

Question ID a229cabe

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: a229cabe

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

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: a229cabe 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 a6ab27d1

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: a6ab27d1

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

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: a6ab27d1 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 45f00d75

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: 45f00d75

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

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: 45f00d75 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 b882793f

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: b882793f

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

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: b882793f 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 d0d3c29c

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: d0d3c29c

$$\begin{aligned}y &= -3x \\ 4x + y &= 15\end{aligned}$$

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

- A. 1
- B. 5
- C. 15
- D. 45

ID: d0d3c29c Answer

Correct Answer: C

Rationale

Choice C is correct. The given system of linear equations can be solved by the substitution method. Substituting $-3x$ for y from the first equation in the given system into the second equation yields $4x + (-3x) = 15$, or $x = 15$.

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 absolute value of y , not the value of x .

Question Difficulty: Medium

Question ID a5aa159f

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: a5aa159f

$$\begin{aligned}6x + 7y &= 28 \\ 2x + 2y &= 10\end{aligned}$$

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: a5aa159f 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 4b153444

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: 4b153444

$$\begin{aligned}5x &= 15 \\ -4x + y &= -2\end{aligned}$$

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

- A. -17
- B. -13
- C. 13
- D. 17

ID: 4b153444 Answer

Correct Answer: C

Rationale

Choice C is correct. Adding the second equation of the given system to the first equation yields $5x + (-4x + y) = 15 + (-2)$, which is equivalent to $x + y = 13$. So the value of $x + y$ is 13 .

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

Choice B is incorrect. This is the value of $-(x + y)$.

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

Question Difficulty: Medium

Question ID 51105ab7

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: 51105ab7

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

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: 51105ab7 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 e5b7b067

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: e5b7b067

$$\begin{aligned} 4x &= 20 \\ -3x + y &= -7 \end{aligned}$$

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

- A. -27
- B. -13
- C. 13
- D. 27

ID: e5b7b067 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $4x = 20$ and $-3x + y = -7$ is a system of equations with a solution (x, y) . Adding the second equation in the given system to the first equation yields $4x + (-3x + y) = 20 + (-7)$, which is equivalent to $x + y = 13$. Thus, the value of $x + y$ is 13 .

Choice A is incorrect. This represents the value of $-2(x + y) - 1$.

Choice B is incorrect. This represents the value of $-(x + y)$.

Choice D is incorrect. This represents the value of $2(x + y) + 1$.

Question Difficulty: Medium

Question ID 9559faae

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: 9559faae

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

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: 9559faae 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 19e7dacc

Assessment	Test	Domain	Skill	Difficulty
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ID: 19e7dacc

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: 19e7dacc 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 60bac251

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: 60bac251

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

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

ID: 60bac251 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 bb0ac882

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Systems of two linear equations in two variables	

ID: bb0ac882

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: bb0ac882 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