Question ID 7eea65e3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 7eea65e3

Which of the following systems of linear equations has no solution?

A. $y = 6x + 3$
$y = 6x + 9$

B. $y = 10$
$y = 10x + 10$

C. $y = 14x + 14$
$y = 10x + 14$

D. $x = 3$
$y = 10$

ID: 7eea65e3 Answer

Correct Answer: A

Rationale

Choice A is correct. A system of two linear equations in two variables, x and y, has no solution if the graphs of the lines represented by the equations in the *xy*-plane are distinct and parallel. The graphs of two lines in the *xy*-plane represented by equations in slope-intercept form, $y = mx + b$, where m and b are constants, are parallel if their slopes, m, are the same and are distinct if their *y*-coordinates of the *y*-intercepts, b, are different. In the equations $y = 6x + 3$ and $y = 6x + 9$, the values of m are each 6, and the values of b are 3 and 9, respectively. Since the slopes of these lines are the same and the *y*-coordinates of the *y*-intercepts are different, it follows that the system of linear equations in choice A has no solution.

Choice B is incorrect. The two lines represented by these equations are a horizontal line and a line with a slope of 10 that have the same *y*-coordinate of the *y*-intercept. Therefore, this system has a solution, $(0, 10)$, rather than no solution.

Choice C is incorrect. The two lines represented by these equations have different slopes and the same *y*-coordinate of the *y*-intercept. Therefore, this system has a solution, $(0, 14)$, rather than no solution.

Choice D is incorrect. The two lines represented by these equations are a vertical line and a horizontal line. Therefore, this system has a solution, $(3, 10)$, rather than no solution.

Question Difficulty: Medium

Question ID cdcfc854

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: cdcfc854

$$y - 9x = 13$$
$$5x = 2y$$

What is the solution (x, y) to the given system of equations?

A. $(\frac{5}{2}, 1)$

B. $(1, \frac{2}{5})$

C. $(-2, -5)$

D. $(-5, -2)$

ID: cdcfc854 Answer

Correct Answer: C

Rationale

Choice C is correct. Adding $9x$ to both sides of the first equation in the given system yields $y = 9x + 13$. Substituting the expression $9x + 13$ for y in the second equation in the given system yields $5x = 2(9x + 13)$. Distributing the 2 on the right-hand side of this equation yields $5x = 18x + 26$. Subtracting $18x$ from both sides of this equation yields $-13x = 26$. Dividing both sides of this equation by -13 yields $x = -2$. Substituting -2 for x in the equation $y = 9x + 13$ yields $y = 9(-2) + 13$, or $y = -5$. Therefore, the solution (x, y) to the given system of equations is $(-2, -5)$.

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 D is incorrect. This is the solution (y, x), not (x, y), to the given system of equations.

Question Difficulty: Medium

Question ID e13b9cac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: e13b9cac

$$6x + 7y = 28$$
$$2x + 2y = 10$$

The solution to the given system of equations is (x, y). What is the value of y?

A. -2

B. 7

C. 14

D. 18

ID: e13b9cac Answer

Correct Answer: A

Rationale

Choice A is correct. The given system of linear equations can be solved by the elimination method. Multiplying each side of the second equation in the given system by 3 yields $(2x + 2y)(3) = (10)(3)$, or $6x + 6y = 30$. Subtracting this equation from the first equation in the given system yields $(6x + 7y) - (6x + 6y) = (28) - (30)$, which is equivalent to $(6x - 6x) + (7y - 6y) = 28 - 30$, or $y = -2$.

Choice B is incorrect. This is the value of x, not the value of y.

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 c751fef8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: c751fef8

$$y = -\frac{1}{5}x$$
$$y = \frac{1}{7}x$$

The solution to the given system of equations is (x, y). What is the value of x?

A. -5

B. 0

C. 2

D. 7

ID: c751fef8 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given by the first equation in the system that $y = -\frac{1}{5}x$. Substituting $-\frac{1}{5}x$ for y in the second equation in the system, $y = \frac{1}{7}x$, yields $-\frac{1}{5}x = \frac{1}{7}x$. Adding $-\frac{1}{5}x$ to both sides of this equation yields $0 = \frac{1}{7}x + \frac{1}{5}x$, which is equivalent to $0 = \frac{5}{35}x + \frac{7}{35}x$, or $0 = \frac{12}{35}x$. Multiplying both sides of this equation by $\frac{35}{12}$ yields $0 = x$. Therefore, the value of x is 0.

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: Medium

Question ID 66b488d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 66b488d2

$$y = 2x + 10$$
$$y = 2x - 1$$

At how many points do the graphs of the given equations intersect in the *xy*-plane?

A. Zero

B. Exactly one

C. Exactly two

D. Infinitely many

ID: 66b488d2 Answer

Correct Answer: A

Rationale

Choice A is correct. A system of two linear equations in two variables, x and y, has zero points of intersection if the lines represented by the equations in the *xy*-plane are distinct and parallel. The graphs of two lines in the *xy*-plane represented by equations in slope-intercept form, $y = mx + b$, are distinct if the *y*-coordinates of their *y*-intercepts, b, are different and are parallel if their slopes, m, are the same. For the two equations in the given system, $y = 2x + 10$ and $y = 2x - 1$, the values of b are 10 and -1, respectively, and the values of m are both 2. Since the values of b are different, the graphs of these lines have different *y*-coordinates of the *y*-intercept and are distinct. Since the values of m are the same, the graphs of these lines have the same slope and are parallel. Therefore, the graphs of the given equations are lines that intersect at zero points in the *xy*-plane.

Choice B is incorrect. The graphs of a system of two linear equations have exactly one point of intersection if the lines represented by the equations have different slopes. Since the given equations represent lines with the same slope, there is not exactly one intersection point.

Choice C is incorrect. The graphs of a system of two linear equations can never have exactly two intersection points.

Choice D is incorrect. The graphs of a system of two linear equations have infinitely many intersection points when the lines represented by the equations have the same slope and the same *y*-coordinate of the *y*-intercept. Since the given equations represent lines with different *y*-coordinates of their *y*-intercepts, there are not infinitely many intersection points.

Question Difficulty: Medium

Question ID 89ad6f07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 89ad6f07

$$3x + 6 = 4y$$
$$3x + 4 = 2y$$

The solution to the given system of equations is (x, y). What is the value of y?

ID: 89ad6f07 Answer

Correct Answer: 1

Rationale

The correct answer is 1. Subtracting the second equation from the first equation in the given system of equations yields $(3x - 3x) + (6 - 4) = 4y - 2y$, which is equivalent to $0 + 2 = 2y$, or $2 = 2y$. Dividing each side of this equation by 2 yields $1 = y$.

Question Difficulty: Medium

Question ID 8d876c45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 8d876c45

$$2a + 8b = 198$$
$$2a + 4b = 98$$

The solution to the given system of equations is (a, b). What is the value of b?

ID: 8d876c45 Answer

Correct Answer: 25

Rationale

The correct answer is 25. Subtracting the second equation from the first equation in the given system of equations yields $(2a - 2a) + (8b - 4b) = 198 - 98$, which is equivalent to $0 + 4b = 100$, or $4b = 100$. Dividing each side of this equation by 4 yields $b = 25$.

Question Difficulty: Medium

Question ID 518befa8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 518befa8

Which of the following systems of linear equations has no solution?

A. $x = 3$
$y = 5$

B. $y = 6x + 6$
$y = 5x + 6$

C. $y = 16x + 3$
$y = 16x + 19$

D. $y = 5$
$y = 5x + 5$

ID: 518befa8 Answer

Correct Answer: C

Rationale

Choice C is correct. A system of two linear equations in two variables, x and y, has no solution if the graphs of the lines represented by the equations in the *xy*-plane are distinct and parallel. The graphs of two lines in the *xy*-plane represented by equations in slope-intercept form, $y = mx + b$, where m and b are constants, are parallel if their slopes, m, are the same and are distinct if their *y*-coordinates of the *y*-intercepts, b, are different. In the equations $y = 16x + 3$ and $y = 16x + 19$, the values of m are each 16, and the values of b are 3 and 19, respectively. Since the slopes of these lines are the same, and the *y*-coordinates of the *y*-intercepts are different, it follows that the system of linear equations in choice C has no solution.

Choice A is incorrect. The lines represented by the equations in this system are a vertical line and a horizontal line. Therefore, this system has a solution, $(3, 5)$, rather than no solution.

Choice B is incorrect. The two lines represented by these equations have different slopes and the same *y*-coordinate of the *y*-intercept. Therefore, this system has a solution, $(0, 6)$, rather than no solution.

Choice D is incorrect. The two lines represented by these equations are a horizontal line and a line with a slope of 5 that have the same *y*-coordinate of the *y*-intercept. Therefore, this system has a solution, $(0, 5)$, rather than no solution.

Question Difficulty: Medium

Question ID 6c050229

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 6c050229

$$x + 3 = -2y + 5$$
$$x - 3 = 2y + 7$$

The solution to the given system of equations is (x, y). What is the value of $2x$?

A. -2

B. 6

C. 12

D. 24

ID: 6c050229 Answer

Correct Answer: C

Rationale

Choice C is correct. Adding the second equation in the given system to the first equation in the given system yields $(x + 3) + (x - 3) = (-2y + 5) + (2y + 7)$. Adding like terms in this equation yields $2x = 12$. Thus, the value of $2x$ is 12.

Choice A is incorrect. This is the value of y, not $2x$.

Choice B is incorrect. This is the value of x, not $2x$.

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

Question Difficulty: Medium

Question ID 89cf1784

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 89cf1784

$$y = 6x + 16$$
$$-7x - y = 36$$

What is the solution (x, y) to the given system of equations?

A. $(-4, -8)$

B. $(-\frac{20}{13}, -\frac{80}{13})$

C. $(4, 40)$

D. $(20, 136)$

ID: 89cf1784 Answer

Correct Answer: A

Rationale

Choice A is correct. The given system of linear equations can be solved by the substitution method. The first equation in the given system of equations defines y as $6x + 16$. Substituting $6x + 16$ for y in the second equation of the given system of equations yields $-7x - (6x + 16) = 36$. Applying the distributive property on the left-hand side of this equation yields $-7x - 6x - 16 = 36$, or $-13x - 16 = 36$. Adding 16 to both sides of this equation yields $-13x = 52$. Dividing both sides of this equation by -13 yields $x = -4$. Substituting -4 for x in the first equation of the given system of equations, $y = 6x + 16$, yields $y = 6(-4) + 16$, or $y = -8$. Therefore, the solution (x, y) to the given system of equations is $(-4, -8)$.

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 9843892f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 9843892f

$$3y = 4x + 17$$
$$-3y = 9x - 23$$

The solution to the given system of equations is (x, y). What is the value of $39x$?

A. -18

B. -6

C. 6

D. 18

ID: 9843892f Answer

Correct Answer: D

Rationale

Choice D is correct. Adding the second equation to the first equation in the given system of equations yields $3y - 3y = 4x + 9x + 17 - 23$, or $0 = 13x - 6$. Adding 6 to each side of this equation yields $6 = 13x$. Multiplying each side of this equation by 3 yields $18 = 39x$. Therefore, the value of $39x$ is 18.

Choice A is incorrect. This is the value of $-39x$, not $39x$.

Choice B is incorrect. This is the value of $-13x$, not $39x$.

Choice C is incorrect. This is the value of $13x$, not $39x$.

Question Difficulty: Medium

Question ID ebbc00fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: ebbc00fb

$$y = -\frac{1}{9}x$$
$$y = \frac{1}{2}x$$

The solution to the given system of equations is (x, y). What is the value of x?

A. -9

B. -7

C. 0

D. 2

ID: ebbc00fb Answer

Correct Answer: C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = -\frac{1}{9}x$. Substituting $-\frac{1}{9}x$ for y in the second equation in the system yields $-\frac{1}{9}x = \frac{1}{2}x$. Multiplying the left-hand side of this equation by $\frac{2}{2}$ and the right-hand side by $\frac{9}{9}$ yields $-\frac{2}{18}x = \frac{9}{18}x$. Adding $\frac{2}{18}x$ to both sides of this equation yields $0 = \frac{11}{18}x$. Multiplying both sides of this equation by $\frac{18}{11}$ yields $x = 0$.

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

Question Difficulty: Medium

Question ID b2c1a14d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: b2c1a14d

$$y = \frac{2}{7}x + 3$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. If the second equation in the system is $y = mx + b$, where m and b are constants, what is the value of b?

A. -3

B. $-\frac{1}{3}$

C. $\frac{1}{3}$

D. 3

ID: b2c1a14d Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the system has infinitely many solutions. The graphs of two lines in the *xy*-plane represented by equations in slope-intercept form, $y = mx + b$, where m and b are constants, have infinitely many solutions if their slopes, m, are the same and if their *y*-coordinates of the *y*-intercepts, b, are also the same. The first equation in the given system is $y = \frac{2}{7}x + 3$. For this equation, the slope is $\frac{2}{7}$ and the *y*-coordinate of the *y*-intercept is 3. If the second equation is in the form $y = mx + b$, then for the two equations to be equivalent, the values of m and b in the second equation must equal the corresponding values in the first equation. Therefore, the second equation must have a slope, m, of $\frac{2}{7}$, and a *y*-coordinate of the *y*-intercept, b, of 3. Thus, the value of b is 3.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty: Medium

Question ID d79caaad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: d79caaad

The combined original price for a mirror and a vase is $\$60$. After a 25% discount to the mirror and a 45% discount to the vase are applied, the combined sale price for the two items is $\$39$. Which system of equations gives the original price m, in dollars, of the mirror and the original price v, in dollars, of the vase?

A. $m + v = 60$
$0.55m + 0.75v = 39$

B. $m + v = 60$
$0.45m + 0.25v = 39$

C. $m + v = 60$
$0.75m + 0.55v = 39$

D. $m + v = 60$
$0.25m + 0.45v = 39$

ID: d79caaad Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that m represents the original price, in dollars, of the mirror, and v represents the original price, in dollars, of the vase. It's also given that the combined original price for the mirror and the vase is $\$60$. This can be represented by the equation $m + v = 60$. After a 25% discount to the mirror is applied, the sale price of the mirror is 75% of its original price. This can be represented by the expression $0.75m$. After a 45% discount to the vase is applied, the sale price of the vase is 55% of its original price. This can be represented by the expression $0.55v$. It's given that the combined sale price for the two items is $\$39$. This can be represented by the equation $0.75m + 0.55v = 39$. Therefore, the system of equations consisting of the equations $m + v = 60$ and $0.75m + 0.55v = 39$ gives the original price m, in dollars, of the mirror and the original price v, in dollars, of the vase.

Choice A is incorrect. The second equation in this system of equations represents a 45% discount to the mirror and a 25% discount to the vase.

Choice B is incorrect. The second equation in this system of equations represents a 55% discount to the mirror and a 75% discount to the vase.

Choice D is incorrect. The second equation in this system of equations represents a 75% discount to the mirror and a 55% discount to the vase.

Question Difficulty: Medium

Question ID 81c05538

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 81c05538

$$-15x + 25y = 65$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. Which of the following could be the second equation in the system?

A. $12x + 20y = 52$

B. $12x + 20y = -52$

C. $-12x + 20y = 52$

D. $-12x + 20y = -52$

ID: 81c05538 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions when the two linear equations are equivalent. Dividing both sides of the given equation by 5 yields $-3x + 5y = 13$. Dividing both sides of choice C by 4 also yields $-3x + 5y = 13$, so choice C is equivalent to the given equation. Thus, choice C could be the second equation in the system.

Choice A is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions.

Choice B is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions.

Choice D is incorrect. The system consisting of this equation and the given equation has no solution, not infinitely many solutions.

Question Difficulty: Medium

Question ID 43f4e0a1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 43f4e0a1

$$x + 3y = 29$$
$$3y = 11$$

The solution to the given system of equations is (x, y). What is the value of x?

ID: 43f4e0a1 Answer

Correct Answer: 18

Rationale

The correct answer is 18. It's given by the second equation in the system that $3y = 11$. Substituting 11 for $3y$ in the first equation in the system, $x + 3y = 29$, yields $x + 11 = 29$. Subtracting 11 from both sides of this equation yields $x = 18$.

Question Difficulty: Medium

Question ID 16fe36f6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 16fe36f6

$$y = \frac{1}{3}x - 14$$
$$y = -x + 18$$

The solution to the given system of equations is (x, y). What is the value of x?

ID: 16fe36f6 Answer

Correct Answer: 24

Rationale

The correct answer is 24. The given system of equations can be solved by the substitution method. The first equation in the given system of equations is $y = \frac{1}{3}x - 14$. Substituting $\frac{1}{3}x - 14$ for y in the second equation in the given system yields $\frac{1}{3}x - 14 = -x + 18$. Adding 14 to both sides of this equation yields $\frac{1}{3}x = -x + 32$. Adding x to both sides of this equation yields $\frac{4}{3}x = 32$. Multiplying both sides of this equation by $\frac{3}{4}$ yields $x = 24$.

Question Difficulty: Medium

Question ID 7addd737

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 7addd737

$$y = 9x + 12$$
$$x + 7y = 20$$

The solution to the given system of equations is (x, y). What is the value of y?

ID: 7addd737 Answer

Correct Answer: 3

Rationale

The correct answer is 3. It's given that $y = 9x + 12$. Substituting $9x + 12$ for y in the second equation in the system, $x + 7y = 20$, yields $x + 7(9x + 12) = 20$, which gives $x + 63x + 84 = 20$, or $64x + 84 = 20$. Subtracting 84 from each side of this equation yields $64x = -64$. Dividing each side of this equation by 64 yields $x = -1$. Substituting -1 for x in the first equation in the system, $y = 9x + 12$, yields $y = 9(-1) + 12$, or $y = 3$. Therefore, the value of y is 3.

Question Difficulty: Medium

Question ID 670da52f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 670da52f

$$y = 6x + 3$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. Which equation could be the second equation in this system?

A. $y = 2(6x) + 3$

B. $y = 2(6x + 3)$

C. $2(y) = 2(6x) + 3$

D. $2(y) = 2(6x + 3)$

ID: 670da52f Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions when the two linear equations are equivalent. When one equation is a multiple of another equation, the two equations are equivalent. Multiplying each side of the given equation by 2 yields $2(y) = 2(6x + 3)$. Thus, $2(y) = 2(6x + 3)$ is equivalent to the given equation and could be the second equation in the system.

Choice A is incorrect. The system consisting of this equation and the given equation has one solution rather than infinitely many solutions.

Choice B is incorrect. The system consisting of this equation and the given equation has one solution rather than infinitely many solutions.

Choice C is incorrect. The system consisting of this equation and the given equation has no solutions rather than infinitely many solutions.

Question Difficulty: Medium

Question ID f637b1a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: f637b1a9

A bus traveled on the highway and on local roads to complete a trip of 160 miles. The trip took 4 hours. The bus traveled at an average speed of 55 miles per hour (mph) on the highway and an average speed of 25 mph on local roads. If x is the time, in hours, the bus traveled on the highway and y is the time, in hours, it traveled on local roads, which system of equations represents this situation?

A. $55x + 25y = 4$
$x + y = 160$

B. $55x + 25y = 160$
$x + y = 4$

C. $25x + 55y = 4$
$x + y = 160$

D. $25x + 55y = 160$
$x + y = 4$

ID: f637b1a9 Answer

Correct Answer: B

Rationale

Choice B is correct. If the bus traveled at an average speed of 55 miles per hour (mph) on the highway for x hours, then the bus traveled $55x$ miles on the highway. If the bus traveled at an average speed of 25 mph on local roads for y hours, then the bus traveled $25y$ miles on local roads. It's given that the trip was 160 miles. This can be represented by the equation $55x + 25y = 160$. It's also given that the trip took 4 hours. This can be represented by the equation $x + y = 4$. Therefore, the system consisting of the equations $55x + 25y = 160$ and $x + y = 4$ represents this situation.

Choice A is incorrect. This system of equations represents a situation where the trip was 4 miles and took 160 hours.

Choice C is incorrect. This system of equations represents a situation where the trip was 4 miles and took 160 hours, and the bus traveled at an average speed of 25 mph on the highway and 55 mph on local roads.

Choice D is incorrect. This system of equations represents a situation where the bus traveled at an average speed of 25 mph on the highway and 55 mph on local roads.

Question Difficulty: Medium

Question ID 96164aab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 96164aab

$$8x + y = 5$$
$$y = 9x + 1$$

The solution to the given system of equations is (x, y). What is the value of x?

A. -6

B. $\frac{4}{17}$

C. $\frac{6}{17}$

D. 4

ID: 96164aab Answer

Correct Answer: B

Rationale

Choice B is correct. The second equation in the given system is $y = 9x + 1$. Substituting $9x + 1$ for y in the first equation in the given system yields $8x + 9x + 1 = 5$, which is equivalent to $17x + 1 = 5$. Subtracting 1 from both sides of this equation yields $17x = 4$. Dividing both sides of this equation by 17 yields $x = \frac{4}{17}$.

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: Medium

Question ID 9be24954

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 9be24954

$$y = -2x$$
$$3x + y = 40$$

The solution to the given system of equations is (x, y). What is the value of *x*?

ID: 9be24954 Answer

Correct Answer: 40

Rationale

The correct answer is 40. It's given in the first equation of the system that $y = -2x$. Substituting $-2x$ for y in the second equation of the system yields $3x + (-2x) = 40$. Combining like terms on the left-hand side of this equation yields $x = 40$. Therefore, the value of x is 40.

Question Difficulty: Medium

Question ID dcd58812

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: dcd58812

Two customers purchased the same kind of bread and eggs at a store. The first customer paid 12.45 dollars for 1 loaf of bread and 2 dozen eggs. The second customer paid 19.42 dollars for 4 loaves of bread and 1 dozen eggs. What is the cost, in dollars, of 1 dozen eggs?

A. 3.77

B. 3.88

C. 4.15

D. 4.34

ID: dcd58812 Answer

Correct Answer: D

Rationale

Choice D is correct. Let ℓ represent the cost, in dollars, of 1 loaf of bread, and let d represent the cost, in dollars, of 1 dozen eggs. It's given that the first customer paid 12.45 dollars for 1 loaf of bread and 2 dozen eggs. Therefore, the first customer's purchase can be represented by the equation $\ell + 2d = 12.45$. It's also given that the second customer paid 19.42 dollars for 4 loaves of bread and 1 dozen eggs. Therefore, the second customer's purchase can be represented by the equation $4\ell + d = 19.42$. The equations $\ell + 2d = 12.45$ and $4\ell + d = 19.42$ form a system of linear equations, which can be solved by elimination to find the value of d. Multiplying the first equation in the system by -4 yields $-4\ell - 8d = -49.8$. Adding $-4\ell - 8d = -49.8$ to the second equation, $4\ell + d = 19.42$, yields $(-4\ell + 4\ell) + (-8d + d) = (-49.8 + 19.42)$, which is equivalent to $-7d = -30.38$. Dividing both sides of this equation by -7 yields $d = 4.34$. Therefore, the cost, in dollars, of 1 dozen eggs is 4.34.

Choice A is incorrect. This is the cost, in dollars, of 1 loaf of bread.

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 37036956

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 37036956

A proposal for a new library was included on an election ballot. A radio show stated that 3 times as many people voted in favor of the proposal as people who voted against it. A social media post reported that $15{,}000$ more people voted in favor of the proposal than voted against it. Based on these data, how many people voted against the proposal?

A. $7{,}500$

B. $15{,}000$

C. $22{,}500$

D. $45{,}000$

ID: 37036956 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that a radio show stated that 3 times as many people voted in favor of the proposal as people who voted against it. Let x represent the number of people who voted against the proposal. It follows that $3x$ is the number of people who voted in favor of the proposal and $3x - x$, or $2x$, is how many more people voted in favor of the proposal than voted against it. It's also given that a social media post reported that $15{,}000$ more people voted in favor of the proposal than voted against it. Thus, $2x = 15{,}000$. Since $2x = 15{,}000$, the value of x must be half of $15{,}000$, or $7{,}500$. Therefore, $7{,}500$ people voted against the proposal.

Choice B is incorrect. This is how many more people voted in favor of the proposal than voted against it, not the number of people who voted against the proposal.

Choice C is incorrect. This is the number of people who voted in favor of the proposal, not the number of people who voted against the proposal.

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

Question Difficulty: Medium

Question ID ea0720d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: ea0720d1

A company that provides whale-watching tours takes groups of 21 people at a time. The company's revenue is 80 dollars per adult and 60 dollars per child. If the company's revenue for one group consisting of adults and children was $1{,}440$ dollars, how many people in the group were children?

A. 3

B. 9

C. 12

D. 18

ID: ea0720d1 Answer

Correct Answer: C

Rationale

Choice C is correct. Let x represent the number of children in a whale-watching tour group. Let y represent the number of adults in this group. Because it's given that 21 people are in a group and the group consists of adults and children, it must be true that $x + y = 21$. Since the company's revenue is 60 dollars per child, the total revenue from x children in this group was $60x$ dollars. Since the company's revenue is 80 dollars per adult, the total revenue from y adults in this group was $80y$ dollars. Because it's given that the total revenue for this group was $1{,}440$ dollars, it must be true that $60x + 80y = 1{,}440$. The equations $x + y = 21$ and $60x + 80y = 1{,}440$ form a linear system of equations that can be solved to find the value of x, which represents the number of children in the group, using the elimination method. Multiplying both sides of the equation $x + y = 21$ by 80 yields $80x + 80y = 1{,}680$. Subtracting $60x + 80y = 1{,}440$ from $80x + 80y = 1{,}680$ yields $(80x + 80y) - (60x + 80y) = 1{,}680 - 1{,}440$, which is equivalent to $80x - 60x + 80y - 80y = 240$, or $20x = 240$. Dividing both sides of this equation by 20 yields $x = 12$. Therefore, 12 people in the group were children.

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

Choice B is incorrect. This is the number of adults in the group, not the number of children in the group.

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

Question Difficulty: Medium

Question ID b944bec6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: b944bec6

At how many points do the graphs of the equations $y = x + 20$ and $y = 8x$ intersect in the *xy*-plane?

A. 0

B. 1

C. 2

D. 8

ID: b944bec6 Answer

Correct Answer: B

Rationale

Choice B is correct. Each given equation is written in slope-intercept form, $y = mx + b$, where m is the slope and $(0, b)$ is the *y*-intercept of the graph of the equation in the *xy*-plane. The graphs of two lines that have different slopes will intersect at exactly one point. The graph of the first equation is a line with slope 1. The graph of the second equation is a line with slope 8. Since the graphs are lines with different slopes, they will intersect at exactly one point.

Choice A is incorrect because two graphs of linear equations have 0 intersection points only if they are parallel and therefore have the same slope.

Choice C is incorrect because two graphs of linear equations in the *xy*-plane can have only 0, 1, or infinitely many points of intersection.

Choice D is incorrect because two graphs of linear equations in the *xy*-plane can have only 0, 1, or infinitely many points of intersection.

Question Difficulty: Medium

Question ID 8422756b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 8422756b

A wire with a length of 106 inches is cut into two parts. One part has a length of x inches, and the other part has a length of y inches. The value of x is 6 more than 4 times the value of y. What is the value of x?

A. 25

B. 28

C. 56

D. 86

ID: 8422756b Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that a wire with a length of 106 inches is cut into two parts. It's also given that one part has a length of x inches and the other part has a length of y inches. This can be represented by the equation $x + y = 106$. It's also given that the value of x is 6 more than 4 times the value of y. This can be represented by the equation $x = 4y + 6$. Substituting $4y + 6$ for x in the equation $x + y = 106$ yields $4y + 6 + y = 106$, or $5y + 6 = 106$. Subtracting 6 from each side of this equation yields $5y = 100$. Dividing each side of this equation by 5 yields $y = 20$. Substituting 20 for y in the equation $x = 4y + 6$ yields $x = 4(20) + 6$, or $x = 86$.

Choice A is incorrect. This value represents less than half of the total length of 106 inches; however, x represents the length of the longer part of the wire, since it's given that the value of x is 6 more than 4 times the value of y.

Choice B is incorrect. This value represents less than half of the total length of 106 inches; however, x represents the length of the longer part of the wire, since it's given that the value of x is 6 more than 4 times the value of y.

Choice C is incorrect. This represents a part that is 6 more than the length of the other part, rather than 6 more than 4 times the length of the other part.

Question Difficulty: Medium

Question ID b8f0032a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: b8f0032a

$$y = 3x$$
$$2x + y = 12$$

The solution to the given system of equations is (x, y). What is the value of $5x$?

A. 24

B. 15

C. 12

D. 5

ID: b8f0032a Answer

Correct Answer: C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = 3x$. Substituting $3x$ for y in the equation $2x + y = 12$ yields $2x + 3x = 12$, or $5x = 12$.

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 d874224b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: d874224b

$$x + 2y = 6$$
$$x - 2y = 4$$

The solution to the given system of equations is (x, y). What is the value of x?

A. 2.5

B. 5

C. 6

D. 10

ID: d874224b Answer

Correct Answer: B

Rationale

Choice B is correct. Adding the first equation to the second equation in the given system yields $(x + 2y) + (x - 2y) = 6 + 4$, or $(x + x) + (2y - 2y) = 10$. Combining like terms in this equation yields $2x = 10$. Dividing both sides of this equation by 2 yields $x = 5$. Thus, the value of x is 5.

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. This is the value of $2x$, not x.

Question Difficulty: Medium

Question ID 1615e831

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 1615e831

$$y = 3x + 9$$
$$3y = 8x - 6$$

The solution to the given system of equations is (x, y). What is the value of $x - y$?

A. -123

B. -33

C. 3

D. 57

ID: 1615e831 Answer

Correct Answer: D

Rationale

Choice D is correct. The first equation in the given system of equations defines y as $3x + 9$. Substituting $3x + 9$ for y in the second equation in the given system of equations yields $3(3x + 9) = 8x - 6$. Applying the distributive property on the left-hand side of this equation yields $9x + 27 = 8x - 6$. Subtracting $8x$ from both sides of this equation yields $x + 27 = -6$. Subtracting 27 from both sides of this equation yields $x = -33$. Substituting -33 for x in the first equation of the given system of equations yields $y = 3(-33) + 9$, or $y = -90$. Substituting -33 for x and -90 for y into the expression $x - y$ yields $-33 - (-90)$, or 57.

Choice A is incorrect. This is the value of $x + y$, not $x - y$.

Choice B is incorrect. This is the value of x, not $x - y$.

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

Question Difficulty: Medium

Question ID 3a519c76

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	Medium

ID: 3a519c76

The sum of a number x and 7 is twice as large as a number y. The number y is 3 less than the number x. Which system of equations describes this situation?

A. $x + 7 = 2y$
$y = x - 3$

B. $x + 7 = 2y$
$y = 3 - x$

C. $2(x + 7) = y$
$y = x - 3$

D. $2(x + 7) = y$
$y = 3 - x$

ID: 3a519c76 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the sum of a number x and 7 is twice as large as a number y. This can be described by the equation $x + 7 = 2y$. It's also given that the number y is 3 less than the number x. This can be described by the equation $y = x - 3$. Therefore, the system consisting of the equations $x + 7 = 2y$ and $y = x - 3$ describes this situation.

Choice B is incorrect. The equation $y = 3 - x$ describes a situation where the number y is x less than 3.

Choice C is incorrect. The equation $2(x + 7) = y$ describes a situation where the number y is twice the sum of a number x and 7.

Choice D is incorrect. The equation $2(x + 7) = y$ describes a situation where the number y is twice the sum of a number x and 7, and the equation $y = 3 - x$ describes a situation where a number y is x less than 3.

Question Difficulty: Medium