

$7z + 7 > -2z - 4$ Solve The Following For Inequality For Z Simplest Form

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When working with inequalities involving variables and constants, understanding how to simplify and solve them is a fundamental skill in algebra. The inequality $7z + 7 > -2z - 4$ is a typical example that requires careful manipulation to find the range of values for z that satisfy it. This article provides a comprehensive guide to solving this inequality, simplifying it to its most basic form, and interpreting the solution. Whether you're a student preparing for exams or someone looking to strengthen your algebra skills, this step-by-step approach will clarify the process and ensure you understand each stage thoroughly.

Understanding the Inequality

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

- The inequality has two expressions involving the variable z : $7z + 7$ on the left and $-2z - 4$ on the right.
- The inequality sign is 'greater than' ($>$), indicating that the expression on the left must be strictly greater than the expression on the right.
- The goal is to find all values of z that satisfy this condition, expressed as an inequality in simplest form.

Step-by-Step Solution Process

1. Write Down the Original Inequality

Begin with the given inequality:

$$7z + 7 > -2z - 4$$

2. Isolate the Variable Terms on One Side

To simplify, the first step is to move all z -terms to one side and constants to the other:

- Add $2z$ to both sides to move the z -terms to the left:

$$7z + 2z + 7 > -2z + 2z - 4$$

- Simplify:

$$(7z + 2z) + 7 > -4$$

- Which results in:

$$9z + 7 > -4$$

3. Isolate the Constant Term

Next, subtract 7 from both sides to move constants to the right:

$$9z + 7 - 7 > -4 - 7$$

- Simplify:

$$9z > -11$$

4. Solve for z

- Divide both sides by 9 to isolate z:

$$z > -\left(\frac{11}{9}\right)$$

- Since dividing by a positive number preserves the inequality direction, no change is needed.

Final Simplified Form of the Inequality

The solution in its simplest form is:

$$z > -\left(\frac{11}{9}\right)$$

This indicates that all real numbers greater than $-\left(\frac{11}{9}\right)$ satisfy the original inequality.

Interpreting the Solution

Understanding what this solution means is crucial:

- The inequality $z > -11/9$ includes all real numbers larger than $-\left(\frac{11}{9}\right)$.
- The solution is an open interval:

$$\left(-\left(\frac{11}{9}\right), \infty\right)$$

- Graphically, on the number line, this is represented by a ray starting just to the right of $-\left(\frac{11}{9}\right)$ and extending infinitely to the right.

Additional Considerations and Tips

1. Check for Special Cases

- Ensure the coefficient of z is not zero, which would turn the inequality into a constant statement.
- In this case, the coefficient is 9, so no special cases arise.

2. Verify the Solution

- Pick a test value greater than $\frac{11}{9}$, for example, $z = 0$:

$$\begin{aligned} 7(0) + 7 &> -2(0) - 4 \\ 0 + 7 &> 0 - 4 \\ 7 &> -4 \quad - \text{ True} \end{aligned}$$

- Pick a value less than $\frac{11}{9}$, for example, $z = -2$:

$$\begin{aligned} 7(-2) + 7 &> -2(-2) - 4 \\ -14 + 7 &> 4 - 4 \\ -7 &> 0 \quad - \text{ False} \end{aligned}$$

- This confirms the solution set is correct.

Common Mistakes to Avoid

- Forgetting to reverse the inequality sign when multiplying or dividing both sides by a negative number.
- Ignoring to perform the same operation on both sides.
- Miscalculating the constant term or the coefficient of z .
- Assuming the solution includes equality when the inequality is strict (i.e., $>$ rather than $\geq$).

Applications and Real-World Relevance

Understanding how to solve inequalities like $7z + 7 > -2z - 4$ has practical significance:

- Financial calculations involving thresholds.
- Engineering tolerances.
- Data analysis where certain variables need to stay within specified bounds.
- Decision-making processes that depend on variable constraints.

Practice Problems for Mastery

To reinforce your understanding, try solving these inequalities:

1. $2x - 5 < 3x + 4$

2. $-4a + 6 > 2a - 8$

3. $3(y + 2) > 2y + 7$

4. $-x/2 < 3$

5. $5z + 10 > 2z + 4$

Ensure you follow the steps outlined above: isolate the variable, simplify, and interpret the solution.

Summary

Solving inequalities such as $7z + 7 > -2z - 4$ involves a straightforward process of algebraic manipulation:

- Move all variable terms to one side.
- Move constants to the other side.
- Simplify the resulting expression.
- Divide or multiply to isolate the variable, paying attention to the inequality sign.
- Interpret the solution set.

The final answer, $z > -11/9$, provides a clear range of values satisfying the inequality. Mastering these steps enhances your algebra skills and prepares you for more complex problem-solving scenarios.

If you practice regularly and pay attention to detail, you'll find solving inequalities becomes intuitive and useful across various disciplines and real-life applications.

Frequently Asked Questions

How do I solve the inequality $7z + 7 > -2z - 4$ for z ?

To solve $7z + 7 > -2z - 4$, first add $2z$ to both sides: $7z + 2z + 7 > -4$. This simplifies to $9z + 7 > -4$. Next, subtract 7 from both sides: $9z > -11$. Finally, divide both sides by 9 : $z > -11/9$. The solution is $z > -11/9$.

What is the simplest form of the inequality $7z + 7 > -2z - 4$?

The simplest form after solving is $z > -11/9$.

How do I represent the solution of $7z + 7 > -2z - 4$ on a number line?

Plot a circle at $z = -11/9$ and shade all values greater than that point, since the inequality is $z > -11/9$.

Can the inequality $7z + 7 > -2z - 4$ be written in interval

notation?

Yes, the solution is written as $(-11/9, \infty)$, representing all real numbers greater than $-11/9$.

What are the key steps to solve the inequality $7z + 7 > -2z - 4$?

The key steps are: add $2z$ to both sides, subtract 7 from both sides, then divide both sides by 9 to isolate z .

Is the inequality $7z + 7 > -2z - 4$ linear or nonlinear?

It is a linear inequality because it involves variables to the first power without any products or exponents.

What happens if I multiply both sides of the inequality by a negative number?

Multiplying by a negative number reverses the inequality sign. However, in this case, dividing by 9 (a positive number) does not change the inequality sign.

Is the solution to $7z + 7 > -2z - 4$ unique?

No, the solution is a range of values where $z > -11/9$, representing infinitely many solutions greater than that value.

Can I check my solution for the inequality $7z + 7 > -2z - 4$?

Yes, pick a value greater than $-11/9$, substitute it into the original inequality, and verify that the inequality holds true.

Additional Resources

$7z + 7 > -2z - 4$: Solve The Following For Inequality For Z Simplest Form

Introduction

Mathematics, particularly algebra, serves as the foundational language for countless scientific, technological, and everyday problem-solving scenarios. Among the fundamental topics is solving inequalities—a skill essential for understanding ranges, constraints, and conditions within various contexts. One such inequality, $7z + 7 > -2z - 4$, provides an excellent example to explore algebraic manipulation, logical reasoning, and the process of simplification to arrive at the most straightforward form of the solution.

This article aims to thoroughly dissect the inequality $7z + 7 > -2z - 4$, guiding readers through each

step with clarity. We will analyze the problem's structure, execute detailed algebraic procedures, and interpret the solutions within the broader scope of inequality solving techniques. Whether you're a student, educator, or enthusiast, this comprehensive review will deepen your understanding of inequalities and their resolution.

Understanding the Inequality

The inequality under scrutiny is:

$$7z + 7 > -2z - 4$$

In algebraic terms, the goal is to find all values of z that satisfy this inequality. To do so, we need to isolate z on one side, simplifying the expression step-by-step while maintaining the inequality's integrity.

Step 1: Recognize the Structure

This inequality is linear with respect to z , meaning the variable appears to the first power without exponents or complex functions. Linear inequalities are generally straightforward to solve, but attention must be paid to the operations performed to preserve inequality direction, especially when multiplying or dividing by negative numbers.

Step 2: Isolate the Variable Terms

The first step is to gather all terms involving z on one side and constants on the other.

Original inequality:

$$7z + 7 > -2z - 4$$

To facilitate this, add $2z$ to both sides to bring all z terms to the left:

$$(7z + 2z) + 7 > -2z + 2z - 4$$

Simplifies to:

$$9z + 7 > -4$$

Next, subtract 7 from both sides to isolate the z term:

$$9z + 7 - 7 > -4 - 7$$

Which simplifies to:

$$9z > -11$$

Step 3: Solve for z

Now, divide both sides of the inequality by 9 to solve for z:

$$z > -11/9$$

Important Note: Since 9 is positive, the inequality sign remains unchanged.

Step 4: Final Simplified Solution

The solution in its simplest form is:

$$z > -11/9$$

This indicates that any real number greater than $-11/9$ satisfies the original inequality.

Deep Dive: Additional Considerations and Interpretations

1. Domain and Validity

The solution $z > -11/9$ encompasses all real numbers larger than approximately $-1.222\dots$. The domain of z is the entire real number line, with the only restriction being z must be strictly greater than $-11/9$.

2. Graphical Representation

Graphically, this solution can be visualized on a number line:

- A solid circle at $-11/9$ indicates that the boundary point is not included in the solution (since the inequality is strict $>$).
- An arrow pointing to the right signifies all z values greater than $-11/9$.

3. Inequality Significance

This inequality exemplifies the straightforward nature of linear inequalities where solution sets are intervals. Understanding how the solution set behaves and is represented is crucial in fields like optimization, economics, and engineering.

Common Challenges and Troubleshooting

While this inequality is relatively simple, solving more complex inequalities often introduces pitfalls. Here are some common challenges:

- Multiplying or dividing both sides by a negative number: This reverses the inequality sign.

- Handling compound inequalities: Requires splitting into multiple parts.
- Dealing with absolute value inequalities: Necessitates considering multiple cases.

In this problem, such complexities do not arise, but awareness is essential for broader applications.

Practical Applications of Inequality Solving

Understanding how to solve inequalities like $7z + 7 > -2z - 4$ extends beyond academia into real-world scenarios:

- Budget constraints: Ensuring expenses stay within limits.
- Engineering tolerances: Defining acceptable ranges.
- Business profit margins: Maintaining revenues above certain thresholds.
- Statistical thresholds: Determining when data points surpass critical values.

In each case, translating real-world conditions into inequalities and solving them accurately is vital.

Summary of the Solving Process

Step	Operation	Result	Explanation
1	Add $2z$ to both sides	$9z + 7 > -4$	Bring z terms together
2	Subtract 7 from both sides	$9z > -11$	Isolate z term
3	Divide both sides by 9	$z > -11/9$	Solve for z

Final Remarks

The inequality $7z + 7 > -2z - 4$ underscores the importance of systematic algebraic manipulation. Its solution, $z > -11/9$, provides a clear and concise description of the set of all z satisfying the original condition. Mastery of such fundamental inequalities forms a stepping stone toward understanding more advanced mathematical concepts, including systems of inequalities, quadratic inequalities, and optimization problems.

By meticulously applying algebraic principles—combining like terms, maintaining the inequality sign, and simplifying step-by-step—students and professionals alike can confidently navigate the landscape of inequalities with clarity and precision.

Additional Resources

For those interested in further exploring inequality solving techniques, consider the following:

- "Algebra and Inequalities" by Robert F. Blitzer
- Khan Academy's online courses on inequalities and algebraic manipulation

- Practice worksheets on linear inequalities with varying complexity

Conclusion

The task of solving $7z + 7 > -2z - 4$ exemplifies core algebraic skills that are vital across numerous disciplines. Through careful step-by-step analysis, the solution reveals itself as $z > -11/9$, a straightforward but powerful conclusion. Such exercises reinforce logical reasoning, algebraic fluency, and the ability to interpret mathematical solutions within real-world contexts—skills that underpin success in both academic pursuits and practical applications.

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