What Is The Value Of X In The Linear Inequality? -3(4x - 8.2) < -11.98x + 143/ OA. X < 49.25 OB.

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Introduction

Linear inequalities are fundamental concepts in algebra that help us understand relationships between variables and constants. They are instrumental in solving real-world problems involving constraints, ranges, and conditions. When dealing with inequalities involving multiple expressions, such as the one presented here, the process of isolating the variable and determining its permissible values becomes both a mathematical challenge and a valuable skill.

In this article, we will explore the detailed process of solving the specific linear inequality:

-3(4x - 8.2) < -11.98x + 143 / OA, with the constraint that X < 49.25 OB.

While this inequality appears complex at first glance, breaking it down step by step will reveal the range of values that X can take. Additionally, understanding such inequalities enhances problem-solving abilities and prepares learners for more advanced math topics.

Understanding the Components of the Inequality

Before diving into the solution, it’s essential to interpret the components of the inequality:

The Left Side: -3(4x - 8.2)

This term involves multiplying a binomial by -3, which will require distribution and simplification.

The Right Side: -11.98x + 143 / OA

This expression combines a linear term with a constant divided by a variable or constant term, depending on the context. "OA" might refer to a specific value or segment, but for the purpose of this mathematical explanation, we'll treat it as a constant or known value.

The Constraint: X < 49.25 OB

This indicates that the solution for X must be less than a certain value, possibly involving another segment or point "OB."

Step-by-Step Solution Approach

Step 1: Simplify the Left Side

Apply the distributive property:

$$
-3(4x - 8.2) = -3 \times 4x + (-3) \times (-8.2) = -12x + 24.6
$$

Now, the inequality becomes:

$$
-12x + 24.6 < -11.98x + \frac{143}{OA}
$$

Step 2: Isolate the Variable Terms

Bring all the terms involving X to one side and constants to the other:

$$
-12x + 24.6 < -11.98x + \frac{143}{OA}
$$

Subtract $-11.98x$ from both sides:

$$
-12x + 24.6 + 11.98x < \frac{143}{OA}
$$

Combine like terms:

$$
(-12x + 11.98x) + 24.6 < \frac{143}{OA}
$$
$$
-0.02x + 24.6 < \frac{143}{OA}
$$

Step 3: Solve for X

Subtract 24.6 from both sides:

$$
-0.02x < \frac{143}{OA} - 24.6
$$

Divide both sides by -0.02, noting that dividing by a negative reverses the inequality:

$$
x > \frac{\frac{143}{OA} - 24.6}{-0.02}
$$

This yields the solution for X in terms of the constant $\frac{143}{OA}$.

Incorporating the Constraint: X < 49.25 OB

The inequality solution for X provides a boundary condition depending on the value of $\frac{143}{OA}$. To fully determine the permissible range of X:

- Calculate the right side explicitly once the values of OA are known.
- Recognize that X must also be less than 49.25 OB, which sets an upper limit for X.

Therefore, the overall solution set for X will be:

$$
x > \text{(computed lower bound)} \quad \text{and} \quad x < 49.25 OB
$$

The intersection of these inequalities will give the permissible range for X.

Practical Examples and Numerical Solutions

Example 1: Assuming OA = 1 and OB = 1

If we assume OA and OB are both 1 for simplicity:

$$
x > \frac{\frac{143}{1} - 24.6}{-0.02} = \frac{143 - 24.6}{-0.02} = \frac{118.4}{-0.02} = -5920
$$

And the constraint:

$$
x < 49.25 \times 1 = 49.25
$$

Solution set:

$$
x > -5920 \quad \text{and} \quad x < 49.25
$$

Thus, the values of X satisfying the inequality are all real numbers between -5920 and 49.25.

Example 2: Different values for OA and OB

Suppose OA = 2 and OB = 3:

$$
x > \frac{\frac{143}{2} - 24.6}{-0.02} = \frac{71.5 - 24.6}{-0.02} = \frac{46.9}{-0.02} = -2345
$$

Constraint:

$$
x < 49.25 \times 3 = 147.75
$$

Solution set:

$$
x > -2345 \quad \text{and} \quad x < 147.75
$$

This wider range reflects the influence of different OA and OB values.

Additional Considerations

Impact of Variable Constants

- The value of OA significantly influences the lower bound of X.
- If OA is very small or zero, the division may become undefined or lead to different interpretations.
- When dealing with real-world problems, the values of OA and OB should be known or estimated appropriately.

Importance of Inequality Direction

- Remember to reverse the inequality sign when dividing by a negative number.
- Carefully check the steps to avoid common mistakes.

Graphical Representation

Plotting the inequalities on a number line can help visualize the permissible range of X. The solution set is the intersection of the ranges derived from the inequality and the constraint.

Applications of Solving Linear Inequalities

Understanding how to solve inequalities like this one has numerous applications, including:

- Budgeting and financial planning
- Engineering design constraints
- Optimization problems
- Scientific modeling where variables are limited within certain bounds
- Real-world decision-making scenarios requiring boundary conditions

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Conclusion

The process of finding the value of X in the given linear inequality involves systematic steps:

1. Distribute and simplify expressions.
2. Isolate the variable terms.
3. Solve for X, taking care with inequality directions.
4. Incorporate additional constraints to narrow down the solution set.

By following these steps, you can determine the permissible range of X values that satisfy the inequality, given specific values for constants like OA and OB. Mastery of such inequalities enhances problem-solving skills and provides a foundation for tackling more complex algebraic and real-world problems.

Remember, always verify your solutions by substituting back into the original inequality and considering all constraints to ensure accuracy and completeness.

Frequently Asked Questions

How do I solve the linear inequality -3(4x - 8.2) < -11.98x + 143 to find the value of x?

First, expand the left side: -3 4x = -12x and -3 -8.2 = 24.6, so the inequality becomes -12x + 24.6 < -11.98x + 143. Then, bring like terms together: -12x + 11.98x < 143 - 24.6, which simplifies to -0.02x < 118.4. Dividing both sides by -0.02 (and reversing the inequality sign because dividing by a negative) gives x > -5920.

What is the solution for x in the inequality -3(4x - 8.2) < -11.98x + 143, and how does it compare to the given options x < 49.25 and x > ?

After solving, we find x > -5920. The options provided are x < 49.25 and x > ?. Since -5920 is less than 49.25, the solution x > -5920 encompasses all x greater than -5920, including values less than 49.25, so the inequality solution is consistent with x > -5920 rather than x < 49.25.

Is the inequality $-3(4x - 8.2) < -11.98x + 143$ equivalent to $x < 49.25$ or $x >$?

No, after solving, the inequality leads to $x > -5920$, which does not directly match $x < 49.25$. Therefore, the given options do not fully represent the solution set. The inequality's solution is $x > -5920$, implying all real numbers greater than -5920 satisfy the inequality.

Why does dividing by a negative number in the inequality change the direction of the inequality sign?

Dividing both sides of an inequality by a negative number reverses the inequality sign because of the properties of inequalities. This ensures the inequality remains true when multiplying or dividing both sides by a negative value, maintaining the correct relationship between the two expressions.

What is the significance of the options $x < 49.25$ and $x >$? in relation to solving the inequality?

These options suggest possible solution intervals for x. However, based on the actual solution $x > -5920$, the options $x < 49.25$ and $x >$? are partial representations. The key is recognizing that the inequality solution includes all x greater than -5920, which may or may not align with these specific options depending on the context.

Additional Resources

Understanding the Value of X in the Linear Inequality: A Comprehensive Analysis

Linear inequalities are fundamental in algebra, providing insights into the relationships between variables and constants. Among the myriad of inequalities, the specific problem involving the inequality:

$$
-3(4x - 8.2) < -11.98x + \frac{143}{OA} \quad \text{and} \quad X < 49.25 \quad \text{(OB)}
$$

presents an excellent opportunity to explore techniques for solving inequalities, interpreting their solutions, and understanding the implications of the given constraints.

Introduction to Linear Inequalities

Linear inequalities are expressions involving a linear combination of variables and constants, connected by inequality signs such as `<`, `>`, `≤`, or `≥`. For example:

$$
ax + b < c
$$

or

$$
d x + e \leq f
$$

These inequalities define ranges of possible values for the variable(s) involved, often representing feasible solutions in various applied contexts like economics, engineering, and science.

Key concepts:

- Solution Set: The set of all values that satisfy the inequality.
- Graphical Representation: Usually visualized on a number line or coordinate plane.
- Solving Process: Involves algebraic manipulations similar to equations, with attention to reversing inequalities when multiplying/dividing by negative numbers.

Analyzing the Given Inequality

Let's dissect the inequality:

$$
-3(4x - 8.2) < -11.98x + \frac{143}{OA}
$$

with the additional condition:

$$
X < 49.25 \quad \text{(OB)}
$$

Step 1: Simplify the Left Side

Begin by distributing the -3 across the parentheses:

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

\[

-3 \times -8.2 = +24.6
\]

Thus, the left side simplifies to:

\[
-12x + 24.6
\]

Now, the inequality becomes:

\[
-12x + 24.6 < -11.98x + \frac{143}{OA}
\]

Step 2: Isolate the Variable \(x\)

Our goal is to solve for \(x\). To do this:

1. Move all \(x\)-terms to one side.
2. Move constants to the other.

Subtract \(-11.98x\) from both sides:

\[
-12x + 24.6 + 11.98x < \frac{143}{OA}
\]

which simplifies to:

\[
(-12x + 11.98x) + 24.6 < \frac{143}{OA}
\]
\[
-0.02x + 24.6 < \frac{143}{OA}
\]

Step 3: Solve for \(x\)

Subtract 24.6 from both sides:

\[
-0.02x < \frac{143}{OA} - 24.6

\]

Next, divide both sides by -0.02. Remember: dividing or multiplying both sides of an inequality by a negative number reverses the inequality sign.

- Note: -0.02 is negative, so the inequality sign flips.

Thus:

$$
x > \frac{\frac{143}{OA} - 24.6}{-0.02}
$$

or equivalently:

$$
x > - \frac{\frac{143}{OA} - 24.6}{0.02}
$$

Step 4: Interpreting the Result

The exact value of x depends on the value of OA, which appears to be a variable or a given constant, possibly representing a length, coefficient, or parameter in the problem context.

Key points:

- The solution for x depends heavily on the numerical value of $\frac{143}{OA}$.
- If OA is known, you can compute the right side explicitly.
- The inequality indicates that x must be greater than a certain value, which is determined by the parameters.

Considering the Additional Condition $X < 49.25$ (OB)

The problem states:

$$
X < 49.25
$$

which suggests that the solution for x must satisfy both the inequality derived above and this upper bound.

Combined solution set:

$$
x > - \frac{\frac{143}{OA} - 24.6}{0.02} \quad \text{and} \quad x < 49.25
$$

This describes an intersection of two ranges. To fully understand the feasible values, one must:

- Calculate the critical point from the inequality involving OA.
- Compare that with the upper bound of 49.25.
- Determine the intersection of these ranges.

Implications and Practical Interpretations

The solution to this inequality problem has practical significance depending on the context. For example:

- If x represents a measurable quantity like length, time, or cost, the inequalities define permissible ranges.
- The parameter OA might be a fixed constant or a variable, influencing the bounds significantly.
- The restriction $x < 49.25$ could denote a physical or logical maximum in the problem context.

Special Cases and Considerations:

- When OA is known: direct computation of the bounds allows explicit solution sets.
- If OA is variable: the solution becomes a function of OA, leading to a parametric range.
- Sign of the denominator: Since 0.02 is positive, the direction of inequalities remains consistent when dividing.

Visualizing the Solution Set

Plotting the solution:

1. Identify the critical point:

$$
x_{crit} = - \frac{\frac{143}{OA} - 24.6}{0.02}
$$

2. The solution set:

$$
x \in (x_{crit}, 49.25)
$$

assuming $x_{crit} < 49.25$. If x_{crit} exceeds 49.25, then the solution set is empty (no solution).

Practical Example: Numerical Calculation

Suppose $OA = 1$:

$$
\frac{143}{1} = 143
$$

Compute:

$$
x_{crit} = - \frac{143 - 24.6}{0.02} = - \frac{118.4}{0.02}
$$

Calculate numerator:

$$
118.4
$$

Divide by 0.02:

$$
\frac{118.4}{0.02} = 5920
$$

Apply the negative sign:

$$
x_{crit} = -5920
$$

Solution:

$$
x > -5920 \quad \text{and} \quad x < 49.25
$$

which means the feasible range:

$$
x \in (-5920, 49.25)
$$

This is a wide interval, indicating that for $OA=1$, solutions are practically all x less than 49.25 but greater than -5920.

Impact of Changing OA:

- If $OA = 10$:

$$
\frac{143}{10} = 14.3
$$
$$
x_{crit} = - \frac{14.3 - 24.6}{0.02} = - \frac{-10.3}{0.02} = - (-515) = 515
$$

Solution:

$$
x > 515 \quad \text{and} \quad x < 49.25
$$

which is impossible, since x cannot be both greater than 515 and less than 49.25 simultaneously. Therefore, no solutions in this scenario.

This example underscores how the value of OA dramatically influences the solution set.

Conclusion: Summarizing the Solution Process and Insights

To determine the value of x satisfying the given inequality:

\[
-3(4x - 8.2) < -11.98x + \frac{143}{OA}
\]
and the constraint:

\[
x < 49.25
\]

the key steps involve:

- Distributing and simplifying the inequality.
- Carefully handling the division by a negative coefficient.
- Recognizing the dependency of the critical point on the parameter \(OA\).
- Interpreting the solution set as an intersection of ranges.

The main takeaway is that the solution for \(x\) hinges on the known value of \(OA\). Once \(OA\) is specified, the critical value can be computed explicitly, leading to a clear feasible solution interval.

Additional Considerations and Recommendations

- Always verify the sign when dividing both sides of an inequality by a negative number.
- Consider the physical or contextual meaning of parameters like \(OA\) and \(OB\).
- Use graphical methods to visualize solution sets, especially when parameters vary.
- Be

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