In The Equation 2r - 7 = 15, What Value Of R Makes This Equation True?

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Solving for the variable r in algebraic equations is a fundamental skill in mathematics that allows us to find unknown values based on given relationships. When faced with the equation $2r - 7 = 15$, the goal is to determine the specific value of r that makes this statement true. Understanding how to solve such equations not only helps in mathematical problem-solving but also enhances critical thinking skills applicable in various real-life situations.

Understanding the Equation: 2r - 7 = 15

Before diving into the steps to find the value of r, it's essential to understand the components of the equation:

- $2r$: This represents two times the unknown variable r.
- -7: This indicates that seven is subtracted from $2r$.
- $= 15$: The equation states that the expression on the left side is equal to 15.

The primary objective is to isolate r on one side of the equation to determine its value.

Step-by-Step Solution to Find the Value of r

Let's go through the process methodically.

Step 1: Write Down the Equation

The given equation is:

$$
2r - 7 = 15
$$

Step 2: Isolate the Term Containing r

To solve for r, start by eliminating the constant term -7 from the left side:

- Add 7 to both sides of the equation:

$$
2r - 7 + 7 = 15 + 7
$$

which simplifies to:

$$
2r = 22
$$

Step 3: Solve for r

Now, divide both sides of the equation by 2 to isolate r:

$$
\frac{2r}{2} = \frac{22}{2}
$$

which results in:

$$
r = 11
$$

Verification of the Solution

It's always good practice to verify your solution by substituting it back into the original equation:

$$
2r - 7 = 15
$$

Substitute $r = 11$:

$$
2 \times 11 - 7 = 15
$$
$$
22 - 7 = 15
$$
$$
15 = 15
$$

Since both sides are equal, this confirms that $r = 11$ is the correct solution.

Understanding the Importance of Solving Such Equations

Solving for unknowns like r in equations such as $2r - 7 = 15$ is foundational in algebra. These skills are crucial for various advanced mathematical concepts and real-world applications, including:

- Engineering calculations
- Financial modeling
- Scientific research
- Computer programming

By mastering basic algebraic manipulations, students develop logical reasoning and problem-solving skills that are valuable across many disciplines.

Additional Techniques for Solving Equations

While the method demonstrated is straightforward, there are other techniques and considerations when solving different types of equations:

1. Handling Equations with Multiple Variables

When equations involve more than one variable, such as $2r + 3s = 20$, additional information or systems of equations are necessary to find the individual values.

2. Dealing with Fractions

For equations involving fractions, such as $\frac{r}{2} + 5 = 10$, multiplying through by the denominator can simplify the process.

3. Equations with Variables on Both Sides

In cases like $3r + 4 = 2r + 9$, combining like terms and then isolating the variable is essential.

Practice Problems for Mastery

To solidify understanding, try solving the following equations:

1. Find r in $5r - 3 = 12$.
2. Determine r in $3r + 7 = 2r + 14$.
3. Solve $\frac{r}{4} + 3 = 6$.
4. Find r in $2(r + 3) = 16$.

Answers:

1. $r = 3$
2. $r = 7$
3. $r = 12$
4. $r = 5$

Conclusion: The Value of r That Satisfies the Equation

In conclusion, the solution to the equation $2r - 7 = 15$ is $r = 11$. By systematically applying algebraic principles—adding or subtracting to isolate the variable and dividing to solve—we find the value that makes the equation true. Mastering such techniques is essential for progressing in mathematics and applying these skills in real-world contexts. Whether you're solving simple equations or tackling complex problems, understanding the fundamental steps ensures accuracy and confidence in your solutions.

Frequently Asked Questions

What is the value of r in the equation 2r - 7 = 15?

The value of r is 11.

How do you solve for r in the equation 2r - 7 = 15?

Add 7 to both sides to get 2r = 22, then divide both sides by 2 to find r = 11.

What steps are involved in solving 2r - 7 = 15 for r?

First, add 7 to both sides: 2r = 22. Then, divide both sides by 2: r = 11.

Can you verify the solution r = 11 in the equation 2r - 7 = 15?

Yes, substituting r = 11 gives 2(11) - 7 = 22 - 7 = 15, which is true.

Is the solution r = 11 unique for the equation 2r - 7 = 15?

Yes, because it's a linear equation, it has only one solution, r = 11.

What type of equation is 2r - 7 = 15?

It is a linear equation in one variable.

Why is it important to perform inverse operations when solving for r?

Inverse operations help isolate the variable r and solve the equation accurately.

Additional Resources

In The Equation 2r - 7 = 15, What Value Of R Makes This Equation True?
Understanding how to solve for an unknown variable in an algebraic equation is a fundamental skill in mathematics. The question “In The Equation 2r - 7 = 15, what value of r makes this equation true?” invites us to explore the process of isolating the variable to find its precise value. Whether you're a student brushing up on algebra or someone seeking to sharpen problem-solving skills, this guide will walk you through the steps in a clear, detailed manner.

Introduction to Algebraic Equations

In algebra, equations are statements that assert the equality of two expressions. Typically, these expressions contain variables—symbols that represent unknown or changing quantities. The goal when solving an equation like 2r - 7 = 15 is to find the value of the variable r that makes the equation true.

Understanding the structure of such equations is crucial. The general form involves constants (fixed numbers) and variables (like r), combined through operations such as addition, subtraction, multiplication, or division. Solving involves performing inverse operations to isolate the variable on one side of the equation.

Breaking Down the Equation: 2r - 7 = 15

The equation at hand is:

2r - 7 = 15

- 2r indicates twice the value of r.
- Subtracting 7 from 2r gives us 15.

Our task is to find the value of r that satisfies this relationship.

Step-by-Step Solution Guide

Step 1: Understand the Goal

The main objective is to isolate r on one side of the equation. Currently, r is multiplied by 2 and then has 7 subtracted from it. To solve for r, we need to undo these operations.

Step 2: Add 7 to Both Sides

Since -7 is subtracted from 2r, the first step is to counteract this subtraction by adding 7 to both sides of the equation:

2r - 7 + 7 = 15 + 7

Simplifies to:

2r = 22

Why add 7?
Because addition and subtraction are inverse operations. Adding 7 cancels out the subtracting 7 on the left side, while maintaining the equality by balancing both sides.

Step 3: Divide Both Sides by 2

Now, 2r means 2 times r. To isolate r, divide both sides of the equation by 2:

(2r) / 2 = 22 / 2

Simplifies to:

r = 11

Why divide by 2?
Division is the inverse of multiplication. Dividing both sides by 2 cancels out the coefficient multiplying r.

Verifying the Solution

To ensure our solution is accurate, substitute r = 11 back into the original equation:

2(11) - 7 = 15

Calculations:

22 - 7 = 15

15 = 15

Since both sides are equal, r = 11 is the correct solution.

Summary of the Solution Process

Here's a quick recap of the steps:

1. Identify the operations involving the variable: Multiplication by 2, then subtraction of 7.
2. Undo addition/subtraction: Add 7 to both sides.
3. Undo multiplication/division: Divide both sides by 2.
4. Simplify and solve: Find r = 11.
5. Verify your answer: Substitute back into the original equation to confirm.

Additional Tips for Solving Similar Equations

- Always perform inverse operations in reverse order of the operations surrounding the variable.
- Keep the equation balanced by performing the same operation on both sides.
- Double-check your solution by substitution.
- Be cautious of the order of operations—PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction).

Practice Problems to Reinforce Learning

1. Solve for x: 3x + 4 = 19
2. Find y: 5y - 10 = 0
3. Determine z: (z/3) + 2 = 8
4. Solve for a: 7a - 3a + 5 = 13

Try solving these on your own to become more comfortable with algebraic manipulations!

Common Mistakes to Avoid

- Ignoring the need to perform inverse operations: For example, forgetting to add or subtract when necessary.
- Not performing the same operation on both sides: This can lead to incorrect solutions.
- Misapplying order of operations: Always handle addition/subtraction before multiplication/division unless parentheses indicate otherwise.
- Skipping verification: Always substitute your answer back into the original equation to verify correctness.

Final Thoughts

Understanding how to solve for r in the equation 2r - 7 = 15 exemplifies fundamental algebra skills. The process involves recognizing the operations affecting the variable, performing inverse operations systematically, and verifying the solution. Mastering these strategies builds a solid foundation for tackling more complex equations and mathematical problems.

Whether you're preparing for exams or just looking to sharpen your problem-solving toolkit, practicing the process outlined here will serve you well. Remember, patience and careful execution are key to becoming proficient in algebra. Happy solving!

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