

Math

Module 2

(27 questions)

QUESTION 1

Choice D is correct. It's given that $8x = 320$. Dividing both sides of this equation by 2 yields $4x = 160$. Therefore, the value of $4x$ is 160.

Choice A is incorrect. This is the value of $16x$, not $4x$. *Choice B* is incorrect. This is the value of $8x$, not $4x$. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 2

Choice B is correct. It's given that a participant must complete at least 120 training hours to earn the certificate of completion. Let x represent the number of additional training hours a participant must complete to earn the certificate if the participant has completed 44 training hours. After completing x more training hours, the participant will have completed a total of $44 + x$ training hours. It's given that this total must be at least 120, so $44 + x \geq 120$. Subtracting 44 from both sides of this inequality yields $x \geq 76$. Therefore, the minimum number of additional training hours the participant must complete to earn the certificate of completion is 76.

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

Choice C is incorrect. This represents the total number of training hours required to earn the certificate, not the minimum number of additional training hours required. *Choice D* is incorrect. This represents the total number of training hours if the participant completes 120 more hours, not the minimum number of additional training hours required.

QUESTION 3

Choice B is correct. Since 10 decimeters is equivalent to 1 meter, 130 decimeters is equivalent to 130 decimeters $\left(\frac{1 \text{ meter}}{10 \text{ decimeters}}\right)$, or 13 meters.

Choice A is incorrect. This is the length, in meters, that is equivalent to 13, not 130, decimeters. *Choice C* is incorrect. This is the length, in meters, that is equivalent to 1,300, not 130, decimeters. *Choice D* is incorrect. This is the length, in meters, that is equivalent to 13,000, not 130, decimeters.

QUESTION 4

Choice D is correct. It's given that the lab technician combines 30 grams of compound A, 40 grams of compound B, and x grams of compound C and that the resulting mixture has a mass of 130 grams. The mass, in grams, of the mixture is equal to the sum of the masses, in grams, of the combined compounds, or $130 = 30 + 40 + x$. Combining like terms in the equation $130 = 30 + 40 + x$ yields $130 = 70 + x$. Subtracting 70 from both sides of this equation yields $60 = x$. Therefore, the value of x is 60.

Choice A is incorrect. This is the difference between the masses of compound B and compound A, not the mass of compound C. *Choice B* is incorrect. This is the mass of compound A, not the mass of compound C. *Choice C* is incorrect. This is the mass of compound B, not the mass of compound C.

QUESTION 5

Choice D is correct. The expression $0.24x$ represents the result of multiplying a positive integer x by 0.24. Since 0.24 is equivalent to $\frac{24}{100}$, it follows that 0.24 is equivalent to 24%. Therefore, multiplying a positive integer by 0.24 represents 24% of that integer. Thus, the expression $0.24x$ represents 24% of x .

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 6

The correct answer is 97. The perimeter of a square is the sum of the lengths of all four of its sides. Since all sides of a square have equal length, the perimeter of a square with side length s can be expressed as $s + s + s + s$, or $4s$. Since it's given that the perimeter of a square is 388 centimeters, it follows that $4s = 388$. Dividing both sides of this equation by 4 yields $s = 97$. Therefore, the side length, in centimeters, of this square is 97.

QUESTION 7

The correct answer is 2. It's given that the function g is defined

by $g(x) = \sqrt{(3x - 9)(3x + 9) + 4}$. Substituting 3 for x in function g gives

$g(3) = \sqrt{(3 \cdot 3 - 9)(3 \cdot 3 + 9) + 4}$. This can be rewritten as

$g(3) = \sqrt{(9 - 9)(9 + 9) + 4}$, or $g(3) = \sqrt{(0)(18) + 4}$. It follows that $g(3) = \sqrt{0 + 4}$,

or $g(3) = \sqrt{4}$, which is equivalent to $g(3) = 2$. Therefore, the value of $g(3)$ is 2.

QUESTION 8

Choice C is correct. It's given that the equation $x + y = 50$ represents the possible combinations of the number of members who use field A, x , and the number of members who use field B, y , for a 50-member sports team at a practice. It's also given that at this practice, 24 members use field A. Substituting 24 for x in the equation $x + y = 50$ yields $24 + y = 50$. Subtracting 24 from both sides of this equation yields $y = 26$. Therefore, at this practice, 26 members use field B.

Choice A is incorrect. This is the number of members who use field A at this practice. **Choice B** is incorrect and may result from conceptual or calculation errors. **Choice D** is incorrect. This is the total number of members on the sports team.

QUESTION 9

Choice C is correct. For the graph shown, the vertical axis represents the number of bacteria in a population, and the horizontal axis represents time, in hours, after an initial observation. Based on the graph, 2 hours after the initial observation, the estimated number of bacteria in the population is between 100 and 110. Of the given choices, only 104 is between 100 and 110. Therefore, the estimated number of bacteria in the population 2 hours after the initial observation is 104.

Choice A is incorrect. This represents the estimated number of bacteria in the population at the time of the initial observation. **Choice B** is incorrect. This represents the estimated number of bacteria in the population approximately 1 hour after the initial observation. **Choice D** is incorrect and may result from conceptual or calculation errors.

QUESTION 10

Choice D is correct. The area, A , of a rectangle is given by the formula $A = \ell w$, where ℓ is the length of the rectangle and w is the width of the rectangle. The figure shows the rectangle has a length of 20 centimeters and a width of 5 centimeters. Substituting 20 for ℓ and 5 for w in the formula $A = \ell w$ yields $A = (20)(5)$, or $A = 100$. Therefore, the area, in square centimeters, of the rectangle is 100.

Choice A is incorrect. This is the width, in centimeters, not the area, in square centimeters, of the rectangle. **Choice B** is incorrect. This is the difference between the length and the width, in centimeters, not the area, in square centimeters, of the rectangle. **Choice C** is incorrect. This is the sum of the length and the width, in centimeters, not the area, in square centimeters, of the rectangle.

QUESTION 11

Choice C is correct. It's given that hexagon G and hexagon H are similar and that the length of each side of hexagon G is 2.8 times the length of its corresponding side in hexagon H. If the length of one side of hexagon H is h , it follows that its corresponding side in hexagon G is 2.8 times h , or $2.8h$.

Choice A is incorrect. This expression represents the length of the corresponding side in hexagon G when the length of each side of hexagon H is 2.8 times the length of its corresponding side in hexagon G rather than when the length of each side of hexagon G is 2.8 times the length of its corresponding side in hexagon H.

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 B is correct. In the given equation, $d = 29w + 100$, d represents the total amount of money, in dollars, that Lorie has in a piggy bank w weeks after she starts to save. Therefore, the total amount of money, in dollars, that Lorie has in the piggy bank 10 weeks after she starts to save can be found by substituting 10 for w in the equation, which yields $d = 29(10) + 100$, which is equivalent to $d = 290 + 100$, or $d = 390$. Thus, the total amount of money Lorie has in the piggy bank 10 weeks after she starts to save is 390 dollars.

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 13

The correct answer is -9 . It's given that the graph of $9x + y = 14$ in the xy -plane is a line. A linear equation can be written in the form $y = mx + b$, where m represents the slope of the line and $(0, b)$ is the y -intercept in the xy -plane. Subtracting $9x$ from both sides of the equation $9x + y = 14$ yields $y = -9x + 14$. Since the value of m in this equation is -9 , it follows that the slope of the line is -9 .

QUESTION 14

The correct answer is 10.75. It's given that the sand and landscaping pebbles the contractor ordered for a project cost a total of \$154. It's also given that the equation $18.5x + 29.25y = 154$ represents the relationship between the number of cubic yards of sand, x , and the number of tons of landscaping pebbles, y , the contractor ordered. Since x represents the number of cubic yards of sand ordered, $18.5x$ represents the total cost, in dollars, of the sand, and the cost per cubic yard of sand is \$18.50. Similarly, since y represents the number of tons of landscaping pebbles ordered, $29.25y$ represents the total cost, in dollars, of the landscaping pebbles, and the cost per ton of landscaping pebbles is \$29.25. Therefore, a ton of landscaping pebbles cost the contractor $29.25 - 18.50$, or 10.75, more dollars than a cubic yard of sand. Note that 10.75 and $43/4$ are examples of ways to enter a correct answer.

QUESTION 15

Choice B is correct. It's given that Laura bought t tarts for \$4 each and m muffins for \$2 each and spent \$58. Therefore, the amount Laura spent on the tarts is $4t$, and the amount Laura spent on the muffins is $2m$. Since Laura spent \$58, it follows that this relationship can be represented by the equation $4t + 2m = 58$. It's also given that Laura bought a total of 21 baked goods consisting of t tarts and m muffins. This relationship can be represented by the equation $t + m = 21$. Therefore, the system consisting of the equations $t + m = 21$ and $4t + 2m = 58$ represents this situation.

Choice A is incorrect. The second equation in this system represents a situation where each tart costs \$2, not \$4, and each muffin costs \$4, not \$2. **Choice C** is incorrect and may result from conceptual errors. **Choice D** is incorrect and may result from conceptual errors.

QUESTION 16

Choice C is correct. It's given that the length of a crystal formation was estimated to be 270 centimeters at the beginning of a study and that the length of this crystal formation was estimated to increase at a rate of 9 centimeters per year. Therefore, the estimated length, in centimeters, of this crystal formation 10 years after the study began is $270 + 10(9)$, or 360.

Choice A is incorrect. This is the increase in length, not the total length, in centimeters, of the crystal formation 10 years after the study began. **Choice B** is incorrect. This is the length, in centimeters, of the crystal formation after 1 year, not after 10 years. **Choice D** is incorrect and may result from conceptual or calculation errors.

QUESTION 17

Choice B is correct. It's given that each side of the pentagon has a length of n feet. The perimeter of a polygon is the sum of all its side lengths, so the perimeter can be written as $n + n + n + n + n$, or $5n$. It's also given that the perimeter of the pentagon is 80 feet. Therefore, the equation $80 = 5n$ gives the perimeter in terms of n .

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 18

Choice A is correct. The Pythagorean theorem states that in a right triangle with legs of length a and b and a hypotenuse with length c , the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs; that is, $c^2 = a^2 + b^2$. It's given that the length of the hypotenuse of a right triangle is c and the lengths of its legs are 6 and 9. Substituting these values into the equation $c^2 = a^2 + b^2$ yields $c^2 = 6^2 + 9^2$. Therefore, the expression that represents the value of c^2 is $6^2 + 9^2$.

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 19

Choice C is correct. An equation defining the linear function g can be written in the form $g(x) = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the graph of $y = g(x)$ in the xy -plane. It's given that the graph of $y = g(x)$ has a slope of 37. Therefore, $m = 37$. It's also given that the graph of $y = g(x)$ passes through the point $(0, 6)$. Therefore, $b = 6$. Substituting 37 for m and 6 for b in the equation $g(x) = mx + b$ yields $g(x) = 37x + 6$. Thus, the equation that defines g is $g(x) = 37x + 6$.

Choice A is incorrect. For this function, the graph of $y = g(x)$ in the xy -plane has a slope of $\frac{37}{6}$, not 37, and passes through the point $(0, 0)$, not $(0, 6)$. *Choice B* is incorrect. For this function, the graph of $y = g(x)$ in the xy -plane has a slope of 6, not 37, and passes through the point $(0, \frac{37}{6})$, not $(0, 6)$. *Choice D* is incorrect. For this function, the graph of $y = g(x)$ in the xy -plane passes through the point $(0, 37)$, not $(0, 6)$.

QUESTION 20

The correct answer is 1,008. Adding the first equation to the second equation in the given system yields $(\frac{x}{2} + \frac{x}{7}) + (9(y - 11) - 9(y - 11)) = 25 + 47$, which gives $(\frac{x}{2} + \frac{x}{7}) + 0 = 72$, or $\frac{x}{2} + \frac{x}{7} = 72$. Multiplying both sides of this equation by 14 yields $14(\frac{x}{2} + \frac{x}{7}) = 14(72)$, which gives $7x + 2x = 1,008$, or $9x = 1,008$. Therefore, the value of $9x$ is 1,008.

QUESTION 21

The correct answer is either 25, 26, 27, 28, 29, 30, 31, 32, 33, or 34. It's given that the frequency table summarizes the daily low temperature for each of 31 days, where the daily low temperature was recorded to the nearest integer. If a data set contains an odd number of values, the median is the middle value in the list when the data values are listed in ascending order. There are 31 data values in the data set, so the median of the recorded daily low temperatures is the 16th value when the values are listed in numerical order. Since the temperatures in the table are given as ranges rather than specific values, it's not possible to know the exact value of the median, only a range of possible values. The table shows the ranges of recorded daily low temperatures in ascending order. It follows that a list of the data values, in ascending order, would be such that the 1st value is between -5 and 4, the next 4 values are between 5 and 14, the next 4 values are between 15 and 24, the next 7 values are between 25 and 34, and so on. Thus, the 16th value of the ordered list is an integer between 25 and 34. Therefore, the median of the recorded daily low temperatures, in degrees Fahrenheit, could be any integer between 25 and 34. Note that 25, 26, 27, 28, 29, 30, 31, 32, 33, or 34 may be entered as the correct answer.

QUESTION 22

Choice A is correct. If the equations $-10x + y = 19$ and $10x + y = 19$ are graphed in the xy -plane, the point (x, y) at which the graphs intersect can be found by solving the system of the two given equations. Adding the two given equations yields $(-10x + y) + (10x + y) = 19 + 19$, or $2y = 38$. Dividing both sides of this equation by 2 yields $y = 19$. Substituting 19 for y in the equation $10x + y = 19$ yields $10x + 19 = 19$. Subtracting 19 from both sides of this equation yields $10x = 0$. Dividing both sides of this equation by 10 yields $x = 0$. Therefore, the graphs intersect at the point $(0, 19)$.

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 A is correct. Subtracting $12r$ from both sides of the given equation yields $13s = t - 12r$. Dividing both sides of this equation by 13 yields $s = \frac{t - 12r}{13}$.

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 24

Choice B is correct. To complete the square, adding $\left(\frac{2}{2}\right)^2$, or 1, to each side of this equation yields $x^2 - 2x + 1 = 38 + 1$, or $(x - 1)^2 = 39$. Taking the square root of both sides of this equation yields $x - 1 = \pm\sqrt{39}$. Adding 1 to both sides of this equation yields $x = 1 \pm \sqrt{39}$. Therefore, the solutions to the given equation are $x = 1 + \sqrt{39}$ and $x = 1 - \sqrt{39}$. Of these two solutions, only $1 + \sqrt{39}$ is given as a choice.

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 25

Choice D is correct. It's given that a sphere has a density of 76 ounces per cubic inch. Since the density is given in ounces per cubic inch, the mass, in ounces, can be found by multiplying the density by the volume, in cubic inches. It's also given that the sphere has a radius of 3 inches. The volume of a sphere is given by the formula $V = \frac{4}{3}\pi r^3$, where r represents the radius. Substituting 3 for r in this formula yields $V = \frac{4}{3}\pi(3)^3$, or $V = 36\pi$. Therefore, the volume of this sphere is 36π cubic inches. It follows that the mass of the sphere is equivalent to $\left(\frac{76 \text{ ounces}}{\text{cubic inch}}\right)(36\pi \text{ cubic inches})$, or $2,736\pi$ ounces.

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 26

Choice B is correct. It's given that the scatterplot shows the data points in data set W and that the line of best fit for data set W can be represented by the equation $y = a + cx$, where a and c are constants. An equation in the form $y = b + mx$ represents a line with a slope of m and a y -intercept of $(0, b)$. Therefore, in the equation $y = a + cx$, c represents the slope of the line of best fit for data set W and a represents the y -coordinate of the y -intercept. A line of best fit represents the general trend of the data points in a data set, so that the distance between the line and the data points is minimized. The 7 data points in data set W have an upward trend, and the line of best fit for data set W has a positive slope and a positive y -coordinate of the y -intercept. It follows that a and c are positive constants. It's given that data set V consists of every point from data set W as well as the point $(14, 8)$ and that the line of best fit for data set V can be represented by the equation $y = j + kx$, where j and k are constants. In this equation, k represents the slope of the line of best fit for data set V and j represents the y -coordinate of the y -intercept. Data set V also generally has an upward trend. However, the rightmost data point in data set V, $(14, 8)$, has a y -value that is much lower than the y -values of other data points near it. Because $(14, 8)$ is the rightmost data point and lies well below the upward trend, minimizing the distance between $(14, 8)$ and the line of best fit for data set V requires the line of best fit for data set V to pass through a point at $x = 14$ that has a corresponding y -value between $y = 8$ and the y -value predicted by the line of best fit for data set W at $x = 14$. In other words, the right end of the line of best fit for data set V must be lower in the xy -plane than the right end of the line of best fit for data set W. In order to also minimize the distance between the line of best fit for data set V and the other 7 points in data set V, the left end of the line of best fit for data set V must be higher in the xy -plane than the left end of the line of best fit for data set W. It follows that the y -coordinate of the y -intercept of the line of best fit for data set V must be greater than the y -coordinate of the y -intercept of the line for data set W. In terms of a and j , it must be true that $j > a$, or $a < j$. Therefore, statement I is false. Because, in the xy -plane, the line of best fit for data set V is higher on the left and lower on the right than the line of best fit for data set W, the line of best fit for data set V must have a slope that is less than the slope of the line of best fit for data set W. Therefore, in terms of c and k , it must be true that $k < c$, or $c > k$. It follows that only statement II must be true.

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 27

The correct answer is $\frac{9}{7}$. The left-hand side of the given equation is the expression $\frac{7}{9}x^2 - (\frac{7}{9}r + s)x + rs$. Applying the distributive property to this expression yields $\frac{7}{9}x^2 - \frac{7}{9}rx - sx + rs$. Since the first two terms of this expression have a common factor of $\frac{7}{9}x$ and the last two terms of this expression have a common factor of s , the expression $\frac{7}{9}x^2 - \frac{7}{9}rx - sx + rs$ can be rewritten as $\frac{7}{9}x(x - r) - s(x - r)$. Since the two terms in this expression have a common factor of $(x - r)$, the expression $\frac{7}{9}x(x - r) - s(x - r)$ can be rewritten as $(x - r)(\frac{7}{9}x - s)$. Therefore, the given equation can be rewritten as $(x - r)(\frac{7}{9}x - s) = 0$. By the zero product property, it follows that $x - r = 0$ or $\frac{7}{9}x - s = 0$. Adding r to both sides of the equation $x - r = 0$ yields $x = r$. Adding s to both sides of the equation $\frac{7}{9}x - s = 0$ yields $\frac{7}{9}x = s$. Dividing both sides of this equation by $\frac{7}{9}$ yields $x = \frac{9s}{7}$. Therefore, the solutions to the given equation are r and $\frac{9s}{7}$. It follows that the product of the solutions to the given equation is $r(\frac{9s}{7})$, or $\frac{9}{7}rs$. It's given that the product of the solutions to the given equation is rst ; therefore, $\frac{9}{7}rs = rst$. Since it's also given that r and s are positive constants, dividing both sides of the equation $\frac{9}{7}rs = rst$ by rs yields $\frac{9}{7} = t$. Thus, the value of t is $\frac{9}{7}$. Note that $9/7$, 1.285 , and 1.286 are examples of ways to enter a correct answer.