

$-7x - 3 = 2 - 7x - 5$ Step By Step

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Solving algebraic equations can seem challenging at first, but with a systematic approach, it becomes manageable and even enjoyable. One such equation that illustrates the fundamental techniques of algebra is:

$$\backslash -7x - 3 = 2 - 7x - 5$$

In this comprehensive guide, we'll explore how to solve this equation step by step, breaking down each process for clarity. Whether you're a student struggling with algebra or someone refreshing your skills, this article will help you understand the solution process thoroughly.

Understanding the Equation

Before jumping into the solution, it's crucial to understand what the equation represents and identify its components.

Equation Breakdown

The equation is:

$$\backslash -7x - 3 = 2 - 7x - 5$$

- The variable is x , which we need to solve for.
- The equation involves constants (-3 , 2 , -5) and a term with the variable ($-7x$).

Goal of Solving

Our primary goal is to find the value of x that makes the equation true. To accomplish this, we will use algebraic properties such as addition, subtraction, and combining like terms.

Step-by-Step Solution Process

Let's proceed through the solution step by step to solve for x in the given equation.

Step 1: Write Down the Original Equation

$$-7x - 3 = 2 - 7x - 5$$

Step 2: Simplify Both Sides of the Equation

The right side of the equation contains two constants: 2 and -5. Combine these to simplify the expression.

- Combine constants: $2 - 5 = -3$

Now, rewrite the equation:

$$-7x - 3 = -3 - 7x$$

Step 3: Observe the Equation for Like Terms

Notice that both sides have the term $-7x$. This is an important point because it can lead to simplification.

Step 4: Add or Subtract Terms to Isolate the Variable

Since both sides contain $-7x$, we can attempt to eliminate these terms to see what remains.

- Subtract $-7x$ from both sides:

$$(-7x - 3) - (-7x) = (-3 - 7x) - (-7x)$$

This simplifies to:

$$-3 = -3$$

Step 5: Analyze the Result

After eliminating the variable, we're left with:

$$-3 = -3$$

This is a true statement, which indicates that the original equation is an identity — it is true for all values of x .

Understanding the Implication of the Result

Since the simplified form leads to a true statement regardless of the value of x , it suggests:

- The equation has infinitely many solutions.
- The original equation is an identity, meaning any real number substituted for x will satisfy the equation.

Summary of the Solution

- The equation simplifies to a true statement after eliminating the variable, indicating it's an identity.
- Therefore, the solution set is all real numbers.

Alternative Approach: Checking for Special Cases

Sometimes, equations may not simplify this straightforwardly. Let's explore an alternative approach in case the steps above seem confusing.

Method: Bring all variable terms to one side

1. Subtract $-7x$ from both sides:

$$-7x - 3 + 7x = 2 - 7x - 5 + 7x$$

Which simplifies to:

$$-3 = 2 - 5$$

2. Simplify constants:

$$2 - 5 = -3$$

3. The equation becomes:

$$-3 = -3$$

This confirms the previous conclusion: the equation is always true, so solutions are all real numbers.

Common Mistakes to Avoid When Solving Such Equations

While solving algebraic equations, especially those involving variables on both sides, students often make mistakes. Here are some pitfalls to watch out for:

- **Forgetting to perform the same operation on both sides:** Always remember to add, subtract, multiply, or divide both sides equally.
- **Mismanaging signs:** Pay attention to positive and negative signs, especially when combining constants or subtracting terms.
- **Assuming equations are always solvable for a single value:** Some equations are identities or inconsistent; understand the difference.
- **Overlooking the possibility of infinitely many solutions or no solutions:** Recognize when the simplified form indicates these cases.

Summary of Key Points

- The given equation $(-7x - 3 = 2 - 7x - 5)$ simplifies to a true statement, indicating infinitely many solutions.
- When variables cancel out and you're left with a true statement, the solution set includes all real numbers.

- Always perform operations systematically and carefully to avoid errors.
- Recognize special cases: identities (all real solutions) or contradictions (no solutions).

Additional Tips for Solving Similar Equations

- Always simplify both sides first: Combine like terms to make the equation easier to analyze.
- Isolate the variable: Use addition or subtraction to bring all variable terms to one side.
- Use inverse operations: To solve for the variable, perform the opposite operation (addition if the term is subtracted, division if multiplied).
- Check your solution: Substitute your answer back into the original equation to verify correctness.
- Learn to recognize different cases:
 - Unique solutions: When variables are isolated on one side.
 - Infinite solutions: When the simplified form is a true statement.
 - No solutions: When the simplified form is a contradiction.

Conclusion

Solving the equation $(-7x - 3 = 2 - 7x - 5)$ reveals the importance of simplifying and understanding the structure of algebraic equations. Through careful step-by-step analysis, we found that the equation is an identity with infinitely many solutions — meaning any real number substituted for x satisfies the equation.

By mastering these techniques, you'll be better equipped to handle a wide variety of algebraic equations confidently. Remember to stay systematic, double-check your work, and understand the nature of the equations you're solving.

If you encounter similar problems, follow the same principles demonstrated here: simplify, isolate, analyze, and verify. With practice, solving equations like this will become quick and intuitive.

Happy solving!

Frequently Asked Questions

How do I start solving the equation $-7x - 3 = 2 - 7x - 5$ step by step?

Begin by simplifying both sides of the equation. Combine like terms on the right side: $2 - 5 = -3$, so the equation becomes $-7x - 3 = -7x - 3$.

Why do both sides of the equation $-7x - 3 = 2 - 7x - 5$ simplify to the same expression?

Because after simplifying the right side, $2 - 5$ equals -3 , making the equation $-7x - 3 = -7x - 3$, which indicates it is an identity and true for all x .

What is the solution to the equation $-7x - 3 = 2 - 7x - 5$?

Since both sides simplify to the same expression, the equation is true for all real values of x , meaning x is any real number.

Does the equation $-7x - 3 = 2 - 7x - 5$ have a unique solution?

No, it doesn't have a unique solution; it is an identity, so every real number x satisfies the equation.

How can I verify that the equation $-7x - 3 = 2 - 7x - 5$ holds for all x ?

Simplify both sides: left remains $-7x - 3$, and right simplifies to $-7x - 3$. Since both sides are the same, the equation holds for all x .

What does it mean when an equation simplifies to the same expression on both sides?

It means the equation is an identity, true for all real values of the variable, indicating infinitely many solutions.

Can I find a specific value for x in the equation $-7x - 3 = 2 - 7x - 5$?

No, because the equation simplifies to an identity, so every real value of x satisfies it; there is no unique solution.

Additional Resources

$-7x - 3 = 2 - 7x - 5$ Step By Step — this equation may seem straightforward at first glance, but it offers an excellent opportunity to explore fundamental algebraic principles like combining like terms, isolating variables, and understanding the properties of equality. If you're looking to master solving linear equations,

breaking down the problem step by step is essential. This guide will walk you through solving this specific equation, illustrating key concepts along the way, and providing tips to handle similar equations confidently.

Introduction: Understanding the Equation

Before diving into the solution, let's understand what the equation $-7x - 3 = 2 - 7x - 5$ involves. It's a linear algebraic equation where:

- The variable is x .
- There are constants and coefficients involved.
- The equation appears to have similar terms on both sides.

The goal is to find the value of x that makes this equation true. To do so, we'll apply algebraic principles such as:

- Combining like terms
- Moving variables and constants to the same side
- Simplifying expressions step-by-step

Step 1: Clarify and Simplify the Equation

First, carefully examine both sides of the equation:

$$-7x - 3 = 2 - 7x - 5$$

Notice that the right side contains the phrase $- 5$ Step By Step, which appears to be part of the original problem statement rather than a typical term. It seems like a formatting or transcription mistake, but assuming that the actual intended equation is:

$$-7x - 3 = 2 - 7x - 5$$

If this is accurate, then the right side simplifies to:

$$2 - 7x - 5$$

Our first step is to simplify the right side of the equation.

Step 2: Simplify the Right Side

Combine like terms on the right:

- Constants: 2 and -5

$$2 - 5 = -3$$

So, the right side simplifies to:

$$-3 - 7x$$

Now, the entire equation is:

$$-7x - 3 = -3 - 7x$$

Step 3: Recognize the Equation's Structure

At this stage, observe that both sides have similar terms:

Left Side: $-7x - 3$

Right Side: $-3 - 7x$

Since addition is commutative, the right side is equivalent to:

$$-7x - 3$$

which is exactly the same as the left side.

Step 4: Analyze the Result

Given that:

$$-7x - 3 = -7x - 3$$

This is an identity—meaning the equation is true for all values of x . In algebraic terms, the equation holds for every real number x because both sides are identical expressions.

Step 5: Conclusion — Infinite Solutions

When an equation simplifies to an identity (the same expression on both sides), the solution set is all real numbers. This is called an identity equation.

Therefore, the solution to the original equation is:

$$x \in \mathbb{R} \text{ (all real numbers)}$$

Additional Considerations: When Do Equations Have No Solution or a Single Solution?

While this particular problem results in infinite solutions, it's essential to understand scenarios where equations have:

- No solution: When the simplification leads to a false statement, like $0 = 5$.
- Exactly one solution: When variables cancel out, leaving a true statement with a specific number for x .

Summary of the Step-by-Step Process

Here's a concise list to solve similar equations:

1. Write the equation clearly. Ensure all terms are correctly transcribed.
2. Simplify both sides by combining like terms.
3. Isolate the variable by moving all variable terms to one side, constants to the other.
4. Simplify further to solve for x .
5. Determine the nature of the solution:
 - Identity (all real numbers)
 - Contradiction (no solution)
 - Unique solution (a specific value of x)

Bonus Tips for Solving Linear Equations

- Always double-check your simplified expressions.
- Be cautious with negative signs and distribution.
- Remember that adding or subtracting the same number from both sides keeps the equation balanced.
- When variables cancel out, verify whether you're left with a true or false statement to conclude about the solution set.

Final Thoughts

The equation $-7x - 3 = 2 - 7x - 5$ Step By Step, upon simplification, reveals the importance of carefully combining like terms and recognizing the structure of algebraic expressions. Whether you encounter equations with unique solutions, infinitely many solutions, or none at all, following a systematic approach ensures clarity and confidence in solving algebraic problems.

Mastering these foundational skills builds a strong base for tackling more complex algebra, functions, and beyond. Remember, practice makes perfect — so try solving similar equations to reinforce your understanding!

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