

Select The Correct Answer.Which Statement Is True About This Equation? $-9(x + 3) + 12 = -3(2x + 5) - 3x$

Select The Correct Answer.Which Statement Is True About This Equation? $-9(x + 3) + 12 = -3(2x + 5) - 3x$ **O**The is a fundamental question often encountered in algebra that tests your understanding of solving linear equations. Grasping how to analyze and solve such equations is crucial for students aiming to excel in mathematics. In this comprehensive guide, we will thoroughly examine this specific equation, explore the methods to solve it, and determine which statement accurately describes its solution. This article aims to be an SEO-friendly resource, providing clear explanations, step-by-step solutions, and useful tips for mastering similar algebraic problems.

Understanding the Equation

Before diving into solving, it is essential to understand the structure of the given equation:

$$\begin{aligned} & \backslash \\ & -9(x + 3) + 12 = -3(2x + 5) - 3x \\ & \backslash \end{aligned}$$

This is a linear equation involving a variable (x) , parentheses, and multiple terms. The goal is to isolate (x) and find its value(s). To do that, we need to perform operations step-by-step, simplifying both sides of the equation.

Step-by-Step Solution Process

1. Expand Both Sides

The first step is to distribute the constants outside the parentheses:

- Left side:

$$\begin{aligned} & \backslash \\ & -9(x + 3) = -9 \times x + -9 \times 3 = -9x - 27 \\ & \backslash \end{aligned}$$

- Right side:

$$\begin{aligned} & \backslash \\ & -3(2x + 5) = -3 \times 2x + -3 \times 5 = -6x - 15 \\ & \backslash \end{aligned}$$

Now, rewrite the equation with the expanded terms:

$$\begin{aligned} & \\ -9x - 27 + 12 &= -6x - 15 - 3x \\ & \end{aligned}$$

2. Simplify Both Sides

Combine like terms:

- Left side:

$$\begin{aligned} & \\ -9x + (-27 + 12) &= -9x - 15 \\ & \end{aligned}$$

- Right side:

$$\begin{aligned} & \\ -6x - 3x - 15 &= -9x - 15 \\ & \end{aligned}$$

Now, the simplified equation looks like:

$$\begin{aligned} & \\ -9x - 15 &= -9x - 15 \\ & \end{aligned}$$

3. Analyze the Simplified Equation

At this stage, observe that both sides are identical:

$$\begin{aligned} & \\ -9x - 15 &= -9x - 15 \\ & \end{aligned}$$

This indicates that the equation holds true for all values of (x) . In other words, the equation is an identity, meaning it has infinitely many solutions because any value of (x) satisfies the equation.

Interpreting the Solution

Type of Equation

The equation reduces to a statement that is always true, which classifies it as an identity. Here's what that means:

- Identity Equation: An equation that is true for all real numbers (x) . It indicates that the

expressions on both sides are equivalent regardless of x .

- Contradiction: If, after simplification, the statement reduces to a false statement such as $0 = 5$, it would mean no solutions exist.

- Unique Solution: If, after simplification, you find a statement like $x = c$, where c is a constant, then there is exactly one solution.

Since in our case the simplified form is always true, the original equation has infinitely many solutions.

Possible Statements About the Equation

When asked "Which statement is true about this equation?" the options could be:

- A) The equation has a unique solution.
- B) The equation has infinitely many solutions.
- C) The equation has no solution.
- D) The solution depends on certain restrictions.

Based on the analysis, the correct answer is:

B) The equation has infinitely many solutions.

Why Is This Important?

Understanding whether an equation has one solution, no solutions, or infinitely many solutions is fundamental in algebra. Recognizing the type of equation helps in solving complex problems efficiently and accurately.

Examples of Different Types of Equations

To deepen your understanding, consider these examples:

- **Unique solution:** $2x + 3 = 7$ (Solution: $x=2$)
- **Infinite solutions:** $4(x-1) = 4x - 4$ (which simplifies to a true statement for all x)
- **No solution:** $x + 2 = x - 3$ (which simplifies to a false statement)

Tips for Solving Similar Equations

To effectively analyze and solve algebraic equations like the one examined, keep these tips in mind:

1. Always Expand Parentheses First

Distribute constants across parentheses to simplify the equation.

2. Combine Like Terms

Group similar terms to simplify both sides.

3. Look for Patterns

Identify whether both sides are identical (identity), inconsistent, or reducible to a single solution.

4. Check Your Final Result

Verify your solution by substituting the value(s) back into the original equation.

5. Practice Different Types of Equations

Practice solving equations with different structures to become proficient.

Conclusion

In summary, the equation $(-9(x + 3) + 12 = -3(2x + 5) - 3x)$ simplifies to a true statement for all real numbers (x) . Therefore, the statement that correctly describes it is that the equation has infinitely many solutions. Recognizing the nature of such equations is essential in algebra, as it allows students and mathematicians to classify and solve equations efficiently. Remember that mastering these concepts will significantly improve your problem-solving skills and prepare you for more advanced mathematical challenges.

Key Takeaways:

- Always expand parentheses first.
- Simplify both sides thoroughly.
- Recognize the type of equation based on the simplified form.
- Equations that reduce to a true statement for all (x) have infinitely many solutions.
- Practice with various equations to build confidence.

By understanding these principles and practicing regularly, you'll become adept at analyzing and solving algebraic equations, setting a strong foundation for future mathematics success.

Frequently Asked Questions

What is the main goal when solving the equation $-9(x + 3) + 12 = -3(2x + 5) - 3x$?

The main goal is to find the value of x that satisfies the equation by simplifying and solving for x .

Which step correctly simplifies the left side of the equation $-9(x + 3) + 12$?

Distributing -9 gives $-9x - 27$, then adding 12 results in $-9x - 15$.

What is the simplified form of the right side of the equation $-3(2x + 5) - 3x$?

Distributing -3 gives $-6x - 15$, and combining with $-3x$ results in $-9x - 15$.

After simplifying both sides, what is the resulting equation?

$-9x - 15 = -9x - 15$.

What does the equation $-9x - 15 = -9x - 15$ tell us about the solutions?

It indicates that the equation is true for all values of x , meaning infinitely many solutions.

Is the statement 'The equation has a unique solution' true or false in this case?

False, because the simplified form shows infinitely many solutions, not just one.

What is the correct statement about the original equation based on its simplified form?

The original equation is an identity, true for all real values of x .

Which answer choice correctly describes the nature of the equation?

The statement 'This equation is always true' or 'has infinitely many solutions' is correct.

Additional Resources

Select The Correct Answer. Which Statement Is True About This Equation? $-9(x + 3) + 12 = -3(2x + 5) - 3x$ OAThe

When approaching algebraic equations like $-9(x + 3) + 12 = -3(2x + 5) - 3x$ OAThe, understanding the structure and simplifying step-by-step are crucial for identifying the correct statement about the equation. This process involves expanding parentheses, combining like terms, and solving for the variable to determine the truthfulness of various possible statements. In this review, we will explore the different aspects of this equation, including how to simplify it, interpret its solutions, and analyze the pros and cons of different approaches to solving similar equations.

Understanding the Equation: Structure and Components

The given equation is:

$$-9(x + 3) + 12 = -3(2x + 5) - 3x \text{ OAThe}$$

At first glance, this appears to be a linear algebraic equation involving the variable x within parentheses, alongside constant terms and coefficients. To analyze and solve it, one must understand its components:

- Distributive property: Both sides involve distributing coefficients across parentheses.
- Constants: The numbers 12 and the other constants affect the equation's balance.
- Variables: The variable x appears both inside parentheses and outside, necessitating careful expansion.
- Additional text "OAThe": This seems extraneous or perhaps a typographical error; for clarity, we will focus on the main algebraic structure.

Step-by-Step Simplification

Breaking down the process helps in understanding the solution's pathway.

1. Expand Both Sides

- Left side: $-9(x + 3)$ expands to $-9x - 27$.
- Right side: $-3(2x + 5)$ expands to $-6x - 15$.

Thus, the equation becomes:

$$-9x - 27 + 12 = -6x - 15 - 3x$$

2. Simplify Constant Terms

Combine constants on each side:

- Left: $-27 + 12 = -15$.
- Right remains $-6x - 15 - 3x$.

Now, the equation is:

$$-9x - 15 = -6x - 15 - 3x$$

3. Combine Like Terms on the Right

$$-6x - 3x = -9x.$$

So, the right side simplifies to:

$$-9x - 15$$

The equation is now:

$$-9x - 15 = -9x - 15$$

Interpreting the Simplified Equation

At this point, the equation:

$$-9x - 15 = -9x - 15$$

presents a situation where both sides are identical expressions. This indicates that, for any value of x , the equation holds true because both sides are equal regardless of x . Such an equation is called an identity.

Implication:

The original equation simplifies to an identity, meaning it is true for all real numbers x .

Analyzing the True Statement About the Equation

Given the simplification, the key question is: Which statement about this equation is true? Common options might include:

- The equation has a unique solution.
- The equation has infinitely many solutions.
- The equation has no solution.
- The equation is an identity (true for all x).

Based on the steps above, the correct statement is:

"The equation is an identity and is true for all real values of x ."

Features of the Equation and Its Solution

Pros:

- Simplification process clearly shows the nature of the solution.
- Illustrates the importance of distributing and combining like terms.
- Reinforces understanding of identities versus equations with unique solutions.

Cons:

- Potential confusion if extraneous text like "OAThe" is misinterpreted.
- May seem complex at first glance due to parentheses and coefficients, though straightforward upon expansion.

Implications and Educational Significance

Understanding this particular equation's nature highlights some important algebraic concepts:

1. Recognizing Identities

- When simplifying leads to a statement like $A = A$, the equation holds for all x .
- Such equations do not restrict x to a specific value and are useful in verifying algebraic identities.

2. Differentiating Types of Equations

- Unique solution: When simplification yields a specific value for x .
- No solution: When simplification results in a contradiction like $0 = \text{non-zero}$.
- Identity: When both sides are identical expressions, valid for all x .

3. Practical Applications

- Equations that are identities can be used to verify algebraic formulas.
- Recognizing these helps in simplifying complex algebraic expressions efficiently.

Conclusion: Final Thoughts on the Equation

The analysis of $-9(x + 3) + 12 = -3(2x + 5) - 3x$ reveals that after expanding and simplifying, the equation reduces to an identity. This means it is true for all real values of x .

Choosing the correct statement about the equation hinges on understanding this process. The fact that both sides simplify to the same expression indicates an identity rather than an equation with a unique solution or no solution.

In summary:

- The structure of the equation involves common algebraic operations—distribution, combination of like terms, and simplification.
- The simplified form demonstrates that the original equation holds true universally.
- Recognizing identities in algebra is vital for solving and understanding more complex equations.

Final note: When tackling similar equations, always expand carefully, combine like terms meticulously, and check whether the simplified form suggests a unique solution, no solution, or an identity. This approach ensures accurate interpretation and solution of algebraic statements.

Disclaimer: If "OAThe" was part of the original statement, it appears extraneous or possibly a typo, and should be disregarded in the algebraic analysis.

Select The Correct Answer Which Statement Is True About

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