

Question ID 479fcded

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 479fcded

x	y
-6	$n + 184$
-3	$n + 92$
0	n

The table shows three values of x and their corresponding values of y , where n is a constant, for the linear relationship between x and y . What is the slope of the line that represents this relationship in the xy -plane?

- A. $-\frac{92}{3}$
- B. $-\frac{3}{92}$
- C. $\frac{n+92}{-3}$
- D. $\frac{2n-92}{3}$

ID: 479fcded Answer

Correct Answer: A

Rationale

Choice A is correct. The slope, m , of a line in the xy -plane can be found using two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Based on the given table, the line representing the relationship between x and y in the xy -plane passes through the points $(-6, n + 184)$, $(-3, n + 92)$, and $(0, n)$, where n is a constant. Substituting two of these points, $(-3, n + 92)$ and $(0, n)$, for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{n - (n + 92)}{0 - (-3)}$, which is equivalent to $m = \frac{n - n - 92}{0 + 3}$, or $m = -\frac{92}{3}$. Therefore, the slope of the line that represents this relationship in the xy -plane is $-\frac{92}{3}$.

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 Difficulty: Hard

Question ID fd80013a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: fd80013a

In the xy -plane, line ℓ passes through the point $(0, 0)$ and is parallel to the line represented by the equation $y = 8x + 2$. If line ℓ also passes through the point $(3, d)$, what is the value of d ?

ID: fd80013a Answer

Correct Answer: 24

Rationale

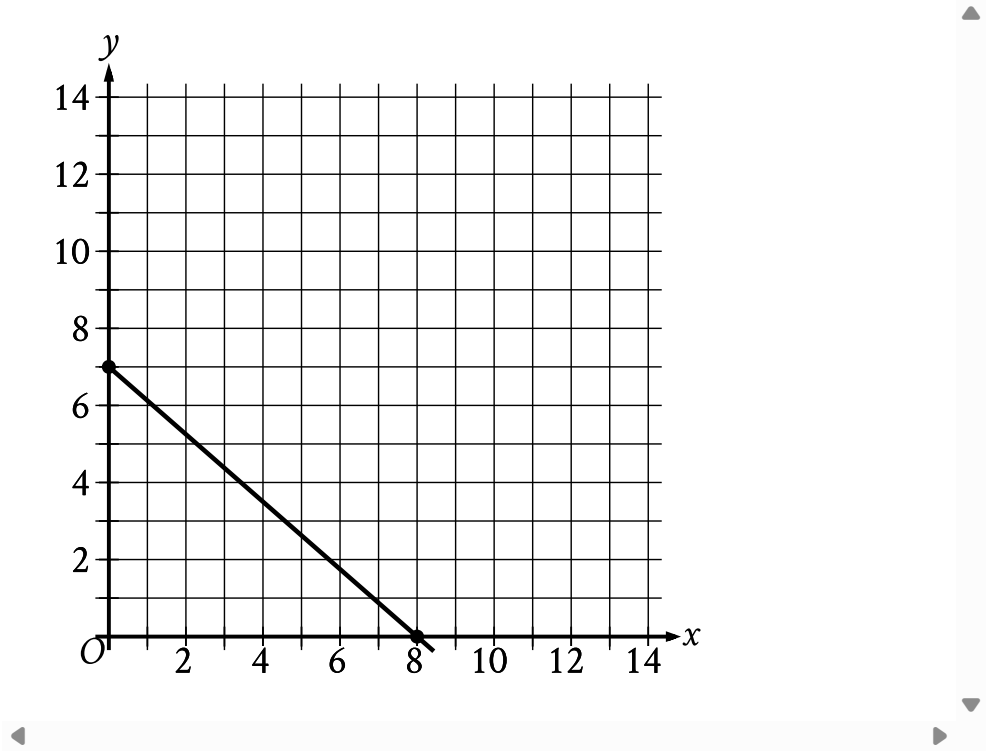
The correct answer is **24**. A line in the xy -plane can be defined by the equation $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It's given that line ℓ passes through the point $(0, 0)$. Therefore, the y -coordinate of the y -intercept of line ℓ is **0**. It's given that line ℓ is parallel to the line represented by the equation $y = 8x + 2$. Since parallel lines have the same slope, it follows that the slope of line ℓ is **8**. Therefore, line ℓ can be defined by an equation in the form $y = mx + b$, where $m = 8$ and $b = 0$. Substituting **8** for m and **0** for b in $y = mx + b$ yields the equation $y = 8x + 0$, or $y = 8x$. If line ℓ passes through the point $(3, d)$, then when $x = 3$, $y = d$ for the equation $y = 8x$. Substituting **3** for x and d for y in the equation $y = 8x$ yields $d = 8(3)$, or $d = 24$.

Question Difficulty: Hard

Question ID 672d125f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 672d125f



The point with coordinates $(d, 4)$ lies on the line shown. What is the value of d ?

- A. $\frac{7}{2}$
- B. $\frac{26}{7}$
- C. $\frac{24}{7}$
- D. $\frac{27}{8}$

ID: 672d125f Answer

Correct Answer: C

Rationale

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 Difficulty: Hard

Question ID 57a15ca6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 57a15ca6

What is the slope of the graph of $10x - 5y = -12$ in the xy -plane?

- A. -2
- B. $-\frac{5}{6}$
- C. $\frac{5}{6}$
- D. 2

ID: 57a15ca6 Answer

Correct Answer: D

Rationale

Choice D is correct. A linear equation can be written in the form $y = mx + b$, where m is the slope of the graph of the equation in the xy -plane and $(0, b)$ is the y -intercept. Subtracting $10x$ from each side of the given equation, $10x - 5y = -12$, yields $-5y = -10x - 12$. Dividing each side of this equation by -5 yields $y = 2x + \frac{12}{5}$. This equation is in the form $y = mx + b$, where $m = 2$. Therefore, the slope of the graph of the given equation in the xy -plane is 2 .

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 Difficulty: Hard

Question ID cacf0929

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: cacf0929

What is the slope of the graph of $y = \frac{1}{4}(27x + 15) + 7x$ in the xy-plane?

ID: cacf0929 Answer

Correct Answer: 13.75, 55/4

Rationale

The correct answer is $\frac{55}{4}$. In the xy-plane, the graph of an equation in the form $y = mx + b$, where m and b are constants, has a slope of m and a y-intercept of $(0, b)$. Applying the distributive property to the right-hand side of the given equation yields $y = \frac{27}{4}x + \frac{15}{4} + 7x$. Combining like terms yields $y = \frac{55}{4}x + \frac{15}{4}$. This equation is in the form $y = mx + b$, where $m = \frac{55}{4}$ and $b = \frac{15}{4}$. It follows that the slope of the graph of $y = \frac{1}{4}(27x + 15) + 7x$ in the xy-plane is $\frac{55}{4}$. Note that 55/4 and 13.75 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 8aa7b0ea

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 8aa7b0ea

x	y
k	13
$k + 7$	-15

The table gives the coordinates of two points on a line in the xy -plane. The y -intercept of the line is $(k - 5, b)$, where k and b are constants. What is the value of b ?

ID: 8aa7b0ea Answer

Correct Answer: 33

Rationale

The correct answer is **33**. It's given in the table that the coordinates of two points on a line in the xy -plane are $(k, 13)$ and $(k + 7, -15)$. The y -intercept is another point on the line. The slope computed using any pair of points from the line will be the same. The slope of a line, m , between any two points, (x_1, y_1) and (x_2, y_2) , on the line can be calculated using the slope formula, $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$. It follows that the slope of the line with the given points from the table, $(k, 13)$ and $(k + 7, -15)$, is $m = \frac{-15 - 13}{k + 7 - k}$, which is equivalent to $m = \frac{-28}{7}$, or $m = -4$. It's given that the y -intercept of the line is $(k - 5, b)$. Substituting -4 for m and the coordinates of the points $(k - 5, b)$ and $(k, 13)$ into the slope formula yields $-4 = \frac{13 - b}{k - (k - 5)}$, which is equivalent to $-4 = \frac{13 - b}{k - k + 5}$, or $-4 = \frac{13 - b}{5}$. Multiplying both sides of this equation by **5** yields $-20 = 13 - b$. Subtracting **13** from both sides of this equation yields $-33 = -b$. Dividing both sides of this equation by -1 yields $b = 33$. Therefore, the value of b is **33**.

Question Difficulty: Hard

Question ID 82ba8114

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 82ba8114

In the xy -plane, line t passes through the points $(0, 9)$ and $(1, 17)$. Which equation defines line t ?

- A. $y = \frac{1}{8}x + 9$
- B. $y = x + \frac{1}{8}$
- C. $y = x + 8$
- D. $y = 8x + 9$

ID: 82ba8114 Answer

Correct Answer: D

Rationale

Choice D is correct. An equation defining a line in the xy -plane can be written in the form $y = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the line. It's given that line t passes through the point $(0, 9)$; therefore, $b = 9$. The slope, m , of a line can be found using any two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting $(0, 9)$ and $(1, 17)$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{17 - 9}{1 - 0}$, or $m = 8$. Substituting 8 for m and 9 for b in the equation $y = mx + b$ yields $y = 8x + 9$.

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 Difficulty: Hard

Question ID e2c015ca

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: e2c015ca

The equation $7g + 7b = 840$ represents the number of blue tiles, b , and the number of green tiles, g , an artist needs for an 840-square-inch tile project. The artist needs 71 blue tiles for the project. How many green tiles does he need?

ID: e2c015ca Answer

Correct Answer: 49

Rationale

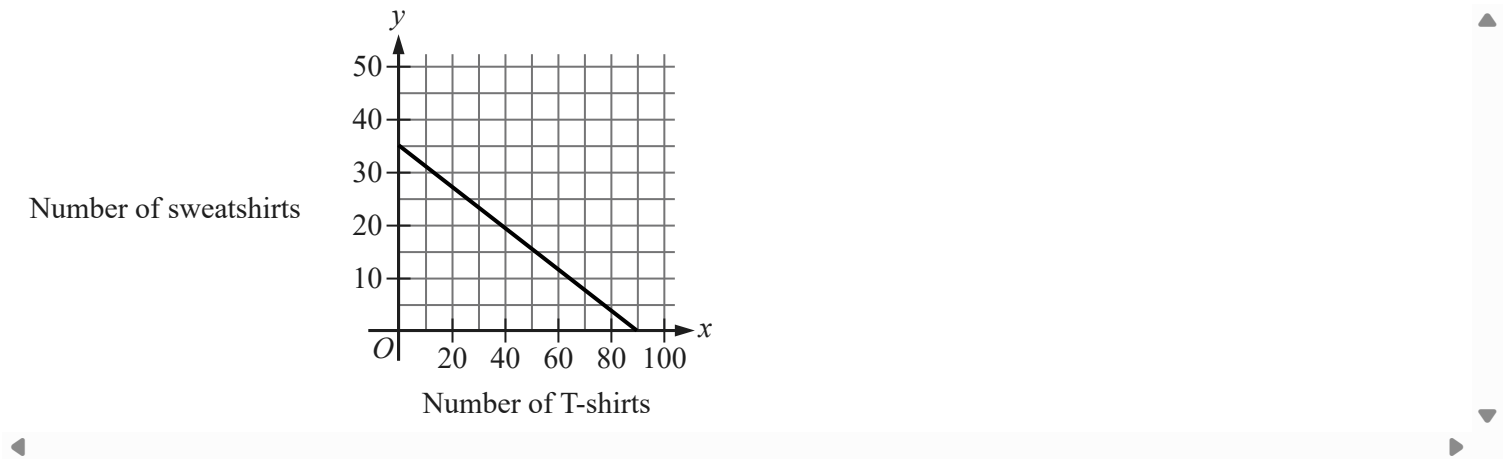
The correct answer is 49. It's given that the equation $7g + 7b = 840$ represents the number of blue tiles, b , and the number of green tiles, g , an artist needs for an 840-square-inch tile project. It's also given that the artist needs 71 blue tiles for the project. Substituting 71 for b in the equation $7g + 7b = 840$ yields $7g + 7(71) = 840$, or $7g + 497 = 840$. Subtracting 497 from both sides of this equation yields $7g = 343$. Dividing both sides of this equation by 7 yields $g = 49$. Therefore, the artist needs 49 green tiles for the project.

Question Difficulty: Hard

Question ID 891af74b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 891af74b



The graph models the relationship between the number of T-shirts, x , and the number of sweatshirts, y , that Kira can purchase for a school fundraiser. Which equation could represent this relationship?

- A. $y = 7x + 18$
- B. $7x + 18y = 630$
- C. $y = 18x + 7$
- D. $18x + 7y = 630$

ID: 891af74b Answer

Correct Answer: B

Rationale

Choice B is correct. A line in the xy -plane can be written as $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept. The graph shown is a line passing through the points $(0, 35)$ and $(90, 0)$. Substituting 0 for x and 35 for y in the equation $y = mx + b$ yields $35 = m(0) + b$, or $35 = b$. Substituting 35 for b , 90 for x , and 0 for y in the equation $y = mx + b$ yields $0 = 90m + 35$. Subtracting 35 from both sides of this equation yields $-35 = 90m$. Dividing both sides of this equation by 90 yields $-\frac{35}{90} = m$, or $-\frac{7}{18} = m$. Substituting $-\frac{7}{18}$ for m and 35 for b in the equation $y = mx + b$ yields $y = -\frac{7}{18}x + 35$. Multiplying both sides of this equation by 18 yields $18y = -7x + 35(18)$, or $18y = -7x + 630$. Adding $7x$ to both sides of this equation yields $7x + 18y = 630$. Therefore, the equation $7x + 18y = 630$ represents the relationship between x and y modeled by the graph.

Choice A is incorrect. The point $(0, 35)$ is not on the graph of this equation, since $7(0) + 18 = 18$, not 35 .

Choice C is incorrect. The point $(0, 35)$ is not on the graph of this equation, since $18(0) + 7 = 7$, not 35 .

Choice D is incorrect. The point $(90, 0)$ is not on the graph of this equation, since $18(90) + 7(0) = 1,620$, not 630 .

Question Difficulty: Hard

Question ID b17dc88e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: b17dc88e

Line t in the xy -plane has a slope of $-\frac{1}{3}$ and passes through the point $(9, 10)$. Which equation defines line t ?

- A. $y = 13x - \frac{1}{3}$
- B. $y = 9x + 10$
- C. $y = -\frac{x}{3} + 10$
- D. $y = -\frac{x}{3} + 13$

ID: b17dc88e Answer

Correct Answer: D

Rationale

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 Difficulty: Hard

Question ID 6d6d2d18

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 6d6d2d18

What is the slope of the graph of $y = \frac{5x}{13} - 23$ in the xy -plane?

ID: 6d6d2d18 Answer

Correct Answer: .3846, 5/13

Rationale

The correct answer is $\frac{5}{13}$. The graph of a line in the xy -plane can be represented by the equation $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept. The given equation can be written as $y = \left(\frac{5}{13}\right)x - 23$. Therefore, the slope of the graph of this equation in the xy -plane is $\frac{5}{13}$. Note that 5/13, .3846, 0.385, and 0.384 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID c875e2b1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: c875e2b1

A certain apprentice has enrolled in **85** hours of training courses. The equation $10x + 15y = 85$ represents this situation, where x is the number of on-site training courses and y is the number of online training courses this apprentice has enrolled in. How many more hours does each online training course take than each on-site training course?

ID: c875e2b1 Answer

Correct Answer: 5

Rationale

The correct answer is **5**. It's given that the equation $10x + 15y = 85$ represents the situation, where x is the number of on-site training courses, y is the number of online training courses, and **85** is the total number of hours of training courses the apprentice has enrolled in. Therefore, $10x$ represents the number of hours the apprentice has enrolled in on-site training courses, and $15y$ represents the number of hours the apprentice has enrolled in online training courses. Since x is the number of on-site training courses and y is the number of online training courses the apprentice has enrolled in, **10** is the number of hours each on-site course takes and **15** is the number of hours each online course takes. Subtracting these numbers gives $15 - 10$, or **5** more hours each online training course takes than each on-site training course.

Question Difficulty: Hard

Question ID 9737fa47

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 9737fa47

A line in the xy -plane has a slope of 9 and passes through the point $(0, -5)$. The equation $y = px + r$ defines the line, where p and r are constants. What is the value of p ?

ID: 9737fa47 Answer

Correct Answer: 9

Rationale

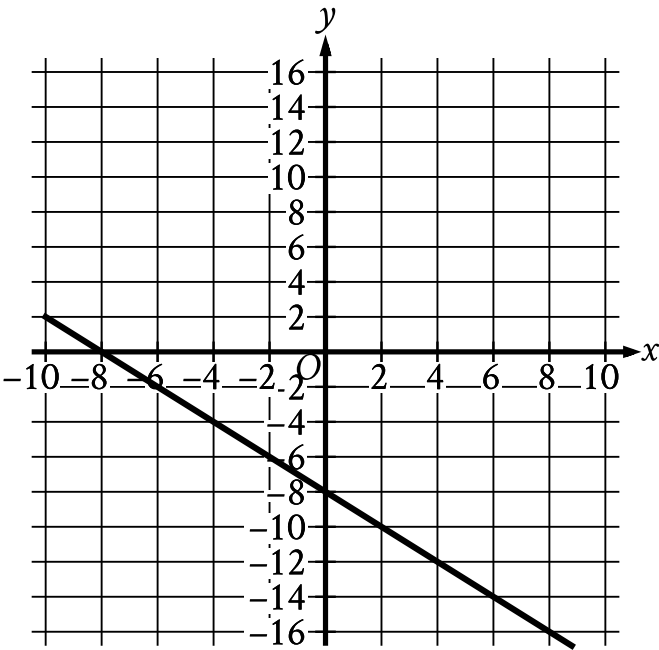
The correct answer is 9 . It's given that the equation $y = px + r$ defines the line. In this equation, p represents the slope of the line and r represents the y -coordinate of the y -intercept of the line. It's given that the line has a slope of 9 . Therefore, the value of p is 9 .

Question Difficulty: Hard

Question ID 992040e7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 992040e7



What is an equation of the graph shown?

- A. $y = -2x - 8$
- B. $y = x - 8$
- C. $y = -x - 8$
- D. $y = 2x - 8$

ID: 992040e7 Answer

Correct Answer: C

Rationale

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 Difficulty: Hard

Question ID 83237209

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 83237209

A store sells two different-sized containers of blueberries. The store’s sales of these blueberries totaled **896.86** dollars last month. The equation **$4.51x + 6.07y = 896.86$** represents this situation, where **x** is the number of smaller containers sold and **y** is the number of larger containers sold. According to the equation, what is the price, in dollars, of each smaller container?

ID: 83237209 Answer

Correct Answer: 4.51, 451/100

Rationale

The correct answer is **4.51**. It’s given that the equation **$4.51x + 6.07y = 896.86$** represents this situation, where **x** is the number of smaller containers sold, **y** is the number of larger containers sold, and **896.86** is the store’s total sales, in dollars, of blueberries last month. Therefore, **$4.51x$** represents the store's sales, in dollars, of smaller containers, and **$6.07y$** represents the store's sales, in dollars, of larger containers. Since **x** is the number of smaller containers sold, the price, in dollars, of each smaller container is **4.51**.

Question Difficulty: Hard

Question ID a7bd2179

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: a7bd2179

x	y
$-2s$	24
$-s$	21
s	15

The table shows three values of x and their corresponding values of y , where s is a constant. There is a linear relationship between x and y . Which of the following equations represents this relationship?

- A. $sx + 3y = 18s$
- B. $3x + sy = 18s$
- C. $3x + sy = 18$
- D. $sx + 3y = 18$

ID: a7bd2179 Answer

Correct Answer: B

Rationale

Choice B is correct. The linear relationship between x and y can be represented by an equation of the form $y - y_1 = m(x - x_1)$, where m is the slope of the graph of the equation in the xy -plane and (x_1, y_1) is a point on the graph. The slope of a line can be found using two points on the line and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Each value of x and its corresponding value of y in the table can be represented by a point (x, y) . Substituting the points $(-s, 21)$ and $(s, 15)$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{15 - 21}{s - (-s)}$, which gives $m = \frac{-6}{2s}$, or $m = -\frac{3}{s}$. Substituting $-\frac{3}{s}$ for m and the point $(s, 15)$ for (x_1, y_1) in the equation $y - y_1 = m(x - x_1)$ yields $y - 15 = -\frac{3}{s}(x - s)$. Distributing $-\frac{3}{s}$ on the right-hand side of this equation yields $y - 15 = -\frac{3x}{s} + 3$. Adding 15 to each side of this equation yields $y = -\frac{3x}{s} + 18$. Multiplying each side of this equation by s yields $sy = -3x + 18s$. Adding $3x$ to each side of this equation yields $3x + sy = 18s$. Therefore, the equation $3x + sy = 18s$ represents this relationship.

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 Difficulty: Hard

Question ID 007254a7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 007254a7

A line passes through the points (4, 6) and (15, 24) in the xy-plane. What is the slope of the line?

ID: 007254a7 Answer

Correct Answer: 1.636, 18/11

Rationale

The correct answer is $\frac{18}{11}$. For a line that passes through the points (x_1, y_1) and (x_2, y_2) in the xy-plane, the slope of the line can be calculated using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. It's given that a line passes through the points (4, 6) and (15, 24) in the xy-plane. Substituting (4, 6) for (x_1, y_1) and (15, 24) for (x_2, y_2) in the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, yields $m = \frac{24 - 6}{15 - 4}$, or $m = \frac{18}{11}$. Therefore, the slope of the line is $\frac{18}{11}$. Note that 18/11 and 1.636 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID d1db7318

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d1db7318

Line ℓ is defined by $3y + 12x = 5$. Line n is perpendicular to line ℓ in the xy -plane. What is the slope of line n ?

ID: d1db7318 Answer

Correct Answer: 0.25, 1/4

Rationale

The correct answer is $\frac{1}{4}$. For an equation in slope-intercept form $y = mx + b$, m represents the slope of the line in the xy -plane defined by this equation. It's given that line ℓ is defined by $3y + 12x = 5$. Subtracting $12x$ from both sides of this equation yields $3y = -12x + 5$. Dividing both sides of this equation by 3 yields $y = -\frac{12}{3}x + \frac{5}{3}$, or $y = -4x + \frac{5}{3}$. Thus, the slope of line ℓ in the xy -plane is -4 . Since line n is perpendicular to line ℓ in the xy -plane, the slope of line n is the negative reciprocal of the slope of line ℓ . The negative reciprocal of -4 is $-\frac{1}{(-4)} = \frac{1}{4}$. Note that $\frac{1}{4}$ and $.25$ are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 37a6c2a9

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 37a6c2a9

The graph of $9x - 10y = 19$ is translated down 4 units in the xy -plane. What is the x -coordinate of the x -intercept of the resulting graph?

ID: 37a6c2a9 Answer

Correct Answer: 59/9, 6.555, 6.556

Rationale

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.

Question Difficulty: Hard

Question ID d149d565

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d149d565

Line h is defined by $\frac{1}{5}x + \frac{1}{7}y - 70 = 0$. Line j is perpendicular to line h in the xy -plane. What is the slope of line j ?

- A. $-\frac{7}{5}$
- B. $-\frac{5}{7}$
- C. $\frac{7}{5}$
- D. $\frac{5}{7}$

ID: d149d565 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that line h is defined by $\frac{1}{5}x + \frac{1}{7}y - 70 = 0$. This equation can be written in slope-intercept form $y = mx + b$, where m is the slope of line h and b is the y -coordinate of the y -intercept of line h . Adding 70 to both sides of $\frac{1}{5}x + \frac{1}{7}y - 70 = 0$ yields $\frac{1}{5}x + \frac{1}{7}y = 70$. Subtracting $\frac{1}{5}x$ from both sides of this equation yields $\frac{1}{7}y = -\frac{1}{5}x + 70$. Multiplying both sides of this equation by 7 yields $y = -\frac{7}{5}x + 490$. Therefore, the slope of line h is $-\frac{7}{5}$. It's given that line j is perpendicular to line h in the xy -plane. Two lines are perpendicular if their slopes are negative reciprocals, meaning that the slope of the first line is equal to -1 divided by the slope of the second line. Therefore, the slope of line j is the negative reciprocal of the slope of line h . The negative reciprocal of $-\frac{7}{5}$ is $\frac{-1}{(-\frac{7}{5})}$, or $\frac{5}{7}$. Therefore, the slope of line j is $\frac{5}{7}$.

Choice A is incorrect. This is the slope of a line in the xy -plane that is parallel, not perpendicular, to line h .

Choice B is incorrect. This is the reciprocal, not the negative reciprocal, of $-\frac{7}{5}$.

Choice C is incorrect. This is the negative, not the negative reciprocal, of $-\frac{7}{5}$.

Question Difficulty: Hard

Question ID ceb0737c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: ceb0737c

Line p is defined by $2y + 18x = 9$. Line r is perpendicular to line p in the xy -plane. What is the slope of line r ?

- A. -9
- B. $-\frac{1}{9}$
- C. $\frac{1}{9}$
- D. 9

ID: ceb0737c Answer

Correct Answer: C

Rationale

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 Difficulty: Hard

Question ID 6e19ea96

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 6e19ea96

A certain township consists of a **5**-hectare industrial park and a **24**-hectare neighborhood. The total number of trees in the township is **4,529**. The equation $5x + 24y = 4,529$ represents this situation. Which of the following is the best interpretation of x in this context?

- A. The average number of trees per hectare in the industrial park
- B. The average number of trees per hectare in the neighborhood
- C. The total number of trees in the industrial park
- D. The total number of trees in the neighborhood

ID: 6e19ea96 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that a certain township consists of a **5**-hectare industrial park and a **24**-hectare neighborhood and that the total number of trees in the township is **4,529**. It's also given that the equation $5x + 24y = 4,529$ represents this situation. Since the total number of trees for a given area can be determined by taking the size of the area, in hectares, times the average number of trees per hectare, the best interpretation of $5x$ is the number of trees in the industrial park and the best interpretation of $24y$ is the number of trees in the neighborhood. Since **5** is the size of the industrial park, in hectares, the best interpretation of x is the average number of trees per hectare in the industrial park.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

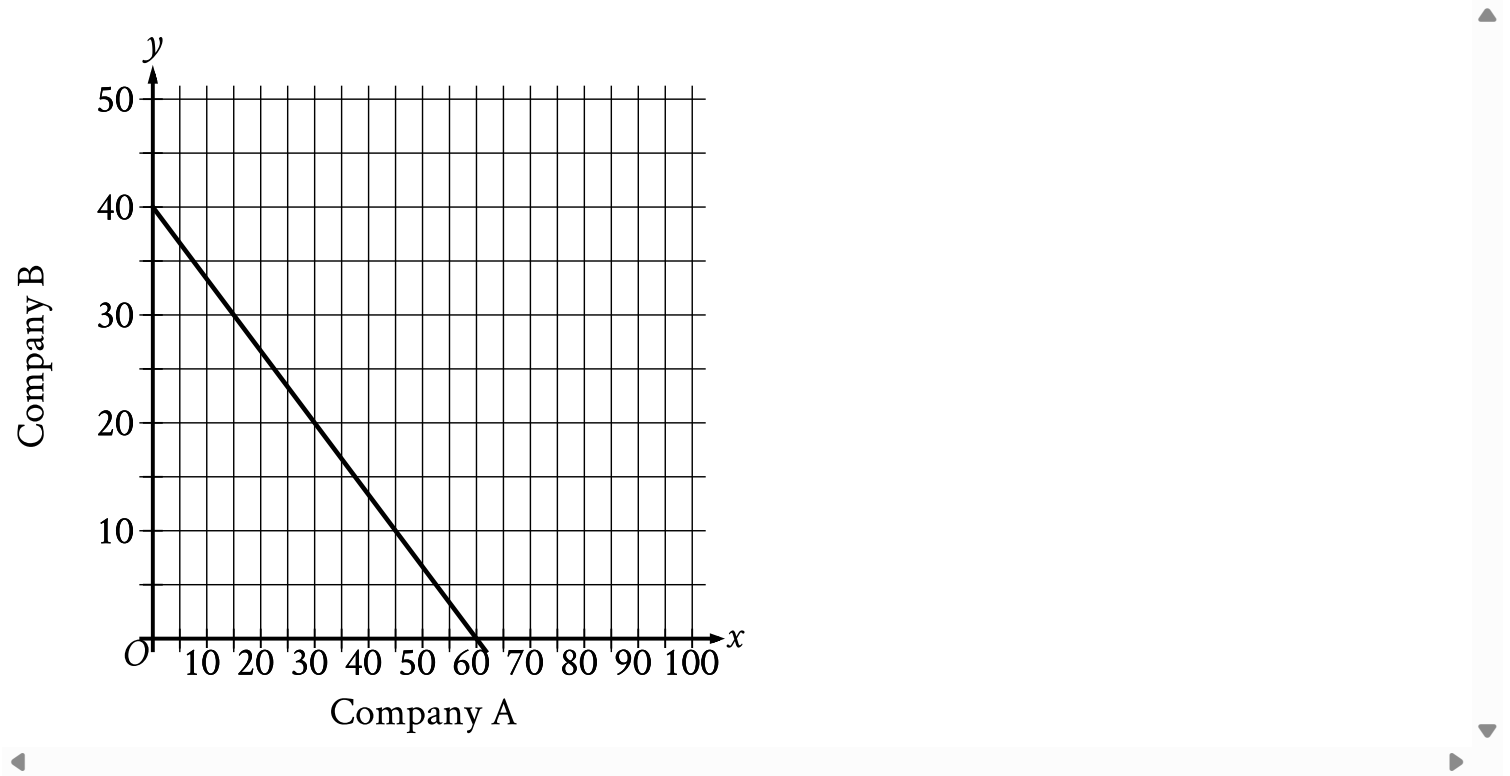
Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Hard

Question ID c76c55f1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: c76c55f1



The graph shows the relationship between the number of shares of stock from Company A, x , and the number of shares of stock from Company B, y , that Simone can purchase. Which equation could represent this relationship?

- A. $y = 8x + 12$
- B. $8x + 12y = 480$
- C. $y = 12x + 8$
- D. $12x + 8y = 480$

ID: c76c55f1 Answer

Correct Answer: B

Rationale

Choice B is correct. The graph shown is a line passing through the points $(0, 40)$ and $(60, 0)$. Since the relationship between x and y is linear, if two points on the graph make a linear equation true, then the equation represents the relationship. Substituting 0 for x and 40 for y in the equation in choice B, $8x + 12y = 480$, yields $8(0) + 12(40) = 480$, or $480 = 480$, which is true. Substituting 60 for x and 0 for y in the equation $8x + 12y = 480$ yields $8(60) + 12(0) = 480$, or $480 = 480$, which is true. Therefore, the equation $8x + 12y = 480$ represents the relationship between x and y .

Choice A is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $40 = 8(0) + 12$, or $40 = 12$, is not true.

Choice C is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $40 = 12(0) + 8$, or $40 = 8$, is not true.

Choice D is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $12(0) + 8(40) = 480$, or $320 = 480$, is not true.

Question Difficulty: Hard

Question ID 58268fa4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 58268fa4

$$\begin{aligned}5x + 7y &= 1 \\ ax + by &= 1\end{aligned}$$

In the given pair of equations, a and b are constants. The graph of this pair of equations in the xy -plane is a pair of perpendicular lines. Which of the following pairs of equations also represents a pair of perpendicular lines?

- A. $10x + 7y = 1$
 $ax - 2by = 1$
- B. $10x + 7y = 1$
 $ax + 2by = 1$
- C. $10x + 7y = 1$
 $2ax + by = 1$
- D. $5x - 7y = 1$
 $ax + by = 1$

ID: 58268fa4 Answer

Correct Answer: B

Rationale

Choice B is correct. Two lines are perpendicular if their slopes are negative reciprocals, meaning that the slope of the first line is equal to -1 divided by the slope of the second line. Each equation in the given pair of equations can be written in slope-intercept form, $y = mx + b$, where m is the slope of the graph of the equation in the xy -plane and $(0, b)$ is the y -intercept. For the first equation, $5x + 7y = 1$, subtracting $5x$ from both sides gives $7y = -5x + 1$, and dividing both sides of this equation by 7 gives $y = -\frac{5}{7}x + \frac{1}{7}$. Therefore, the slope of the graph of this equation is $-\frac{5}{7}$. For the second equation, $ax + by = 1$, subtracting ax from both sides gives $by = -ax + 1$, and dividing both sides of this equation by b gives $y = -\frac{a}{b}x + \frac{1}{b}$. Therefore, the slope of the graph of this equation is $-\frac{a}{b}$. Since the graph of the given pair of equations is a pair of perpendicular lines, the slope of the graph of the second equation, $-\frac{a}{b}$, must be the negative reciprocal of the slope of the graph of the first equation, $-\frac{5}{7}$. The negative reciprocal of $-\frac{5}{7}$ is $\frac{-1}{(-\frac{5}{7})}$, or $\frac{7}{5}$. Therefore, $-\frac{a}{b} = \frac{7}{5}$, or $\frac{a}{b} = -\frac{7}{5}$. Similarly, rewriting the equations in choice B in slope-intercept form yields $y = -\frac{10}{7}x + \frac{1}{7}$ and $y = -\frac{a}{2b}x + \frac{1}{2b}$. It follows that the slope of the graph of the first equation in choice B is $-\frac{10}{7}$ and the slope of the graph of the second equation in choice B is $-\frac{a}{2b}$. Since $\frac{a}{b} = -\frac{7}{5}$, $-\frac{a}{2b}$ is equal to $-\left(\frac{1}{2}\right)\left(-\frac{7}{5}\right)$, or $\frac{7}{10}$. Since $\frac{7}{10}$ is the negative reciprocal of $-\frac{10}{7}$, the pair of equations in choice B represents a pair of perpendicular lines.

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 Difficulty: Hard

Question ID 8905014c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 8905014c

In the xy -plane, line k passes through the points $(0, -5)$ and $(1, -1)$. Which equation defines line k ?

- A. $y = -x + \frac{1}{4}$
- B. $y = \frac{1}{4}x - 5$
- C. $y = -x + 4$
- D. $y = 4x - 5$

ID: 8905014c Answer

Correct Answer: D

Rationale

Choice D is correct. An equation defining a line in the xy -plane can be written in the form $y = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the line. It's given that line k passes through the point $(0, -5)$; therefore, $b = -5$. The slope, m , of a line can be found using any two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(0, -5)$ and $(1, -1)$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{-1 - (-5)}{1 - 0}$, or $m = 4$. Substituting 4 for m and -5 for b in the equation $y = mx + b$ yields $y = 4x - 5$.

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

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

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

Question Difficulty: Hard

Question ID d6f829aa

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d6f829aa

When line n is graphed in the xy -plane, it has an x -intercept of $(-4, 0)$ and a y -intercept of $(0, \frac{86}{3})$. What is the slope of line n ?

- A. $\frac{3}{344}$
- B. $\frac{6}{43}$
- C. $\frac{43}{6}$
- D. $\frac{344}{3}$

ID: d6f829aa Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that when line n is graphed in the xy -plane, it has an x -intercept of $(-4, 0)$ and a y -intercept of $(0, \frac{86}{3})$. The slope, m , of a line can be found using any two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(-4, 0)$ and $(0, \frac{86}{3})$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{\frac{86}{3} - 0}{0 - (-4)}$, or $m = \frac{43}{6}$. Therefore, the slope of line n is $\frac{43}{6}$.

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

Choice B is incorrect. This is the slope of a line that has an x -intercept of $(\frac{86}{3}, 0)$ and a y -intercept of $(0, -4)$.

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

Question Difficulty: Hard

Question ID ed45b58a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: ed45b58a

If the graph of $27x + 33y = 297$ is shifted down 5 units in the xy -plane, what is the y -intercept of the resulting graph?

- A. $(0, 4)$
- B. $(0, 6)$
- C. $(0, 14)$
- D. $(0, 28)$

ID: ed45b58a Answer

Correct Answer: A

Rationale

Choice A is correct. When the graph of an equation in the form $Ax + By = C$, where A , B , and C are constants, is shifted 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 $27x + 33y = 297$ is shifted down 5 units in the xy -plane. Therefore, the resulting graph can be represented by the equation $27x + 33(y + 5) = 297$, or $27x + 33y + 165 = 297$. Subtracting 165 from both sides of this equation yields $27x + 33y = 132$. The y -intercept of the graph of an equation in the xy -plane is the point where the line intersects the y -axis, represented by the point $(0, y)$. Substituting 0 for x in the equation $27x + 33y = 132$ yields $27(0) + 33y = 132$, or $33y = 132$. Dividing both sides of this equation by 33 yields $y = 4$. Therefore, if the graph of $27x + 33y = 297$ is shifted down 5 units, the y -intercept of the resulting graph is $(0, 4)$.

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

Choice C is incorrect. This is the y -intercept of the graph of $27x + 33y = 297$ shifted up, not down, 5 units.

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

Question Difficulty: Hard

Question ID c9640c5e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: c9640c5e

$$5G + 45R = 380$$

At a school fair, students can win colored tokens that are worth a different number of points depending on the color. One student won G green tokens and R red tokens worth a total of 380 points. The given equation represents this situation. How many more points is a red token worth than a green token?

ID: c9640c5e Answer

Correct Answer: 40

Rationale

The correct answer is 40 . It's given that $5G + 45R = 380$, where G is the number of green tokens and R is the number of red tokens won by one student and these tokens are worth a total of 380 points. Since the equation represents the situation where the student won points with green tokens and red tokens for a total of 380 points, each term on the left-hand side of the equation represents the number of points won for one of the colors. Since the coefficient of G in the given equation is 5 , a green token must be worth 5 points. Similarly, since the coefficient of R in the given equation is 45 , a red token must be worth 45 points. Therefore, a red token is worth $45 - 5$ points, or 40 points, more than a green token.

Question Difficulty: Hard

Question ID d6b7f117

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d6b7f117

$$24.5x + 24.75y = 641$$

Isabel ordered topsoil and crushed stone, which cost a total of **\$641**, for her garden. The given equation represents the relationship between the number of cubic yards of topsoil, *x*, and the number of tons of crushed stone, *y*, Isabel ordered. How much more, in dollars, did a ton of crushed stone cost Isabel than a cubic yard of topsoil?

ID: d6b7f117 Answer

Correct Answer: 0.25, 1/4

Rationale

The correct answer is **.25**. It's given that the topsoil and crushed stone Isabel ordered for her garden cost a total of **\$641**. It's also given that the equation **$24.5x + 24.75y = 641$** represents the relationship between the number of cubic yards of topsoil, *x*, and the number of tons of crushed stone, *y*, that Isabel ordered. Since *x* represents the number of cubic yards of topsoil ordered, **$24.5x$** represents the total cost, in dollars, of the topsoil, and the cost per cubic yard of topsoil is **\$24.50**. Similarly, since *y* represents the number of tons of crushed stone ordered, **$24.75y$** represents the total cost, in dollars, of crushed stone ordered, and the cost per ton of crushed stone is **\$24.75**. Therefore, a ton of crushed stone cost Isabel **$24.75 - 24.50$** , or **0.25**, more dollars than a cubic yard of topsoil. Note that .25 and 1/4 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID b6c52d17

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: b6c52d17

The graph of $7x + 2y = -31$ in the xy -plane has an x -intercept at $(a, 0)$ and a y -intercept at $(0, b)$, where a and b are constants. What is the value of $\frac{b}{a}$?

- A. $-\frac{7}{2}$
- B. $-\frac{2}{7}$
- C. $\frac{2}{7}$
- D. $\frac{7}{2}$

ID: b6c52d17 Answer

Correct Answer: D

Rationale

Choice D is correct. The x -coordinate a of the x -intercept $(a, 0)$ can be found by substituting 0 for y in the given equation, which gives $7x + 2(0) = -31$, or $7x = -31$. Dividing both sides of this equation by 7 yields $x = -\frac{31}{7}$. Therefore, the value of a is $-\frac{31}{7}$. The y -coordinate b of the y -intercept $(0, b)$ can be found by substituting 0 for x in the given equation, which gives $7(0) + 2y = -31$, or $2y = -31$. Dividing both sides of this equation by 2 yields $y = -\frac{31}{2}$. Therefore, the value of b is $-\frac{31}{2}$. It follows that the value of $\frac{b}{a}$ is $\frac{-\frac{31}{2}}{-\frac{31}{7}}$, which is equivalent to $(\frac{31}{2})(\frac{7}{31})$, or $\frac{7}{2}$.

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 Difficulty: Hard

Question ID 6392c153

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 6392c153

Line k is defined by $y = \frac{17}{7}x + 4$. Line j is parallel to line k in the xy -plane. What is the slope of line j ?

- A. $\frac{7}{17}$
- B. $\frac{17}{7}$
- C. 4
- D. 17

ID: 6392c153 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that line k is defined by $y = \frac{17x}{7} + 4$. For an equation of a line written in the form $y = mx + b$, m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It follows that the slope of line k is $\frac{17}{7}$. It's also given that line j is parallel to line k in the xy -plane. Since parallel lines have equal slopes, line j also has a slope of $\frac{17}{7}$.

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

Choice C is incorrect. This is the y -coordinate of the y -intercept of line k , not the slope of line j .

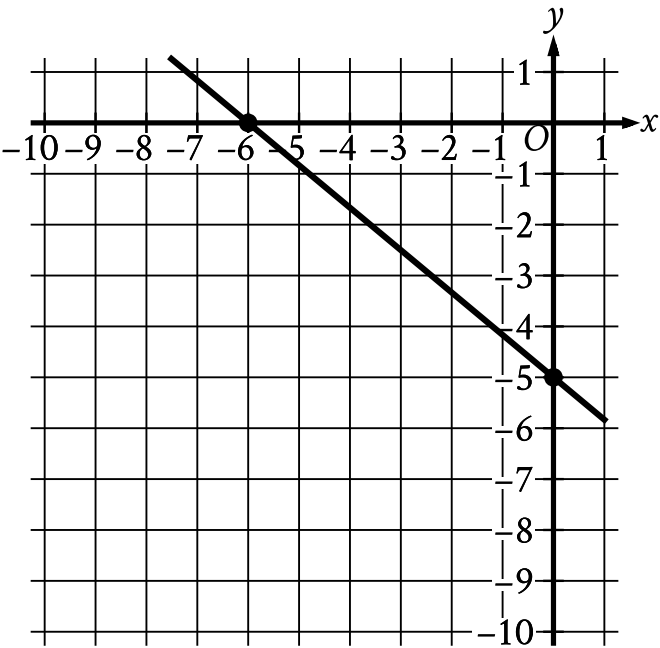
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 271580a8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 271580a8



Line k is shown in the xy -plane. Line j (not shown) is perpendicular to line k . What is the slope of line j ?

ID: 271580a8 Answer

Correct Answer: 1.2, 6/5

Rationale

The correct answer is $\frac{6}{5}$. It's given that line j is perpendicular to line k in the xy -plane. This means that the slope of line j is the opposite reciprocal of the slope of line k . For a line that passes through the points (x_1, y_1) and (x_2, y_2) in the xy -plane, the slope of the line can be calculated as $\frac{y_2 - y_1}{x_2 - x_1}$. It's shown that line k passes through the points $(-6, 0)$ and $(0, -5)$ in the xy -plane. Substituting -6 for x_1 , 0 for y_1 , 0 for x_2 , and -5 for y_2 in $\frac{y_2 - y_1}{x_2 - x_1}$ yields $\frac{-5 - 0}{0 - (-6)}$, or $-\frac{5}{6}$. The opposite reciprocal of $-\frac{5}{6}$ is $\frac{6}{5}$. Therefore, the slope of line j is $\frac{6}{5}$. Note that 6/5 and 1.2 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 476dc73f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 476dc73f

A total of **2** squares each have side length r . A total of **6** equilateral triangles each have side length t . None of these squares and triangles shares a side. The sum of the perimeters of all these squares and triangles is **210**. Which equation represents this situation?

- A. $6r + 24t = 210$
- B. $2r + 6t = 210$
- C. $8r + 18t = 210$
- D. $6r + 2t = 210$

ID: 476dc73f Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that a total of **2** squares each have side length r . Therefore, each of the squares has perimeter $4r$. Since there are a total of **2** squares, the sum of the perimeters of these squares is $4r + 4r$, which is equivalent to $2(4r)$, or $8r$. It's also given that a total of **6** equilateral triangles each have side length t . Therefore, each of the equilateral triangles has perimeter $3t$. Since there are a total of **6** equilateral triangles, the sum of the perimeters of these triangles is $3t + 3t + 3t + 3t + 3t + 3t$, which is equivalent to $6(3t)$, or $18t$. Since the sum of the perimeters of the squares is $8r$ and the sum of the perimeters of the triangles is $18t$, the sum of the perimeters of all these squares and triangles is $8r + 18t$. It's given that the sum of the perimeters of all these squares and triangles is **210**. Therefore, the equation $8r + 18t = 210$ represents this situation.

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 Difficulty: Hard

Question ID 55634ff7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 55634ff7

A chemist combines water and acetic acid to make a mixture with a volume of **56 milliliters (mL)**. The volume of acetic acid in the mixture is **10 mL**. What is the volume of water, in **mL**, in the mixture? (Assume that the volume of the mixture is the sum of the volumes of water and acetic acid before they were mixed.)

ID: 55634ff7 Answer

Correct Answer: 46

Rationale

The correct answer is **46**. It's given that a chemist combines water and acetic acid to make a mixture with a volume of **56** milliliters (mL) and that the volume of acetic acid in the mixture is **10** mL. Let x represent the volume of water, in mL, in the mixture. The equation $x + 10 = 56$ represents this situation. Subtracting **10** from both sides of this equation yields $x = 46$. Therefore, the volume of water, in mL, in the mixture is **46**.

Question Difficulty: Hard

Question ID 69236d08

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 69236d08

x	y
18	130
23	160
26	178

For line h , the table shows three values of x and their corresponding values of y . Line k is the result of translating line h down 5 units in the xy -plane. What is the x -intercept of line k ?

- A. $(-\frac{26}{3}, 0)$
- B. $(-\frac{9}{2}, 0)$
- C. $(-\frac{11}{3}, 0)$
- D. $(-\frac{17}{6}, 0)$

ID: 69236d08 Answer

Correct Answer: D

Rationale

Choice D is correct. The equation of line h can be written in slope-intercept form $y = mx + b$, where m is the slope of the line and $(0, b)$ is the y -intercept of the line. It's given that line h contains the points $(18, 130)$, $(23, 160)$, and $(26, 178)$. Therefore, its slope m can be found as $\frac{160-130}{23-18}$, or 6. Substituting 6 for m in the equation $y = mx + b$ yields $y = 6x + b$. Substituting 130 for y and 18 for x in this equation yields $130 = 6(18) + b$, or $130 = 108 + b$. Subtracting 108 from both sides of this equation yields $22 = b$. Substituting 22 for b in $y = 6x + b$ yields $y = 6x + 22$. Since line k is the result of translating line h down 5 units, an equation of line k is $y = 6x + 22 - 5$, or $y = 6x + 17$. Substituting 0 for y in this equation yields $0 = 6x + 17$. Solving this equation for x yields $x = -\frac{17}{6}$. Therefore, the x -intercept of line k is $(-\frac{17}{6}, 0)$.

- 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 Difficulty: Hard

Question ID be02f3aa

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: be02f3aa

What is the slope of the graph of $y = \frac{1}{3}(29x + 10) + 5x$ in the xy-plane?

ID: be02f3aa Answer

Correct Answer: 14.66, 14.67, 44/3

Rationale

The correct answer is $\frac{44}{3}$. A linear equation can be written in the form $y = mx + b$, where m is the slope of the graph of the equation in the xy-plane and $(0, b)$ is the y-intercept. Distributing the $\frac{1}{3}$ in the equation $y = \frac{1}{3}(29x + 10) + 5x$ yields $y = \frac{29}{3}x + \frac{10}{3} + 5x$. Combining like terms on the right-hand side of this equation yields $y = \frac{44}{3}x + \frac{10}{3}$. This equation is in the form $y = mx + b$, where $m = \frac{44}{3}$ and $b = \frac{10}{3}$. Therefore, the slope of the graph of the given equation in the xy-plane is $\frac{44}{3}$. Note that 44/3, 14.66, and 14.67 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID ce9dbaf3

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: ce9dbaf3

Lily made **36** cups of jam. Lily then filled x small containers and y large containers with all the jam she made. The equation $4x + 6y = 36$ represents this situation. Which is the best interpretation of $6y$ in this context?

- A. The number of large containers Lily filled
- B. The number of small containers Lily filled
- C. The total number of cups of jam in the large containers
- D. The total number of cups of jam in the small containers

ID: ce9dbaf3 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the equation $4x + 6y = 36$ represents the situation where Lily filled x small containers and y large containers with all the jam she made, which was **36** cups. Therefore, $6y$ represents the total number of cups of jam in the large containers.

Choice A is incorrect. The number of large containers Lily filled is represented by y , not $6y$.

Choice B is incorrect. The number of small containers Lily filled is represented by x , not $6y$.

Choice D is incorrect. The total number of cups of jam in the small containers is represented by $4x$, not $6y$.

Question Difficulty: Hard

Question ID cca65a7c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: cca65a7c

A neighborhood consists of a **2**-hectare park and a **35**-hectare residential area. The total number of trees in the neighborhood is **3,934**. The equation $2x + 35y = 3,934$ represents this situation. Which of the following is the best interpretation of x in this context?

- A. The average number of trees per hectare in the park
- B. The average number of trees per hectare in the residential area
- C. The total number of trees in the park
- D. The total number of trees in the residential area

ID: cca65a7c Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that a neighborhood consists of a **2**-hectare park and a **35**-hectare residential area and that the total number of trees in the neighborhood is **3,934**. It's also given that the equation $2x + 35y = 3,934$ represents this situation. Since the total number of trees for a given area can be determined by taking the number of hectares times the average number of trees per hectare, this must mean that the terms $2x$ and $35y$ correspond to the number of trees in the park and in the residential area, respectively. Since $2x$ corresponds to the number of trees in the park, and **2** is the size of the park, in hectares, x must represent the average number of trees per hectare in the park.

Choice B 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 Difficulty: Hard

Question ID e76256e7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: e76256e7

What is the y -coordinate of the y -intercept of the graph of $\frac{3x}{7} = -\frac{5y}{9} + 21$ in the xy -plane?

ID: e76256e7 Answer

Correct Answer: 189/5, 37.8

Rationale

The correct answer is $\frac{189}{5}$. A y -intercept of a graph in the xy -plane is a point where the graph intersects the y -axis, which is a point with an x -coordinate of **0**. Substituting **0** for x in the given equation yields $\frac{3(0)}{7} = -\frac{5y}{9} + 21$, or **0** $= -\frac{5y}{9} + 21$. Subtracting **21** from both sides of this equation yields **-21** $= -\frac{5y}{9}$. Multiplying both sides of this equation by **-9** yields **189** $= 5y$. Dividing both sides of this equation by **5** yields $\frac{189}{5} = y$. Therefore, the y -coordinate of the y -intercept of the graph of the given equation in the xy -plane is $\frac{189}{5}$. Note that 189/5 and 37.8 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID a1d4d6de

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: a1d4d6de

$$2x + y = 37$$

In triangle QRS , sides QR and RS each have a length of x centimeters and side SQ has a length of y centimeters. The given equation represents this situation. Which of the following is the best interpretation of 37 in this context?

- A. The difference, in centimeters, between the lengths of sides QR and SQ
- B. The difference, in centimeters, between the lengths of sides QR and RS
- C. The sum of the lengths, in centimeters, of the three sides of the triangle
- D. The length, in centimeters, of one of the two sides of equal length

ID: a1d4d6de Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that in triangle QRS , sides QR and RS each have a length of x centimeters. Therefore, the expression $2x$ represents the sum of the lengths, in centimeters, of sides QR and RS . It's also given that side SQ has a length of y centimeters. Therefore, the expression $2x + y$ represents the sum of the lengths, in centimeters, of sides QR , RS , and SQ . Since $2x + y$ is the sum of the lengths, in centimeters, of the three sides of the triangle and $2x + y = 37$, it follows that 37 is the sum of the lengths, in centimeters, of the three sides of the triangle.

Choice A is incorrect. The difference, in centimeters, between the lengths of sides QR and SQ is $x - y$, not 37 .

Choice B is incorrect. The difference, in centimeters, between the lengths of sides QR and RS is $x - x$, or 0 , not 37 .

Choice D is incorrect. The length, in centimeters, of one of the two sides of equal length is x , not 37 .

Question Difficulty: Hard

Question ID a9ee9cb4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: a9ee9cb4

x	1	2	3
y	11	16	21

The table shows three values of x and their corresponding values of y . Which equation represents the linear relationship between x and y ?

- A. $y = 5x + 6$
- B. $y = 5x + 11$
- C. $y = 6x + 5$
- D. $y = 6x + 11$

ID: a9ee9cb4 Answer

Correct Answer: A

Rationale

Choice A is correct. The linear relationship between x and y can be represented by the equation $y = mx + b$, where m is the slope of the line in the xy -plane that represents the relationship, and b is the y -coordinate of the y -intercept. The slope can be computed using any two points on the line. The slope of a line between any two points, (x_1, y_1) and (x_2, y_2) , on the line can be calculated using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. In the given table, each value of x and its corresponding value of y can be represented by a point (x, y) . In the given table, when the value of x is 1, the corresponding value of y is 11 and when the value of x is 2, the corresponding value of y is 16. Therefore, the points (1, 11) and (2, 16) are on the line. Substituting (1, 11) and (2, 16) for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{16 - 11}{2 - 1}$, or $m = 5$. Substituting 5 for m in the equation $y = mx + b$ yields $y = 5x + b$. Substituting the first value of x in the table, 1, and its corresponding value of y , 11, for x and y , respectively, in this equation yields $11 = 5(1) + b$, or $11 = b + 5$. Subtracting 5 from both sides of this equation yields $6 = b$. Substituting 6 for b in the equation $y = 5x + b$ yields $y = 5x + 6$. Therefore, the equation $y = 5x + 6$ represents the linear relationship between x and y .

Choice B is incorrect. For this relationship, when the value of x is 1, the corresponding value of y is 16, not 11.

Choice C is incorrect. For this relationship, when the value of x is 2, the corresponding value of y is 17, not 16.

Choice D is incorrect. For this relationship, when the value of x is 1, the corresponding value of y is 17, not 11.

Question Difficulty: Hard

Question ID 136884df

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 136884df

Line p is defined by $4y + 8x = 6$. Line r is perpendicular to line p in the xy -plane. What is the slope of line r ?

ID: 136884df Answer

Correct Answer: .5, 1/2

Rationale

The correct answer is $\frac{1}{2}$. For an equation in slope-intercept form $y = mx + b$, m represents the slope of the line in the xy -plane defined by this equation. It's given that line p is defined by $4y + 8x = 6$. Subtracting $8x$ from both sides of this equation yields $4y = -8x + 6$. Dividing both sides of this equation by 4 yields $y = -\frac{8}{4}x + \frac{6}{4}$, or $y = -2x + \frac{3}{2}$. Thus, the slope of line p is -2 . If line r is perpendicular to line p , then the slope of line r is the negative reciprocal of the slope of line p . The negative reciprocal of -2 is $-\frac{1}{(-2)} = \frac{1}{2}$. Note that 1/2 and .5 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID e3e3fe7e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: e3e3fe7e

Figure A and figure B are both regular polygons. The sum of the perimeter of figure A and the perimeter of figure B is **63** inches. The equation $3x + 6y = 63$ represents this situation, where x is the number of sides of figure A and y is the number of sides of figure B. Which statement is the best interpretation of **6** in this context?

- A. Each side of figure B has a length of **6** inches.
- B. The number of sides of figure B is **6**.
- C. Each side of figure A has a length of **6** inches.
- D. The number of sides of figure A is **6**.

ID: e3e3fe7e Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that figure A and figure B (not shown) are both regular polygons and the sum of the perimeters of the two figures is **63 inches**. It's also given that x is the number of sides of figure A and y is the number of sides of figure B, and that the equation $3x + 6y = 63$ represents this situation. Thus, $3x$ and $6y$ represent the perimeters, in inches, of figure A and figure B, respectively. Since $6y$ represents the perimeter, in inches, of figure B and y is the number of sides of figure B, it follows that each side of figure B has a length of **6 inches**.

Choice B is incorrect. The number of sides of figure B is y , not **6**.

Choice C is incorrect. Since the perimeter, in inches, of figure A is represented by $3x$, each side of figure A has a length of **3 inches**, not **6 inches**.

Choice D is incorrect. The number of sides of figure A is x , not **6**.

Question Difficulty: Hard

Question ID f1350f37

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: f1350f37

In the xy -plane, line s passes through the point $(0, 0)$ and is parallel to the line represented by the equation $y = 18x + 2$. If line s also passes through the point $(4, d)$, what is the value of d ?

- A. 2
- B. 18
- C. 72
- D. 74

ID: f1350f37 Answer

Correct Answer: C

Rationale

Choice C is correct. A line in the xy -plane can be represented by an equation of the form $y = mx + b$, where m is the slope and b is the y -coordinate of the y -intercept of the line. It's given that line s passes through the point $(0, 0)$. Therefore, the y -coordinate of the y -intercept of line s is 0 . It's also given that line s is parallel to the line represented by the equation $y = 18x + 2$. Since parallel lines have the same slope, it follows that the slope of line s is 18 . Therefore, line s can be represented by the equation $y = mx + b$, where $m = 18$ and $b = 0$. Substituting 18 for m and 0 for b in $y = mx + b$ yields the equation $y = 18x + 0$, or $y = 18x$. If line s passes through the point $(4, d)$, then when $x = 4$, $y = d$ for the equation $y = 18x$. Substituting 4 for x and d for y in this equation yields $d = 18(4)$, or $d = 72$.

Choice A is incorrect. This is the y -coordinate of the y -intercept of the line represented by the equation $y = 18x + 2$.

Choice B is incorrect. This is the slope of the line represented by the equation $y = 18x + 2$.

Choice D is incorrect. The line represented by the equation $y = 18x + 2$, not line s , passes through the point $(4, 74)$.

Question Difficulty: Hard

Question ID 8ec3cae8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 8ec3cae8

Line k is defined by $y = 7x + \frac{1}{8}$. Line j is perpendicular to line k in the xy -plane. What is the slope of line j ?

- A. -8
- B. $-\frac{1}{7}$
- C. $\frac{1}{8}$
- D. 7

ID: 8ec3cae8 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that line k is defined by $y = 7x + \frac{1}{8}$. For an equation in slope-intercept form $y = mx + b$, m represents the slope of the line defined by this equation in the xy -plane and b represents the y -coordinate of the y -intercept of this line. Therefore, the slope of line k is 7 . It's also given that line j is perpendicular to line k in the xy -plane. Therefore, the slope of line j is the opposite reciprocal of the slope of line k . The opposite reciprocal of 7 is $-\frac{1}{7}$. Therefore, the slope of line j is $-\frac{1}{7}$.

Choice A is incorrect. This is the opposite reciprocal of the y -coordinate of the y -intercept, not the slope, of line k .

Choice C is incorrect. This is the y -coordinate of the y -intercept of line k , not the slope of line j .

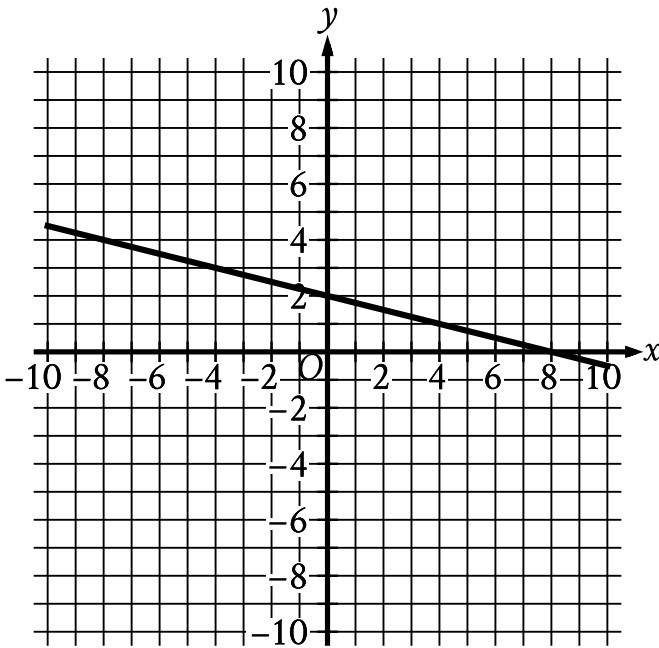
Choice D is incorrect. This is the slope of a line that is parallel, not perpendicular, to line k .

Question Difficulty: Hard

Question ID d999ef02

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d999ef02



The graph of $y = f(x) + 14$ is shown. Which equation defines function f ?

- A. $f(x) = -\frac{1}{4}x - 12$
- B. $f(x) = -\frac{1}{4}x + 16$
- C. $f(x) = -\frac{1}{4}x + 2$
- D. $f(x) = -\frac{1}{4}x - 14$

ID: d999ef02 Answer

Correct Answer: A

Rationale

Choice A is correct. An equation for the graph shown can be written in slope-intercept form $y = mx + b$, where m is the slope of the graph and its y -intercept is $(0, b)$. Since the y -intercept of the graph shown is $(0, 2)$, the value of b is 2 . Since the graph also passes through the point $(4, 1)$, the slope can be calculated as $\frac{1-2}{4-0}$, or $-\frac{1}{4}$. Therefore, the value of m is $-\frac{1}{4}$. Substituting $-\frac{1}{4}$ for m and 2 for b in the equation $y = mx + b$ yields $y = -\frac{1}{4}x + 2$. It's given that an equation for the graph shown is $y = f(x) + 14$. Substituting $f(x) + 14$ for y in the equation $y = -\frac{1}{4}x + 2$ yields $f(x) + 14 = -\frac{1}{4}x + 2$. Subtracting 14 from both sides of this equation yields $f(x) = -\frac{1}{4}x - 12$.

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 Difficulty: Hard

Question ID 567c2bc5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 567c2bc5

x	y
-18	-48
7	52

The table shows two values of x and their corresponding values of y . In the xy -plane, the graph of the linear equation representing this relationship passes through the point $(\frac{1}{7}, a)$. What is the value of a ?

- A. $-\frac{4}{11}$
- B. $-\frac{4}{77}$
- C. $\frac{4}{7}$
- D. $\frac{172}{7}$

ID: 567c2bc5 Answer

Correct Answer: D

Rationale

Choice D is correct. The linear relationship between x and y can be represented by the equation $y = mx + b$, where m is the slope of the graph of this equation in the xy -plane and b is the y -coordinate of the y -intercept. The slope of a line between any two points (x_1, y_1) and (x_2, y_2) on the line can be calculated using the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Based on the table, the graph contains the points $(-18, -48)$ and $(7, 52)$. Substituting $(-18, -48)$ and $(7, 52)$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{52 - (-48)}{7 - (-18)}$, which is equivalent to $m = \frac{100}{25}$, or $m = 4$. Substituting 4 for m , -18 for x , and -48 for y in the equation $y = mx + b$ yields $-48 = 4(-18) + b$, or $-48 = -72 + b$. Adding 72 to both sides of this equation yields $24 = b$. Therefore, $m = 4$ and $b = 24$. Substituting 4 for m and 24 for b in the equation $y = mx + b$ yields $y = 4x + 24$. Thus, the equation $y = 4x + 24$ represents the linear relationship between x and y . It's also given that the graph of the linear equation representing this relationship in the xy -plane passes through the point $(\frac{1}{7}, a)$. Substituting $\frac{1}{7}$ for x and a for y in the equation $y = 4x + 24$ yields $a = 4(\frac{1}{7}) + 24$, which is equivalent to $a = \frac{4}{7} + \frac{168}{7}$, or $a = \frac{172}{7}$.

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 Difficulty: Hard

Question ID 3409ce40

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 3409ce40

- Line r is defined by the equation $4x - 9y = 3$. Line s is parallel to line r in the xy -plane. What is the slope of line s ?
- A. $\frac{9}{4}$
 - B. $\frac{4}{9}$
 - C. -4
 - D. -9

ID: 3409ce40 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that line s is parallel to line r in the xy -plane. This means that the slope of line r is equal to the slope of line s . Line r is defined by the equation $4x - 9y = 3$. This equation can be written in slope-intercept form $y = mx + b$, where m represents the slope of the line and b represents the y -coordinate of the y -intercept of the line. Subtracting $4x$ from both sides of the equation $4x - 9y = 3$ yields $-9y = -4x + 3$. Dividing both sides of this equation by -9 yields $y = \frac{4}{9}x - \frac{1}{3}$. Therefore, the slope of line r is $\frac{4}{9}$. Since parallel lines have equal slopes, the slope of line s is also $\frac{4}{9}$.

Choice A is incorrect. This is the reciprocal of the slope of line s , not the slope of line s .

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 Difficulty: Hard

Question ID 7dad301b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 7dad301b

$\frac{3}{5}x + \frac{3}{4}y = 7$

Which table gives three values of *x* and their corresponding values of *y* for the given equation?

A.

<i>x</i>	<i>y</i>
1	$\frac{113}{20}$
2	$\frac{101}{20}$
4	$\frac{77}{20}$

B.

<i>x</i>	<i>y</i>
1	$\frac{47}{5}$
2	$\frac{44}{5}$
4	$\frac{38}{5}$

C.

<i>x</i>	<i>y</i>
1	$\frac{148}{15}$
2	$\frac{136}{15}$
4	$\frac{112}{15}$

D.

<i>x</i>	<i>y</i>
1	$\frac{128}{15}$
2	$\frac{116}{15}$
4	$\frac{92}{15}$

ID: 7dad301b Answer

Correct Answer: D

Rationale

Choice D is correct. Each of the tables gives the same three values of *x*: 1, 2, and 4. Substituting 1 for *x* in the given equation yields $(\frac{3}{5})(1) + \frac{3}{4}y = 7$, or $\frac{3}{5} + \frac{3}{4}y = \frac{35}{5}$. Subtracting $\frac{3}{5}$ from both sides of this equation yields $\frac{3}{4}y = \frac{32}{5}$. Multiplying both sides of this equation by $\frac{4}{3}$ yields $y = \frac{128}{15}$. Therefore, when *x* = 1, the corresponding value of *y* for the

given equation is $\frac{128}{15}$. Substituting **2** for x in the given equation yields $\left(\frac{3}{5}\right)(2) + \frac{3}{4}y = 7$, or $\frac{6}{5} + \frac{3}{4}y = \frac{35}{5}$. Subtracting $\frac{6}{5}$ from both sides of this equation yields $\frac{3}{4}y = \frac{29}{5}$. Multiplying both sides of this equation by $\frac{4}{3}$ yields $y = \frac{116}{15}$. Therefore, when $x = 2$, the corresponding value of y for the given equation is $\frac{116}{15}$. Substituting **4** for x in the given equation yields $\left(\frac{3}{5}\right)(4) + \frac{3}{4}y = 7$, or $\frac{12}{5} + \frac{3}{4}y = \frac{35}{5}$. Subtracting $\frac{12}{5}$ from both sides of this equation yields $\frac{3}{4}y = \frac{23}{5}$. Multiplying both sides of this equation by $\frac{4}{3}$ yields $y = \frac{92}{15}$. Therefore, when $x = 4$, the corresponding value of y for the given equation is $\frac{92}{15}$. The table in choice D gives x -values of **1**, **2**, and **4** and corresponding y -values of $\frac{128}{15}$, $\frac{116}{15}$, and $\frac{92}{15}$, respectively. Therefore, the table in choice D gives three values of x and their corresponding values of y for the given equation.

Choice A is incorrect. This table gives three values of x and their corresponding values of y for the equation $\frac{3}{5}x + \frac{3}{4}y = 7$.

Choice B is incorrect. This table gives three values of x and their corresponding values of y for the equation $\frac{3}{5}x + y = 10$.

Choice C is incorrect. This table gives three values of x and their corresponding values of y for the equation $\frac{3}{5}x + \frac{3}{4}y = 8$.

Question Difficulty: Hard

Question ID 9b8cc94d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 9b8cc94d

Line k is defined by $y = -\frac{17}{3}x + 5$. Line j is perpendicular to line k in the xy -plane. What is the slope of line j ?

ID: 9b8cc94d Answer

Correct Answer: .1764, .1765, 3/17

Rationale

The correct answer is $\frac{3}{17}$. It's given that line j is perpendicular to line k in the xy -plane. This means that the slope of line j is the negative reciprocal of the slope of line k . The equation of line k , $y = -\frac{17}{3}x + 5$, is written in slope-intercept form $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It follows that the slope of line k is $-\frac{17}{3}$. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of $-\frac{17}{3}$ is $\frac{-1}{-\frac{17}{3}}$, or $\frac{3}{17}$. Thus, the slope of line j is $\frac{3}{17}$. Note that 3/17, .1764, .1765, and 0.176 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 4986ad22

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 4986ad22

A batch of banana milkshakes consists of **4** cups of ice cream and **2** bananas and has **1,114 milligrams (mg)** of calcium. There is **276 mg** of calcium in **1** cup of the ice cream used to make this batch of milkshakes. How much calcium, **in mg**, is in **1** banana?

- A. **5**
- B. **10**
- C. **419**
- D. **1,104**

ID: 4986ad22 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that a batch of banana milkshakes consists of **4** cups of ice cream and **2** bananas and has **1,114 mg** of calcium. It's also given that there is **276 mg** of calcium in **1** cup of the ice cream used to make this batch of milkshakes. It follows that the total amount of calcium in **4** cups of ice cream is **4(276)**, or **1,104 mg**. Let ***x*** represent the amount of calcium, in mg, in **1** banana. It follows that the total amount of calcium in **2** bananas is **2*x*** mg. Since the batch of banana milkshakes has **1,114 mg** of calcium, the equation **1,104 + 2*x* = 1,114** represents this situation. Subtracting **1,104** from both sides of this equation yields **2*x* = 10**. Dividing both sides of this equation by **2** yields ***x* = 5**. Therefore, the amount of calcium in **1** banana is **5 mg**.

Choice B is incorrect. This is the amount of calcium, in mg, in **2** bananas, not in **1** banana.

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

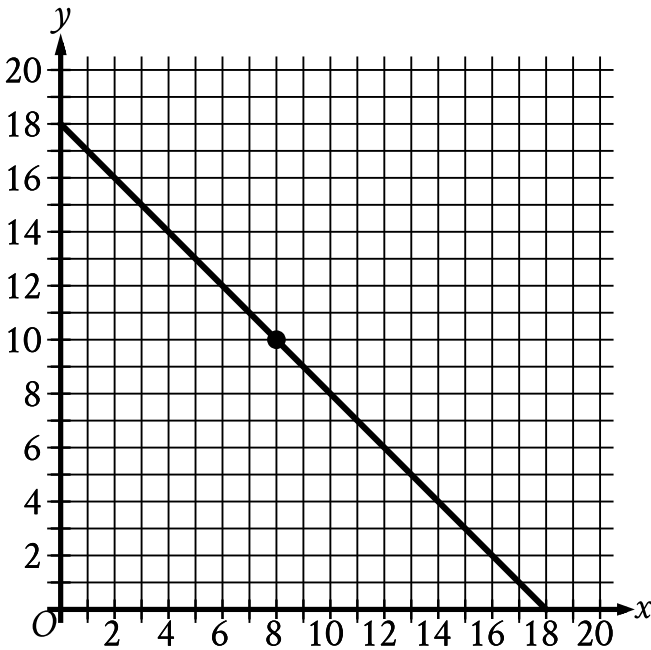
Choice D is incorrect. This is the amount of calcium, in mg, in **4** cups of ice cream, not in **1** banana.

Question Difficulty: Hard

Question ID e0a8b133

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: e0a8b133



The graph in the xy -plane models the possible combinations of length x , in meters (m), and width y , in meters, for a rectangle with a perimeter of **36 m**. Which statement is the best interpretation of the point $(8, 10)$ in this context?

- A. The length is **10 m** less than the perimeter, and the width is **8 m** less than the perimeter.
- B. The length is **10 m**, and the width is **8 m**.
- C. The length is **8 m**, and the width is **10 m**.
- D. The length is **8 m** less than the perimeter, and the width is **10 m** less than the perimeter.

ID: e0a8b133 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the graph in the xy -plane models the possible combinations of length x , in meters (m), and width y , in meters, for a rectangle with a perimeter of **36 m**. Since x represents the length, in meters, and y represents the width, in meters, the point $(8, 10)$ in the xy -plane represents a rectangle whose length is **8 m** and whose width is **10 m**.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect. This is an interpretation of the point $(10, 8)$, not $(8, 10)$.

Choice D is incorrect and may result from conceptual errors.

Question ID 21ded0ba

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 21ded0ba

Keenan made **32** cups of vegetable broth. Keenan then filled **x** small jars and **y** large jars with all the vegetable broth he made. The equation **$3x + 5y = 32$** represents this situation. Which is the best interpretation of **$5y$** in this context?

- A. The number of large jars Keenan filled
- B. The number of small jars Keenan filled
- C. The total number of cups of vegetable broth in the large jars
- D. The total number of cups of vegetable broth in the small jars

ID: 21ded0ba Answer

Correct Answer: C

Rationale

Choice C is correct. It’s given that the equation **$3x + 5y = 32$** represents the situation where Keenan filled **x** small jars and **y** large jars with all the vegetable broth he made, which was **32** cups. Therefore, **$3x$** represents the total number of cups of vegetable broth in the small jars and **$5y$** represents the total number of cups of vegetable broth in the large jars.

Choice A is incorrect. The number of large jars Keenan filled is represented by **y** , not **$5y$** .

Choice B is incorrect. The number of small jars Keenan filled is represented by **x** , not **$5y$** .

Choice D is incorrect. The total number of cups of vegetable broth in the small jars is represented by **$3x$** , not **$5y$** .

Question Difficulty: Hard

Question ID 46782383

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 46782383

At a state fair, attendees can win tokens that are worth a different number of points depending on the shape. One attendee won S square tokens and C circle tokens worth a total of $1,120$ points. The equation $80S + 90C = 1,120$ represents this situation. How many more points is a circle token worth than a square token?

- A. 950
- B. 90
- C. 80
- D. 10

ID: 46782383 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the equation $80S + 90C = 1,120$ represents this situation, where S is the number of square tokens won, C is the number of circle tokens won, and $1,120$ is the total number of points the tokens are worth. It follows that $80S$ represents the total number of points the square tokens are worth. Therefore, each square token is worth 80 points. It also follows that $90C$ represents the total number of points the circle tokens are worth. Therefore, each circle token is worth 90 points. Since a circle token is worth 90 points and a square token is worth 80 points, then a circle token is worth $90 - 80$, or 10 , more points than a square token.

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

Choice B is incorrect. This is the number of points a circle token is worth.

Choice C is incorrect. This is the number of points a square token is worth.

Question Difficulty: Hard

Question ID d2b63a46

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: d2b63a46

x	y
-6	65
-3	56
3	38
6	29

The table shows four values of x and their corresponding values of y . There is a linear relationship between x and y . Which of the following equations represents this relationship?

- A. $9x + 3y = 141$
- B. $9x + 3y = 3$
- C. $3x + 9y = 141$
- D. $3x + 9y = 3$

ID: d2b63a46 Answer

Correct Answer: A

Rationale

Choice A is correct. An equation representing the linear relationship between x and y can be written in slope-intercept form $y = mx + b$, where m is the slope of the graph of the equation in the xy -plane and $(0, b)$ is the y -intercept. The slope, m , can be calculated using two ordered pairs, (x_1, y_1) and (x_2, y_2) , and the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the ordered pairs $(-6, 65)$ and $(6, 29)$ from the table for (x_1, y_1) and (x_2, y_2) , respectively, in this formula yields $m = \frac{29 - 65}{6 - (-6)}$, which is equivalent to $m = \frac{-36}{12}$, or $m = -3$. Substituting -3 for m in the formula $y = mx + b$ yields $y = -3x + b$. Substituting the point $(-6, 65)$ into this equation yields $65 = -3(-6) + b$, or $65 = 18 + b$. Subtracting 18 from both sides of this equation yields $47 = b$. Substituting 47 for b in the equation $y = -3x + b$ yields $y = -3x + 47$. Adding $3x$ to both sides of this equation yields $3x + y = 47$. Multiplying both sides of this equation by 3 yields $9x + 3y = 141$.

Choice B is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $9(-6) + 3(65) = 3$, or $141 = 3$, which is false.

Choice C is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $3(-6) + 9(65) = 141$, or $567 = 141$, which is false.

Choice D is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $3(-6) + 9(65) = 3$, or $567 = 3$, which is false.

Question ID 60a9d5ac

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 60a9d5ac

In the xy -plane, line p has a slope of $-\frac{5}{3}$ and an x -intercept of $(-6, 0)$. What is the y -coordinate of the y -intercept of line p ?

ID: 60a9d5ac Answer

Correct Answer: -10

Rationale

The correct answer is -10 . A line in the xy -plane can be represented by the equation $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept. It's given that line p has a slope of $-\frac{5}{3}$. Therefore, $m = -\frac{5}{3}$. It's also given that line p has an x -intercept of $(-6, 0)$. Therefore, when $x = -6$, $y = 0$. Substituting $-\frac{5}{3}$ for m , -6 for x , and 0 for y in the equation $y = mx + b$ yields $0 = (-\frac{5}{3})(-6) + b$, which is equivalent to $0 = 10 + b$. Subtracting 10 from both sides of this equation yields $-10 = b$. Therefore, the y -coordinate of the y -intercept of line p is -10 .

Question Difficulty: Hard

Question ID 48296c1e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 48296c1e

$$2.5b + 5r = 80$$

The given equation describes the relationship between the number of birds, b , and the number of reptiles, r , that can be cared for at a pet care business on a given day. If the business cares for **16** reptiles on a given day, how many birds can it care for on this day?

- A. 0
- B. 5
- C. 40
- D. 80

ID: 48296c1e Answer

Correct Answer: A

Rationale

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.

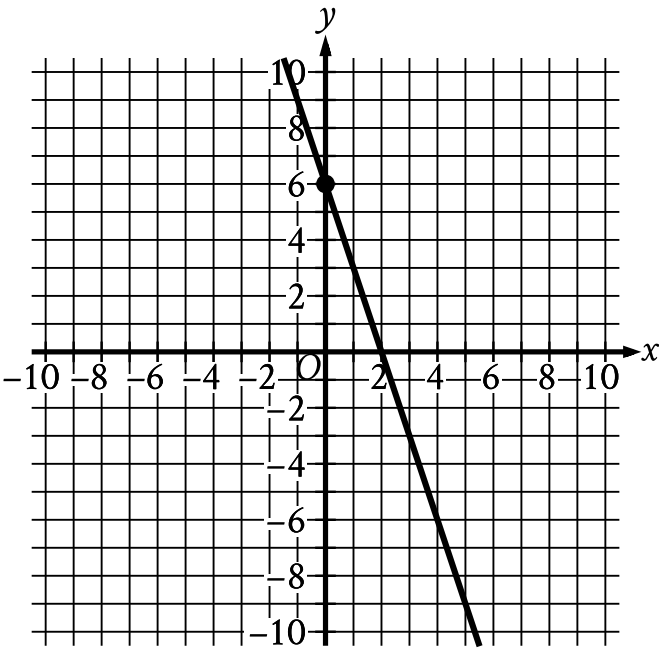
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 42d720b2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in two variables	Hard

ID: 42d720b2



The graph shows a linear relationship between x and y . Which equation represents this relationship, where R is a positive constant?

- A. $Rx + 18y = 36$
- B. $Rx - 18y = -36$
- C. $18x + Ry = 36$
- D. $18x - Ry = -36$

ID: 42d720b2 Answer

Correct Answer: C

Rationale

Choice C is correct. The equation representing the linear relationship shown can be written in slope-intercept form $y = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the line. The line shown passes through the points $(0, 6)$ and $(2, 0)$. Given two points on a line, (x_1, y_1) and (x_2, y_2) , the slope of the line can be calculated using the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting $(0, 6)$ and $(2, 0)$ for (x_1, y_1) and (x_2, y_2) , respectively, in this equation yields $m = \frac{0 - 6}{2 - 0}$, which is equivalent to $m = -\frac{6}{2}$, or $m = -3$. Since $(0, 6)$ is the y -intercept, it follows that $b = 6$. Substituting -3 for m and 6 for b in the equation $y = mx + b$ yields $y = -3x + 6$. Adding $3x$ to both sides of this equation yields $3x + y = 6$. Multiplying this equation by 6 yields $18x + 6y = 36$. It follows that the equation $18x + Ry = 36$, where R is a positive constant, represents this relationship.

Choice A is incorrect. The graph of this relationship passes through the point $(0, 2)$, not $(0, 6)$.

Choice B is incorrect. The graph of this relationship passes through the point $(0, 2)$, not $(0, 6)$.

Choice D is incorrect. The graph of this relationship passes through the point $(-2, 0)$, not $(2, 0)$.

Question Difficulty: Hard