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 $3kx + 13 = \frac{48}{17}x + 36$ 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 70474bfb

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

ID: 70474bfb

Each side of a 30-sided polygon has one of three lengths. The number of sides with length $8 \text{ centimeters (cm)}$ 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: 70474bfb 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 be844d92

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

What value of t is the solution to the equation $0.8t - 0.46 = 8(t - 0.001) + 1.9$?

Correct Answer: -.3266, -.3267, -49/150

Rationale

The correct answer is -.3267. Applying the distributive property to the right-hand side of the given equation yields $0.8t - 0.46 = 8t - 0.008 + 1.9$, or $0.8t - 0.46 = 8t + 1.892$. Subtracting $0.8t$ from both sides of this equation yields $-0.46 = 7.2t + 1.892$. Subtracting 1.892 from both sides of this equation yields $-2.352 = 7.2t$. Dividing both sides of this equation by 7.2 yields $\frac{-2.352}{7.2} = t$. Therefore, the value of t is approximately -0.32667. Note that -.3267, -.3266, -0.326, and -0.327 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID d55d1acd

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

If $\frac{x-5}{7} = \frac{x-5}{9}$, the value of $x - 5$ is between which of the following pairs of values?

A. -9 and -7

B. -3 and 3

C. 4.5 and 5.5

D. 6.75 and 9.25

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by $(7)(9)$, or 63, yields $(63)\frac{x-5}{7} = (63)\frac{x-5}{9}$, or $9(x-5) = 7(x-5)$. Subtracting $7(x-5)$ from both sides of this equation yields $2(x-5) = 0$. Dividing both sides of this equation by 2 yields $x - 5 = 0$. Therefore, if $\frac{x-5}{7} = \frac{x-5}{9}$, then the value of $x - 5$ is 0. It follows that of the given choices, the value of $x - 5$ is between -3 and 3.

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 2a366aeb

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

A manufacturing plant makes 10-inch, 9-inch, and 7-inch frying pans. During a certain day, the number of 10-inch frying pans that the manufacturing plant makes is 4 times the number n of 9-inch frying pans it makes, and the number of 7-inch frying pans it makes is 10. During this day, the manufacturing plant makes 100 frying pans total. Which equation represents this situation?

A. $10(4n) + 9n + 7(10) = 100$

B. $10n + 9n + 7n = 100$

C. $4n + 10 = 100$

D. $5n + 10 = 100$

Correct Answer: D

Rationale

Choice D is correct. It's given that during a certain day, the number of 9-inch frying pans the manufacturing plant makes is n and the number of 7-inch frying pans it makes is 10. It's also given that during this day the number of 10-inch frying pans that the manufacturing plant makes is 4 times the number of 9-inch frying pans, or $4n$. Therefore, the total number of 7-inch, 9-inch, and 10-inch frying pans the manufacturing plant makes is $n + 10 + 4n$, or $5n + 10$. It's given that during this day the manufacturing plant makes 100 frying pans total. Thus, the equation $5n + 10 = 100$ represents this situation.

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 d5f06835

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

$$\frac{12x+28}{4} - \frac{s}{13} = r(x-8)$$

In the given equation, s and r are constants, and $s > 0$. If the equation has infinitely many solutions, what is the value of s?

Correct Answer: 403

Rationale

The correct answer is 403. For a linear equation in one variable to have infinitely many solutions, the coefficients of the variable must be equal on both sides of the equation and the constant terms must also be equal on both sides of the equation. The given equation can be rewritten as $\frac{43x+7}{4}$ - $\frac{s}{13} = rx$ - 8, or $3x + 7$ - $\frac{s}{13} = rx$ - 8. Applying the distributive property to the right-hand side of this equation yields $3x + 7$ - $\frac{s}{13} = rx$ - $8r$. For this equation to have infinitely many solutions, the coefficients of x must be equal, so it follows that $3 = r$. Additionally, the constant terms must be equal, which means 7 - $\frac{s}{13} =$ - $8r$. Substituting 3 for r in this equation yields 7 - $\frac{s}{13} =$ - 83, or 7 - $\frac{s}{13} =$ - 24. Adding $\frac{s}{13}$ to both sides of this equation yields $7 =$ - $24 + \frac{s}{13}$. Adding 24 to both sides of this equation yields $31 = \frac{s}{13}$. Multiplying both sides of this equation by 13 yields $403 = s$. Therefore, if the equation has infinitely many solutions, the value of s is 403.

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 $-2t + 3 = 38$. 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 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 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

Question ID bd12c0bd

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

ID: bd12c0bd

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: bd12c0bd 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 1c5a62e1

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

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

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

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

ID: 07d65258

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

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: 07d65258 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 $-3x1 - 7p = 84$. Dividing both sides of this equation by -3 yields $x1 - 7p = -28$. 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