

Is (2, 2) A Solution Of $y < 4x + 6$? Choose 1 Answer: Yes(No

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When analyzing whether a specific point satisfies a given inequality, such as $(2, 2)$ with the inequality $y < 4x + 6$, it is essential to understand the fundamental concepts of coordinate geometry, inequalities, and how to test points within these inequalities. This article provides a comprehensive guide to determine whether the point $(2, 2)$ is a solution to the inequality $y < 4x + 6$, along with detailed explanations, step-by-step procedures, and related insights.

Understanding The Components Of The Inequality $y < 4x + 6$

Before analyzing the point $(2, 2)$, it is crucial to understand the structure of the inequality $y < 4x + 6$.

1. The Slope-Intercept Form

- The given inequality $y < 4x + 6$ is in slope-intercept form, which is generally written as $y = mx + b$, where:
 - m is the slope of the line (how steep it is).
 - b is the y-intercept (the point where the line crosses the y-axis).
- In this case:
 - Slope (m) = 4
 - Y-intercept (b) = 6

2. Graphing The Boundary Line

- The boundary line for the inequality $y < 4x + 6$ is the line $y = 4x + 6$.
- To graph this line:
 - Plot the y-intercept $(0, 6)$.
 - Use the slope (rise over run = 4/1) to find additional points.
 - Draw a straight line through these points.

3. Determining The Solution Region

- Since the inequality is $y < 4x + 6$ (strictly less than), the solution region is below the line, not including the line itself.
- This is typically represented graphically with a dashed line to indicate the boundary line is not part of the solution set.

TESTING THE POINT (2, 2) AGAINST THE INEQUALITY

TO VERIFY WHETHER (2, 2) SATISFIES $y < 4x + 6$, FOLLOW THESE STEPS:

1. SUBSTITUTE THE POINT COORDINATES INTO THE INEQUALITY

- GIVEN POINT: $(x, y) = (2, 2)$
- SUBSTITUTE INTO $y < 4x + 6$:
- $2 < 4(2) + 6$

2. SIMPLIFY THE EXPRESSION

- CALCULATE THE RIGHT SIDE:
- $4(2) + 6 = 8 + 6 = 14$
- NOW, COMPARE:
- $2 < 14$

3. ANALYZE THE RESULT

- SINCE 2 IS INDEED LESS THAN 14, THE INEQUALITY HOLDS TRUE WHEN SUBSTITUTING THE POINT'S COORDINATES.
- THEREFORE, THE POINT (2, 2) SATISFIES THE INEQUALITY $y < 4x + 6$.

CONCLUSION: IS (2, 2) A SOLUTION OF $y < 4x + 6$?

BASED ON THE SUBSTITUTION AND COMPARISON, THE ANSWER IS YES.

- THE POINT (2, 2) LIES IN THE REGION BELOW THE LINE $y = 4x + 6$.
- IT SATISFIES THE INEQUALITY $y < 4x + 6$, CONFIRMING IT IS A SOLUTION.

FURTHER INSIGHTS INTO SOLVING AND VISUALIZING INEQUALITIES

UNDERSTANDING HOW TO DETERMINE SOLUTIONS TO INEQUALITIES LIKE $y < 4x + 6$ IS FUNDAMENTAL IN ALGEBRA AND COORDINATE GEOMETRY. BELOW ARE ADDITIONAL TIPS AND EXPLANATIONS TO DEEPEN YOUR COMPREHENSION:

1. GRAPHICAL REPRESENTATION

- GRAPH THE BOUNDARY LINE $y = 4x + 6$.
- SHADE THE REGION THAT SATISFIES THE INEQUALITY:
- FOR $y < 4x + 6$, SHADE BELOW THE LINE.
- USE A DASHED LINE TO INDICATE THE BOUNDARY LINE IS NOT INCLUDED UNLESS THE INEQUALITY IS $y \leq 4x + 6$ (WHICH

INCLUDES THE LINE).

2. TESTING ADDITIONAL POINTS

- WHEN IN DOUBT, PICK A TEST POINT NOT ON THE BOUNDARY LINE (E.G., THE ORIGIN $(0, 0)$) AND SEE IF IT SATISFIES THE INEQUALITY.
- FOR $y < 4x + 6$:
- SUBSTITUTE $(0, 0)$:
- $0 < 4(0) + 6$? $0 < 6$? TRUE.
- SINCE THE ORIGIN SATISFIES THE INEQUALITY, THE SOLUTION REGION INCLUDES THE ORIGIN, CONFIRMING THE SHADING BELOW THE LINE.

3. RECOGNIZING THE TYPE OF INEQUALITY

- STRICT INEQUALITIES ($<$ OR $>$): BOUNDARY LINE IS DASHED.
- INCLUSIVE INEQUALITIES ($\leq$ OR $\geq$): BOUNDARY LINE IS SOLID.

4. PRACTICAL APPLICATIONS

- INEQUALITIES ARE USED IN VARIOUS FIELDS:
- ECONOMICS (BUDGET CONSTRAINTS)
- ENGINEERING (FEASIBILITY REGIONS)
- BUSINESS (PROFIT AND LOSS REGIONS)
- COMPUTER SCIENCE (ALGORITHM CONSTRAINTS)

COMMON MISTAKES TO AVOID

WHEN WORKING THROUGH INEQUALITIES AND POINTS:

- **CONFUSING THE INEQUALITY SIGN:** REMEMBER THAT " $<$ " MEANS BELOW THE LINE, AND " $>$ " MEANS ABOVE.
- **FORGETTING TO TEST THE POINT:** ALWAYS SUBSTITUTE THE COORDINATES TO VERIFY.
- **MISINTERPRETING THE BOUNDARY LINE:** DETERMINE WHETHER IT'S INCLUDED BASED ON THE INEQUALITY SYMBOL.
- **GRAPHICAL INACCURACIES:** USE PRECISE PLOTTING TO AVOID MISINTERPRETATION.

SUMMARY

- THE POINT $(2, 2)$ WHEN TESTED AGAINST $y < 4x + 6$ RESULTS IN A TRUE STATEMENT.
- HENCE, $(2, 2)$ IS A SOLUTION TO THE INEQUALITY $y < 4x + 6$.

- VISUALIZING THE INEQUALITY ON A GRAPH CONFIRMS THE POINT LIES IN THE SHADED REGION BELOW THE BOUNDARY LINE.
- UNDERSTANDING THESE CONCEPTS IS FUNDAMENTAL FOR SOLVING AND ANALYZING INEQUALITIES IN ALGEBRA AND BEYOND.

FINAL ANSWER

YES, $(2, 2)$ IS A SOLUTION OF $y < 4x + 6$.

NOTE: MASTERY OF INEQUALITY TESTING AND GRAPHING IS ESSENTIAL FOR SOLVING COMPLEX ALGEBRAIC PROBLEMS EFFICIENTLY. PRACTICE WITH DIFFERENT POINTS AND INEQUALITIES TO BUILD CONFIDENCE AND ENHANCE YOUR PROBLEM-SOLVING SKILLS.

FREQUENTLY ASKED QUESTIONS

IS THE POINT $(2, 2)$ A SOLUTION TO THE INEQUALITY $y < 4x + 6$?

YES

HOW DO YOU DETERMINE IF A POINT SATISFIES THE INEQUALITY $y < 4x + 6$?

BY SUBSTITUTING THE POINT'S x AND y VALUES INTO THE INEQUALITY AND CHECKING IF THE STATEMENT HOLDS TRUE.

DOES THE POINT $(2, 2)$ SATISFY THE INEQUALITY $y < 4x + 6$?

YES, BECAUSE WHEN $x=2$, $4(2)+6=14$, AND SINCE $2 < 14$, THE POINT $(2, 2)$ SATISFIES THE INEQUALITY.

WHAT IS THE FIRST STEP TO VERIFY IF $(2, 2)$ IS A SOLUTION TO $y < 4x + 6$?

SUBSTITUTE $x=2$ AND $y=2$ INTO THE INEQUALITY AND CHECK IF $y < 4x + 6$ HOLDS TRUE.

CAN THE POINT $(2, 2)$ BE CONSIDERED A SOLUTION IF y EQUALS $4x + 6$?

NO, BECAUSE THE INEQUALITY IS STRICT ($<$), SO y MUST BE LESS THAN $4x + 6$, NOT EQUAL.

IS THE INEQUALITY $y < 4x + 6$ LINEAR?

YES, IT'S A LINEAR INEQUALITY REPRESENTING A HALF-PLANE BELOW THE LINE $y = 4x + 6$.

WHAT TYPE OF GRAPH REPRESENTS THE INEQUALITY $y < 4x + 6$?

A HALF-PLANE BELOW THE BOUNDARY LINE $y = 4x + 6$.

BASED ON THE INEQUALITY $y < 4x + 6$, SHOULD THE POINT $(2, 2)$ BE INCLUDED IN THE SOLUTION SET?

YES, BECAUSE IT SATISFIES THE INEQUALITY, WITH $y=2 < 14$ WHEN $x=2$.

ADDITIONAL RESOURCES

Is $(2, 2)$ a solution of $y < 4x + 6$?

Understanding whether a specific point satisfies a given inequality is fundamental in algebra and coordinate geometry. In this case, we are asked: Is the point $(2, 2)$ a solution of the inequality $y < 4x + 6$? This question involves determining if the point $(2, 2)$ lies below the line defined by $y = 4x + 6$, since the inequality uses the less than symbol ($<$). To answer this comprehensively, we need to analyze the inequality, evaluate the point, and understand the implications of the solution set.

Understanding the inequality $y < 4x + 6$

The Equation of the Boundary Line

The inequality $y < 4x + 6$ represents all the points below the straight line $y = 4x + 6$ on the Cartesian plane. The line $y = 4x + 6$ is the boundary, where the inequality changes from true to false or vice versa. When dealing with such inequalities, it's essential to understand:

- The boundary line: $y = 4x + 6$
- The nature of the inequality: " $<$ " indicates the region strictly below the line, meaning y values less than $4x + 6$ for corresponding x values.

Graphing the Boundary Line

Graphing $y = 4x + 6$ can help visualize the solution:

- Slope (m): 4
- Y-intercept (b): 6

To plot:

1. Start at $(0, 6)$ on the y -axis.
2. Use the slope to find another point: from $(0, 6)$, move right 1 unit and up 4 units to $(1, 10)$.
3. Draw the line passing through these points.

The line divides the coordinate plane into two regions:

- The region above the line where $y > 4x + 6$
- The region below the line where $y < 4x + 6$

Evaluating the point $(2, 2)$

The core task is to determine if the point $(2, 2)$ satisfies the inequality $y < 4x + 6$.

Step-by-step analysis:

1. Identify the x and y values:

$$x = 2$$

$$y = 2$$

2. Substitute into the inequality:

$$y < 4x + 6$$

$$2 < 4(2) + 6$$

3. Simplify:

$$2 < 8 + 6$$

$$2 < 14$$

4. CHECK THE INEQUALITY:

Is $2 < 14$? YES, THIS STATEMENT IS TRUE.

SINCE THE INEQUALITY HOLDS TRUE WHEN SUBSTITUTING THE POINT'S COORDINATES, $(2, 2)$ IS A SOLUTION TO $y < 4x + 6$.

GEOMETRICAL INTERPRETATION

VISUALLY, THE POINT $(2, 2)$ LIES BELOW THE LINE $y = 4x + 6$ BECAUSE:

- AT $x = 2$, THE LINE $y = 4(2) + 6 = 14$.
- THE y -COORDINATE OF THE POINT $(2, 2)$ IS LESS THAN 14, CONFIRMING IT'S BELOW THE LINE.

THIS CONFIRMS THE ALGEBRAIC CALCULATION: THE POINT SATISFIES THE INEQUALITY.

ADDITIONAL CONSIDERATIONS

IS THE SOLUTION SET OPEN OR CLOSED?

- SINCE THE INEQUALITY IS STRICT ($<$), THE SOLUTION SET INCLUDES ALL POINTS BELOW THE LINE BUT NOT ON THE LINE ITSELF.
- THE BOUNDARY LINE $y = 4x + 6$ IS NOT PART OF THE SOLUTION SET BECAUSE THE INEQUALITY IS STRICT ($<$), NOT $\leq$.

WHAT ABOUT OTHER POINTS?

- EXAMPLE POINT ABOVE THE LINE: $(2, 16)$
- $16 < 14$? No. So, $(2, 16)$ IS NOT A SOLUTION.
- EXAMPLE POINT ON THE LINE: $(2, 14)$
- $14 < 14$? No. So, POINTS ON THE LINE ARE NOT SOLUTIONS SINCE THE INEQUALITY IS STRICT.

SUMMARY AND FINAL ANSWER

BASED ON THE ALGEBRAIC SUBSTITUTION AND GEOMETRIC INTERPRETATION, THE POINT $(2, 2)$ SATISFIES THE INEQUALITY $y < 4x + 6$. THEREFORE, THE CORRECT ANSWER IS:

YES

BROADER IMPLICATIONS AND PRACTICE TIPS

WHY IS THIS IMPORTANT?

UNDERSTANDING HOW TO EVALUATE WHETHER A POINT IS A SOLUTION TO AN INEQUALITY IS CRUCIAL IN VARIOUS FIELDS SUCH AS:

- GRAPHING INEQUALITIES AND UNDERSTANDING FEASIBLE REGIONS IN OPTIMIZATION PROBLEMS
- ANALYZING REGIONS IN COORDINATE GEOMETRY FOR REAL-WORLD APPLICATIONS LIKE TERRAIN MAPPING, ECONOMICS, AND ENGINEERING
- DEVELOPING INTUITION ABOUT THE RELATIONSHIP BETWEEN ALGEBRAIC EXPRESSIONS AND THEIR GEOMETRIC REPRESENTATIONS

PRACTICE STRATEGIES

- ALWAYS SUBSTITUTE THE POINT'S COORDINATES INTO THE INEQUALITY TO VERIFY SOLUTION STATUS
- SKETCH THE BOUNDARY LINE AND SHADE THE APPROPRIATE REGION TO VISUALIZE SOLUTIONS
- REMEMBER THAT STRICT INEQUALITIES ($<$, $>$) EXCLUDE THE BOUNDARY LINE, WHILE $\leq$ OR $\geq$ INCLUDE IT

FINAL THOUGHTS

IN CONCLUSION, EVALUATING WHETHER $(2, 2)$ IS A SOLUTION OF $y < 4x + 6$ REVEALS THE IMPORTANCE OF ALGEBRAIC SUBSTITUTION AND GEOMETRIC REASONING. SINCE THE POINT $(2, 2)$ MAKES THE INEQUALITY TRUE, IT RESIDES BELOW THE LINE $y = 4x + 6$, CONFIRMING IT AS A SOLUTION.

ANSWER: YES

Is 2 2 A Solution Of Y Lt 4x 6 Choose 1 Answer Yes No

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