similarly, the term $(y - k)^2$ can be obtained by adding the square of half the coefficient of y to both sides of this equation, which yields $\left(x + \frac{1}{2}\right)^2 + \left(y^2 + y + \frac{1}{4}\right) = \frac{199}{2} + \frac{1}{4} + \frac{1}{4}$, or $\left(x + \frac{1}{2}\right)^2 + \left(y + \frac{1}{2}\right)^2 = \frac{199}{2} + \frac{1}{4} + \frac{1}{4}$. This equation is equivalent to $\left(x + \frac{1}{2}\right)^2 + \left(y + \frac{1}{2}\right)^2 = 100$, or $\left(x + \frac{1}{2}\right)^2 + \left(y + \frac{1}{2}\right)^2 = 10^2$. Therefore, the length of the circle's radius is 10.

QUESTION 21

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 22

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.

SAT

Scoring Your Paper SAT Practice Test #4

Congratulations on completing an SAT® practice test.
To score your test, follow the instructions in this guide.

IMPORTANT: *This scoring guide is for students who completed the paper version of this digital SAT practice test.*

1 Total Score 400–1600 Scale	Total Score	
2 Section Scores 200–800 Scale	Reading and Writing	Math
	Modules 1 & 2	Modules 1 & 2

Scores Overview

Each assessment in the digital SAT Suite (SAT, PSAT/NMSQT®, PSAT™ 10, and PSAT™ 8/9) reports test scores on a common scale.

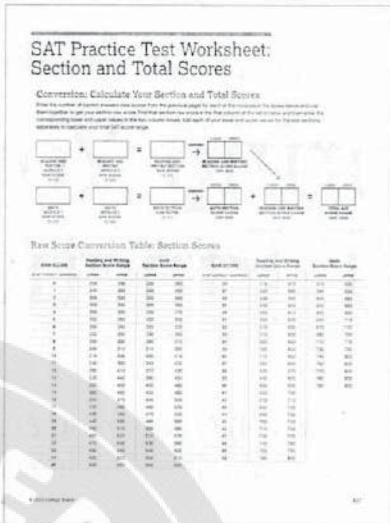
For more details about scores, visit **sat.org/scores**.

How to Calculate Your Practice Test Scores

The worksheets on pages 626 and 627 help you calculate your test scores.

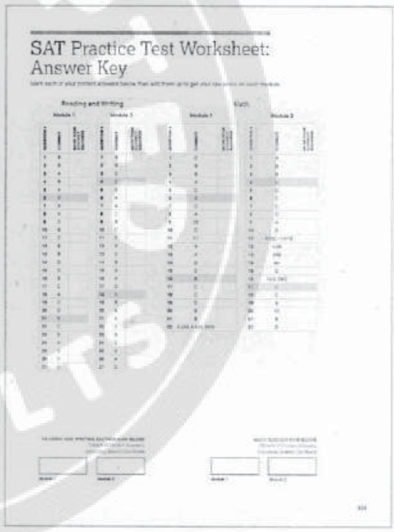
GET SET UP

1. In addition to your practice test, you'll need the conversion tables and answer key at the end of this guide.


SAT Practice Test Worksheet:
Section and Total Scores

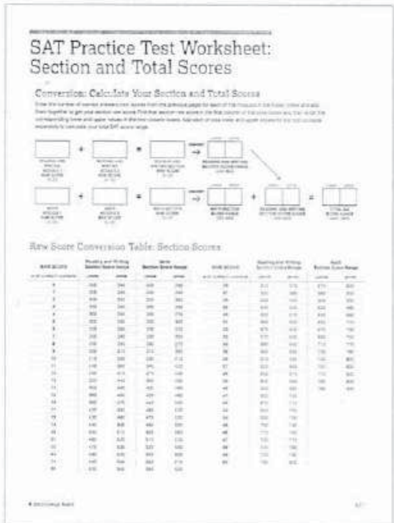
SCORE YOUR PRACTICE TEST

2. Compare your answers to the answer key on page 626, and count up the total number of correct answers for each section. Write the number of correct answers for each section in the answer key at the bottom of that section.


SAT Practice Test Worksheet:
Answer Key

CALCULATE YOUR SCORES

3. Using your marked-up answer key and the conversion tables, follow the directions on page 627 to get your section and test scores.


SAT Practice Test Worksheet:
Section and Total Scores

Get Section and Total Scores

Section and total scores for the paper version of this digital SAT practice test are expressed as ranges. That's because the scoring method described in this guide is a simplified (and therefore slightly less precise) version of the one used in Bluebook™, the digital test application.

To obtain your Reading and Writing and Math section scores, use the provided answer key to determine the number of questions you answered correctly in each section. These numbers constitute your *raw scores* for the two sections. Use the provided table to convert your raw score for each section into a *scaled score* range consisting of a "lower" and "upper" value. Add the two lower values together and the two upper values together to obtain your total score range.

GET YOUR READING AND WRITING SECTION SCORE

Calculate your SAT Reading and Writing section score (it's on a scale of 200–800).

1. Use the answer key on page 626 to find the number of questions in module 1 and module 2 that you answered correctly.
2. To determine your Reading and Writing raw score, add the number of correct answers you got on module 1 and module 2. **Exclude the questions in grayed-out rows from your calculation.**
3. Use the Raw Score Conversion Table: Section Scores on page 627 to turn your raw score into your Reading and Writing section score.
4. The "lower" and "upper" values associated with your raw score establish the range of scores you might expect to receive had this been an actual test.

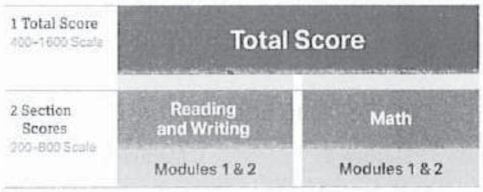
GET YOUR MATH SECTION SCORE

Calculate your SAT Math section score (it's on a scale of 200–800).

1. Use the answer key on page 626 to find the number of questions in module 1 and module 2 that you answered correctly.
2. To determine your Math raw score, add the number of correct answers you got on module 1 and module 2. **Exclude the questions in grayed-out rows from your calculation.**
3. Use the Raw Score Conversion Table: Section Scores on page 627 to turn your raw score into your Math section score.
4. The "lower" and "upper" values associated with your raw score establish the range of scores you might expect to receive had this been an actual test.

GET YOUR TOTAL SCORE

Add together the "lower" values for the Reading and Writing and Math sections, and then add together the "upper" values for the two sections. The result is your total score, expressed as a range, for this SAT practice test. The total score is on a scale of 400–1600.



Your total score on this SAT practice test is the sum of your Reading and Writing section score and your Math section score. On this paper version of the digital SAT practice test, you'll receive a lower and upper score for each test section and the total score. This is the range of scores that you might expect to receive.

Use the worksheets on pages 626 and 627 to calculate your section and total scores.

SAT Practice Test Worksheet: Answer Key

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

Reading and Writing

Module 1

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

Module 2

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

Math

Module 1

QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS
1	C	
2	B	
3	B	
4	A	
5	C	
6	5	
7	D	
8	A	
9	28	
10	C	
11	11	
12	9	
13	A	
14	D	
15	D	
16	B	
17	C	
18	C	
19	D	
20	B	
21	B	
22	6.555, 6.556, 59/9	

Module 2

QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS
1	A	
2	B	
3	B	
4	C	
5	D	
6	C	
7	C	
8	C	
9	A	
10	C	
11	-.9333, -14/15	
12	4.06	
13	289	
14	44	
15	D	
16	14.5, 29/2	
17	C	
18	C	
19	A	
20	10	
21	B	
22	D	

READING AND WRITING SECTION RAW SCORE
(Total # of Correct Answers, Excluding Grayed-Out Rows)

Module 1 | Module 2

MATH SECTION RAW SCORE
(Total # of Correct Answers, Excluding Grayed-Out Rows)

Module 1 | Module 2

SAT Practice Test Worksheet: Section and Total Scores

Conversion: Calculate Your Section and Total Scores

Enter the number of correct answers (raw scores from the previous page) for each of the modules in the boxes below and add them together to get your section raw score. Find that section raw score in the first column of the table below and then enter the corresponding lower and upper values in the two-column boxes. Add each of your lower and upper values for the test sections separately to calculate your total SAT score range.

READING AND WRITING MODULE 1 RAW SCORE (0–25) + READING AND WRITING MODULE 2 RAW SCORE (0–25) = READING AND WRITING SECTION RAW SCORE (0–50) CONVERT → LOWER UPPER READING AND WRITING SECTION SCORE RANGE (200–800)

MATH MODULE 1 RAW SCORE (0–20) + MATH MODULE 2 RAW SCORE (0–20) = MATH SECTION RAW SCORE (0–40) CONVERT → LOWER UPPER MATH SECTION SCORE RANGE (200–800) + LOWER UPPER READING AND WRITING SECTION SCORE RANGE (200–800) = LOWER UPPER TOTAL SAT SCORE RANGE (400–1600)

Raw Score Conversion Table: Section Scores

RAW SCORE	Reading and Writing Section Score Range		Math Section Score Range		RAW SCORE	Reading and Writing Section Score Range		Math Section Score Range	
(# OF CORRECT ANSWERS)	LOWER	UPPER	LOWER	UPPER	(# OF CORRECT ANSWERS)	LOWER	UPPER	LOWER	UPPER
0	200	260	200	260	26	510	570	570	630
1	200	260	200	260	27	520	580	590	650
2	200	260	200	260	28	530	590	600	660
3	200	260	200	260	29	540	600	620	680
4	200	260	200	270	30	550	610	630	690
5	200	260	200	300	31	560	620	650	710
6	200	260	200	320	32	570	630	670	730
7	200	260	230	350	33	570	630	690	750
8	200	260	290	370	34	580	640	710	770
9	200	310	310	390	35	590	650	730	790
10	210	330	330	410	36	610	650	740	800
11	240	360	340	420	37	620	660	750	800
12	290	410	370	430	38	630	670	770	800
13	320	440	390	450	39	640	680	780	800
14	350	450	400	460	40	650	690	780	800
15	380	460	420	480	41	660	700		
16	390	470	440	500	42	670	710		
17	420	480	460	520	43	680	720		
18	430	490	470	530	44	690	730		
19	440	500	490	550	45	700	740		
20	450	510	500	560	46	710	750		
21	460	520	510	570	47	730	770		
22	470	530	530	590	48	740	780		
23	480	540	540	600	49	750	790		
24	490	550	550	610	50	780	800		
25	500	560	560	620					