

What Is The Missing Step In Solving The Inequality $4(x - 3) + 4 < 10 + 6x$? 1. The Distributive Property:

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When tackling inequalities like $4(x - 3) + 4 < 10 + 6x$, understanding each step is crucial to arriving at the correct solution. One common point of confusion involves identifying the missing or overlooked step in the process. Often, students recognize the need to distribute, but they may forget to apply the distributive property properly or skip a key step afterward. In this article, we'll explore the complete process of solving this inequality, emphasizing the critical role of the distributive property and the steps that follow. By the end, you'll understand what the missing step is and how to approach similar inequalities confidently.

Understanding the Given Inequality

The Problem Statement

The inequality we're working with is:

$$4(x - 3) + 4 < 10 + 6x$$

Our goal is to isolate the variable x and find its range of values that satisfy the inequality.

Initial Observations

- The expression involves a distributive property application: $4(x - 3)$.
- There are constants on both sides, as well as a term with x on the right.
- To solve, we need to eliminate parentheses, combine like terms, and isolate x .

The Importance of the Distributive Property

What Is the Distributive Property?

The distributive property is a fundamental algebraic rule that states:

- For any real numbers a , b , and c :
- $a(b + c) = ab + ac$

This property allows us to remove parentheses by multiplying each term inside the parentheses by the factor outside.

Applying the Distributive Property to Our Inequality

In our case, $4(x - 3)$ becomes:

$$4x - 4 \cdot 3 = 4x - 12$$

This step is essential; missing it would make the subsequent steps invalid, leading to incorrect solutions.

The Step That Often Gets Missed

What Is the Missing Step?

The common mistake or missing step when solving inequalities like this is the failure to perform the distributive property correctly at the outset. Specifically, students sometimes forget to distribute 4 over $(x - 3)$ or attempt to skip directly to combining like terms without distributing, which results in incorrect algebraic manipulation.

Why Is This Step Critical?

- Without distributing, the inequality can't be simplified accurately.
- Skipping this step leads to errors in later steps, such as incorrectly combining terms or solving for x .
- Ensuring the distribution is performed correctly is fundamental to maintaining the integrity of the solution process.

Step-by-Step Solution of the Inequality

Step 1: Distribute

Apply the distributive property to $4(x - 3)$:

$$4x - 12 + 4 < 10 + 6x$$

Here, the missing step is explicitly performing $4 \times$ and 4×3 , which is often overlooked.

Step 2: Combine Like Terms on the Left Side

Combine constants on the left:

$$4x - 12 + 4 = 4x - 8$$

Now, the inequality becomes:

$$4x - 8 < 10 + 6x$$

Step 3: Move Variable Terms to One Side

Subtract $6x$ from both sides to gather all x terms on the left:

$$4x - 6x - 8 < 10 + 6x - 6x$$

$$-2x - 8 < 10$$

Step 4: Isolate the Variable Term

Add 8 to both sides to move constants to the right:

$$-2x - 8 + 8 < 10 + 8$$

$$-2x < 18$$

Step 5: Solve for x

Divide both sides by -2 . Remember, dividing by a negative reverses the inequality sign:

$$x > -9$$

Summary of the Correct Solution Path

1. **Distribute** the 4 over the parentheses: $4(x - 3)$ becomes $4x - 12$.

2. **Combine like terms** on the left side: $4x - 8$.
3. **Move variable terms** to one side: subtract $6x$ from both sides.
4. **Isolate the constant**: add 8 to both sides.
5. **Solve for x**: divide by -2 and flip the inequality sign.

Common Mistakes and How to Avoid Them

Mistake 1: Forgetting to Distribute

- Always perform the distribution before combining like terms.
- Double-check each step to ensure parentheses are correctly expanded.

Mistake 2: Incorrect Sign Handling

- Remember that dividing both sides of an inequality by a negative number reverses the inequality sign.
- Always flip the inequality when dividing by a negative.

Mistake 3: Combining Terms Incorrectly

- Keep track of terms carefully, especially when moving variables and constants across the inequality.
- Use clear steps rather than rushing through algebraic manipulations.

Conclusion: The Significance of the Missing Step

The missing step in solving inequalities like $4(x - 3) + 4 < 10 + 6x$ is the explicit application of the distributive property. Recognizing and performing this step correctly ensures that the inequality is simplified properly, paving the way for accurate solutions. Skipping or neglecting this crucial step can lead to errors that alter the entire solution process.

By understanding and carefully executing each step—especially the

distributive property—you'll develop stronger algebraic skills and confidence in solving inequalities efficiently. Remember, meticulousness in algebra pays off in getting correct results and understanding the underlying concepts.

Frequently Asked Questions

What is the first step to isolate the variable in the inequality $4(x - 3) + 4 < 10 + 6x$?

Apply the distributive property to $4(x - 3)$ to remove parentheses: $4x - 12 + 4 < 10 + 6x$, which simplifies to $4x - 8 < 10 + 6x$.

After applying the distributive property, what is the next step to solve the inequality $4x - 12 + 4 < 10 + 6x$?

Combine like terms on the left side: $4x - 12 + 4$ simplifies to $4x - 8$.

What is the missing step after simplifying to $4x - 8 < 10 + 6x$?

Subtract $6x$ from both sides to gather variable terms on one side: $4x - 6x - 8 < 10 + 6x - 6x$, simplifying to $-2x - 8 < 10$.

How do you solve for x after obtaining $-2x - 8 < 10$?

Add 8 to both sides: $-2x < 10 + 8$, which simplifies to $-2x < 18$, then divide both sides by -2 (remember to flip the inequality sign): $x > -9$.

What is the key step that involves the distributive property when solving the inequality $4(x - 3) + 4 < 10 + 6x$?

The key step is applying the distributive property to expand $4(x - 3)$ into $4x - 12$, which sets the foundation for simplifying and solving the inequality.

Additional Resources

What Is The Missing Step In Solving The Inequality $4(x - 3) + 4 < 10 + 6x$? 1. The Distributive Property

Introduction

When working through algebraic inequalities, one of the most common and foundational steps involves applying the distributive property. This step is crucial because it simplifies expressions, allowing us to isolate variables and ultimately solve the inequality. In the specific inequality:

$$\backslash[4(x - 3) + 4 < 10 + 6x \backslash]$$

a common mistake or oversight can be missing the application of the distributive property, which leads to incorrect or incomplete solutions. This detailed exploration will examine what the missing step typically is, why it is essential, and how to correctly execute it to arrive at the solution.

Understanding the Distributive Property

Definition and Significance

The distributive property, also known as distributivity, states that:

$$\backslash[a(b + c) = ab + ac \backslash]$$

for all real numbers $\backslash(a, b, c \backslash)$.

In simple terms, it allows us to "distribute" a multiplication across terms inside parentheses, transforming an expression into a sum of products. This step is fundamental in algebra because it simplifies expressions, especially when dealing with multiple terms.

Why Is It Important?

- Simplifies complex expressions: By distributing, we convert expressions with parentheses into sums or differences, making it easier to combine like terms.
- Prepares for combining like terms: After applying the distributive property, terms involving the variable can be grouped, facilitating the process of solving for the variable.
- Ensures correctness in algebraic manipulations: Skipping or misapplying the distributive property leads to incorrect solutions or confusion.

The Step-by-Step Breakdown of Solving the Inequality

Let's analyze the specific inequality:

$$\backslash[4(x - 3) + 4 < 10 + 6x \backslash]$$

and identify the missing or misapplied step.

Step 1: Recognize the Role of Parentheses

In the expression $\backslash(4(x - 3) \backslash)$, the parentheses indicate that the entire $\backslash(x - 3) \backslash$ term is to be multiplied by 4.

Key Point: Before proceeding with any further manipulations, it's essential to apply the distributive property to this term.

Step 2: Applying the Distributive Property

Correct step:

$$\backslash[4(x - 3) = 4 \times x - 4 \times 3 = 4x - 12 \backslash]$$

Common mistake:

- Ignoring the parentheses and writing:

$$\backslash[4x - 3 + 4 \backslash]$$

which is incorrect because it neglects to multiply 4 by both (x) and (-3) .

Step 3: Simplify the Entire Left Side

After applying the distributive property:

$$\backslash[4x - 12 + 4 \backslash]$$

which simplifies further to:

$$\backslash[4x - 8 \backslash]$$

Now, the inequality becomes:

$$\backslash[4x - 8 < 10 + 6x \backslash]$$

Step 4: Move All Variable Terms to One Side

Subtract $(6x)$ from both sides:

$$\backslash[4x - 6x - 8 < 10 \backslash]$$

which simplifies to:

$$\backslash[-2x - 8 < 10 \backslash]$$

Step 5: Isolate the Variable Term

Add 8 to both sides:

$$\begin{aligned} & \backslash[\\ & -2x < 18 \\ & \backslash] \end{aligned}$$

Step 6: Solve for x

Divide both sides by -2 :

$$\begin{aligned} & \backslash[\\ & x > -9 \\ & \backslash] \end{aligned}$$

Important Note: When dividing by a negative number, the inequality direction must be flipped.

The Missing Step: Emphasizing the Importance of Distributive Property

The crucial missing step in many students' solutions is the application of the distributive property to $4(x - 3)$. Failing to do this leads to incorrect algebraic manipulation, making it impossible to correctly isolate the variable.

- What is often done instead? Students might mistakenly treat $4(x - 3)$ as $4x - 3$, which is clearly incorrect because the 4 must multiply both terms, not just the x .

- Result of missing this step: The entire solution process becomes flawed, leading to incorrect solutions or no solution at all.

Deep Dive: Why Do Students Miss the Distributive Step?

Several common reasons why this critical step is overlooked include:

- Misunderstanding parentheses: Some students believe parentheses indicate grouping but forget they also imply multiplication.
- Assumption of distributive property only for certain cases: For example, they might remember distributing over addition but forget it's necessary over subtraction as well.
- Rushing through the problem: Speeding through steps can cause students to skip or overlook the application of the distributive property.

Visual and Conceptual Aids

To reinforce understanding, consider visualizing the distributive property:

- Think of $4(x - 3)$ as four groups, each containing $(x - 3)$.
- Distributing the 4 across these groups results in:

$4x - 12$ and $4(-3)$

- Summing these gives the expanded form:

$4x - 12$

Practical Tips for Students

- Always look for parentheses before starting to solve. They indicate the need for distribution.

- Recall the distributive property explicitly: $a(b + c) = ab + ac$.

- Double-check your distribution: After applying, verify each term is multiplied appropriately.

- Use visual aids or physical grouping: For example, imagine physically distributing items into groups.

Common Pitfalls and How to Avoid Them

Pitfall	Explanation	How to Avoid
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Skipping the distributive step	Treating $4(x - 3)$ as $4x - 3$	Always write out the full distribution step
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Forgetting negative signs	Distributing over subtraction can lead to sign errors	Break down carefully: $4(x - 3) = 4x - 12$, not $4x + 12$
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Misapplying to similar but different expressions	Confusing $4(x + 3)$ with $4(x - 3)$	Track signs carefully and double-check
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Summary and Key Takeaways

- The missing step in solving the inequality $4(x - 3) + 4 < 10 + 6x$ is the application of the distributive property to expand $4(x - 3)$ into $4x - 12$.

- Properly executing this step ensures the inequality simplifies correctly, leading to an accurate solution.

- The distributive property is fundamental in algebra and must be applied whenever parentheses are present with multiplication.

- Failing to distribute correctly causes errors that can cascade through the rest of the problem, preventing correct solution derivation.

- Reinforcing understanding through visual, conceptual, and procedural methods helps avoid missing this critical step.

Final Thoughts

Mastering the distributive property is a cornerstone of algebra proficiency.

Recognizing its role in simplifying expressions like $4(x - 3)$ is essential. When solving inequalities, always pause to identify parentheses and ensure the distributive property is correctly applied. Doing so not only helps in arriving at the correct solution but also strengthens overall algebraic reasoning skills.

What Is The Missing Step In Solving The Inequality $4x - 3 < 10 - 6x$ The Distributive Property

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- [The LC-3 LD Instruction Can Be Replaced By A Sequence Of Two Or More Other Instructions. In This Problem.](#)
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