

Question ID bb93e1bd

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: bb93e1bd

$$\begin{aligned}y &= -\frac{1}{9}x \\ y &= \frac{1}{2}x\end{aligned}$$

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: bb93e1bd 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: Hard

Question ID 249313d5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 249313d5

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: 249313d5 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: Hard

Question ID db8430a3

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: db8430a3

$$2a + 8b = 198$$

$$2a + 4b = 98$$

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

ID: db8430a3 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: Hard

Question ID 4820d38d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 4820d38d

$$\begin{aligned}y &= 3x + 9 \\ 3y &= 8x - 6\end{aligned}$$

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: 4820d38d 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: Hard

Question ID 804081ee

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 804081ee

$$\begin{aligned}6 + 7r &= pw \\ 7r - 5w &= 5w + 11\end{aligned}$$

In the given system of equations, p is a constant. If the system has no solution, what is the value of p ?

ID: 804081ee Answer

Correct Answer: 10

Rationale

The correct answer is 10. Solving by substitution, the given system of equations, where p is a constant, can be written so that the left-hand side of each equation is equal to $7r$. Subtracting 6 from each side of the first equation in the given system, $6 + 7r = pw$, yields $7r = pw - 6$. Adding $5w$ to each side of the second equation in the given system, $7r - 5w = 5w + 11$, yields $7r = 10w + 11$. Since the left-hand side of each equation is equal to $7r$, setting the the right-hand side of the equations equal to each other yields $pw - 6 = 10w + 11$. A linear equation in one variable, w , has no solution if and only if the equation is false; that is, when there's no value of w that produces a true statement. For the equation $pw - 6 = 10w + 11$, there's no value of w that produces a true statement when $pw = 10w$. Therefore, for the equation $pw - 6 = 10w + 11$, there's no value of w that produces a true statement when the value of p is 10. It follows that in the given system of equations, the system has no solution when the value of p is 10.

Question Difficulty: Hard

Question ID 8dde9438

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 8dde9438

$$\begin{aligned}y &= 4x + 1 \\ 4y &= 15x - 8\end{aligned}$$

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

ID: 8dde9438 Answer

Correct Answer: 35

Rationale

The correct answer is 35. The first equation in the given system of equations defines y as $4x + 1$. Substituting $4x + 1$ for y in the second equation in the given system of equations yields $4(4x + 1) = 15x - 8$. Applying the distributive property on the left-hand side of this equation yields $16x + 4 = 15x - 8$. Subtracting $15x$ from each side of this equation yields $x + 4 = -8$. Subtracting 4 from each side of this equation yields $x = -12$. Substituting -12 for x in the first equation of the given system of equations yields $y = 4(-12) + 1$, or $y = -47$. Substituting -12 for x and -47 for y into the expression $x - y$ yields $-12 - (-47)$, or 35.

Question Difficulty: Hard

Question ID f564e206

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: f564e206

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

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: f564e206 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: Hard

Question ID a3572e9d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: a3572e9d

$$\begin{aligned} -x - wy &= -337 \\ 2x - wy &= 47 \end{aligned}$$

In the given system of equations, w is a constant. In the xy -plane, the graphs of these equations intersect at the point $(q, 19)$, where q is a constant. What is the value of w ?

ID: a3572e9d Answer

Correct Answer: 11

Rationale

The correct answer is 11. It's given that the graphs of the equations in the given system intersect at the point $(q, 19)$, where q is a constant. Therefore, the coordinates of this point must satisfy both equations. Substituting the point $(q, 19)$ into the first equation, $-x - wy = -337$, yields $-q - w(19) = -337$. Adding $19w$ to both sides of this equation yields $-q = -337 + 19w$, which is equivalent to $q = 337 - 19w$. Substituting the point $(q, 19)$ into the second equation yields $2q - w(19) = 47$. Substituting $337 - 19w$ in place of q in the equation $2q - w(19) = 47$ yields $2(337 - 19w) - 19w = 47$. Applying the distributive property to the left-hand side of this equation yields $674 - 38w - 19w = 47$. Combining like terms on the left-hand side of this equation yields $674 - 57w = 47$. Subtracting 674 from both sides of this equation yields $-57w = -627$. Dividing both sides of this equation by -57 yields $w = 11$.

Question Difficulty: Hard

Question ID 01c33da0

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 01c33da0

$$\begin{aligned}ax + by &= 72 \\ 6x + 2by &= 56\end{aligned}$$

In the given system of equations, a and b are constants. The graphs of these equations in the xy -plane intersect at the point $(4, y)$. What is the value of a ?

- A. 3
- B. 4
- C. 6
- D. 14

ID: 01c33da0 Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that the graphs of the given system of equations intersect at the point $4, y$. Therefore, $4, y$ is the solution to the given system. Multiplying the first equation in the given system by -2 yields $-2ax - 2by = -144$. Adding this equation to the second equation in the system yields $-2a + 6x + -2b + 2by = -144 + 56$, or $-2a + 6x = -88$. Since $4, y$ is the solution to the system, the value of a can be found by substituting 4 for x in this equation, which yields $-2a + 64 = -88$. Dividing both sides of this equation by 4 yields $-2a + 6 = -22$. Subtracting 6 from both sides of this equation yields $-2a = -28$. Dividing both sides of this equation by -2 yields $a = 14$.

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 40bfb4d6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 40bfb4d6

$$\begin{aligned}\frac{2}{5}x + \frac{7}{5}y &= \frac{2}{7} \\ gx + ky &= \frac{5}{2}\end{aligned}$$

In the given system of equations, g and k are constants. The system has infinitely many solutions. What is the value of $\frac{g}{k}$?

ID: 40bfb4d6 Answer

Correct Answer: .2857, 2/7

Rationale

The correct answer is $\frac{2}{7}$. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions if and only if the two linear equations are equivalent. Multiplying each side of the first equation in the system by $\frac{35}{4}$ yields $\frac{35}{4}\frac{2}{5}x + \frac{7}{5}y = \frac{35}{4}\frac{2}{7}$, or $\frac{7}{2}x + \frac{49}{4}y = \frac{5}{2}$. Since this equation is equivalent to the second equation and has the same right side as the second equation, the coefficients of x and y , respectively, should also be the same. It follows that $g = \frac{7}{2}$ and $k = \frac{49}{4}$. Therefore, the value of $\frac{g}{k}$ is $\frac{\frac{7}{2}}{\frac{49}{4}}$, or $\frac{2}{7}$. Note that 2/7, .2857, 0.285, and 0.286 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 9f6d8dbb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 9f6d8dbb

$$2x + 3y = 7$$
$$10x + 15y = 35$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $\left(\frac{r}{5} + 7, -\frac{r}{5} + 35\right)$
- B. $\left(-\frac{3r}{2} + \frac{7}{2}, r\right)$
- C. $\left(r, \frac{2r}{3} + \frac{7}{3}\right)$
- D. $\left(r, -\frac{3r}{2} + \frac{7}{2}\right)$

ID: 9f6d8dbb Answer

Correct Answer: B

Rationale

Choice B is correct. The two given equations are equivalent because the second equation can be obtained from the first equation by multiplying each side of the equation by 5. Thus, the graphs of the equations are coincident, so if a point lies on the graph of one of the equations, it also lies on the graph of the other equation. A point x, y lies on the graph of an equation in the xy -plane if and only if this point represents a solution to the equation. It is sufficient, therefore, to find the point that represents a solution to the first given equation. Substituting the x - and y -coordinates of choice B, $-\frac{3r}{2} + \frac{7}{2}$ and r , for x and y , respectively, in the first equation yields $2(-\frac{3r}{2} + \frac{7}{2}) + 3r = 7$, which is equivalent to $-3r + 7 + 3r = 7$, or $7 = 7$. Therefore, the point $-\frac{3r}{2} + \frac{7}{2}, r$ represents a solution to the first equation and thus lies on the graph of each equation in the xy -plane for the given system.

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 852dcde1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 852dcde1

$$\begin{aligned} 48x - 64y &= 48y + 24 \\ ry &= \frac{1}{8} - 12x \end{aligned}$$

In the given system of equations, r is a constant. If the system has no solution, what is the value of r ?

ID: 852dcde1 Answer

Correct Answer: -28

Rationale

The correct answer is -28. A system of two linear equations in two variables, x and y , has no solution 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 the form $Ax + By = C$, where A , B , and C are constants, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients for x and y in the other equation. The first equation in the given system, $48x - 64y = 48y + 24$, can be written in the form $Ax + By = C$ by subtracting $48y$ from both sides of the equation to yield $48x - 112y = 24$. The second equation in the given system, $ry = \frac{1}{8} - 12x$, can be written in the form $Ax + By = C$ by adding $12x$ to both sides of the equation to yield $12x + ry = \frac{1}{8}$. The coefficient of x in the second equation is $\frac{1}{4}$ times the coefficient of x in the first equation. That is, $48\frac{1}{4} = 12$. For the lines to be parallel, the coefficient of y in the second equation must also be $\frac{1}{4}$ times the coefficient of y in the first equation. Therefore, $-112\frac{1}{4} = r$, or $-28 = r$. Thus, if the given system has no solution, the value of r is -28.

Question Difficulty: Hard

Question ID 4a31a156

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 4a31a156

$$3x + 6 = 4y$$

$$3x + 4 = 2y$$

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

ID: 4a31a156 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: Hard

Question ID d23ede16

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: d23ede16

$$\begin{aligned}2(8x) + 4(7y) &= 12 \\ -2(8x) + 4(7y) &= 12\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $8x + 7y$?

ID: d23ede16 Answer

Correct Answer: 3

Rationale

The correct answer is 3. Adding the second equation to the first equation in the given system of equations yields $28x - 28x + 47y + 47y = 12 + 12$, or $87y = 24$. Dividing both sides of this equation by 8 yields $7y = 3$. Substituting 3 for $7y$ in the first equation, $28x + 47y = 12$, yields $28x + 43 = 12$, or $28x + 12 = 12$. Subtracting 12 from both sides of this equation yields $28x = 0$. Dividing both sides of this equation by 2 yields $8x = 0$. Substituting 0 for $8x$ and 3 for $7y$ in the expression $8x + 7y$ yields $0 + 3$, or 3. Therefore, the value of $8x + 7y$ is 3.

Question Difficulty: Hard

Question ID dca95bc2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: dca95bc2

$$\begin{aligned}8x + 7y &= 9 \\ 24x + 21y &= 27\end{aligned}$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $(r, -\frac{8r}{7} + \frac{9}{7})$
- B. $(-\frac{8r}{7} + \frac{9}{7}, r)$
- C. $(-\frac{8r}{7} + 9, \frac{8r}{7} + 27)$
- D. $(\frac{r}{3} + 9, -\frac{r}{3} + 27)$

ID: dca95bc2 Answer

Correct Answer: A

Rationale

Choice A is correct. Dividing both sides of the second equation in the given system by 3 yields $8x + 7y = 9$, which is the first equation in the given system. Therefore, the first and second equations represent the same line in the xy -plane. If the x - and y -coordinates of a point satisfy an equation, the point lies on the graph of the equation in the xy -plane. Choice A is a point with x -coordinate r and y -coordinate $-\frac{8r}{7} + \frac{9}{7}$. Substituting r for x and $-\frac{8r}{7} + \frac{9}{7}$ for y in the equation $8x + 7y = 9$ yields $8r + 7(-\frac{8r}{7} + \frac{9}{7}) = 9$. Applying the distributive property to the left-hand side of this equation yields $8r - 8r + 9 = 9$. Combining like terms on the left-hand side of this equation yields $9 = 9$, so the coordinates of the point $r, -\frac{8r}{7} + \frac{9}{7}$ satisfy both equations in the given system. Therefore, for each real number r , the point $r, -\frac{8r}{7} + \frac{9}{7}$ lies on the graph of each equation in the xy -plane for the given system.

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

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

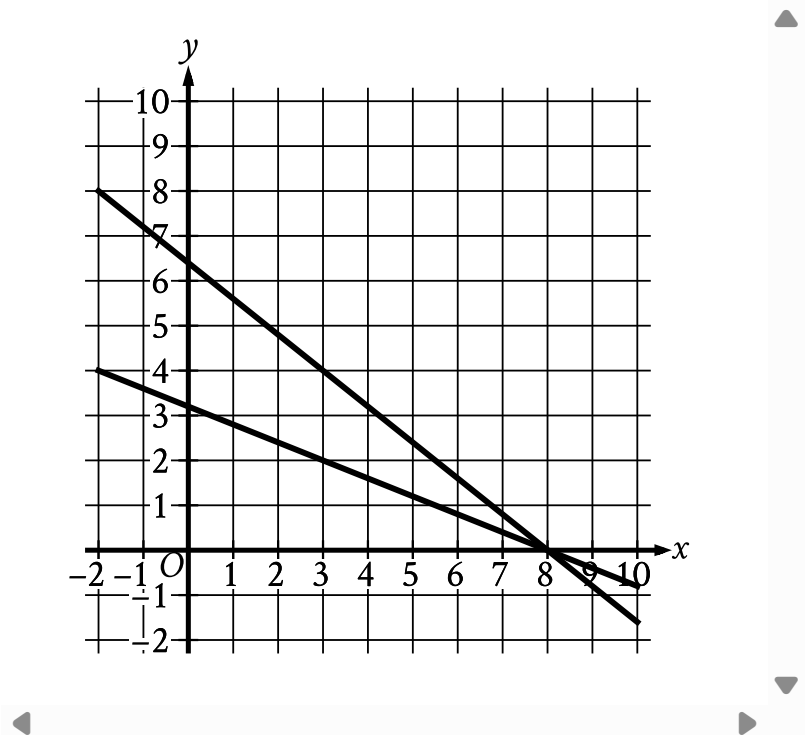
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 612cefa6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 612cefa6



What system of linear equations is represented by the lines shown?

- A. $8x + 4y = 32$
 $-10x - 4y = -64$
- B. $8x - 4y = 32$
 $-10x + 4y = -64$
- C. $4x - 10y = 32$
 $-8x + 10y = -64$
- D. $4x + 10y = 32$
 $-8x - 10y = -64$

ID: 612cefa6 Answer

Correct Answer: D

Rationale

Choice D is correct. A line in the xy -plane that passes through the points x_1, y_1 and x_2, y_2 has slope m , where $m = \frac{y_2 - y_1}{x_2 - x_1}$, and can be defined by an equation of the form $y - y_1 = m(x - x_1)$. One of the lines shown in the graph passes through the points 8, 0 and 3, 4. Substituting 8 for x_1 , 0 for y_1 , 3 for x_2 , and 4 for y_2 in the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$ yields $m = \frac{4 - 0}{3 - 8}$, or $m = -\frac{4}{5}$. Substituting $-\frac{4}{5}$ for m , 8 for x_1 and 0 for y_1 in the equation $y - y_1 = m(x - x_1)$ yields $y - 0 = -\frac{4}{5}(x - 8)$, which is equivalent to $y = -\frac{4}{5}x + \frac{32}{5}$. Adding $\frac{4}{5}x$ to both sides

of this equation yields $\frac{4}{5}x + y = \frac{32}{5}$. Multiplying both sides of this equation by -10 yields $-8x - 10y = -64$. Therefore, an equation of this line is $-8x - 10y = -64$. Similarly, the other line shown in the graph passes through the points 8, 0 and 3, 2. Substituting 8 for x_1 , 0 for y_1 , 3 for x_2 , and 2 for y_2 in the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$ yields $m = \frac{2 - 0}{3 - 8}$, or $m = -\frac{2}{5}$. Substituting $-\frac{2}{5}$ for m , 8 for x_1 , and 0 for y_1 in the equation $y - y_1 = mx - x_1$ yields $y - 0 = -\frac{2}{5}x - 8$, which is equivalent to $y = -\frac{2}{5}x + \frac{16}{5}$. Adding $\frac{2}{5}x$ to both sides of this equation yields $\frac{2}{5}x + y = \frac{16}{5}$. Multiplying both sides of this equation by 10 yields $4x + 10y = 32$. Therefore, an equation of this line is $4x + 10y = 32$. So, the system of linear equations represented by the lines shown is $4x + 10y = 32$ and $-8x - 10y = -64$.

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 38f4e04c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 38f4e04c

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: 38f4e04c 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: Hard

Question ID 484d0c18

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 484d0c18

$$\begin{aligned}8x + y &= 5 \\ y &= 9x + 1\end{aligned}$$

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: 484d0c18 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: Hard

Question ID f1048255

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: f1048255

$$\begin{aligned}y &= 3x \\ 2x + y &= 12\end{aligned}$$

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: f1048255 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: Hard

Question ID f6ffb4d2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: f6ffb4d2

$$\begin{aligned}24x + y &= 48 \\ 6x + y &= 72\end{aligned}$$

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

ID: f6ffb4d2 Answer

Correct Answer: 80

Rationale

The correct answer is 80. Subtracting the second equation in the given system from the first equation yields $24x + y - 6x + y = 48 - 72$, which is equivalent to $24x - 6x + y - y = -24$, or $18x = -24$. Dividing each side of this equation by 3 yields $6x = -8$. Substituting -8 for $6x$ in the second equation yields $-8 + y = 72$. Adding 8 to both sides of this equation yields $y = 80$.

Alternate approach: Multiplying each side of the second equation in the given system by 4 yields $24x + 4y = 288$. Subtracting the first equation in the given system from this equation yields $24x + 4y - 24x + y = 288 - 48$, which is equivalent to $24x - 24x + 4y - y = 240$, or $3y = 240$. Dividing each side of this equation by 3 yields $y = 80$.

Question Difficulty: Hard

Question ID 9de99d25

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 9de99d25

$$\begin{aligned}\frac{7}{8}y - \frac{5}{8}x &= \frac{4}{7} - \frac{7}{8}y \\ \frac{5}{4}x + \frac{7}{4} &= py + \frac{15}{4}\end{aligned}$$

In the given system of equations, p is a constant. If the system has no solution, what is the value of p ?

ID: 9de99d25 Answer

Correct Answer: 3.5, 7/2

Rationale

The correct answer is $\frac{7}{2}$. A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are distinct and parallel. Two lines represented by equations in standard form $Ax + By = C$, where A , B , and C are constants, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation. The first equation in the given system, $\frac{7}{8}y - \frac{5}{8}x = \frac{4}{7} - \frac{7}{8}y$, can be written in standard form by adding $\frac{7}{8}y$ to both sides of the equation, which yields $\frac{14}{8}y - \frac{5}{8}x = \frac{4}{7}$, or $-\frac{5}{8}x + \frac{14}{8}y = \frac{4}{7}$. Multiplying each term in this equation by -8 yields $5x - 14y = -\frac{32}{7}$. The second equation in the given system, $\frac{5}{4}x + \frac{7}{4} = py + \frac{15}{4}$, can be written in standard form by subtracting $\frac{7}{4}$ and py from both sides of the equation, which yields $\frac{5}{4}x - py = \frac{8}{4}$. Multiplying each term in this equation by 4 yields $5x - 4py = 8$. The coefficient of x in the first equation, $5x - 14y = -\frac{32}{7}$, is equal to the coefficient of x in the second equation, $5x - 4py = 8$. For the lines to be parallel, and for the coefficients for x and y in one equation to be proportional to the corresponding coefficients in the other equation, the coefficient of y in the second equation must also be equal to the coefficient of y in the first equation. Therefore, $-14 = -4p$. Dividing both sides of this equation by -4 yields $\frac{-14}{-4} = p$, or $p = \frac{7}{2}$. Therefore, if the given system of equations has no solution, the value of p is $\frac{7}{2}$. Note that $7/2$ and 3.5 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID bbc6a2a2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: bbc6a2a2

$$\begin{aligned}x + 2y &= 6 \\ x - 2y &= 4\end{aligned}$$

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: bbc6a2a2 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.

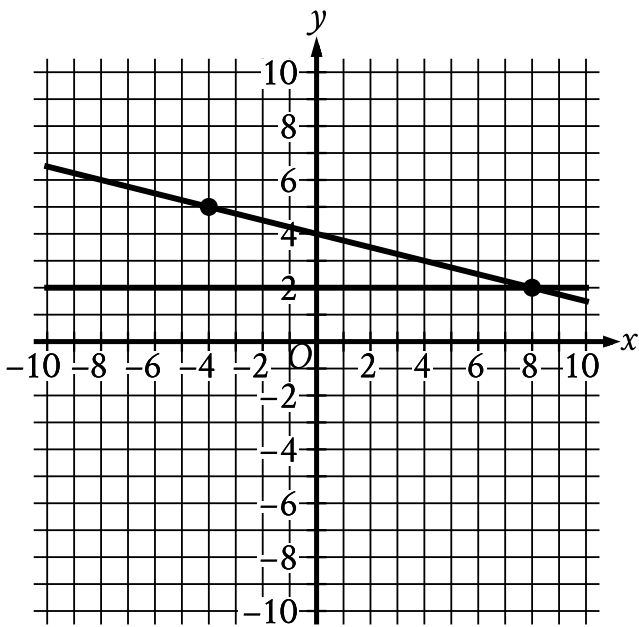
Choice D is incorrect. This is the value of $2x$, not x .

Question Difficulty: Hard

Question ID 520d8c3b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 520d8c3b



If a new graph of three linear equations is created using the system of equations shown and the equation $x + 4y = -16$, how many solutions (x, y) will the resulting system of three equations have?

- A. Zero
- B. Exactly one
- C. Exactly two
- D. Infinitely many

ID: 520d8c3b Answer

Correct Answer: A

Rationale

Choice A is correct. A solution to a system of equations must satisfy each equation in the system. It follows that if an ordered pair x, y is a solution to the system, the point x, y lies on the graph in the xy -plane of each equation in the system. The only point that lies on each graph of the system of two linear equations shown is their intersection point 8, 2. It follows that if a new graph of three linear equations is created using the system of equations shown and the graph of $x + 4y = -16$, this system has either zero solutions or one solution, the point 8, 2. Substituting 8 for x and 2 for y in the equation $x + 4y = -16$ yields $8 + 4(2) = -16$, or $16 = -16$. Since this equation is not true, the point 8, 2 does not lie on the graph of $x + 4y = -16$. Therefore, 8, 2 is not a solution to the system of three equations. It follows that there are zero solutions to this system.

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 8a3bc140

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 8a3bc140

$$\begin{aligned}y &= \frac{1}{3}x - 14 \\ y &= -x + 18\end{aligned}$$

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

ID: 8a3bc140 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: Hard

Question ID d69a8772

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: d69a8772

$$5y = 10x + 11$$

$$-5y = 5x - 21$$

The solution to the given system of equations is (x, y) . What is the value of $30x$?

ID: d69a8772 Answer

Correct Answer: 20

Rationale

The correct answer is 20. Adding the first equation to the second equation in the given system yields $5y - 5y = 10x + 5x + 11 - 21$, or $0 = 15x - 10$. Adding 10 to both sides of this equation yields $10 = 15x$. Multiplying both sides of this equation by 2 yields $20 = 30x$. Therefore, the value of $30x$ is 20.

Question Difficulty: Hard

Question ID 1bbdd17a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 1bbdd17a

$$\begin{aligned}x + 3 &= -2y + 5 \\ x - 3 &= 2y + 7\end{aligned}$$

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: 1bbdd17a 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: Hard

Question ID 6dcc9313

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 6dcc9313

Store A sells raspberries for **\$5.50** per pint and blackberries for **\$3.00** per pint. Store B sells raspberries for **\$6.50** per pint and blackberries for **\$8.00** per pint. A certain purchase of raspberries and blackberries would cost **\$37.00** at Store A or **\$66.00** at Store B. How many pints of blackberries are in this purchase?

- A. 4
- B. 5
- C. 8
- D. 12

ID: 6dcc9313 Answer

Correct Answer: B

Rationale

Choice C is correct. It's given that store A sells raspberries for \$ 5 . 50 per pint and blackberries for \$ 3 . 00 per pint, and a certain purchase of raspberries and blackberries at store A would cost \$ 37 . 00. It's also given that store B sells raspberries for \$ 6 . 50 per pint and blackberries for \$ 8 . 00 per pint, and this purchase of raspberries and blackberries at store B would cost \$ 66 . 00. Let r represent the number of pints of raspberries and b represent the number of pints of blackberries in this purchase. The equation $5.50r + 3.00b = 37.00$ represents this purchase of raspberries and blackberries from store A and the equation $6.50r + 8.00b = 66.00$ represents this purchase of raspberries and blackberries from store B. Solving the system of equations by elimination gives the value of r and the value of b that make the system of equations true. Multiplying both sides of the equation for store A by 6.5 yields $5.50r6.5 + 3.00b6.5 = 37.006.5$, or $35.75r + 19.5b = 240.5$. Multiplying both sides of the equation for store B by 5.5 yields $6.50r5.5 + 8.00b5.5 = 66.005.5$, or $35.75r + 44b = 363$. Subtracting both sides of the equation for store A, $35.75r + 19.5b = 240.5$, from the corresponding sides of the equation for store B, $35.75r + 44b = 363$, yields $35.75r - 35.75r + 44b - 19.5b = 363 - 240.5$, or $24.5b = 122.5$. Dividing both sides of this equation by 24.5 yields $b = 5$. Thus, 5 pints of blackberries are in this purchase.

Choices A and B are incorrect and may result from conceptual or calculation errors. Choice D is incorrect. This is the number of pints of raspberries, not blackberries, in the purchase.

Question Difficulty: Hard

Question ID 577c07fc

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 577c07fc

$3x = 36y - 45$

One of the two equations in a system of linear equations is given. The system has no solution. Which equation could be the second equation in this system?

- A. $x = 4y$
- B. $\frac{1}{3}x = 4y$
- C. $x = 12y - 15$
- D. $\frac{1}{3}x = 12y - 15$

ID: 577c07fc Answer

Correct Answer: B

Rationale

Choice B is correct. A system of two linear equations in two variables, x and y , has no solution when the lines in the xy -plane representing the equations are parallel and distinct. Two lines are parallel and distinct if their slopes are the same and their y -intercepts are different. The slope of the graph of the given equation, $3x = 36y - 45$, in the xy -plane can be found by rewriting the equation in the form $y = mx + b$, where m is the slope of the graph and b is the y -intercept. Adding 45 to each side of the given equation yields $3x + 45 = 36y$. Dividing each side of this equation by 36 yields $\frac{1}{12}x + \frac{5}{4} = y$, or $y = \frac{1}{12}x + \frac{5}{4}$. It follows that the slope of the graph of the given equation is $\frac{1}{12}$ and the y -intercept is $0, \frac{5}{4}$. Therefore, the graph of the second equation in the system must also have a slope of $\frac{1}{12}$, but must not have a y -intercept of $0, \frac{5}{4}$. Multiplying each side of the equation given in choice B by $\frac{1}{4}$ yields $\frac{1}{12}x = y$, or $y = \frac{1}{12}x$. It follows that the graph representing the equation in choice B has a slope of $\frac{1}{12}$ and a y -intercept of $0, 0$. Since the slopes of the graphs of the two equations are equal and the y -intercepts of the graphs of the two equations are different, the equation in choice B could be the second equation in the system.

Choice A is incorrect. This equation can be rewritten as $y = \frac{1}{4}x$. It follows that the graph of this equation has a slope of $\frac{1}{4}$, so the system consisting of this equation and the given equation has exactly one solution, rather than no solution.

Choice C is incorrect. This equation can be rewritten as $y = \frac{1}{12}x + \frac{5}{4}$. It follows that the graph of this equation has a slope of $\frac{1}{12}$ and a y -intercept of $0, \frac{5}{4}$, so the system consisting of this equation and the given equation has infinitely many solutions, rather than no solution.

Choice D is incorrect. This equation can be rewritten as $y = \frac{1}{36}x + \frac{5}{4}$. It follows that the graph of this equation has a slope of $\frac{1}{36}$, so the system consisting of this equation and the given equation has exactly one solution, rather than no solution.

Question Difficulty: Hard

Question ID b5f35989

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: b5f35989

$$\begin{aligned}y &= -\frac{1}{5}x \\ y &= \frac{1}{7}x\end{aligned}$$

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: b5f35989 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: Hard

Question ID 13158731

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 13158731

$$\begin{aligned} -12x + 14y &= 36 \\ -6x + 7y &= -18 \end{aligned}$$

How many solutions does the given system of equations have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 13158731 Answer

Correct Answer: D

Rationale

Choice D is correct. A system of two linear equations in two variables, x and y , has zero solutions if the lines representing the equations in the xy -plane are distinct and parallel. Two lines are distinct and parallel if they have the same slope but different y -intercepts. Each equation in the given system can be written in slope-intercept form $y = mx + b$, where m is the slope of the line representing the equation in the xy -plane and b is the y -intercept. Adding $12x$ to both sides of the first equation in the given system of equations, $-12x + 14y = 36$, yields $14y = 12x + 36$. Dividing both sides of this equation by 14 yields $y = \frac{6}{7}x + \frac{18}{7}$. It follows that the first equation in the given system of equations has a slope of $\frac{6}{7}$ and a y -intercept of $0, \frac{18}{7}$. Adding $6x$ to both sides of the second equation in the given system of equations, $-6x + 7y = -18$, yields $7y = 6x - 18$. Dividing both sides of this equation by 7 yields $y = \frac{6}{7}x - \frac{18}{7}$. It follows that the second equation in the given system of equations has a slope of $\frac{6}{7}$ and a y -intercept of $0, -\frac{18}{7}$. Since the slopes of these lines are the same and the y -intercepts are different, it follows that the given system of equations has zero solutions.

Alternate approach: To solve the system by elimination, multiplying the second equation in the given system of equations, $-6x + 7y = -18$, by -2 yields $12x - 14y = 36$. Adding this equation to the first equation in the given system of equations, $-12x + 14y = 36$, yields $(-12x + 12x) + (-14y + 14y) = 36 + 36$, or $0 = 72$. Since this equation isn't true, the given system of equations has zero solutions.

- 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 180d85b8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 180d85b8

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: 180d85b8 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: Hard

Question ID 51b5bf01

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 51b5bf01

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: 51b5bf01 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: Hard

Question ID 85a3762d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 85a3762d

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: 85a3762d 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 $2x + 7 = y$ describes a situation where the number y is twice the sum of a number x and 7 .

Choice D is incorrect. The equation $2x + 7 = y$ 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: Hard

Question ID 83b4b5ad

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 83b4b5ad

$$\begin{aligned}(x - 2) - 4(y + 7) &= 117 \\ (x - 2) + 4(y + 7) &= 442\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $6(x - 2)$?

ID: 83b4b5ad Answer

Correct Answer: 1677

Rationale

The correct answer is 1,677. Adding the first equation to the second equation in the given system yields $x - 2 + x - 2 + -4y + 7 + 4y + 7 = 117 + 442$, or $2x - 2 = 559$. Multiplying both sides of this equation by 3 yields $6x - 2 = 1,677$. Therefore, the value of $6x - 2$ is 1,677.

Question Difficulty: Hard

Question ID a7bb4e30

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: a7bb4e30

$$\begin{aligned}y - 9x &= 13 \\ 5x &= 2y\end{aligned}$$

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: a7bb4e30 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: Hard

Question ID 4fbd7122

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 4fbd7122

$$\begin{aligned}y &= -2x \\ 3x + y &= 40\end{aligned}$$

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

ID: 4fbd7122 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: Hard

Question ID eb467dfd

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: eb467dfd

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: eb467dfd 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 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: Hard

Question ID a8a2490b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: a8a2490b

In August, a car dealer completed **15** more than **3** times the number of sales the car dealer completed in September. In August and September, the car dealer completed **363** sales. How many sales did the car dealer complete in September?

ID: a8a2490b Answer

Correct Answer: 87

Rationale

The correct answer is 87. It's given that in August, the car dealer completed 15 more than 3 times the number of sales the car dealer completed in September. Let x represent the number of sales the car dealer completed in September. It follows that $3x + 15$ represents the number of sales the car dealer completed in August. It's also given that in August and September, the car dealer completed 363 sales. It follows that $x + 3x + 15 = 363$, or $4x + 15 = 363$. Subtracting 15 from each side of this equation yields $4x = 348$. Dividing each side of this equation by 4 yields $x = 87$. Therefore, the car dealer completed 87 sales in September.

Question Difficulty: Hard

Question ID 7594f779

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 7594f779

$$\begin{aligned}\frac{7}{2}x + 6y &= 25 \\ \frac{5}{2}x + 6y &= 23\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $\frac{17}{2}x + 18y$?

- A. 2
- B. 3
- C. 48
- D. 71

ID: 7594f779 Answer

Correct Answer: D

Rationale

Choice D is correct. Multiplying the second equation in the given system by 2 yields $\frac{10}{2}x + 12y = 46$. Adding this equation to the first equation in the system yields $\frac{7}{2}x + 6y + \frac{10}{2}x + 12y = 25 + 46$, which is equivalent to $\frac{7}{2}x + \frac{10}{2}x + 6y + 12y = 25 + 46$, or $\frac{17}{2}x + 18y = 71$. Therefore, the value of $\frac{17}{2}x + 18y$ is 71.

Choice A is incorrect. This is the value of x , not the value of $\frac{17}{2}x + 18y$.

Choice B is incorrect. This is the value of y , not the value of $\frac{17}{2}x + 18y$.

Choice C is incorrect. This the value of $\frac{7}{2}x + 6y + \frac{5}{2}x + 6y$, or $6x + 12y$, not the value of $\frac{17}{2}x + 18y$.

Question Difficulty: Hard

Question ID 3aad6202

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 3aad6202

A sample of a certain alloy has a total mass of **50.0** grams and is **50.0%** silicon by mass. The sample was created by combining two pieces of different alloys. The first piece was **30.0%** silicon by mass and the second piece was **80.0%** silicon by mass. What was the mass, in grams, of the silicon in the second piece?

- A. **9.0**
- B. **16.0**
- C. **20.0**
- D. **30.0**

ID: 3aad6202 Answer

Correct Answer: B

Rationale

Choice B is correct. Let x represent the total mass, in grams, of the first piece, and let y represent the total mass, in grams, of the second piece. It's given that the sample has a total mass of 50.0 grams. Therefore, the equation $x + y = 50.0$ represents this situation. It's also given that the sample is 50.0% silicon by mass. Therefore, the total mass of the silicon in the sample is 0.500×50.0 , or 25.0, grams. It's also given that the first piece was 30.0% silicon by mass and the second piece was 80.0% silicon by mass. Therefore, the masses, in grams, of the silicon in the first and second pieces can be represented by the expressions $0.300x$ and $0.800y$, respectively. Since the sample was created by combining the first and second pieces, and the total mass of the silicon in the sample is 25.0 grams, the equation $0.300x + 0.800y = 25.0$ represents this situation. Subtracting y from both sides of the equation $x + y = 50.0$ yields $x = 50.0 - y$. Substituting $50.0 - y$ for x in the equation $0.300x + 0.800y = 25.0$ yields $0.300(50.0 - y) + 0.800y = 25.0$. Distributing 0.300 on the left-hand side of this equation yields $15.0 - 0.300y + 0.800y = 25.0$. Combining like terms on the left-hand side of this equation yields $15.0 + 0.500y = 25.0$. Subtracting 15.0 from both sides of this equation yields $0.500y = 10.0$. Dividing both sides of this equation by 0.500 yields $y = 20.0$. Substituting 20.0 for y in the expression representing the mass, in grams, of the silicon in the second piece, $0.800y$, yields $0.800(20.0)$, or 16.0. Therefore, the mass, in grams, of the silicon in the second piece is 16.0.

Choice A is incorrect. This is the mass, in grams, of the silicon in the first piece, not the second piece.

Choice C is incorrect. This is the total mass, in grams, of the second piece, not the mass, in grams, of the silicon in the second piece.

Choice D is incorrect. This is the total mass, in grams, of the first piece, not the mass, in grams, of the silicon in the second piece.

Question Difficulty: Hard

Question ID 3d39d100

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 3d39d100

$$\begin{aligned} 7x + 6y &= 5 \\ 28x + 24y &= 20 \end{aligned}$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $(r, -\frac{6r}{7} + \frac{5}{7})$
- B. $(r, \frac{7r}{6} + \frac{5}{6})$
- C. $(\frac{r}{4} + 5, -\frac{r}{4} + 20)$
- D. $(-\frac{6r}{7} + \frac{5}{7}, r)$

ID: 3d39d100 Answer

Correct Answer: D

Rationale

Choice D is correct. Dividing each side of the second equation in the given system by 4 yields $7x + 6y = 5$. It follows that the two equations in the given system are equivalent and any point that lies on the graph of one equation will also lie on the graph of the other equation. Substituting r for y in the equation $7x + 6y = 5$ yields $7x + 6r = 5$. Subtracting $6r$ from each side of this equation yields $7x = -6r + 5$. Dividing each side of this equation by 7 yields $x = -\frac{6r}{7} + \frac{5}{7}$. Therefore, the point $(-\frac{6r}{7} + \frac{5}{7}, r)$ lies on the graph of each equation in the xy -plane for each real number r .

Choice A is incorrect. Substituting r for x in the equation $7x + 6y = 5$ yields $7r + 6y = 5$. Subtracting $7r$ from each side of this equation yields $6y = -7r + 5$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{6} + \frac{5}{6}$. Therefore, the point $(r, -\frac{7r}{6} + \frac{5}{6})$, not the point $(r, -\frac{6r}{7} + \frac{5}{7})$, lies on the graph of each equation.

Choice B is incorrect. Substituting r for x in the equation $7x + 6y = 5$ yields $7r + 6y = 5$. Subtracting $7r$ from each side of this equation yields $6y = -7r + 5$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{6} + \frac{5}{6}$. Therefore, the point $(r, -\frac{7r}{6} + \frac{5}{6})$, not the point $(r, \frac{7r}{6} + \frac{5}{6})$, lies on the graph of each equation.

Choice C is incorrect. Substituting $\frac{r}{4} + 5$ for x in the equation $7x + 6y = 5$ yields $7(\frac{r}{4} + 5) + 6y = 5$, or $\frac{7r}{4} + 35 + 6y = 5$. Subtracting $\frac{7r}{4} + 35$ from each side of this equation yields $6y = -\frac{7r}{4} - 35 + 5$, or $6y = -\frac{7r}{4} - 30$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{24} - 5$. Therefore, the point $(\frac{r}{4} + 5, -\frac{7r}{24} - 5)$, not the point $(\frac{r}{4} + 5, -\frac{r}{4} + 20)$, lies on the graph of each equation.

Question Difficulty: Hard

Question ID 87b1b2ab

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 87b1b2ab

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: 87b1b2ab 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 $l + 2d = 12.45$. 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 $4l + d = 19.42$. The equations $l + 2d = 12.45$ and $4l + d = 19.42$ 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 $-4l - 8d = -49.8$. Adding $-4l - 8d = -49.8$ to the second equation, $4l + d = 19.42$, yields $-4l + 4l + -8d + d = -49.8 + 19.42$, 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: Hard

Question ID 2a6cd47c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 2a6cd47c

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

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: 2a6cd47c 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: Hard

Question ID b3cb25e2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: b3cb25e2

$$\begin{aligned}x + 3y &= 29 \\ 3y &= 11\end{aligned}$$

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

ID: b3cb25e2 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: Hard

Question ID 22ddfcc6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 22ddfcc6

Which system of linear equations has no solution?

- A. $-2x + 3y = -9$
 $2x - 3y = 9$
- B. $2x - 3y = 9$
 $3x + 4y = 10$
- C. $2x - 3y = 9$
 $-6x + 9y = -27$
- D. $-2x + 3y = 9$
 $4x - 6y = 18$

ID: 22ddfcc6 Answer

Correct Answer: D

Rationale

Choice D is correct. A system of linear equations can be solved by the elimination method. Multiplying the equation $-2x + 3y = 9$ by 2 yields $-4x + 6y = 18$. Adding this equation to the equation $4x - 6y = 18$ yields $0 = 36$, which has no solution. It follows that the system of linear equations consisting of $-2x + 3y = 9$ and $4x - 6y = 18$ has no solution.

Choice A is incorrect. This system of linear equations has infinitely many solutions, rather than no solution.

Choice B is incorrect. This system of linear equations has one solution, rather than no solution.

Choice C is incorrect. This system of linear equations has infinitely many solutions, rather than no solution.

Question Difficulty: Hard

Question ID 69831c61

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 69831c61

A piece of wire with a length of **32** 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 **4** more than **3** times the value of y . What is the value of x ?

ID: 69831c61 Answer

Correct Answer: 25

Rationale

The correct answer is 25. It's given that a piece of wire has a length of 32 inches and 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. It follows that the equation $x + y = 32$ represents this situation. It's also given that the value of x is 4 more than 3 times the value of y , or $x = 3y + 4$. Substituting $3y + 4$ for x in the equation $x + y = 32$ yields $3y + 4 + y = 32$. Combining like terms on the left-hand side of this equation yields $4y + 4 = 32$. Subtracting 4 from both sides of this equation yields $4y = 28$. Dividing both sides of this equation by 4 yields $y = 7$. Substituting 7 for y in the equation $x = 3y + 4$ yields $x = 3 (7) + 4$, or $x = 25$. Therefore, the value of x is 25.

Question Difficulty: Hard

Question ID ccb6e50f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: ccb6e50f

$y = 6x + 3$

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: ccb6e50f 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 $2y = 26x + 3$. Thus, $2y = 26x + 3$ 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: Hard

Question ID 70ba140a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 70ba140a

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: 70ba140a 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: Hard

Question ID 3bf6f7ad

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 3bf6f7ad

$$\begin{aligned}y &= 9x + 12 \\ x + 7y &= 20\end{aligned}$$

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

ID: 3bf6f7ad 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: Hard

Question ID 3dae14f0

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 3dae14f0

$y = 2x + 10$

$y = 2x - 1$

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: 3dae14f0 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: Hard

Question ID f11c61c6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: f11c61c6

$$5x + 14y = 45$$

$$10x + 7y = 27$$

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

ID: f11c61c6 Answer

Correct Answer: 1.8, 9/5

Rationale

The correct answer is $\frac{9}{5}$. Multiplying the first equation in the given system by 2 yields $10x + 28y = 90$. Subtracting the second equation in the given system, $10x + 7y = 27$, from $10x + 28y = 90$ yields $10x + 28y - 10x + 7y = 90 - 27$, which is equivalent to $10x + 28y - 10x - 7y = 63$, or $21y = 63$. Dividing both sides of this equation by 21 yields $y = 3$. The value of x can be found by substituting 3 for y in either of the two given equations. Substituting 3 for y in the equation $10x + 7y = 27$ yields $10x + 7(3) = 27$, or $10x + 21 = 27$. Subtracting 21 from both sides of this equation yields $10x = 6$. Dividing both sides of this equation by 10 yields $x = \frac{6}{10}$, or $x = \frac{3}{5}$. Therefore, the value of xy is $\frac{3}{5}(3)$, or $\frac{9}{5}$. Note that 9/5 and 1.8 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 9551313d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 9551313d

$$\begin{aligned}y &= 6x + 16 \\ -7x - y &= 36\end{aligned}$$

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: 9551313d 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: Hard

Question ID aac69209

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: aac69209

$$\begin{aligned} 3y &= 4x + 17 \\ -3y &= 9x - 23 \end{aligned}$$

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: aac69209 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: Hard