

Math

Module 1

(27 questions)

QUESTION 1

Choice D is correct. It's given that the vehicle travels 9 feet per second for 7 seconds. The distance traveled can be found by multiplying the rate, 9 feet per second, by the time, 7 seconds. This yields $\left(\frac{9 \text{ feet}}{1 \text{ second}}\right)(7 \text{ seconds})$, or 63 feet.

Therefore, the vehicle travels 63 feet in 7 seconds.

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 2

Choice A is correct. The perimeter, P , of a square can be found using the formula $P = 4s$, where s is the length of each side of the square. It's given that square X has a side length of 24 centimeters. Substituting 24 for s in the formula for the perimeter of a square yields $P = 4(24)$, or $P = 96$. Therefore, the perimeter of square X is 96 centimeters. It's also given that the perimeter of square Y is 2 times the perimeter of square X. Therefore, the perimeter of square Y is $2(96)$, or 192, centimeters. Substituting 192 for P in the formula $P = 4s$ gives $192 = 4s$. Dividing both sides of this equation by 4 gives $48 = s$. Therefore, the length, in centimeters, of one side of square Y is 48.

Alternate approach: It's given that the perimeter of square Y is 2 times the perimeter of square X. The scale factor of the perimeters of two squares is equal to the scale factor of the lengths of the sides of the two squares. It follows that the length of each side of square Y is 2 times the length of each side of square X. It's given that square X has a side length of 24 centimeters. It follows that the length, in centimeters, of one side of square Y is $2(24)$, or 48.

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. This is the length, in centimeters, of one side of a square whose perimeter is $\frac{1}{2}$ times, not 2 times, the perimeter of square X.

QUESTION 3

Choice B is correct. It's given that 100% of the business owners attended the meeting, which means all the business owners attended the meeting. Since there are 45 business owners and 100% of them attended the meeting, 45 business owners attended the meeting.

Choice A is incorrect. This represents 0%, not 100%, of 45. *Choice C* is incorrect. This represents 1,000%, not 100%, of 45. *Choice D* is incorrect. This represents 10,000%, not 100%, of 45.

QUESTION 4

Choice D is correct. In the given expression, $10x$ and $2x$ are like terms, and $10y$ and $7y$ are like terms. By combining like terms in the given expression, it can be rewritten as $12x + 17y + 3$.

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 5

Choice B is correct. It's given that the triangle has one side with a length of x inches and two sides each with a length of y inches. The perimeter of a triangle is the sum of the lengths of its three sides. Therefore, the perimeter, in inches, of this triangle is $x + y + y$, or $x + 2y$. It's also given that the perimeter of this triangle is 23 inches. Therefore, the equation $x + 2y = 23$ represents this situation.

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

Choice C is incorrect. This equation represents a triangle with a perimeter of 23 inches that has two sides with a length of x inches and one side with a length of y inches, not one side with a length of x inches and two sides with a length of y inches. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 6

The correct answer is 1,000. It's given that $1.3x = 1,300$. Dividing both sides of this equation by 1.3 yields $x = 1,000$. Therefore, 1,000 is the solution to the given equation.

QUESTION 7

The correct answer is 20. The graph shows the relationship between x and y . The point on the graph with an x -coordinate of 1 is (1, 20). Therefore, if the value of x is 1, the value of y , to the nearest integer, is 20.

QUESTION 8

Choice A is correct. It's given that function f is defined by $f(x) = \frac{1}{7}x - 7$.

Substituting 70 for x in the given function yields $f(70) = \frac{1}{7}(70) - 7$, or $f(70) = 3$.

Therefore, the value of $f(70)$ is 3.

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 C is correct. The median of a data set with an odd number of values is the middle value of the data set when the values are in ascending or descending order. It's given that there are 11 values in each data set, so the middle value of each data set is the sixth value. Since the values in each data set are given in ascending order, the median of each data set is the sixth value. In data set A the sixth value is 10, so the median of data set A is 10. In data set B the sixth value is also 10, so the median of data set B is 10. Therefore, the medians of data sets A and B are equal.

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 10

Choice C is correct. A linear function can be defined by the equation

$f(x) = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the graph of $y = f(x)$ in the xy -plane. The slope of a line that passes through the points (x_1, y_1) and (x_2, y_2) can be calculated using the equation $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$. The line shown passes through the points $(0, -1)$ and $(5, -4)$. Substituting $(0, -1)$ for (x_1, y_1) and $(5, -4)$ for (x_2, y_2) in the equation $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$ yields $m = \frac{-4 - (-1)}{5 - 0}$, or $m = -\frac{3}{5}$.

Since the line shown passes through the point $(0, -1)$, it follows that $b = -1$.

Substituting $-\frac{3}{5}$ for m and -1 for b in the equation $f(x) = mx + b$ yields

$f(x) = -\frac{3}{5}x - 1$. Therefore, the equation $f(x) = -\frac{3}{5}x - 1$ defines function f .

Choice A is incorrect. The graph of this equation has a positive slope, which means it defines a function that's increasing, not decreasing. *Choice B* is incorrect. The graph of this equation has a positive slope, which means it defines a function that's increasing, not decreasing. *Choice D* is incorrect. This equation defines a linear function whose graph has a slope of $-\frac{5}{3}$, not $-\frac{3}{5}$.

QUESTION 11

Choice B is correct. In the given expression, $2t^2$ is a common factor of each term. Factoring out $2t^2$ from each term in the given expression $114t^3 - 26t^2u$ yields $2t^2(57t - 13u)$. Therefore, the expression $2t^2(57t - 13u)$ is equivalent to $114t^3 - 26t^2u$.

Choice A is incorrect. This expression is equivalent to $114t^3 - 26tu$, not $114t^3 - 26t^2u$. **Choice C** is incorrect. This expression is equivalent to $114t^3u - 26tu$, not $114t^3 - 26t^2u$. **Choice D** is incorrect. This expression is equivalent to $114t^3u - 26t^2u$, not $114t^3 - 26t^2u$.

QUESTION 12

Choice B is correct. It's given that a competitor needs to score at least 90 total points from two rounds. It's also given that each completed task in the first round is worth 5 points and each completed task in the second round is worth 6 points, where x represents the number of completed tasks in the first round and y represents the number of completed tasks in the second round. It follows that the expression $5x$ represents the total points earned in the first round and $6y$ represents the total points earned in the second round. Therefore, $5x + 6y$ represents the competitor's total score from both rounds. Since the competitor must score at least 90 total points, the total score must be greater than or equal to 90. Therefore, the inequality $5x + 6y \geq 90$ models this situation.

Choice A is incorrect. This inequality models a situation in which the total number of tasks completed, not the total points earned, is at most, not at least, 90.

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 4. The second equation in the given system is $y = 7$. Substituting 7 for y in the first equation in the given system yields $3x + 8(7) = 68$, or $3x + 56 = 68$. Subtracting 56 from both sides of this equation yields $3x = 12$. Dividing both sides of this equation by 3 yields $x = 4$. Therefore, the value of x is 4.

QUESTION 14

The correct answer is $\frac{9}{50}$. If one of these people is selected at random, the probability of selecting a person who chose a green T-shirt is equal to the number of people who chose a green T-shirt divided by the total number of people. The table shows that 9 people chose a green T-shirt. It's given that the total number of people is 50. Therefore, the probability of selecting a person who chose a green T-shirt is $\frac{9}{50}$. Note that $\frac{9}{50}$ and .18 are examples of ways to enter a correct answer.

QUESTION 15

Choice A is correct. The sum of the measures of the angles of a triangle is 180° . Therefore, in $\triangle DEF$, the sum of the measures of $\angle D$, $\angle E$, and $\angle F$ is 180° . It's given that the measure of $\angle D$ is 163° . It follows that the sum of the measures of $\angle E$ and $\angle F$ is $(180 - 163)^\circ$, or 17° . Therefore, the measure, in degrees, of $\angle E$ must be less than 17. Of the given choices, only 16 is less than 17. Thus, the measure, in degrees, of $\angle E$ could be 16.

Choice B is incorrect. If the measure, in degrees, of $\angle E$ is 18, then the sum of the measures of the angles of $\triangle DEF$ is greater than, not equal to, 180° . **Choice C** is incorrect. If the measure, in degrees, of $\angle E$ is 90, then the sum of the measures of the angles of $\triangle DEF$ is greater than, not equal to, 180° . **Choice D** is incorrect. If the measure, in degrees, of $\angle E$ is 164, then the sum of the measures of the angles of $\triangle DEF$ is greater than, not equal to, 180° .

QUESTION 16

Choice B is correct. It's given that the equation $0.6t + 3 = 7$ describes the situation in which a plant's stem will grow at a constant rate from 3 inches to 7 inches in t weeks. Thus, the coefficient 0.6 represents the constant rate at which the stem's length increases with respect to time t , in weeks. This means the stem's length increases by 0.6 inches each week. Therefore, the best interpretation of 0.6 in this context is the length, in inches, that the plant's stem will grow each week.

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

Choice C is incorrect. This is the best interpretation of t , not 0.6. **Choice D** is incorrect and may result from conceptual or calculation errors.

QUESTION 17

Choice C is correct. The volume, V , of a right square pyramid is given by the formula $V = \left(\frac{1}{3}\right)Bh$, where B represents the area of the square base and h represents the height of the pyramid. The area of a square is given by s^2 , where s is the side length of the square. It's given that the side length of the square base is 13 centimeters. It follows that the area of the base is $(13)^2$, or 169 square centimeters. It's given that the height of the pyramid is 15 centimeters.

Substituting 169 for B and 15 for h into the formula $V = \left(\frac{1}{3}\right)Bh$ yields $V = \left(\frac{1}{3}\right)(169)(15)$, or $V = 845$. Therefore, the volume, in cubic centimeters, of the pyramid is 845.

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. This is the value of Bh , not $\frac{1}{3}Bh$.

QUESTION 18

Choice A is correct. It's given that the function $f(x) = 53,000(1.02)^{x-1}$ gives the balance of the loan $f(x)$, in dollars, x years after the loan is taken out, where $x \geq 1$, if no payments are made to the loan. It follows that $f(x)$ represents the balance of the loan, in dollars, x years after it is taken out. The constant 53,000 is the value of $f(x)$ when $x = 1$, since substituting 1 for x in the expression $(1.02)^{x-1}$ yields $(1.02)^0$, or 1. Therefore, $f(1) = 53,000(1)$, or $f(1) = 53,000$; thus, the best interpretation of 53,000 is the balance of the loan, in dollars, 1 year after the loan is taken out.

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 B is correct. The y -intercept of the graph of $y = g(x)$ in the xy -plane occurs at the point where $x = 0$. This means that when $x = 0$, the corresponding value of $g(x)$ is the y -coordinate of the y -intercept of the graph. Substituting 0 for x in the given function yields $g(0) = \left(\frac{1}{8}\right)(3)^0$, which is equivalent to $g(0) = \left(\frac{1}{8}\right)(1)$, or $g(0) = \frac{1}{8}$. Thus, when $x = 0$, the corresponding value of $g(x)$ is $\frac{1}{8}$. Therefore, if the given function g is graphed in the xy -plane, where $y = g(x)$, the y -intercept of the graph is $\left(0, \frac{1}{8}\right)$.

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 20

The correct answer is 598.2. It's given that a polar bear weighs 94 stones, and to use 1 stone = 14 pounds and 1 kilogram = 2.2 pounds. It follows that a weight of 94 stones is equivalent to $(94 \text{ stones})\left(\frac{14 \text{ pounds}}{1 \text{ stone}}\right)\left(\frac{1 \text{ kilogram}}{2.2 \text{ pounds}}\right)$, or approximately 598.18 kilograms. Therefore, the weight of the polar bear is approximately 598.2 kilograms. Note that 598.2 and 598.1 are examples of ways to enter a correct answer.

QUESTION 21

The correct answer is 122. The mean of a data set is calculated by dividing the sum of the data values by the number of values. It's given that the mean boiling point of the 175 chemical compounds the researcher is investigating is 184 degrees Celsius. This can be represented by the equation $\frac{x}{175} = 184$, where x represents the sum of the boiling points, in degrees Celsius, of all 175 compounds. Multiplying both sides of this equation by 175 yields $x = 175(184)$, or $x = 32,200$ degrees Celsius. It's also given that 50 of these compounds were classified as Type A, and that the mean boiling point of the 50 Type A compounds is 339 degrees Celsius. It follows that the sum of the

boiling points, in degrees Celsius, of the Type A compounds is $(50)(339)$, or 16,950. Therefore, the sum of the boiling points, in degrees Celsius, of the 125 Type B compounds is $32,200 - 16,950$, or 15,250. Since there are 125 compounds classified as Type B, the mean boiling point, in degrees Celsius, of the 125 Type B compounds is $\frac{15,250}{125}$, or 122. Therefore, the mean boiling point, in degrees Celsius, of the 125 chemical compounds classified as Type B is 122.

QUESTION 22

Choice C is correct. It's given that the gas mileage of the car is 25 miles per gallon. If the car begins with 15 gallons of gas in the tank, the amount of gas remaining after driving d miles is equal to the initial 15 gallons minus the number of gallons used. The number of gallons used can be expressed as the number of miles driven, d , divided by the gas mileage, 25 miles per gallon, or $\frac{d}{25}$. Therefore, the function that predicts the amount of gas remaining in the tank after the car is driven d miles is $f(d) = 15 - \frac{d}{25}$.

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

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

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

QUESTION 23

Choice A is correct. It's given that point P has coordinates $(4, -5)$. To determine which of the given inequalities are satisfied by the coordinates of P , the values $x = 4$ and $y = -5$ can be substituted into each inequality. Substituting $x = 4$ and $y = -5$ into $y < -2x + 7$ yields $-5 < -2(4) + 7$, which gives $-5 < -8 + 7$, or $-5 < -1$. Since $-5 < -1$ is true, this means the inequality in statement I is satisfied by the coordinates of P . Substituting $x = 4$ and $y = -5$ into $y > x - 5$ yields $-5 > 4 - 5$, or $-5 > -1$. Since $-5 > -1$ is false, this means the inequality in statement II is not satisfied by the coordinates of P . Therefore, only the inequality in statement I is satisfied by the coordinates of P .

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 A is correct. It's given that line k passes through the points $(5, 0)$ and $(0, 7)$. The slope of a line that passes through two points (x_1, y_1) and (x_2, y_2) can be found using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Thus, the slope of line k is $\frac{7 - 0}{0 - 5}$, or $-\frac{7}{5}$. An equation for a line in the xy -plane with slope m and y -intercept $(0, b)$ can be written in the form $y = mx + b$. Since line k passes through $(0, 7)$, the y -intercept of line k is $(0, 7)$. Substituting $-\frac{7}{5}$ for m and 7 for b in $y = mx + b$ yields $y = -\frac{7}{5}x + 7$. Multiplying both sides of this equation by 5 yields $5y = -7x + 35$. Adding $7x$ to both sides of this equation yields $7x + 5y = 35$.

Choice B is incorrect. This is an equation for the line that passes through the points (7, 0) and (0, 5), not (5, 0) and (0, 7). *Choice C* is incorrect. This is an equation for the line that passes through the points (5, 0) and (0, -7), not (5, 0) and (0, 7). *Choice D* is incorrect. This is an equation for the line that passes through the points (7, 0) and (0, -5), not (5, 0) and (0, 7).

QUESTION 25

Choice D is correct. It's given that the graph shows the total amount of snowfall y , in centimeters, x hours after the start of a 10-hour period. Because the graph is horizontal between $x = 4$ and $x = 6$, it follows that the total snowfall did not increase during that interval. Therefore, the rate of snowfall was 0 centimeters per hour between $x = 4$ and $x = 6$.

Choice A is incorrect. The value 6 represents the total snowfall, in centimeters, between $x = 4$ and $x = 6$, not the rate of snowfall, in centimeters per hour, during that interval. *Choice B* is incorrect. The steeper slope indicates that the rate of snowfall was the greatest between $x = 0$ and $x = 4$, not between $x = 6$ and $x = 10$. *Choice C* is incorrect. The total snowfall, not the rate of snowfall, increased between $x = 0$ and $x = 4$.

QUESTION 26

Choice D is correct. It's given that 1 inch on the square drawing represents an actual measurement of 13 feet. It's also given that a smaller version of the same drawing is printed as a square with the side length 85% shorter than the side length of the previous drawing. It follows that an actual 13-foot measurement represented by 1 inch on the previous drawing is represented by a length that is 85% shorter than 1 inch on the smaller drawing. Therefore, on the smaller drawing, each 13-foot actual measurement is represented by $1 - \frac{85}{100}$ inches, or 0.15 inches. Thus, on the smaller drawing, if an actual measurement of 13 feet is represented by 0.15 inches, then let x feet be the actual measurement represented by 1 inch. A proportion can be used to solve for x : $\frac{13}{0.15} = \frac{x}{1}$, or x is equal to approximately 86.67. It follows that a length of 1 inch on the smaller drawing represents an actual length of about 86.67 feet.

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 27

The correct answer is 56. The volume of a right rectangular prism can be found using the formula $V = \ell wh$, where V is the volume, in cubic units; ℓ is the length of the base of the prism, in units; w is the width of the prism, in units; and h is the height of the prism, in units. It's given that the height of the prism is 29 units and the volume is 5,568 cubic units. Substituting 5,568 for V and 29 for h in the formula $V = \ell wh$ yields $5,568 = \ell w(29)$. It's also given that the length of the base of the prism is 75% of the width of the base, which can be represented by $0.75w$. Substituting $0.75w$ for ℓ in the equation $5,568 = \ell w(29)$ yields

$5,568 = (0.75w)(w)(29)$, or $5,568 = 21.75w^2$. Dividing both sides of this equation by 21.75 yields $256 = w^2$. Taking the positive square root of both sides of this equation yields $16 = w$. Substituting 16 for w in the expression for the length yields $0.75(16)$, or 12. Therefore, the perimeter of the base of the prism is equal to $16 + 12 + 16 + 12$, or 56 units.