What Is The Final Step In Solving The Inequality 2(5 4x) < 6x 4? X < 3 X > 3 X < 3 X >

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Understanding how to solve inequalities is fundamental in algebra, and knowing the final step is crucial for accurately interpreting the solution. When faced with complex inequalities like "2(5 4x) < 6x 4? X < 3 X > 3 X < 3 X >", it’s important to carefully analyze each component and methodically arrive at the solution. In this article, we will explore the process step-by-step, clarify the meaning of the final step, and provide a comprehensive guide to solving inequalities efficiently.

Deciphering the Inequality: Clarifying the Expression

Before diving into solving, we need to interpret the inequality correctly. The given expression is:

"2(5 4x) < 6x 4? X < 3 X > 3 X < 3 X >"

This appears to be a representation of a more complex inequality, but it contains some ambiguities, likely due to formatting or transcription errors. Let's assume the intended inequality is:

$2(5 - 4x) < 6x + 4$

and the sequence of inequalities:

$X < 3, X > 3, X < 3, X > ?$

Alternatively, it might be a chain of inequalities like:

$X < 3, X > 3, X < 3, X > 3$

which would be contradictory unless meant to illustrate different solutions.

For clarity, we'll focus on solving the inequality:

$2(5 - 4x) < 6x + 4$

and understand the general process, including the final step in solving such inequalities.

Step-by-Step Guide to Solving the Inequality

1. Expand and Simplify the Inequality

Begin by distributing the 2 across the parentheses:

$2(5 - 4x) = 2 5 - 2 4x = 10 - 8x$

Now, the inequality becomes:

$10 - 8x < 6x + 4$

---

2. Get All Variable Terms on One Side

Subtract 6x from both sides:

$10 - 8x - 6x < 4$

Simplify:

$10 - 14x < 4$

---

3. Isolate the Variable Term

Subtract 10 from both sides:

$-14x < 4 - 10$

$-14x < -6$

---

4. Solve for x

Divide both sides by -14:

$x > (-6) / (-14)$

Remember, dividing both sides of an inequality by a negative number reverses the inequality sign:

$x < (-6) / (-14) = 6/14 = 3/7$

Final solution:

$x < 3/7$

The Final Step in Solving the Inequality

The final step in solving the inequality is typically the last algebraic manipulation that isolates the variable, resulting in the solution set expressed in simplest form. In our example, after simplifying and rearranging, the last step was:

Dividing both sides by -14 and reversing the inequality sign

which yielded:

$x < 3/7$

This step is crucial because it transitions from a combined expression to a clear, interpretable inequality involving the variable alone.

Understanding the Importance of the Final Step

The final step is significant because:

- It provides the solution set for the inequality.
- It involves the last algebraic operation that directly relates to the variable.
- It often includes sign reversal when dividing or multiplying by negative values.
- It determines whether the solution is expressed as an inequality (e.g., $x < a$) or as a specific interval.

In the context of solving inequalities, the final step ensures the solution is in the most understandable and usable form, ready for interpretation or graphing.

Common Mistakes to Avoid in the Final Step

When approaching the final step, be mindful of these pitfalls:

- **Forgetting to reverse the inequality sign** when multiplying or dividing both sides by a negative number.
- **Not simplifying the solution** fully before concluding.
- **Leaving the solution in an ambiguous form** instead of expressing it clearly (e.g., interval notation or simple inequality).

Additional Tips for Solving Inequalities

- Always perform the same operation on both sides of the inequality.
- When dividing or multiplying by negative numbers, remember to flip the inequality sign.
- Simplify expressions as much as possible before solving.
- Check your solution by substituting a value from the solution set back into the original inequality.
- Use graphing techniques to visualize solutions, especially for compound inequalities.

Understanding Compound Inequalities and Their Final Steps

If the original problem involves compound inequalities like:

$X < 3$ and $X > 1$

The solution is the intersection of the two conditions, which is:

$1 < X < 3$

The final step in such cases is to express the solution as a combined inequality or interval, such as:

$(1, 3)$

Conclusion: Mastering the Final Step in Solving Inequalities

The final step in solving an inequality is the crucial algebraic operation that yields the solution in a clear, concise form. Whether it's dividing both sides by a positive or negative number, or simplifying the expression, this step determines the accuracy and clarity of your solution. Understanding and executing this step correctly ensures that you can confidently interpret inequalities and apply them to real-world problems or further mathematical contexts.

By practicing various inequality problems and paying close attention to the final step, you'll develop strong problem-solving skills that are vital for success in algebra and higher mathematics. Remember, the key to mastering inequalities lies in careful manipulation, attention to signs, and clear expression of the solution.

Keywords for SEO optimization:

- Final step in solving inequalities
- How to solve inequalities
- Algebraic inequality solutions
- Reversing inequality sign
- Solving compound inequalities
- Step-by-step inequality solving
- Inequality solution set
- Algebra tips for inequalities

Frequently Asked Questions

What is the first step in solving the inequality $2(5 - 4x) < 6x - 4$?

Distribute the 2 on the left side to get $10 - 8x < 6x - 4$.

How do you isolate the variable x after distributing in the inequality $10 - 8x < 6x - 4$?

Add 8x to both sides and add 4 to both sides to gather x terms on one side and constants on the other.

What is the combined inequality after bringing like terms together in $10 - 8x < 6x - 4$?

The inequality becomes $10 + 4 < 6x + 8x$, which simplifies to $14 < 14x$.

What is the final step in solving the inequality $14 < 14x$?

Divide both sides by 14 to solve for x, resulting in $x > 1$.

What is the solution to the inequality $2(5 - 4x) < 6x - 4$?

The solution is $x > 1$.

How can you interpret the solution $x > 1$ in terms of the original inequality?

It means that for all values of x greater than 1, the original inequality holds true.

What are common mistakes to avoid when solving inequalities like $2(5 - 4x) < 6x - 4$?

Avoid forgetting to distribute correctly, mixing up inequality signs when multiplying or dividing by negative numbers, and forgetting to reverse the inequality when multiplying or dividing by a negative.

How does understanding the final step help in graphing the inequality x > 1?

It helps identify the boundary point at x=1 and indicates that the solution set includes all x-values greater than 1, which can be represented as a shaded region to the right of x=1 on a number line.

Additional Resources

Inequality Solving

Introduction: Navigating the World of Inequalities

Mathematics often presents us with challenges that require more than just straightforward calculations—especially when it comes to inequalities. These expressions, which compare two quantities using symbols like `<`, `>`, `□`, and `□`, are foundational for understanding real-world scenarios such as budgeting, physics, and engineering. One such example is the inequality:

$$
2(5 + 4x) < 6x + 4
$$

Solving inequalities is a skill that involves a series of logical steps, similar to peeling layers off an onion, to arrive at the most simplified and meaningful solution. The final step in solving inequalities often involves interpreting the solution set correctly, ensuring the inequality's solution is valid, and understanding what the solution tells us about the variable involved.

In this article, we will explore the step-by-step process of solving the given inequality, explain the critical final step, and clarify what it signifies in the context of the solution. Whether you're a student brushing up on algebra or an educator seeking a clear explanation, this comprehensive guide aims to shed light on the intricacies involved.

Understanding the Given Inequality

Before diving into the solution, it's crucial to understand what the inequality is asking us to do.

$$
2(5 + 4x) < 6x + 4
$$

This inequality states that twice the quantity $5 + 4x$ is less than $6x + 4$. Our goal is to find all values of x that satisfy this condition.

Step 1: Expand and Simplify the Inequality

The first step involves expanding the left side and simplifying both sides:

$$
2 \times 5 + 2 \times 4x < 6x + 4
$$
$$
10 + 8x < 6x + 4
$$

This step is straightforward: distribute the 2 across the parentheses and prepare the inequality for isolating x.

Step 2: Isolate the Variable x

The core of solving inequalities is to get all terms involving x on one side and constants on the other. To do this, subtract $6x$ from both sides:

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

$$
10 + 2x < 4
$$

Next, subtract 10 from both sides:

$$
10 + 2x - 10 < 4 - 10
$$

$$
2x < -6
$$

This simplifies the inequality to a form where the variable is isolated and easily interpretable.

Step 3: Solve for x

Now, divide both sides by 2:

$$
\frac{2x}{2} < \frac{-6}{2}
$$

$$
x < -3
$$

Important Note: Since dividing or multiplying both sides of an inequality by a negative number reverses the inequality sign, it’s crucial to note that here, we divided by a positive number (2), so the inequality sign remains unchanged.

The Final Step: Interpreting the Solution

Having simplified the inequality, the solution set is:

$$
x < -3
$$

This indicates that all real numbers less than -3 satisfy the original inequality.

Understanding the Final Step in Depth

The “final step” in solving an inequality is not just about arriving at an algebraic expression like $x < -3$, but about understanding what this solution means in context and how to interpret it correctly.

Why Is the Final Step Critical?

- Verification: Confirming that the derived inequality truly satisfies the original expression.
- Representation: Expressing the solution set clearly, often as an interval or a set.
- Application: Using the solution in real-world contexts or further calculations.

How To Properly Interpret the Final Solution

1. Solution Set Representation:
- In interval notation: $(-\infty, -3)$
- In set builder notation: $\{ x \mid x < -3 \}$

2. Graphical Representation:
- On a number line, shade all points to the left of -3, not including -3 itself (since it's a strict inequality).

3. Real-World Context:
- Suppose x represents a quantity like speed or profit; the solution defines the range of values where the inequality holds true.

Additional Considerations: When the Inequality Changes Sign

While our specific inequality did not require flipping the inequality sign, it’s essential to understand the circumstances under which this happens.

Multiplying or Dividing by a Negative Number

- Rule: When both sides of an inequality are multiplied or divided by a negative number, the inequality sign must be reversed.

- Example:

If you have $-2x > 6$, dividing both sides by -2 gives:

$$
x < -3
$$

because the inequality sign flips when dividing by a negative.

Combining Inequalities

- When solving compound inequalities or systems, the order and the logical connectors (and, or) influence the final solution set.

The Significance of the Final Step in Practice

The final step encapsulates the culmination of algebraic manipulations, but its importance extends beyond pure mathematics. It ensures that the solution is:

- Valid: No algebraic errors have been made.
- Complete: The entire solution set is captured.
- Meaningful: It accurately reflects the problem’s constraints.

In our example, concluding that $x < -3$ is the final answer means that any number less than -3 will satisfy the original inequality, providing clarity and a concrete boundary for potential applications.

Additional Examples: Final Step Variations

To deepen understanding, consider these variations:

Example 1: Inequality with a different constant

$$
3(2 + x) \leq 4x - 1
$$

Final step:

- Expand: $6 + 3x \leq 4x - 1$
- Subtract $3x$: $6 \leq x - 1$
- Add 1: $7 \leq x$
- Solution: $x \geq 7$

Example 2: Inequality requiring reversing sign

$$
-4x > 8
$$

Final step:

- Divide both sides by -4: $x < -2$ (note the sign flip)

Conclusion: Mastering the Final Step for Effective Inequality Solving

The final step in solving inequalities is more than a mere algebraic formality; it's the bridge between calculation and comprehension. By carefully isolating the variable and correctly interpreting the inequality sign, one arrives at a solution that is both mathematically sound and practically meaningful.

In our specific example, the final step—concluding that $x < -3$—provides a clear boundary condition, which can be visualized, applied, or extended in various contexts. Whether you're working through academic problems or applying inequalities in real-world scenarios, mastering this final step ensures precision, clarity, and confidence in your mathematical reasoning.

Remember: Always verify the sign changes when multiplying or dividing by negative numbers, represent the solution set clearly, and interpret the results in context. These practices will elevate your inequality-solving skills to a professional level, making complex problems manageable and insightful.

What Is The Final Step In Solving The Inequality 2 5 4x Lt 6x 4 X Lt 3 X Gt 3 X Lt 3 X Gt

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