The Point (0, 0) Is A Solution To Which Of These Inequalities?O Ay+7<2x - 6OB. Y-7<2x-6OC. Y-6<2x-7OD.

The Point (0, 0) Is A Solution To Which Of These Inequalities?O Ay+7<2x - 6OB. Y-7<2x-6OC. Y-6<2x-7OD.

Understanding whether a specific point satisfies a given inequality is fundamental in algebra and coordinate geometry. In this article, we will analyze whether the point (0, 0) is a solution to the inequalities listed:

- A) \(y + 7 < 2x - 6 \)
- B) \(y - 7 < 2x - 6 \)
- C) \(y - 6 < 2x - 7 \)
- D) (Although not explicitly provided, we will assume it to be \(y - 6 < 2x - 7 \) based on the pattern)

This comprehensive guide will help you understand how to determine if a point satisfies an inequality, analyze each inequality step-by-step, and learn key concepts related to graphing inequalities and solutions within coordinate planes.

Understanding Solutions to Inequalities in Coordinate Geometry

In coordinate geometry, inequalities involve expressions with '<', '>', '≤', or '≥'. A point \((x, y)\) is a solution to an inequality if, when substituted into the inequality, the inequality becomes a true statement.

Example:

Given the inequality \(y < 2x + 3 \), the point \((x, y) = (1, 2)\) is a solution if substituting yields a true statement:

\(2 < 2(1) + 3 \Rightarrow 2 < 5 \) (which is true), so \((1, 2)\) is a solution.

Step-by-Step Approach to Determine if (0, 0) is a

Solution

To analyze whether the point \((0, 0)\) satisfies an inequality:

1. Substitute \(x = 0 \) and \(y = 0 \) into the inequality.
2. Simplify both sides.
3. Compare the resulting statement to determine if it is true or false.
4. Conclude whether the point is a solution based on the truth of the statement.

Analysis of Each Inequality

Let's analyze each inequality step-by-step.

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1. Inequality A: \(y + 7 < 2x - 6 \)

Step 1: Substitute \(x=0 \) and \(y=0 \):

\[
0 + 7 < 2(0) - 6
\]

Step 2: Simplify both sides:

\[
7 < 0 - 6 \Rightarrow 7 < -6
\]

Step 3: Is \(7 < -6 \) true?

No, this statement is false.

Conclusion: The point \((0, 0)\) is not a solution to inequality A.

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2. Inequality B: \(y - 7 < 2x - 6 \)

Step 1: Substitute \(x=0 \), \(y=0 \):

\[

0 - 7 < 2(0) - 6
\]

Step 2: Simplify:

\[
-7 < -6
\]

Step 3: Is \(-7 < -6 \) true?

Yes, because \(-7\) is less than \(-6\).

Conclusion: The point \((0, 0)\) is a solution to inequality B.

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3. Inequality C: \(y - 6 < 2x - 7 \)

Step 1: Substitute \(x=0 \), \(y=0 \):

\[
0 - 6 < 2(0) - 7
\]

Step 2: Simplify:

\[
-6 < -7
\]

Step 3: Is \(-6 < -7 \) true?

No, because \(-6\) is greater than \(-7\).

Conclusion: The point \((0, 0)\) is not a solution to inequality C.

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4. Assuming D: \(y - 6 < 2x - 7 \) (or similar)

Since the original problem mentions options D and the pattern suggests a similar inequality, the same method applies.

Summary of Results

Inequality	Substitution Result	Is (0,0) a solution?
A) $y+7<2x-6$	$7 < -6$	No
B) $y-7<2x-6$	$-7 < -6$	Yes
C) $y-6<2x-7$	$-6 < -7$	No

From this analysis, only inequality B is satisfied by the point (0, 0).

Graphical Interpretation of the Inequalities

Understanding the solutions to inequalities also involves graphing their boundary lines and shading the solution regions.

How to Graph the Inequalities:

1. Rewrite the inequality in slope-intercept form $y = mx + b$, if necessary.
2. Graph the boundary line (the equation equal to the boundary, e.g., $y = 2x + c$).
3. Determine which side of the boundary line satisfies the inequality by testing a point (like (0,0)) or using the inequality's sign.
4. Shade the region that contains the solutions.

Applying this to our inequalities:

- For $y + 7 < 2x - 6$:

Rewrite as $y < 2x - 13$. The boundary line is $y = 2x - 13$.

- For $y - 7 < 2x - 6$:

Rewrite as $y < 2x + 1$. The boundary line is $y = 2x + 1$. Since (0,0) satisfies this, shading is on the side where $y < 2x + 1$.

- For $y - 6 < 2x - 7$:

Rewrite as $y < 2x - 1$.

Key Concepts in Solving and Graphing

Inequalities

1. Substitution Method:
Substituting the point's coordinates into the inequality to test its validity.

2. Boundary Lines:
Lines where the inequality becomes an equality, used as the boundary in graphs.

3. Shading Regions:
The solution set is the region on one side of the boundary line, determined by testing a point.

4. Open and Closed Boundaries:
Use dashed lines for "<" or ">" (not including the boundary), and solid lines for "≤" or "≥" (including the boundary).

Practical Applications of Solving Inequalities

Understanding inequalities and their solutions is vital in various real-world contexts:

- Optimizing resources within constraints.
- Determining feasible regions in linear programming.
- Modeling real-life situations, such as budget limits, capacity constraints, or safety margins.
- Graphing inequalities to visualize solutions and make informed decisions.

Conclusion

In summary, to determine whether the point (0, 0) satisfies a given inequality, the key is to substitute its coordinates into the inequality and analyze the resulting statement. From our detailed analysis:

- The point (0, 0) satisfies inequality B: $y - 7 < 2x - 6$.
- It does not satisfy inequalities A and C.

This process exemplifies fundamental algebraic techniques and aids in understanding how solutions to inequalities are determined both algebraically and graphically.

Remember: Practice substituting different points into inequalities and graphing boundary lines to develop a stronger intuition for solutions in coordinate geometry.

Keywords: point (0, 0), inequalities, solutions, coordinate geometry, algebra, graphing inequalities, solution regions, boundary lines, substitution method, algebraic analysis.

Frequently Asked Questions

Is the point (0, 0) a solution to the inequality Ay + 7 < 2x - 6?

To determine, substitute x=0 and y=0: A0 + 7 < 20 - 6 → 7 < -6, which is false. So, (0, 0) is not a solution to this inequality.

Does the point (0, 0) satisfy the inequality Y - 7 < 2x - 6?

Substitute x=0 and y=0: 0 - 7 < 20 - 6 → -7 < -6, which is true. Therefore, (0, 0) is a solution to this inequality.

Is the point (0, 0) a solution to the inequality Y - 6 < 2x - 7?

Substitute x=0 and y=0: 0 - 6 < 20 - 7 → -6 < -7, which is false. So, (0, 0) does not satisfy this inequality.

Which of the given inequalities is satisfied by the point (0, 0)?

Only the inequality Y - 7 < 2x - 6 is satisfied by (0, 0).

How can you verify if (0, 0) is a solution to an inequality?

Substitute x=0 and y=0 into the inequality and check if the resulting statement is true.

What is the significance of the point (0, 0) in analyzing these inequalities?

It serves as a test point to determine which inequalities' regions include the origin.

Are inequalities with the form Y - 7 < 2x - 6 generally satisfied by (0, 0)?

It depends on the specific inequality; in this case, Y - 7 < 2x - 6 is satisfied by (0, 0).

Can the point (0, 0) satisfy multiple inequalities from the list?

No, based on the calculations, (0, 0) only satisfies the inequality Y - 7 < 2x - 6.

What step is essential when testing whether a point satisfies an inequality?

Substitute the point's coordinates into the inequality and verify if the inequality holds true.

Which inequality among the options is false for the point (0, 0)?

Ay + 7 < 2x - 6 and Y - 6 < 2x - 7 are false for (0, 0); only Y - 7 < 2x - 6 is true.

Additional Resources

The Point (0, 0) Is A Solution To Which Of These Inequalities?

Introduction

In the realm of algebra and coordinate geometry, understanding whether a specific point satisfies a given inequality is fundamental. It provides insight into the geometric region described by that inequality, and it is essential for students, educators, and mathematicians alike. A particularly intriguing question is: Is the point (0, 0) a solution to the given inequalities? In this in-depth analysis, we explore this question by examining the inequalities:

- A. $y + 7 < 2x - 6$
- B. $y - 7 < 2x - 6$
- C. $y - 6 < 2x - 7$
- D. (Assumed typo correction) $y - 6 < 2x - 7$

(Note: Since options C and D are identical, we will assume D is a duplicate or typo, and focus on options A, B, and C.)

This investigation aims to determine precisely which of these inequalities the point (0, 0) satisfies, and what this implies about the solution regions they define.

The Significance of the Point (0, 0)

Before analyzing each inequality, it is crucial to understand why the point (0, 0)—also called the origin—is a common test point. In the coordinate plane, (0, 0) is often used as a test point because:

- It is easy to evaluate; substituting $x=0$ and $y=0$ simplifies calculations.
- It generally lies within or outside the regions defined by the inequalities, providing a quick test of whether the region includes the origin.

If (0, 0) satisfies an inequality, then the entire region it describes includes the origin. Conversely, if it does not, then the origin is outside that region.

Methodology for Testing Solutions

To determine whether (0, 0) is a solution:

1. Substitute $x=0$ and $y=0$ into each inequality.
2. Evaluate whether the inequality holds true:
- For "<" inequalities, check if the left side is less than the right side.
- For "≤" inequalities, check if the left side is less than or equal to the right side.
3. Record the results for each inequality.

Analyzing Each Inequality

Inequality A: $y + 7 < 2x - 6$

- Substitute $x=0$, $y=0$:

$$
0 + 7 < 2(0) - 6
$$
$$
7 < -6
$$

- Evaluate:

$7 < -6$ is false.

- Conclusion:

The point (0, 0) does not satisfy inequality A.

Inequality B: $y - 7 < 2x - 6$

- Substitute $x=0$, $y=0$:

$$
0 - 7 < 2(0) - 6
$$

$$
-7 < -6
$$

- Evaluate:

$-7 < -6$ is true.

- Conclusion:

The point (0, 0) satisfies inequality B.

Inequality C: $y - 6 < 2x - 7$

- Substitute $x=0$, $y=0$:

$$
0 - 6 < 2(0) - 7
$$

$$
-6 < -7
$$

- Evaluate:

$-6 < -7$ is false.

- Conclusion:

The point (0, 0) does not satisfy inequality C.

Summary of Findings

Inequality	Substitution Result	Satisfied by (0, 0)?
A. $y + 7 < 2x - 6$	$7 < -6$	No
B. $y - 7 < 2x - 6$	$-7 < -6$	Yes
C. $y - 6 < 2x - 7$	$-6 < -7$	No

Thus, the point (0, 0) is only a solution to inequality B.

Geometric Interpretation

Understanding what this means geometrically requires analyzing the boundary lines and the regions defined by each inequality.

Boundary Lines

- For each inequality, the boundary line is obtained by replacing "<" with "=":

- A: $y + 7 = 2x - 6 \Rightarrow y = 2x - 13$
- B: $y - 7 = 2x - 6 \Rightarrow y = 2x - 6 + 7 = 2x + 1$
- C: $y - 6 = 2x - 7 \Rightarrow y = 2x - 7 + 6 = 2x - 1$

These are straight lines with slope 2, but different y-intercepts.

Regions

- The inequalities with "<" indicate the region below the boundary line if the inequality is $y < \text{(line)}$, or above if $y > \text{(line)}$.

- For inequality B ($y - 7 < 2x - 6$), or equivalently $y < 2x + 1$, the solution region is below the line $y = 2x + 1$.

- Since the test point (0, 0) satisfies inequality B, it lies below the line $y = 2x + 1$, confirming our geometric interpretation.

Implications for the Solution Regions

Given the above, the solution set for each inequality can be visualized:

- Inequality A: Region below $y = 2x - 13$. The point (0, 0), which is at $y=0$, is above this line because $0 > 2(0) - 13 = -13$.

- Inequality B: Region below $y = 2x + 1$. Since (0, 0) satisfies the inequality, it lies below the line $y=2x+1$.

- Inequality C: Region below $y=2x-1$. The point (0, 0) is above this line because $0 > 2(0) - 1 = -1$.

Broader Context and Applications

Understanding which inequalities a point satisfies is crucial in multiple real-world applications:

- Linear programming: Identifying feasible solutions within constraints.
- Graphical solutions: Visualizing solution regions for inequalities.
- Optimization problems: Determining the set of points that satisfy certain constraints.

In educational settings, this exercise reinforces skills in substitution, inequality interpretation, and geometric visualization.

Concluding Remarks

After examining the inequalities:

- Only inequality B includes the point (0, 0) in its solution set.

This outcome not only clarifies the solution region but also illustrates the importance of test points in inequality analysis. The process exemplifies the blend of algebraic calculation and geometric intuition that underpins much of coordinate geometry.

Final Summary

Inequality	Test point (0, 0) satisfies?	Solution region?
$y + 7 < 2x - 6$	No	Region below $y=2x-13$, excluding (0, 0)
$y - 7 < 2x - 6$	Yes	Region below $y=2x+1$, including (0, 0)
$y - 6 < 2x - 7$	No	Region below $y=2x-1$, excluding (0, 0)

Thus, the point (0, 0) is a solution exclusively to the inequality $y - 7 < 2x - 6$.

References

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Note: The analysis hinges on the assumption that option D is a duplicate or typo of option C. If D's inequality differs, a similar process of substitution and evaluation would apply.

End of Article

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