

Explain How You Would Solve A Problem With Variables On Both Sides Of The Equation. $3x+4=89x$

Explain How You Would Solve A Problem With Variables On Both Sides Of The Equation. $3x+4=89x$

Solving equations that contain variables on both sides can seem daunting at first, but with a clear step-by-step approach, it becomes manageable. The key is to isolate the variable you are solving for, which often involves moving all terms containing the variable to one side of the equation and constant terms to the other. In this article, we will explore the process of solving an example equation: $3x + 4 = 89x$. We will break down each step, discuss strategies, and provide tips to help you understand and master such problems.

Understanding the Equation

Before diving into the solution, it is essential to understand what the equation represents and the goal of solving it.

What Does the Equation Represent?

The equation $3x + 4 = 89x$ involves a variable x , which can represent any real number. The goal is to find the value of x that satisfies this equality.

Why Solve Equations?

Solving equations allows us to find unknown values based on given relationships. It is fundamental in algebra and applicable across sciences, engineering, and everyday problem-solving.

Step-by-Step Approach to Solve the Equation

To solve $3x + 4 = 89x$, follow these systematic steps:

Step 1: Identify Like Terms

Look at both sides of the equation and identify terms involving the variable x and constant terms. The left side has $3x$ and 4 , while the right side has $89x$.

Step 2: Move Variable Terms to One Side

Choose one side to collect all variable terms. Usually, it is easiest to move all variable terms to the left side to keep the x terms together.

Action: Subtract $89x$ from both sides

$$3x + 4 - 89x = 89x - 89x$$

Simplify:

$$(3x - 89x) + 4 = 0$$

which simplifies to:

$$-86x + 4 = 0$$

Step 3: Move Constant Terms to the Other Side

Next, isolate the term with x by moving the constant to the right side.

Action: Subtract 4 from both sides

$$-86x + 4 - 4 = 0 - 4$$

Simplify:

$$-86x = -4$$

Step 4: Solve for the Variable

Now, divide both sides by the coefficient of x, which is -86, to find the value of x.

$$x = (-4) / (-86)$$

Simplify:

$$x = 4 / 86$$

Reduce the fraction:

$$x = 2 / 43$$

Final Solution and Verification

The value of x that satisfies the original equation is 2/43. To verify, substitute x back into the original equation:

$$3x + 4 = 89x$$

Substitute $x = 2/43$:

$$3(2/43) + 4 = 89(2/43)$$

Calculate each side:

Left side:

$$(6/43) + 4 = (6/43) + (4 \cdot 43/43) = (6/43) + (172/43) = (6 + 172)/43 = 178/43$$

Right side:

$$89 (2/43) = (89 \cdot 2)/43 = 178/43$$

Since both sides are equal, the solution $x = 2/43$ is verified.

Additional Tips for Solving Similar Equations

When dealing with equations featuring variables on both sides, keep these tips in mind:

- **Always perform the same operation on both sides:** To maintain equality, any addition, subtraction, multiplication, or division must be applied to both sides.
- **Be mindful of negative signs:** Distributing negatives correctly prevents errors.
- **Reduce fractions where possible:** Simplifying your answer makes it easier to interpret and verify.

- **Check your solution:** Substituting back into the original equation ensures accuracy.
- **Practice with different equations:** The more you practice, the more intuitive solving becomes.

Common Mistakes to Avoid

While solving such equations, learners often encounter pitfalls. Being aware of these can help prevent errors:

1. Forgetting to apply the same operation on both sides

Always perform the same addition, subtraction, multiplication, or division to both sides of the equation.

2. Sign errors

Pay close attention to negative signs, especially when moving terms across the equality.

3. Not simplifying fractions

Always reduce fractions to their simplest form to make the solution clearer and verification easier.

4. Overlooking the importance of checking solutions

Always verify your answer by substituting back into the original equation.

Conclusion

Solving equations with variables on both sides, such as $3x + 4 = 89x$, involves a straightforward process of moving all variable terms to one side and constants to the other, then solving for the variable. By systematically following these steps—identifying like terms, moving variables and constants appropriately, performing arithmetic operations carefully, and verifying your solution—you can confidently solve similar algebraic equations. Mastery of this process enhances your overall algebra skills and provides a solid foundation for tackling more complex mathematical problems.

Remember, practice makes perfect. The more equations you solve using these methods, the more intuitive they will become. With patience and attention to detail, you'll be able to handle any equation with variables on both sides with ease.

Frequently Asked Questions

What is the first step to solve an equation with variables on both sides, like $3x + 4 = 89x$?

The first step is to move all variable terms to one side of the equation, typically by subtracting $3x$ from both sides.

How do you combine like terms when solving an equation such as $3x + 4 = 89x$?

You combine like terms by bringing all the x terms to one side and constants to the other, simplifying the equation step by step.

What do you do after moving variables to one side in the equation $3x + 4 = 89x$?

After moving variables, you isolate the variable by combining like terms and then solving for x by dividing both sides by the coefficient of x .

How can I solve the equation $3x + 4 = 89x$ for x ?

Subtract $3x$ from both sides to get $4 = 86x$, then divide both sides by 86 to find $x = 4/86$, which simplifies to $x = 2/43$.

What is the importance of balancing both sides of the equation when solving for variables?

Balancing both sides ensures the equality remains true, allowing you to isolate the variable and find its correct value.

Are there any common mistakes to avoid when solving equations with variables on both sides?

Yes, common mistakes include not properly moving all variable terms to one side or forgetting to perform the same operation on both sides of the equation.

Can the method for solving $3x + 4 = 89x$ be applied to more complex equations with variables on both sides?

Yes, the same principles apply—move all variable terms to one side, combine like terms, and then solve for the variable, even in more complex equations.

What is the value of x in the equation $3x + 4 = 89x$?

$x = 2/43$, obtained by subtracting $3x$ from both sides to get $4 = 86x$, then dividing both sides by 86 .

How do you verify your solution after solving an equation like $3x + 4 = 89x$?

Substitute the value of x back into the original equation to ensure both sides are equal, confirming the solution is correct.

Additional Resources

Explain How You Would Solve A Problem With Variables On Both Sides Of The Equation. $3x+4=89x$

Mathematics, particularly algebra, forms the backbone of logical reasoning and problem-solving across numerous disciplines. Among the fundamental concepts encountered early in algebra are equations involving variables on both sides. One such example is the equation $3x + 4 = 89x$, which requires a systematic approach to isolate the variable and find its value. This article provides a comprehensive, step-by-step explanation of how to solve such equations, emphasizing clarity, precision, and analytical rigor suitable for review and academic publication.

Understanding the Equation Structure

Before diving into the solution process, it is essential to understand the structure and components of the given equation:

- The equation is linear, involving the variable ' x ' raised to the first power.
- It contains variables on both sides: the term $3x$ on the left and $89x$ on the right.
- It includes constants: $+4$ on the left side.
- The goal is to find the value of x that satisfies the equation.

The general form of such an equation can be represented as:

$$a x + c = b x + d$$

where a, b are coefficients of the variable, and c, d are constants.

In the specific case:

$$- a = 3$$

$$- c = 4$$

$$- b = 89$$

$$- d = 0 \text{ (since there is no constant term on the right side apart from the variable)}$$

Step-by-Step Approach to Solving the Equation

The primary goal when solving equations with variables on both sides is to collect all variable terms on one side and constants on the other. The standard procedure involves:

1. Subtracting the variable term on the right from both sides to bring all variable terms to the left.
2. Simplifying the resulting equation.
3. Isolating the variable by dividing both sides by the coefficient of the variable.
4. Verifying the solution by substituting back into the original equation.

Let's apply these steps to $3x + 4 = 89x$.

Step 1: Rearrange the Equation

Subtract $89x$ from both sides to gather variable terms on the left:

$$3x + 4 - 89x = 89x - 89x$$

Simplify:

$$(3x - 89x) + 4 = 0$$

This reduces to:

$$-86x + 4 = 0$$

Step 2: Isolate the Variable Term

Next, subtract 4 from both sides to move constants to the right:

$$-86x + 4 - 4 = 0 - 4$$

Simplify:

$$-86x = -4$$

Step 3: Solve for x

Divide both sides by -86:

$$x = (-4) / (-86)$$

Simplify the fraction:

$$x = 4 / 86$$

Reduce the fraction to lowest terms:

$$x = 2 / 43$$

Step 4: Verify the Solution

Substitute $x = 2/43$ back into the original equation:

Left side:

$$3(2/43) + 4 = (6/43) + 4$$

Express 4 as a fraction with denominator 43:

$$(6/43) + (4 \cdot 43/43) = (6/43) + (172/43) = (6 + 172) / 43 = 178/43$$

Right side:

$$89 \left(\frac{2}{43} \right) = (89 \cdot 2) / 43 = 178 / 43$$

Both sides equal $178/43$, confirming that $x = 2/43$ is indeed the solution.

Deeper Insights into Solving Equations with Variables on Both Sides

While the above example is straightforward, equations with variables on both sides can involve more complex manipulations. Here are critical insights and considerations:

Handling Special Cases

- No solution: When, after simplifying, you arrive at a contradiction such as $0x = \text{non-zero constant}$ (e.g., $0 = 5$), indicating that no value of x satisfies the equation.
- Infinite solutions: When both sides simplify to the same expression, such as $0x + c = 0x + c$, meaning any value of x works.

Common Pitfalls and How to Avoid Them

- Forgetting to perform the same operation on both sides.
- Sign errors during subtraction or division.
- Dividing by zero in cases where the coefficient of x becomes zero, which invalidates the solution process.

Best Practices for Solving

- Always write the steps explicitly.
- Simplify systematically.
- Check solutions by substitution.
- Be aware of special cases where the solution might be undefined or infinite.

Advanced Techniques and Variations

When equations grow more complex, additional strategies may be employed:

- Using substitution if the equation involves multiple variables.
- Applying algebraic identities for quadratic or higher-degree equations.
- Graphical interpretation: plotting the two sides as functions to locate intersection points.

However, for linear equations with variables on both sides like $3x + 4 = 89x$, the fundamental steps outlined above are sufficient and efficient.

Conclusion: The Systematic Path to Solution

Solving an equation with variables on both sides, such as $3x + 4 = 89x$, hinges on the methodical application of algebraic principles:

1. Combine like terms to gather all variable expressions on one side.

2. Simplify the resulting equation.
3. Isolate the variable by division.
4. Verify the solution to confirm correctness.

This approach not only yields the precise value of x but also deepens understanding of algebraic structures and problem-solving techniques. Mastery of these steps enhances mathematical literacy and prepares learners for more advanced topics involving equations, inequalities, and systems.

In the broader context of mathematical problem-solving, equations with variables on both sides serve as foundational exercises in logical reasoning, emphasizing clarity, systematic procedures, and verification—skills essential across scientific, engineering, and analytical disciplines.

Summary

- Equation: $3x + 4 = 89x$
- Solution steps:
 - Subtract $89x$ from both sides: $(3x - 89x) + 4 = 0$
 - Simplify: $-86x + 4 = 0$
 - Subtract 4: $-86x = -4$
 - Divide: $x = (-4)/(-86) = 2/43$
 - Verify: Both sides equal $178/43$ when $x = 2/43$

By adhering to this structured method, students and practitioners can confidently approach similar equations, ensuring accuracy and a deeper understanding of algebraic principles.

Explain How You Would Solve A Problem With Variables On Both Sides Of The Equation $3x + 4 = 89x$

Explain How You Would Solve A Problem With Variables On Both Sides Of The Equation $3x + 4 = 89x$

Related Articles

- [Name Given To The Soldiers Who Fought In The Vietnam War Gamers Tunnel Rats Grubs Grunts](#)
- [What Is The Slope Of The Line Passing Through The Points \(-3, 4\) And \(2, 1\)?3/51-5/3. -1](#)
- [What Details From The Narration Relate Rainsfords Impression Of Zaroff? Select 4 Options.](#)

[Back to Home](#)