Question 2 (Essay Worth 10 Points)(07.02 MC)An Equation Is Shown Below:3(2x - 7) = 3Part A: How Many

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Understanding the Given Equation

When approaching any algebraic problem, especially equations like 3(2x - 7) = 3, it’s essential to understand the structure and components involved. The equation provided is a linear equation involving a single variable, x. Our goal is to solve for x and understand the steps involved in reaching the solution.

This type of problem is fundamental in algebra because it introduces concepts such as distributive property, combining like terms, and isolating the variable to find its value. Learning to solve such equations builds a foundation for more complex algebraic manipulations used in various mathematical and real-world contexts.

Breaking Down the Equation

Before solving, let's analyze the equation:

3(2x - 7) = 3

- The left side involves a multiplication of 3 with the binomial (2x - 7).
- The right side is simply the number 3.

The goal is to find the value of x that makes this equation true.

Step 1: Apply the Distributive Property

The distributive property allows us to eliminate parentheses by multiplying each term inside the parentheses by the factor outside. For this equation:

3(2x - 7) = 3

becomes

3 2x - 3 7 = 3

which simplifies to:

6x - 21 = 3

Step 2: Isolate the Variable Term

Next, we aim to get all terms containing x on one side and constant terms on the other.

Adding 21 to both sides:

6x - 21 + 21 = 3 + 21

which simplifies to:

6x = 24

Step 3: Solve for x

To find x, divide both sides of the equation by 6:

6x / 6 = 24 / 6

which simplifies to:

x = 4

Interpreting the Solution

The value x = 4 satisfies the original equation. To verify, substitute x back into the original equation:

3(2(4) - 7) = 3

Calculate inside the parentheses:

2(4) = 8

8 - 7 = 1

Now multiply by 3:

3 1 = 3

Since both sides equal 3, the solution x = 4 is correct.

Understanding the Significance of the Solution

The process demonstrates fundamental algebraic skills:

- Distributive property application
- Combining like terms
- Isolating the variable
- Verification of the solution

These skills are critical in solving similar equations and in understanding how variables relate within equations.

Common Mistakes and How to Avoid Them

When solving equations like 3(2x - 7) = 3, students often make mistakes that hinder their success. Below are common errors and tips to avoid them:

- **Failing to distribute correctly:** Remember to multiply every term inside the parentheses by the factor outside. For example, 3(2x - 7) becomes 6x - 21, not just 3(2x) - 7.
- **Incorrectly handling signs:** Be cautious when adding or subtracting terms, especially with negative numbers.
- **Dividing incorrectly:** Always divide the entire side by the coefficient of x when isolating the variable.
- **Forgetting to verify the solution:** Substitute the found value back into the original equation to confirm accuracy.

Extensions and Related Concepts

Once comfortable with solving simple linear equations like 3(2x - 7) = 3, students can extend their skills to more complex problems, such as:

Solving Equations with Variables on Both Sides

For example:

2x + 5 = x - 3

This requires moving all variable terms to one side and constants to the other.

Working with Inequalities

Similar principles apply, but solutions are expressed as ranges rather than specific values.

Application in Word Problems

Translating real-world scenarios into equations, such as calculating costs, distances, or quantities, enhances understanding and practical skills.

Importance of Mastering Basic Algebraic Equations

Mastery of solving equations like 3(2x - 7) = 3 is fundamental for progressing in mathematics. It develops critical thinking, problem-solving skills, and the ability to analyze data. These skills are not only essential academically but also valuable in everyday decision-making and various professional fields.

Conclusion

In summary, solving the equation 3(2x - 7) = 3 involves understanding the distributive property, combining like terms, isolating the variable, and verifying the solution. The process illustrates key algebraic techniques, emphasizing the importance of careful calculations and logical reasoning. By mastering these foundational skills, students can confidently approach more complex equations and mathematical concepts, laying a solid groundwork for future learning and application.

Whether you’re preparing for tests, working on homework, or seeking to improve your problem-solving skills, understanding how to solve equations like this is a vital step in your mathematical journey.

Frequently Asked Questions

What is the first step to solve the equation 3(2x - 7) = 3?

Apply the distributive property by multiplying 3 with both terms inside the parentheses: 3 2x and 3 -7, resulting in 6x - 21 = 3.

How do you isolate the variable x in the equation 6x - 21 = 3?

Add 21 to both sides to get 6x = 24, then divide both sides by 6 to find x = 4.

What is the value of x in the equation 3(2x - 7) = 3?

The value of x is 4.

What is the significance of checking your solution in this type of equation?

Checking ensures that substituting x = 4 back into the original equation satisfies the equality, confirming the solution is correct.

Why is it important to simplify both sides of the equation after applying the distributive property?

Simplifying makes it easier to isolate the variable and solve the equation accurately.

Additional Resources

Understanding the Equation 3(2x - 7) = 3: A Step-by-Step Breakdown

When tackling algebraic equations, clarity and systematic approaches are essential for mastering the concepts. In this article, we'll delve into the problem 3(2x - 7) = 3, a fundamental yet instructive example that illustrates the process of solving for an unknown variable, x. Whether you're a student brushing up on algebra or a teacher seeking to clarify problem-solving methods, this comprehensive guide will walk you through each step, ensuring a clear understanding of how to approach similar equations.

Deciphering the Equation: What Does It Represent?

At first glance, the equation 3(2x - 7) = 3 appears simple, but it embodies several core algebraic principles. The left side contains a distributive multiplication over a binomial, while the right side is a constant. The goal is to isolate x and find its value.

Understanding how to manipulate such equations is crucial because they form the foundation for more complex algebraic problems. This problem emphasizes:

- The distributive property
- Combining like terms
- Solving linear equations

Step-by-Step Guide to Solving the Equation

Let's systematically analyze and solve the equation. We'll break the process into clear, manageable steps.

Step 1: Recognize and Apply the Distributive Property

The initial step involves expanding the left side of the equation:

$3(2x - 7) = 3$

Applying the distributive property:

- Multiply 3 by each term inside the parentheses

This gives:

$(3 \times 2x) - (3 \times 7) = 3$

Which simplifies to:

$6x - 21 = 3$

Step 2: Isolate the Variable Term

Next, we want to get all terms containing x on one side and constants on the other.

Add 21 to both sides of the equation:

$6x - 21 + 21 = 3 + 21$

Simplifies to:

$6x = 24$

Step 3: Solve for x

Finally, divide both sides by 6 to isolate x:

$(6x) / 6 = 24 / 6$

Which simplifies to:

$x = 4$

Verification of the Solution

An essential aspect of algebraic problem-solving is verifying your solution by substituting x = 4 back into the original equation.

Original equation:

$3(2x - 7) = 3$

Substitute x = 4:

$3(2(4) - 7) = 3$

Calculate inside parentheses:

$3(8 - 7) = 3$

Simplify:

$3(1) = 3$

And confirm that:

$3 = 3$

Since both sides are equal, the solution x = 4 is correct.

Common Mistakes to Avoid

When solving equations like 3(2x - 7) = 3, students often run into pitfalls. Being aware of these can help prevent errors:

- Forgetting to distribute correctly: Remember that the distributive property applies to all terms inside the parentheses.
- Mixing operations: Ensure addition/subtraction and multiplication/division are performed in the correct order.
- Skipping verification: Always substitute your solution back into the original equation to check for accuracy.
- Incorrect algebraic manipulations: Be cautious with signs, especially when adding or subtracting constants.

Additional Practice Problems

To reinforce your understanding, consider working through similar problems:

1. Solve for x: 4(3x + 2) = 20
2. Solve for x: 5(2x - 4) = 0
3. Solve for x: 2(5x - 3) = 2

For each, follow the same systematic approach: apply distributive property, isolate the variable term, and solve for x. Remember to verify your solutions!

The Importance of These Skills in Algebra

Mastering the process illustrated in solving 3(2x - 7) = 3 is foundational for progressing in algebra. These skills underpin more advanced topics such as solving inequalities, systems of equations, and quadratic equations. Developing a clear, step-by-step approach fosters confidence and accuracy in problem-solving.

Summary: Key Takeaways

- Recognize and apply the distributive property to expand expressions.
- Isolate the variable term by performing inverse operations.
- Always verify your solution by substituting back into the original equation.
- Be cautious with signs and operations to avoid common mistakes.
- Practice with similar equations to strengthen your skills.

In conclusion, understanding how to solve equations like 3(2x - 7) = 3 is a critical step in mastering algebra. By systematically applying the distributive property, isolating the variable, and verifying your answer, you build a solid foundation for tackling more complex mathematical problems. With practice and attention to detail, solving for x becomes a straightforward process, empowering you to confidently navigate algebraic challenges.

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