

Question ID fcc4a886

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: fcc4a886

A factory makes 9-inch, 7-inch, and 4-inch concrete screws. During a certain day, the number of 9-inch concrete screws that the factory makes is 5 times the number n of 7-inch concrete screws, and the number of 4-inch concrete screws is 22. During this day, the factory makes 100 concrete screws total. Which equation represents this situation?

- A. $9(5n) + 7n + 4(22) = 100$
- B. $9n + 7n + 4n = 100$
- C. $5n + 22 = 100$
- D. $6n + 22 = 100$

ID: fcc4a886 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that during a certain day at a factory, the number of 7-inch concrete screws the factory makes is n and the number of 4-inch concrete screws the factory makes is 22. It's also given that during this day the number of 9-inch concrete screws the factory makes is 5 times the number of 7-inch concrete screws, or $5n$. Therefore, the total number of 7-inch, 9-inch, and 4-inch concrete screws is $n + 5n + 22$, or $6n + 22$. It's given that during this day, the factory makes 100 concrete screws total. Thus, the equation $6n + 22 = 100$ represents this situation.

Choice A is incorrect. This equation represents a situation where the total length, in inches, of all the concrete screws, rather than the total number of concrete screws, is 100.

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

Choice C is incorrect. This equation represents a situation where the total number of 9-inch concrete screws and 4-inch concrete screws, not including the 7-inch concrete screws, is 100.

Question Difficulty: Hard

Question ID 83c21f13

Assessment	Test	Domain	Skill	Difficulty
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ID: 83c21f13

Each side of a 30-sided polygon has one of three lengths. The number of sides with length 8 centimeters (cm) is 5 times the number of sides n with length 3 cm. There are 6 sides with length 4 cm. Which equation must be true for the value of n ?

- A. $5n + 6 = 30$
- B. $6n + 6 = 30$
- C. $8n + 3n + 4n = 30$
- D. $8(5n) + 3n + 4(6) = 30$

ID: 83c21f13 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that each side of a 30-sided polygon has one of three lengths. It's also given that the number of sides with length 8 centimeters cm is 5 times the number of sides n with length 3 cm. Therefore, there are $5 \times n$, or $5n$, sides with length 8 cm. It's also given that there are 6 sides with length 4 cm. Therefore, the number of 3 cm, 4 cm, and 8 cm sides are n , 6, and $5n$, respectively. Since there are a total of 30 sides, the equation $n + 6 + 5n = 30$ represents this situation. Combining like terms on the left-hand side of this equation yields $6n + 6 = 30$. Therefore, the equation that must be true for the value of n is $6n + 6 = 30$.

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 81fa9041

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 81fa9041

$$-3x + 21px = 84$$

In the given equation, p is a constant. The equation has no solution. What is the value of p ?

- A. 0
- B. $\frac{1}{7}$
- C. $\frac{4}{3}$
- D. 4

ID: 81fa9041 Answer

Correct Answer: B

Rationale

Choice B is correct. A linear equation in one variable has no solution if and only if the equation is false; that is, when there is no value of x that produces a true statement. It's given that in the equation $-3x + 21px = 84$, p is a constant and the equation has no solution for x . Therefore, the value of the constant p is one that results in a false equation. Factoring out the common factor of $-3x$ on the left-hand side of the given equation yields $-3x(1 - 7p) = 84$. Dividing both sides of this equation by -3 yields $x(1 - 7p) = -28$. Dividing both sides of this equation by $1 - 7p$ yields $x = \frac{-28}{1 - 7p}$. This equation is false if and only if $1 - 7p = 0$. Adding $7p$ to both sides of $1 - 7p = 0$ yields $1 = 7p$. Dividing both sides of this equation by 7 yields $\frac{1}{7} = p$. It follows that the equation $x = \frac{-28}{1 - 7p}$ is false if and only if $p = \frac{1}{7}$. Therefore, the given equation has no solution if and only if the value of p is $\frac{1}{7}$.

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 a5eac396

Assessment	Test	Domain	Skill	Difficulty
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ID: a5eac396

$$2(kx - n) = -\frac{28}{15}x - \frac{36}{19}$$

In the given equation, k and n are constants and $n > 1$. The equation has no solution. What is the value of k ?

ID: a5eac396 Answer

Correct Answer: -.9333, -14/15

Rationale

The correct answer is $-\frac{14}{15}$. A linear equation in the form $ax + b = cx + d$ has no solution only when the coefficients of x on each side of the equation are equal and the constant terms are not equal. Dividing both sides of the given equation by 2 yields $kx - n = -\frac{28}{30}x - \frac{36}{38}$, or $kx - n = -\frac{14}{15}x - \frac{18}{19}$. Since it's given that the equation has no solution, the coefficient of x on both sides of this equation must be equal, and the constant terms on both sides of this equation must not be equal. Since $\frac{18}{19} < 1$, and it's given that $n > 1$, the second condition is true. Thus, k must be equal to $-\frac{14}{15}$. Note that -14/15, -.9333, and -0.933 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID e7af391e

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ID: e7af391e

$$3(kx + 13) = \frac{48}{17}x + 36$$

In the given equation, k is a constant. The equation has no solution. What is the value of k ?

ID: e7af391e Answer

Correct Answer: .9411, .9412, 16/17

Rationale

The correct answer is $\frac{16}{17}$. It's given that the equation $3kx + 13 = \frac{48}{17}x + 36$ has no solution. A linear equation in the form $ax + b = cx + d$, where a , b , c , and d are constants, has no solution only when the coefficients of x on each side of the equation are equal and the constant terms aren't equal. Dividing both sides of the given equation by 3 yields $kx + 13 = \frac{48}{51}x + \frac{36}{3}$, or $kx + 13 = \frac{16}{17}x + 12$. Since the coefficients of x on each side of the equation must be equal, it follows that the value of k is $\frac{16}{17}$. Note that 16/17, .9411, .9412, and 0.941 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 5f546ecc

Assessment	Test	Domain	Skill	Difficulty
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ID: 5f546ecc

If $5(x + 4) = 4(x + 4) + 29$, what is the value of $x + 4$?

- A. ~~−4~~
- B. ~~25~~
- C. **29**
- D. ~~33~~

ID: 5f546ecc Answer

Correct Answer: C

Rationale

Choice C is correct. Subtracting $4x + 4$ from both sides of the given equation yields $1x + 4 = 29$, or $x + 4 = 29$. Therefore, the value of $x + 4$ is 29.

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

Choice B is incorrect. This is the value of x , not $x + 4$.

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

Question Difficulty: Hard

Question ID 8e338d65

Assessment	Test	Domain	Skill	Difficulty
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ID: 8e338d65

$5(t + 3) - 7(t + 3) = 38$

What value of t is the solution to the given equation?

ID: 8e338d65 Answer

Correct Answer: -22

Rationale

The correct answer is -22. The given equation can be rewritten as $-2t + 3 = 38$. Dividing both sides of this equation by -2 yields $t + 3 = -19$. Subtracting 3 from both sides of this equation yields $t = -22$. Therefore, -22 is the value of t that is the solution to the given equation.

Question Difficulty: Hard

Question ID 593de6f7

Assessment	Test	Domain	Skill	Difficulty
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ID: 593de6f7

How many solutions does the equation $10(15x - 9) = -15(6 - 10x)$ have?

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

ID: 593de6f7 Answer

Correct Answer: C

Rationale

Choice C is correct. Applying the distributive property to each side of the given equation yields $150x - 90 = -90 + 150x$. Applying the commutative property of addition to the right-hand side of this equation yields $150x - 90 = 150x - 90$. Since the two sides of the equation are equivalent, this equation is true for any value of x . Therefore, the given equation has infinitely many 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 D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 86e98b7d

Assessment	Test	Domain	Skill	Difficulty
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ID: 86e98b7d

If $2(3t - 10) + t = 40 + 4t$, what is the value of $3t$?

ID: 86e98b7d Answer

Correct Answer: 60

Rationale

The correct answer is 60. Subtracting t from both sides of the given equation yields $2(3t - 10) = 40 + 3t$. Applying the distributive property to the left-hand side of this equation yields $6t - 20 = 40 + 3t$. Adding 20 to both sides of this equation yields $6t = 60 + 3t$. Subtracting $3t$ from both sides of this equation yields $3t = 60$. Therefore, the value of $3t$ is 60.

Question Difficulty: Hard

Question ID 8652a731

Assessment	Test	Domain	Skill	Difficulty
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ID: 8652a731

How many solutions does the equation $12(x - 3) = -3(x + 12)$ have?

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

ID: 8652a731 Answer

Correct Answer: A

Rationale

Choice A is correct. Distributing 12 on the left-hand side and -3 on the right-hand side of the given equation yields $12x - 36 = -3x - 36$. Adding $3x$ to each side of this equation yields $15x - 36 = -36$. Adding 36 to each side of this equation yields $15x = 0$. Dividing each side of this equation by 15 yields $x = 0$. This means that 0 is the only solution to the given equation. Therefore, the given equation has exactly one solution.

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 b08cf45d

Assessment	Test	Domain	Skill	Difficulty
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ID: b08cf45d

$-49x = -98x$

How many solutions does the given equation have?

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

ID: b08cf45d Answer

Correct Answer: B

Rationale

Choice B is correct. Adding $98x$ to each side of the given equation yields $49x = 0$. Dividing each side of this equation by 49 yields $x = 0$. This means that 0 is the only solution to the given equation. Therefore, the given equation has exactly one solution.

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 a36030f7

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ID: a36030f7

If $\frac{x+6}{3} = \frac{x+6}{13}$, the value of $x + 6$ is between which of the following pairs of values?

- A. -7 and -3
- B. -2 and 2
- C. 2 and 7
- D. 8 and 13

ID: a36030f7 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 313, or 39, yields $39\frac{x+6}{3} = 39\frac{x+6}{13}$, or $13x + 6 = 3x + 6$. Subtracting $3x + 6$ from both sides of this equation yields $10x + 6 = 0$. Dividing both sides of this equation by 10 yields $x + 6 = 0$. Therefore, if $\frac{x+6}{3} = \frac{x+6}{13}$, then the value of $x + 6$ is 0. It follows that of the given choices, the value of $x + 6$ is between -2 and 2.

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