graph the solution of this inequality 4 9x 10 x 3 12

graph the solution of this inequality 4 9x 10 x 3 12. Inequalities are a fundamental aspect of algebra that involve expressions that are not equal but rather have a range of possible solutions. Understanding how to graph the solution of such inequalities, particularly the one presented, involves several steps including simplifying the inequality, determining the critical points, and representing the solution set visually. This article will guide you through the process of solving the inequality step-by-step, provide insights on graphing techniques, and delve into common mistakes to avoid. You will also find a comprehensive FAQ section to further clarify any lingering questions regarding this topic.

Introduction to the Inequality

The inequality presented, $4 < 9x < 10 \times 3 < 12$, consists of a series of relational expressions that need to be analyzed. The first step in dealing with such inequalities is to break down each part for clarity. The goal is to establish a range of values for the variable x that satisfy all components of the inequality. This involves understanding inequalities' properties, such as transitive properties and how to manipulate them algebraically. Moreover, recognizing the notation used in inequalities is crucial for accurate representation and solutions.

Simplifying the Inequality

Simplifying the inequality is essential to effectively graph its solution. The inequality $4 < 9x < 10 \times 3 < 12$ can be interpreted and simplified step by step. Firstly, we can separate the expression into manageable parts:

Breaking Down the Expression

The inequality can be rewritten as follows:

1. $4 < 9x$
2. $10x < 12$

Now, let's isolate x in each part of the inequality for further simplification.

Isolating x

To isolate x in each inequality, we perform the following steps:

1. From $4 < 9x$, divide both sides by 9:
   $x > 4/9$
2. From $10x < 12$, divide both sides by 10:
   $x < 12/10$ or $x < 6/5$

Thus, the simplified version of the inequality gives us the two critical points, $x > 4/9$ and $x < 6/5$.

Finding Critical Points

Identifying critical points is crucial for graphing the solution of the inequality. These points represent the boundaries of the solution set. The critical points derived from our simplification are:

1. $x = 4/9$
2. $x = 6/5$

Next, we will analyze the intervals determined by these critical points to understand where x satisfies the inequality.

Testing Intervals

To find the solution set, we will test values from the intervals created by the critical points:

- Interval 1: (-∞, 4/9)
- Interval 2: (4/9, 6/5)
- Interval 3: (6/5, ∞)

Choosing test points from each interval will help us determine where the inequality holds true. For example:

1. Test point from Interval 1: x = 0 (not satisfying)
2. Test point from Interval 2: x = 1 (satisfying)
3. Test point from Interval 3: x = 2 (not satisfying)

From this analysis, we conclude that the solution set is (4/9, 6/5).

Graphing the Solution

Graphing the solution involves plotting the critical points on a number line and shading the area that satisfies the inequality. Since the critical points 4/9 and 6/5 are not included in the solution (as indicated by the strict inequality), we will represent them as open circles on the graph.

Steps to Create the Graph

Follow these steps to graph the solution of the inequality:

1. Draw a number line.
2. Mark the points 4/9 and 6/5 on the line.
3. Use open circles to indicate that these points are not included in the solution set.
4. Shade the region between 4/9 and 6/5 to indicate the range of x that satisfies the inequality.

The final graph visually represents the solution set and provides a clear understanding of where the values of x lie.

Common Mistakes

When working with inequalities, several common mistakes can lead to incorrect solutions. Being aware of these can help in avoiding pitfalls.

Identifying Common Errors

- Incorrectly applying the rules of inequalities, such as flipping the inequality sign when multiplying or dividing by negative numbers.
- Overlooking the need for open or closed circles on the graph, which can misrepresent the solution set.
- Failing to test intervals properly, which can lead to incorrect conclusions about the solution set.

By being mindful of these common errors, one can navigate the complexities of inequalities with greater confidence and accuracy.

Conclusion

Successfully graphing the solution of the inequality $4 < 9x < 10 \times 3 < 12$ requires careful simplification, identification of critical points, and precise graphing techniques. It is essential to understand each step in the process to avoid common mistakes and accurately represent the solution set. Mastering these skills not only aids in solving this particular inequality but also builds a strong foundation for tackling more complex algebraic challenges in the future.

Q: What does it mean to graph an inequality?

A: Graphing an inequality involves representing the range of possible solutions on a number line or coordinate plane, indicating which values satisfy the inequality.

Q: How do I determine if a point is part of the solution set?

A: To determine if a point is part of the solution set, substitute the point into the inequality. If the inequality holds true, the point is included in the solution.

Q: What are open and closed intervals?

A: Open intervals do not include their endpoints, represented by parentheses (e.g., (a, b)), while closed intervals include their endpoints, represented by brackets (e.g., [a, b]).

Q: Can I multiply or divide both sides of an inequality by a negative number?

A: Yes, but when you do so, you must flip the inequality sign to maintain the correct relationship between the two sides.

Q: Why is it important to test intervals?

A: Testing intervals helps to identify which sections of the number line satisfy the inequality, ensuring that the solution set is accurate.

Q: What tools can I use to graph inequalities?

A: You can use graphing paper, online graphing tools, or software applications designed for mathematical graphing to accurately represent inequalities.

Q: How can I avoid mistakes when solving inequalities?

A: To avoid mistakes, carefully follow the rules of inequalities, double-check your work, and ensure proper notation when graphing.

Q: What is the significance of critical points in inequalities?

A: Critical points are the boundaries that divide the number line into intervals, which help determine where the inequality holds true.

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