

# Question ID 2eb1f9e1

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

ID: 2eb1f9e1

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: 2eb1f9e1 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: Medium

# Question ID 80f346ea

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

ID: 80f346ea

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

ID: 80f346ea 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: Medium

# Question ID 38f53fa4

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

ID: 38f53fa4

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: 38f53fa4 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: Medium

# Question ID a39e1c3b

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

ID: a39e1c3b

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

ID: a39e1c3b 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: Medium

# Question ID d609d1ce

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

ID: d609d1ce

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: d609d1ce 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: Medium

Question ID ac7cddee

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

ID: ac7cddee

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: ac7cddee 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: Medium

Question ID e2b60318

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

ID: e2b60318

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: e2b60318 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: Medium

Question ID 28c92268

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

ID: 28c92268

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: 28c92268 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: Medium



Question ID a2bf1dd6

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

ID: a2bf1dd6

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: a2bf1dd6 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: Medium

# Question ID cd13910e

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

ID: cd13910e

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

ID: cd13910e 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: Medium

Question ID 0edb622e

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

ID: 0edb622e

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: 0edb622e 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: Medium

Question ID 3c65fb48

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

ID: 3c65fb48

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

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: 3c65fb48 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: Medium

# Question ID e0a370ba

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

ID: e0a370ba

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: e0a370ba 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: Medium

Question ID 0dac9e81

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

ID: 0dac9e81

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: 0dac9e81 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: Medium

# Question ID 1c769c42

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

ID: 1c769c42

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: 1c769c42 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: Medium

Question ID 58c789fd

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

ID: 58c789fd

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: 58c789fd 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: Medium



Question ID 432f9706

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

ID: 432f9706

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: 432f9706 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: Medium

# Question ID cec3c002

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

ID: cec3c002

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: cec3c002 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: Medium

Question ID 524a5350

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

ID: 524a5350

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: 524a5350 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: Medium

Question ID 012136ca

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

ID: 012136ca

$x$	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: 012136ca 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: Medium

Question ID dd31a371

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

ID: dd31a371

$2.5b + 5r = 80$

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: dd31a371 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: Medium

Question ID ddfd6303

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

ID: ddfd6303

$2x + y = 37$

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: ddfd6303 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  $37$ .

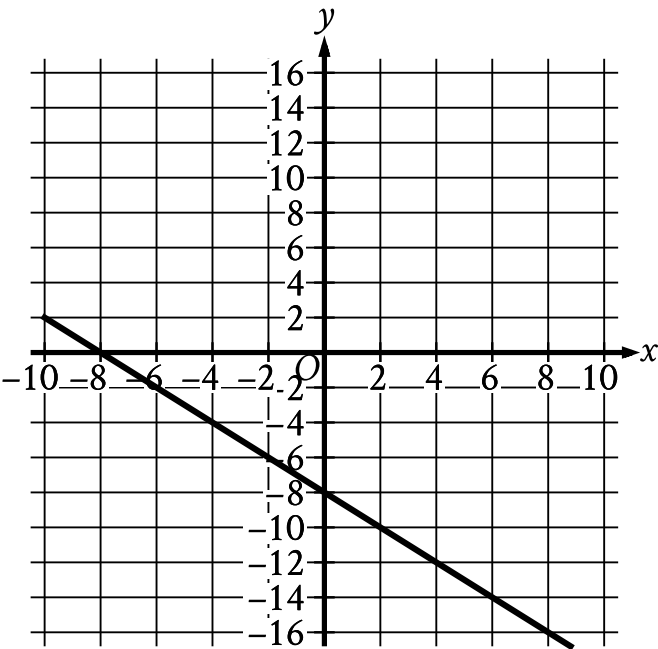
Choice D is incorrect. The length, in centimeters, of one of the two sides of equal length is  $x$ , not  $37$ .

Question Difficulty: Medium

Question ID 96ddbb6a

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

ID: 96ddbb6a



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: 96ddbb6a 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: Medium



Question ID 71dc13cb

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

ID: 71dc13cb

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: 71dc13cb 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  $(9, 10)$ .

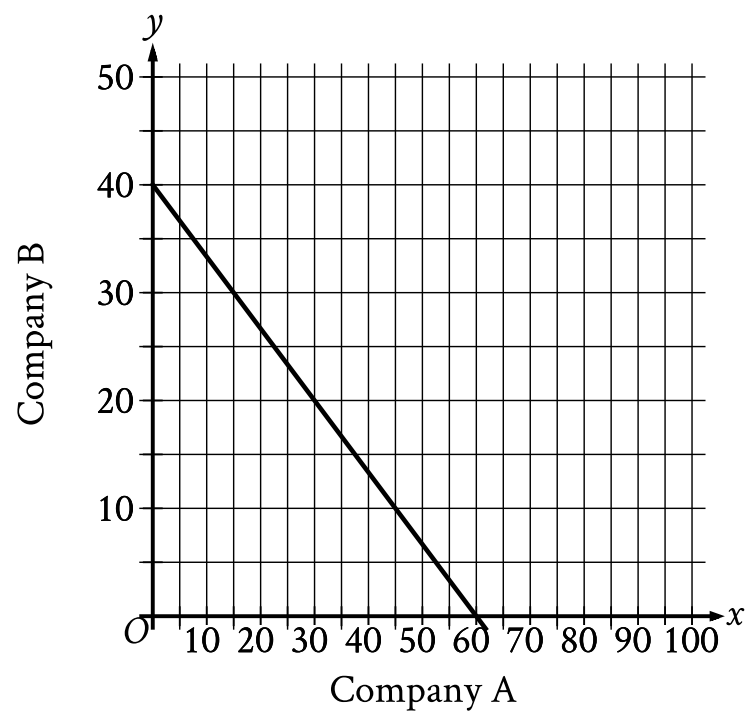
Choice C is incorrect. This equation defines a line that passes through the point  $(0, 10)$ , not  $(9, 10)$ .

Question Difficulty: Medium

Question ID 607bf204

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

ID: 607bf204



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: 607bf204 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: Medium

# Question ID c4aed842

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

ID: c4aed842

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: c4aed842 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: Medium

# Question ID b272276f

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

ID: b272276f

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

ID: b272276f 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: Medium

# Question ID 9df126c4

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

ID: 9df126c4

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: 9df126c4 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: Medium

Question ID 0969c4e8

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

ID: 0969c4e8

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: 0969c4e8 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: Medium