

Question ID 6ee5222e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 6ee5222e

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

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: 6ee5222e 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 $\frac{3}{5}2 + \frac{3}{4}y = 7$, 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 $\frac{3}{5}4 + \frac{3}{4}y = 7$, 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 252d6b8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 252d6b8a

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

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: 252d6b8a 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 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 $\frac{7}{5}$, 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 $-\frac{1}{2} \cdot \frac{7}{5}$, 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 900234f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 900234f1

$$5G + 45R = 380$$

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: 900234f1 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 e40b7bdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: e40b7bdc

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: e40b7bdc 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 dcdceae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: dcdceae

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: dcdceae 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 1cc52a1f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 1cc52a1f

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: 1cc52a1f Answer

Correct Answer: 5

Rationale

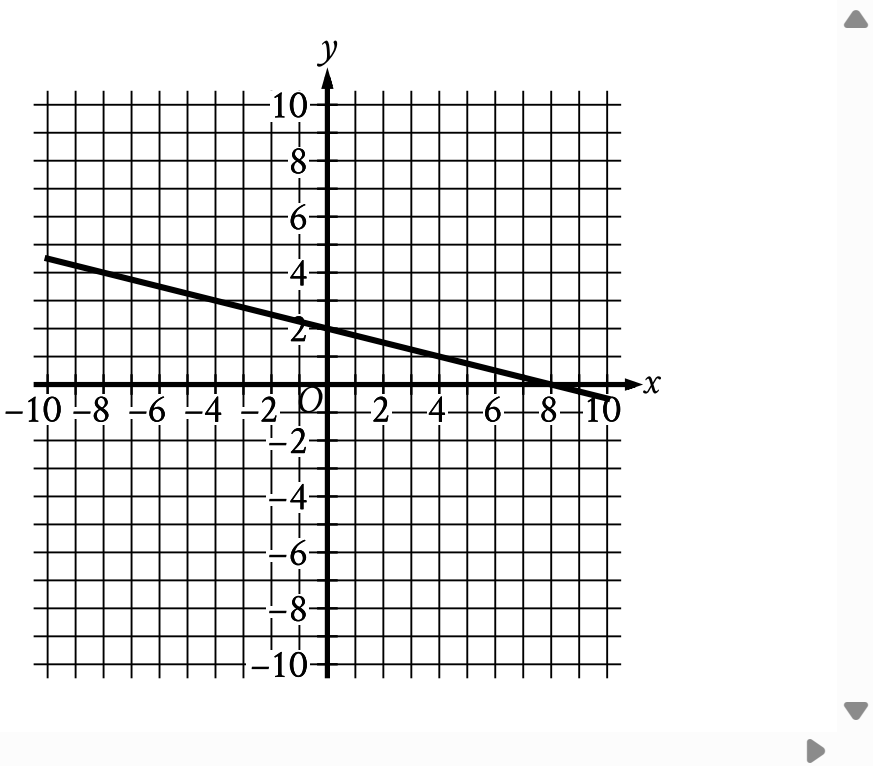
The correct answer is 5. It's given that the equation $10x + 15y = 85$ represents the situation, where x is the number of on-site training courses, y is the number of online training courses, and 85 is the total number of hours of training courses the apprentice has enrolled in. Therefore, $10x$ represents 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 a8e43ae3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: a8e43ae3



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: a8e43ae3 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 b . Since the y -intercept of the graph shown is 2, the value of b is 2. Since the graph also passes through the point (8, 0), the slope can be calculated as $\frac{0 - 2}{8 - 0}$, 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 beb54560

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: beb54560

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: beb54560 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 c73c84cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: c73c84cc

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: c73c84cc Answer

Correct Answer: 59/9, 6.555, 6.556

Rationale

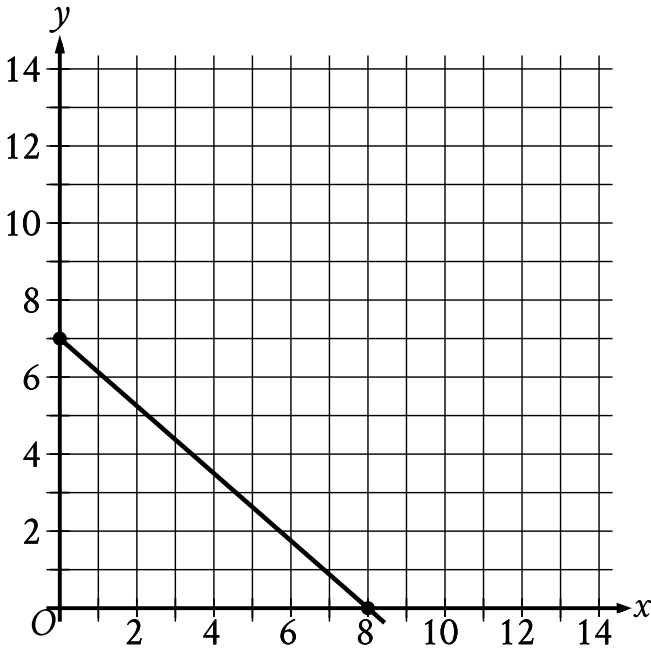
The correct answer is $\frac{59}{9}$. When the graph of an equation in the form $Ax + By = C$, where A , B , and C are constants, is translated down k units in the xy -plane, the resulting graph can be represented by the equation $Ax + By + k = C$. It's given that the graph of $9x - 10y = 19$ is translated down 4 units in the xy -plane. Therefore, the resulting graph can be represented by the equation $9x - 10y + 4 = 19$, 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 $9x - 100 = 59$, 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 35978b89

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 35978b89



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: 35978b89 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 9a67367f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 9a67367f

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: 9a67367f 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 95cc0b50

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 95cc0b50

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: 95cc0b50 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 $7x + 20 = -31$, 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 $70 + 2y = -31$, 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 $\frac{31}{2} \cdot \frac{7}{31}$, 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 e4db4454

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: e4db4454

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: e4db4454 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 0e1dbc1d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 0e1dbc1d

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: 0e1dbc1d 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 1/4 and .25 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 1ad71c23

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 1ad71c23

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: 1ad71c23 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 8d7fb037

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 8d7fb037

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: 8d7fb037 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 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.

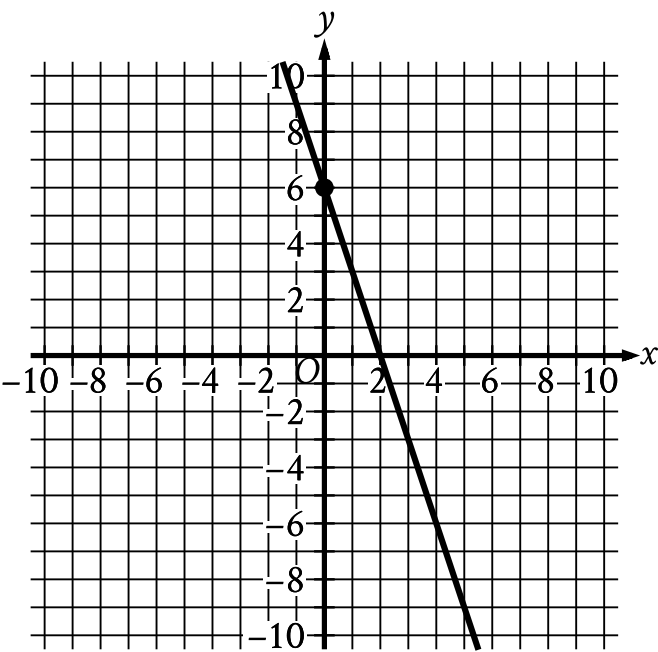
Choice B is incorrect and may result from conceptual or calculation errors.

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

Question ID 8a1fb433

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 8a1fb433



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: 8a1fb433 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 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.

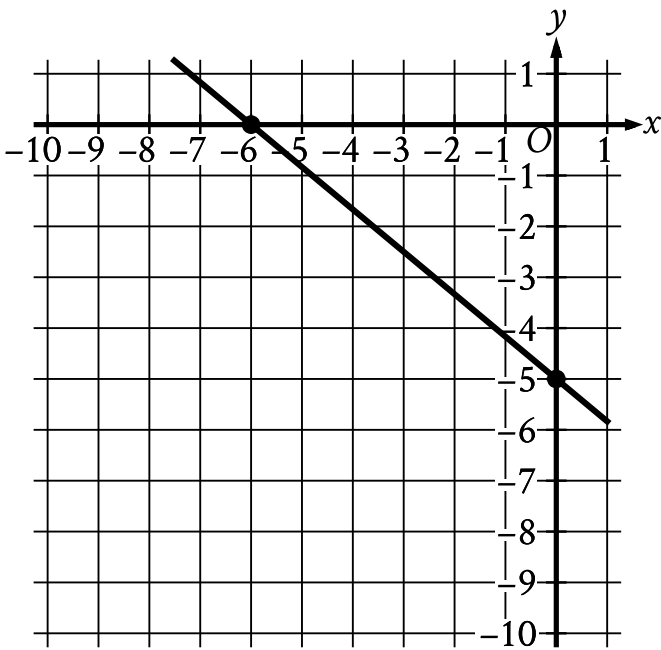
Choice D is incorrect. The graph of this relationship passes through the point -2, 0, not 2, 0.

Question Difficulty: Hard

Question ID 3dcde9ed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 3dcde9ed



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: 3dcde9ed 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 ec0fe2b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: ec0fe2b2

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: ec0fe2b2 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 $d = 83$, or $d = 24$.

Question Difficulty: Hard

Question ID 228bd68a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: 228bd68a

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: 228bd68a 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 $\frac{30}{7} = -\frac{5y}{9} + 21$, 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 a83cf688

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	Hard

ID: a83cf688

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: a83cf688 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 $y - y_1 = mx - x_1$, 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 $y - y_1 = mx - x_1$ 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