

Solve The Inequality $6 (X/2 + 4) > 9$

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Understanding how to approach and solve inequalities is a fundamental skill in algebra that helps in various mathematical and real-world applications. In this article, we will delve into the step-by-step process of solving the inequality $6 (X/2 + 4) > 9$. By exploring the concepts involved, providing detailed explanations, and offering tips for mastering inequality problems, this guide aims to enhance your algebraic problem-solving skills.

Understanding the Inequality: $6 (X/2 + 4) > 9$

Before diving into the solution, it's essential to understand what the inequality represents and the basic principles involved.

Breaking Down the Inequality

The inequality $6 (X/2 + 4) > 9$ involves a linear expression within parentheses multiplied by a coefficient outside the parentheses. The goal is to find all values of X that satisfy the inequality.

Key components:

- The coefficient 6 multiplies the expression $(X/2 + 4)$.
- The inner expression $X/2 + 4$ involves a fraction and a constant term.
- The inequality is strict, indicated by $>$ (greater than), meaning solutions do not include equality.

Why Solve Inequalities?

Solving inequalities allows you to determine the range of values that satisfy certain conditions, which is vital in fields like finance, physics, engineering, and everyday decision-making.

Step-by-Step Solution of the Inequality

Let's now proceed through the process of solving $6 \left(\frac{X}{2} + 4 \right) > 9$ systematically.

Step 1: Simplify the Expression

Begin by distributing the 6 across the terms inside the parentheses:

$$6 \left(\frac{X}{2} + 4 \right) = 6 \times \frac{X}{2} + 6 \times 4$$

Calculate each term:

$$\begin{aligned} - \left(6 \times \frac{X}{2} = 6 \times \frac{X}{2} = \frac{6X}{2} = 3X \right) \\ - \left(6 \times 4 = 24 \right) \end{aligned}$$

So, the inequality simplifies to:

$$3X + 24 > 9$$

Step 2: Isolate the Variable Term

Subtract 24 from both sides to move constants to one side:

$$3X + 24 - 24 > 9 - 24$$

This simplifies to:

$$3X > -15$$

Step 3: Solve for X

Divide both sides by 3 to isolate X:

$$\frac{3X}{3} > \frac{-15}{3}$$

\]

\[
 $X > -5$
\]

Solution: The set of all X such that $X > -5$.

Interpreting the Solution

The inequality $X > -5$ signifies that any real number greater than -5 satisfies the original inequality.

Graphical Representation

- On a number line, the solution is represented as an open interval extending to the right of -5 .
- The point -5 is not included due to the strict inequality $>$.

Graph:

```
```plaintext
<====0----->
-5
```
```

- The open circle at -5 indicates the exclusion of -5 itself.
- The shading to the right indicates all values greater than -5 .

Solution Set in Interval Notation

\[
 $(-5, \infty)$
\]

Additional Tips for Solving Inequalities

Mastering inequality problems involves understanding various concepts and applying best practices.

1. Always Simplify First

- Distribute multiplication over parentheses.
- Combine like terms.
- Simplify fractions where possible.

2. Be Careful When Dividing or Multiplying by Negative Numbers

- Remember, multiplying or dividing both sides of an inequality by a negative number reverses the inequality sign.
- In this problem, since we divided by a positive number (3), the inequality sign remained the same.

3. Maintain the Direction of the Inequality

- When performing operations, keep track of the inequality sign.
- Verify whether you need to flip the inequality when multiplying or dividing by negatives.

4. Check Your Solution

- Substitute some values from the solution set into the original inequality to verify correctness.
- For $X = 0$ (which is greater than -5), check:

$$\begin{aligned} &6 \left(\frac{0}{2} + 4 \right) = 6 \times (0 + 4) = 6 \times 4 = 24 \end{aligned}$$

Since $24 > 9$, the solution holds.

- For $X = -6$ (which is less than -5), check:

$$\begin{aligned} &6 \left(\frac{-6}{2} + 4 \right) = 6 \times (-3 + 4) = 6 \times 1 = 6 \end{aligned}$$

Since $6 > 9$ is false, $X = -6$ is not part of the solution.

Real-World Applications of Solving Inequalities

Understanding and solving inequalities is crucial in various contexts:

- Budgeting and Finance: Determining the minimum income needed to afford a purchase.
- Physics: Finding ranges of velocity or force that satisfy safety conditions.
- Engineering: Ensuring that design parameters stay within specified limits.
- Statistics: Establishing confidence intervals and thresholds.

Conclusion

Solving the inequality $6(X/2 + 4) > 9$ involves straightforward algebraic steps: expanding, isolating the variable, and interpreting the solution. The key takeaways include simplifying expressions, carefully managing inequality signs, and understanding the solution's graphical and interval representations. This process not only reinforces fundamental algebra skills but also enhances analytical thinking required in various academic and practical fields.

Remember, practice makes perfect. Try solving similar inequalities to build confidence and proficiency in algebraic problem-solving. Whether you encounter linear, quadratic, or more complex inequalities, the principles remain consistent: simplify, isolate, and interpret.

Keywords: solve inequality, algebraic inequalities, linear inequalities, inequality solution, solving for X, inequality steps, inequality graph, interval notation, algebra tips, inequality applications

Frequently Asked Questions

How do I start solving the inequality $6(X/2 + 4) > 9$?

Begin by expanding the expression: $6(X/2 + 4)$ and then simplify both sides to isolate X.

What is the first step in solving $6 (X/2 + 4) > 9$?

Distribute 6 across the parentheses: $6 X/2 + 6 4 > 9$, which simplifies to $3X + 24 > 9$.

How do I solve for X after expanding $6 (X/2 + 4) > 9$?

Subtract 24 from both sides to get $3X > -15$, then divide both sides by 3 to find $X > -5$.

What is the solution to the inequality $6 (X/2 + 4) > 9$?

The solution is $X > -5$.

Can the inequality $6 (X/2 + 4) > 9$ be rewritten in a simpler form?

Yes, after simplification, it becomes $X > -5$.

What does the solution $X > -5$ mean in terms of graphing?

It means all real numbers greater than -5 satisfy the inequality, which can be represented as a ray extending to the right on the number line.

Are there any restrictions on X in this inequality?

No, because the inequality involves only linear expressions without any divisions by zero, so X can be any real number greater than -5.

How can I check if a specific value, say $X = 0$, satisfies the inequality?

Plug $X = 0$ into the original inequality: $6 (0/2 + 4) > 9$, which simplifies to $6 4 > 9$, or $24 > 9$, which is true. So, $X = 0$ satisfies the inequality.

What is the importance of distributing in solving inequalities like $6 (X/2 + 4) > 9$?

Distributing helps eliminate parentheses and simplifies the expression, making it easier to isolate X and find the solution.

Is the solution to $6 (X/2 + 4) > 9$ inclusive or exclusive?

It's exclusive because the inequality is 'greater than' ($>$), so $X > -5$, but not equal to -5 .

Additional Resources

Solve The Inequality $6 (X/2 + 4) > 9$

Understanding how to solve inequalities is a fundamental skill in algebra, serving as the backbone for more complex mathematical concepts and real-world problem-solving. Today, we focus on a specific inequality: $6 (X/2 + 4) > 9$. This problem might seem straightforward at first glance, but it offers valuable insights into algebraic manipulation and the logic behind inequalities. Whether you're a student brushing up on your skills or someone interested in mathematical reasoning, this article will guide you through the process step-by-step, ensuring clarity and comprehension.

Breaking Down the Inequality

Before diving into the solution, it's essential to understand the structure of the inequality:

$$6 (X/2 + 4) > 9$$

At first glance, it involves a linear expression inside parentheses, multiplied by 6. The goal is to isolate the variable X and determine which values satisfy the inequality.

Key components:

- The multiplicative factor 6
- The expression inside parentheses: $X/2 + 4$
- The right-side constant: 9

Understanding these components helps identify the order of operations and the steps for solving.

Step-by-Step Solution Process

Let's proceed methodically, applying algebraic principles to solve for X.

Step 1: Remove the parentheses by distributing

Since the term 6 is multiplied by the entire expression inside parentheses, apply the distributive property:

$$6(X/2) + 6 \cdot 4 > 9$$

Calculating:

$$(6 \cdot X/2) + 24 > 9$$

Note: $6(X/2)$ can be simplified further.

Step 2: Simplify the coefficients

Focus on $6 \cdot X/2$:

- Multiply numerator and denominator: $6 \cdot X/2 = (6/2) \cdot X = 3X$

So, the inequality becomes:

$$3X + 24 > 9$$

Step 3: Isolate the variable term

Subtract 24 from both sides to move constants to the right:

$$3X + 24 - 24 > 9 - 24$$

Simplify:

$$3X > -15$$

Step 4: Solve for X

Divide both sides of the inequality by 3:

$$(3X)/3 > -15/3$$

Simplify:

$$X > -5$$

Result: The solution to the inequality is $X > -5$.

Interpreting the Solution

The inequality $X > -5$ tells us that any value of X greater than -5 will satisfy the original inequality $6 (X/2 + 4) > 9$.

Visualizing the solution:

- The solution set is all real numbers greater than -5 .
- In interval notation: $(-5, \infty)$
- In a number line, this is represented by an open circle at -5 , shading to the right.

Checking the Solution

It's always good practice to verify the solution by testing values:

- For $X = -4$ (which is greater than -5):

Plug into the original inequality:

$$6 (-4/2 + 4) = 6 (-2 + 4) = 6 \cdot 2 = 12$$

Since $12 > 9$, the inequality holds.

- For $X = -6$ (which is less than -5):

Plug into the original inequality:

$$6 (-6/2 + 4) = 6 (-3 + 4) = 6 \cdot 1 = 6$$

Since 6 is not greater than 9 , the inequality does not hold.

This confirms that $X > -5$ is the correct solution.

Real-World Applications of Solving Inequalities

Understanding and solving inequalities is not just an academic exercise; it has practical applications across various fields:

- Economics: Determining feasible investment ranges where profit exceeds a certain threshold.
- Engineering: Ensuring that stress or load values stay within safe limits.
- Health Sciences: Establishing age or dosage ranges for treatments.
- Computer Science: Defining bounds in algorithms and resource allocation.

In all these scenarios, inequalities help define acceptable or optimal conditions.

Common Mistakes and How to Avoid Them

While solving inequalities is straightforward, common pitfalls can lead to errors:

- Forgetting to reverse the inequality sign when multiplying or dividing by a negative number:

Tip: Always flip the inequality sign if multiplying or dividing both sides by a negative.

- Incorrect distribution or simplification:

Tip: Carefully apply the distributive property and double-check arithmetic.

- Neglecting to check the solution:

Tip: Plug in test values to verify your solution set.

- Overlooking extraneous solutions:

Tip: Remember that inequalities can have solutions that are conditional; always validate.

Conclusion: Mastering Inequalities

The process of solving $6(X/2 + 4) > 9$ exemplifies the fundamental steps of algebraic manipulation—distributing, simplifying, isolating the variable, and verifying solutions. The key takeaway is that inequalities, while seemingly complex, follow logical rules that, once mastered, empower you to analyze and interpret a wide array of real-world problems.

By understanding the underlying principles, practicing such problems, and being attentive to details, students and learners can develop confidence in tackling more advanced inequalities and algebraic concepts. Remember, the essence of solving inequalities lies in careful operation, strategic thinking, and validation—skills that are invaluable both in mathematics and beyond.

Whether you're solving for x or interpreting real-world data, the ability to manipulate inequalities accurately is a critical tool in your analytical toolkit.

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