In The Inequality 3x + 4y 5, Which Of The Following Ordered Pair Is The Solution?A. (7,2)B. (2,-1)C.

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Understanding the Inequality: 3x + 4y □ 5

When approaching any inequality involving variables, a fundamental step is understanding the inequality itself, in this case:

\[3x + 4y \leq 5 \]

This inequality defines a region in the coordinate plane where all points \((x, y)\) satisfy the condition. To determine which ordered pairs from the options provided satisfy this inequality, we need to analyze the inequality step-by-step.

Breaking Down the Inequality

The Role of the Coefficients and Constants

- Coefficients: The numbers multiplying the variables \(x\) and \(y\) — in this case, 3 and 4, respectively — influence the weight of each variable in the inequality.
- Constant term: The number 5 on the right side represents the boundary level.

Graphical Interpretation

The inequality $3x + 4y \leq 5$ can be visualized as:

- A straight line defined by the boundary equation $3x + 4y = 5$.
- The region below or on this line (since the inequality includes 'less than or equal to').

Boundary Line: $3x + 4y = 5$

- To graph this boundary, find intercepts:

- x-intercept: Set $y=0$:

$$
3x + 4(0) = 5 \Rightarrow 3x = 5 \Rightarrow x = \frac{5}{3} \approx 1.6667
$$

- y-intercept: Set $x=0$:

$$
3(0) + 4y = 5 \Rightarrow 4y=5 \Rightarrow y= \frac{5}{4} = 1.25
$$

- Plotting these intercepts helps visualize the boundary line.

How to Test an Ordered Pair

To determine if an ordered pair (x, y) is a solution:

1. Substitute x and y into the inequality.

2. Simplify the expression.

3. Check if the inequality holds true.

For $3x + 4y \leq 5$:

- If the resulting value is less than or equal to 5, the pair is a solution.
- If it exceeds 5, it is not a solution.

Analyzing the Options

Option A: (7, 2)

- Substitute $x=7$, $y=2$:

$$
3(7) + 4(2) = 21 + 8 = 29
$$

- Since $29 \leq 5$ is false, the point does not satisfy the inequality.

Option B: (2, -1)

- Substitute $x=2$, $y=-1$:

$$
3(2) + 4(-1) = 6 - 4 = 2
$$

- Since $2 \leq 5$ is true, the point satisfies the inequality.

Option C: (Assuming Missing Data)

- The original question seems incomplete for option C. Usually, multiple options are provided. For this guide, let's consider a typical third point, for example, $(0, 0)$:

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

$$
3(0) + 4(0) = 0
$$

- Since $0 \leq 5$ is true, it also satisfies the inequality.

Note: If the original question had a specific option C, please provide it for precise analysis.

Visual Representation and Graphing

Graphing the boundary line $3x + 4y = 5$:

- Plot the intercepts:

- $\left(\frac{5}{3}, 0\right)$
- $(0, 1.25)$

- Shade the region below or on the line, representing all solutions where $3x + 4y \leq 5$.

Key Points for Graphing

- The boundary line is solid because the inequality includes 'equal to' ($\leq$).
- The solution region includes the boundary line itself.

Step-by-Step Guide to Solving Similar Inequalities

1. Identify the inequality type: Linear, quadratic, etc.
2. Rewrite the inequality in slope-intercept form (if possible):

$$
y \leq \text{expression} \quad \text{or} \quad y \geq \text{expression}
$$

3. Plot the boundary line:

- Find intercepts.
- Draw the line (solid if inclusive, dashed if strict inequality).

4. Test a point not on the boundary:

- Usually (0,0), unless it lies on the boundary.
- Determine which side of the line satisfies the inequality.

5. Shade the appropriate region:

- All points satisfying the inequality are in the shaded region.

6. Verify each candidate point:

- Substitute into the inequality.

- Confirm whether the point belongs to the solution region.

Real-World Applications of Linear Inequalities

Understanding and solving inequalities like $3x + 4y \leq 5$ has practical significance:

- Budgeting and finance: Allocating resources within constraints.
- Manufacturing: Ensuring production quantities stay within capacity limits.
- Transportation planning: Determining feasible routes within time or cost limits.
- Diet planning: Combining foods within nutritional bounds.

Additional Tips for Mastering Inequalities

- Practice graphing linear inequalities to develop intuition.
- Always verify solutions by substitution.
- Understand boundary lines and how inequalities relate to the shaded region.
- Learn to interpret inequalities in real-world contexts for better problem-solving skills.

Summary

To determine which ordered pair satisfies the inequality $3x + 4y \leq 5$:

- Substitute the coordinates into the inequality.
- Check if the resulting value is less than or equal to 5.
- Based on the analysis:

- Option A (7, 2): Does not satisfy, as $37 + 42=29 > 5$.
- Option B (2, -1): Satisfies, as $2 \leq 5$.
- Option C: Evaluate similarly once the specific point is known.

Understanding these steps equips you with the skills to analyze similar inequalities and their solutions effectively.

FAQs

How do I graph a linear inequality like $3x + 4y \leq 5$?

- Find the boundary line $3x + 4y = 5$ using intercepts.
- Draw the line with a solid line.
- Test a point (like (0,0)) to see if it satisfies the inequality.
- Shade the region containing that point.

Why is it important to test points?

Testing points helps confirm which side of the boundary line is part of the solution region, especially when the inequality involves $\leq$ or $\geq$.

Can an ordered pair satisfy multiple inequalities at once?

Yes. When solving systems of inequalities, a point must satisfy all inequalities simultaneously to be a solution.

Conclusion

Mastering the process of solving inequalities, especially linear ones like \(3x + 4y \leq 5\), is fundamental in algebra and practical problem-solving. By substituting values, graphing boundary lines, and shading solution regions, you can determine whether specific points are solutions efficiently. Remember to verify your solutions through substitution and visualization for the best understanding. Whether for academic purposes or real-world applications, these skills are essential tools in your mathematical toolkit.

Frequently Asked Questions

Which of the following ordered pairs satisfies the inequality $3x + 4y \leq 5$?

Let's test each option: For (7,2): 3(7) + 4(2) = 21 + 8 = 29, which is not ≤ 5. For (2,-1): 3(2) + 4(-1) = 6 - 4 = 2, which is ≤ 5. Therefore, the solution is (2, -1).

What is the process to determine if an ordered pair is a solution to the inequality $3x + 4y \leq 5$?

Substitute the x and y values of the ordered pair into the inequality and check if the resulting statement is true. If it satisfies the inequality, then the ordered pair is a solution.

Does the ordered pair (7, 2) satisfy the inequality $3x + 4y \leq 5$?

No, because substituting (7, 2) yields 3(7) + 4(2) = 29, which is greater than 5, so it does not satisfy the inequality.

Is the ordered pair (2, -1) a solution to $3x + 4y \leq 5$?

Yes, because substituting (2, -1) gives 3(2) + 4(-1) = 6 - 4 = 2, which is less than or equal to 5.

What does the inequality $3x + 4y \leq 5$ represent in a coordinate plane?

It represents a half-plane consisting of all points (x, y) where the linear combination $3x + 4y$ is less than or equal to 5, including the boundary line $3x + 4y = 5$.

How can you graph the inequality $3x + 4y \leq 5$?

First, graph the boundary line $3x + 4y = 5$. Then, shade the region on the same side of the line where the inequality holds (the side where $3x + 4y \leq 5$).

Which of the options (7, 2) or (2, -1) is a valid solution for the inequality $3x + 4y \leq 5$?

Only (2, -1) is a valid solution because it satisfies the inequality, while (7, 2) does not.

Additional Resources

In the Inequality $3x + 4y \leq 5$, Which Of The Following Ordered Pair Is The Solution? A. (7,2) B. (2,-1) C. ... – this kind of question is a classic example of testing your understanding of inequalities in algebra. Whether you're a student brushing up on your math skills or a teacher preparing instructional materials, breaking down this problem systematically can help clarify how to determine whether a given ordered pair satisfies an inequality. In this guide, we will explore the steps involved in analyzing such inequalities, interpret what solutions look like graphically, and walk through how to evaluate specific ordered pairs with detailed explanations.

Understanding the Inequality: $3x + 4y \leq 5$

Before diving into specific solutions, it's essential to understand the inequality itself. The inequality 3x

+ 4y ≤ 5 involves a linear combination of the variables x and y. The goal is to identify whether particular ordered pairs (x, y) satisfy this inequality, meaning that when substituted into the inequality, the statement remains true.

What Does the Inequality Represent?

Graphically, 3x + 4y ≤ 5 represents a region in the xy-plane – specifically, all the points (x, y) for which the linear expression 3x + 4y is less than or equal to 5. This region includes:

- The boundary line defined by 3x + 4y = 5.
- All points lying below or on this boundary line, where 3x + 4y is less than 5.

Understanding this helps visualize the problem and guides you in determining whether specific pairs are solutions.

Step-by-Step Approach to Verify Solutions

1. Substitution Method

The primary method for checking whether an ordered pair is a solution involves substituting the values of x and y into the inequality:

- Plug in the x-value.
- Plug in the y-value.
- Simplify the expression.
- Check whether the resulting statement is true.

2. Comparing the Result

- If the simplified expression $\leq$ 5, then the ordered pair is a solution.
- If it's > 5, then the ordered pair is not a solution.

Analyzing the Given Options

Let's examine the provided options systematically:

Option A: (7, 2)

Step 1: Substitute x = 7, y = 2 into the inequality:

3(7) + 4(2) = 21 + 8 = 29

Step 2: Compare 29 with 5:

29 $\leq$ 5? No, this is false.

Conclusion: The point (7, 2) does not satisfy the inequality, so it is not a solution.

Option B: (2, -1)

Step 1: Substitute x = 2, y = -1:

3(2) + 4(-1) = 6 - 4 = 2

Step 2: Compare 2 with 5:

$2 \leq 5$? Yes, this is true.

Conclusion: The point (2, -1) satisfies the inequality, so it is a solution.

Option C: ... (Assuming the options continue)

Suppose the third option is an example point, such as (0, 1):

Step 1: Substitute $x = 0$, $y = 1$:

$3(0) + 4(1) = 0 + 4 = 4$

Step 2: Compare 4 with 5:

$4 \leq 5$? Yes, this is true.

Conclusion: The point (0, 1) also satisfies the inequality.

(Note: You can repeat this process for any other options provided.)

Visualizing the Inequality Graphically

Understanding the solution set becomes much clearer when you visualize it:

- Boundary Line: The line $3x + 4y = 5$ divides the plane into two regions.
- Solution Region: All points where $3x + 4y \leq 5$ are on or below this line.

How to Graph the Boundary Line

- Find the intercepts:

- Set $y = 0$:

$3x + 4(0) = 5$ □ $3x = 5$ □ $x = 5/3$ □ 1.67

- Set $x = 0$:

$3(0) + 4y = 5$ □ $4y = 5$ □ $y = 5/4 = 1.25$

- Draw the line passing through (1.67, 0) and (0, 1.25).

Shading the Solution Region

- Since the inequality includes “□”, shade the area below or on the boundary line.
- You can verify a test point (such as the origin (0,0)):

$3(0) + 4(0) = 0$ □ 5? Yes. So, the origin is inside the solution region.

Practical Tips for Solving Similar Problems

- Always substitute the x and y values into the inequality first.
- Remember to compare the resulting expression with the number on the right side.
- Understand the boundary line to interpret whether points are on, above, or below it.
- Use graphing to verify solution regions visually when possible.
- Be cautious with inequalities involving “less than or equal to” versus “less than” – the boundary line is included in the solution set for “□”.

Summarizing the Key Takeaways

Step	Action	Explanation
1	Substitute x and y into the inequality	Replace variables with their values from the options
2	Simplify the expression	Calculate $3x + 4y$
3	Compare to 5	Determine if the expression is ≤ 5 or > 5
4	Conclude whether the point is a solution	If ≤ 5, point satisfies the inequality

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Final Thoughts: Choosing the Correct Solution

Given the options:

- Option A (7, 2): Fails the test, not a solution.
- Option B (2, -1): Satisfies the inequality, is a solution.
- Option C (other points): Would need similar analysis.

In this particular case, (2, -1) is the solution, as it satisfies the inequality $3x + 4y \leq 5$.

Additional Practice

To reinforce your understanding, try analyzing other points with the same approach or graph the entire boundary line and shade the solution region. This visual method complements algebraic substitution and solidifies your grasp of inequalities.

Conclusion

Determining which ordered pair is a solution to an inequality like 3x + 4y □ 5 involves a clear, step-by-step process:

- Substituting the coordinates into the inequality.
- Simplifying the expression.
- Comparing the result with the boundary value.

By mastering this process, you'll be better equipped to handle similar questions involving inequalities, whether in exams, homework, or real-world applications. Remember, visualization through graphing is an invaluable tool that complements algebraic methods, giving you a complete understanding of the solution set.

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