

Select The Correct Answer.Which Number Line Shows The Solution Set To This Inequality?-2x+9<0 A.OB. +0

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Understanding inequalities and their graphical representations is a fundamental skill in algebra. When solving inequalities such as $-2x + 9 < 0$, students often encounter questions that ask them to identify the correct number line illustrating the solution set. This article provides an in-depth explanation of how to analyze and interpret inequalities, especially focusing on the inequality $-2x + 9 < 0$, and guides you through selecting the correct number line that accurately depicts its solution set. Whether you're a student preparing for exams or someone looking to strengthen your algebraic reasoning, this comprehensive guide will help clarify the concepts involved.

Understanding the Inequality $-2x + 9 < 0$

Breaking Down the Inequality

The inequality in question is:

$$-2x + 9 < 0$$

This inequality involves a linear expression in terms of x . Our goal is to find all values of x that satisfy this inequality and then represent these solutions on a number line.

Step-by-Step Solution

To solve $-2x + 9 < 0$, follow these steps:

1. Isolate the variable term:

- Subtract 9 from both sides to isolate the term with x :

$$-2x + 9 - 9 < 0 - 9$$

$$-2x < -9$$

2. Divide both sides by -2:

- Important: When dividing by a negative number, reverse the inequality sign:

$$-2x / -2 > -9 / -2$$

$$x > 9/2$$

The solution to the inequality is:

$$x > 9/2$$

This means that all values of x greater than 4.5 satisfy the inequality.

Graphical Representation of the Solution Set

Understanding Number Line Solutions

When representing inequalities such as $x > 9/2$ on a number line, the goal is to visually depict all points that satisfy the inequality. The key points to consider include:

- The boundary point at $x = 9/2$ (which is 4.5)
- Whether the boundary point itself is included (for $x > 9/2$, it is not included, since the inequality is strict)
- The direction of the shaded region (to the right of 4.5, since x is greater than 4.5)

Types of Number Line Symbols

To accurately illustrate the solution, understanding the symbols is essential:

- Open circle: indicates that the boundary point is not included (used for strict inequalities like $>$ or $<$)
- Closed circle: indicates that the boundary point is included (used for $\geq$ or $\leq$)
- Shaded region: shows all points satisfying the inequality

Which Number Line Shows the Correct Solution?

Analyzing the Given Options

The question provides options labeled A, B, and C, each showing different number lines. To determine which one correctly represents $x > 9/2$, consider the following:

- The number line should have an open circle at $x = 4.5$
- The region to the right of 4.5 should be shaded
- No shading should be on the left of 4.5

Common Mistakes in Graphical Representation

- Using a closed circle at 4.5 when the inequality is strict ($>$), since the boundary point is not included
- Shading the region to the left of 4.5, which would represent $x < 4.5$
- Incorrectly placing the boundary point at a different value

How to Identify the Correct Number Line

Step-by-Step Identification

To select the correct number line:

1. Locate $x = 4.5$ on the number line.
2. Check the circle:
 - Should be open (not filled in) because $x > 9/2$ (strict inequality).
3. Check the shading:
 - Should be shaded to the right of 4.5, indicating all values greater than 4.5 satisfy the inequality.
4. Verify the boundary points:
 - No shading or closed circle at $x = 4.5$, since the boundary point is not included.

Example of the Correct Number Line

The correct graph should display:

- An open circle at $x = 4.5$
- A shaded arrow extending to the right from 4.5

Additional Tips for Interpreting Number Lines and Inequalities

Key Points to Remember

- Always simplify the inequality first to understand the solution set.
- Determine whether the boundary point is included or excluded based on the inequality symbol.
- Use open circles for strict inequalities ($>$ or $<$) and closed circles for inclusive inequalities ($\geq$ or $\leq$).
- Shading should always be directed towards the set of solutions.

Practice Problems

To reinforce understanding, consider practicing with the following inequalities:

1. $x \leq 3$
2. $x > -2$
3. $-x < 5$
4. $2x \geq 8$

For each, identify the solution set and sketch the corresponding number line.

Conclusion

Understanding how to interpret and graph inequalities is crucial in algebra. For the inequality $-2x + 9 < 0$, the solution set is all real numbers greater than 4.5, represented as $x > 9/2$. The correct number line depiction involves an open circle at $x = 4.5$ with shading extending to the right. Recognizing the symbols, boundary points, and shading directions ensures accurate graphical representation, which is vital for solving and visualizing inequalities effectively.

By mastering these concepts, students can confidently analyze similar inequalities, select the correct graphical representations, and deepen their understanding of algebraic solutions. Practice and careful analysis are key to becoming proficient in interpreting number line solutions for inequalities.

Frequently Asked Questions

Which number line accurately represents the solution set for the inequality $-2x + 9 > 0$?

The number line that shows $x < 4.5$ correctly represents the solution set.

What is the solution to the inequality $-2x + 9 > 0$?

The solution is $x < 4.5$.

How do you interpret the inequality $-2x + 9 > 0$?

It means that x must be less than 4.5.

Which option shows the correct shading on a number line for the solution $x < 4.5$?

A number line with shading to the left of 4.5, not including 4.5, is correct.

Is the solution to $-2x + 9 > 0$ inclusive or exclusive?

It is exclusive; the solution is $x < 4.5$, not including 4.5 itself.

What is the key step in solving $-2x + 9 > 0$?

Subtract 9 from both sides and then divide both sides by -2, remembering to flip the inequality sign.

Why does the inequality sign flip when dividing both sides by -2?

Because dividing or multiplying both sides of an inequality by a negative number reverses the inequality sign.

Which number on the number line marks the boundary of the solution set for this inequality?

The point at $x = 4.5$ marks the boundary, with solutions being to the left of this point.

Additional Resources

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Introduction

Mathematical inequalities are fundamental tools used to describe relationships involving ranges of values rather than specific points. They are essential in various fields, from algebra and calculus to applied sciences like physics and economics. A common task in algebra involves solving inequalities and then representing their solutions graphically on a number line. This article delves into the process of solving a particular inequality—specifically, an inequality involving linear expressions—and analyzing the graphical representations to accurately determine the solution set.

The focus of this investigation is the question: "Select The Correct Answer. Which Number Line Shows The Solution Set To This Inequality? $-2x + 9 > 0$ A.OB. +O". While the phrasing appears somewhat ambiguous, it hints at a typical problem involving linear inequalities and their graphical solutions. We will interpret and clarify the problem, explore the steps involved in solving such inequalities, and examine how to identify the correct number line that depicts the solution set.

Clarifying the Inequality and Its Components

Before proceeding, it's critical to interpret the presented inequality and the associated multiple-choice options, as the original phrasing appears to contain typographical or formatting issues.

Possible Interpretation

- The inequality likely involves a linear expression such as:

$(-2x + 9 \leq 0)$ or $(-2x + 9 > 0)$.

- The options labeled as A, B, etc., are probably different graphical representations (number lines) of the solution sets.

Given the text, “ $-2x + 9 \geq 0$,” it is reasonable to assume that the problem refers to solving an inequality involving $(-2x + 9)$ and then selecting the correct number line that visualizes its solution.

Step-by-Step Solution Approach

1. Identifying the Inequality

Assuming the inequality is:

$$\begin{aligned} & \{ \\ & -2x + 9 \leq 0 \\ & \} \end{aligned}$$

or

$$\begin{aligned} & \{ \\ & -2x + 9 > 0 \\ & \} \end{aligned}$$

We need to determine which it is based on the options and context. For clarity, we will analyze both cases:

2. Solving the Inequality

Case 1: $(-2x + 9 \leq 0)$

- Subtract 9 from both sides:

$$\begin{aligned} & \{ \\ & -2x \leq -9 \\ & \} \end{aligned}$$

- Divide both sides by -2 (remember to flip the inequality sign when dividing by a negative):

$$\begin{aligned} & \{ \\ & x \geq \frac{-9}{-2} = \frac{9}{2} \\ & \} \end{aligned}$$

- Simplify:

$$\begin{aligned} & \backslash[\\ & x \geq 4.5 \\ & \backslash] \end{aligned}$$

Solution: All real numbers (x) such that $(x \geq 4.5)$.

Graphical representation: A number line with a solid point at 4.5, shading to the right (including 4.5).

Case 2: $(-2x + 9 > 0)$

- Subtract 9 from both sides:

$$\begin{aligned} & \backslash[\\ & -2x > -9 \\ & \backslash] \end{aligned}$$

- Divide both sides by -2 (flip the inequality):

$$\begin{aligned} & \backslash[\\ & x < \frac{-9}{-2} = 4.5 \\ & \backslash] \end{aligned}$$

Solution: All real numbers (x) such that $(x < 4.5)$.

Graphical representation: Number line with an open point at 4.5, shading to the left (excluding 4.5).

Understanding the Graphical Representations

The key to selecting the correct number line is matching these solutions with their graphical counterparts.

- For $(x \geq 4.5)$: A solid point at 4.5 with shading to the right.
- For $(x < 4.5)$: An open point at 4.5 with shading to the left.

Analyzing the Multiple Choice Options

Suppose the options are as follows:

- Option A: Number line with a solid circle at 4.5 and shading to the right.
- Option B: Number line with an open circle at 4.5 and shading to the left.
- Option C: Number line with a solid circle at 4.5 and shading to the left.
- Option D: Number line with an open circle at 4.5 and shading to the right.

Based on our solutions:

- If the inequality is $(-2x + 9 \leq 0)$, the correct graph is Option A.
- If the inequality is $(-2x + 9 > 0)$, the correct graph is Option B.

The Significance of Correct Graphical Representation

Visualizing inequalities on a number line is a crucial skill that allows students and practitioners to quickly interpret solution sets. It enhances understanding of the nature of inequalities—whether they are inclusive ($\leq, \geq$) or exclusive ($<, >$)—and how to accurately depict them.

Key points:

- Open circle: indicates the boundary point is not included ($<, >$).
- Solid circle: boundary point is included ($\leq, \geq$).
- Shading direction: reflects the set of solutions extending infinitely in a particular direction.

Broader Implications in Mathematical Education

The ability to interpret and select correct graphical representations of inequalities is foundational in algebra. It bridges symbolic manipulation with visual understanding, enabling learners to:

- Grasp the concept of solution sets as intervals or unions of intervals.
- Transition seamlessly between algebraic and graphical solutions.
- Develop critical reasoning skills by analyzing multiple-choice options.

Furthermore, mastery over such problems encourages a deeper comprehension of inequalities' properties, including their behavior under various algebraic operations and transformations.

Practical Applications of Inequality Solutions

Understanding and correctly representing inequalities have real-world applications:

- Economics: Determining price ranges for profit maximization.
- Physics: Establishing permissible ranges of variables like velocity or force.
- Health Sciences: Setting thresholds for vital signs like blood pressure or cholesterol levels.
- Engineering: Designing systems within specified operational limits.

In all these contexts, accurate graphical interpretation aids decision-making and policy formulation.

Conclusion

While the original question appears to contain typographical inconsistencies, the core concept revolves around solving a linear inequality and matching its solution set to a graphical representation on a number line. The process involves algebraic manipulation—solving for (x) —and understanding

the meaning of the inequality's boundary points and shading.

When presented with multiple options, the key is to identify the boundary point's nature (open or closed circle) and the direction of shading, which directly correspond to whether the inequality is strict or inclusive.

In sum:

- For $(-2x + 9 \leq 0)$, the correct number line shows a solid circle at 4.5 with shading to the right.
- For $(-2x + 9 > 0)$, the correct number line shows an open circle at 4.5 with shading to the left.

Mastering these representations enhances one's ability to interpret inequalities accurately, a skill of paramount importance in both academic and practical settings.

Final Remarks

Choosing the correct graphical representation of an inequality is more than a test of visual acuity; it is an essential component of mathematical literacy. It demonstrates an understanding of how algebraic solutions translate into visual forms, ultimately fostering more profound comprehension and application skills. As learners continue to navigate the landscape of inequalities, their capacity to seamlessly integrate symbolic and graphical reasoning will serve as a cornerstone for success in mathematics and beyond.

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