Question ID df8ae774

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

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

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

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

Rationale

The correct answer is $\frac{16}{17}$. It's given that the equation $3(kx + 13) = \frac{48}{17}x + 36$ 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 70474bfb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

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. $8(5n) + 3n + 4(6) = 30$

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 e96acc98

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

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

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

Correct Answer: -22

Rationale

The correct answer is -22. The given equation can be rewritten as $-2(t + 3) = 38$. 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 dc1b988f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

ID: dc1b988f

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: dc1b988f 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 370ac92d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

$$-49x = -98x$$

How many solutions does the given equation have?

A. Zero

B. Exactly one

C. Exactly two

D. Infinitely many

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 b7305783

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

ID: b7305783

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: b7305783 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by $(3)(13)$, or 39, yields $(39)\left(\frac{x+6}{3}\right) = (39)\left(\frac{x+6}{13}\right)$, or $13(x+6) = 3(x+6)$. Subtracting $3(x+6)$ from both sides of this equation yields $10(x+6) = 0$. 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

Question ID bd12c0bd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

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

A. Exactly one

B. Exactly two

C. Infinitely many

D. Zero

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 1c5a62e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

ID: 1c5a62e1

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

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

ID: 1c5a62e1 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 07d65258

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

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

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

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 9dc82916

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

ID: 9dc82916

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: 9dc82916 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 e3f4c118

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	Hard

ID: e3f4c118

If $5 - 7(2 - 4x) = 16 - 8(2 - 4x)$, what is the value of $2 - 4x$?

ID: e3f4c118 Answer

Correct Answer: 11

Rationale

The correct answer is 11. Subtracting 5 from each side of the given equation yields $-7(2 - 4x) = 11 - 8(2 - 4x)$. Adding $8(2 - 4x)$ to each side of this equation yields $2 - 4x = 11$. Therefore, the value of $2 - 4x$ is 11.

Question Difficulty: Hard