The Graph Of Which Function(s) Will Contain The Point (2, 10)?y = 5 Xy = 8 Xy = 10 - Xy = X + 8

The Graph Of Which Function(s) Will Contain The Point (2, 10)? y = 5, x = 8, y = 10 - x, y = x + 8

Understanding which functions' graphs pass through a specific point is a fundamental concept in algebra and coordinate geometry. In this article, we will explore the question: "The graph of which function(s) will contain the point (2, 10)?" We will analyze the given functions—y = 5, x = 8, y = 10 - x, and y = x + 8—to determine which of these graphs include the point (2, 10). This detailed exploration will help clarify how different types of functions are represented graphically and how to verify if a particular point lies on their graphs.

Understanding the Coordinate Point (2, 10)

Before diving into the functions, it's crucial to understand what the point (2, 10) signifies on a coordinate plane:

- x-coordinate = 2: The point is located 2 units along the horizontal axis.
- y-coordinate = 10: The point is located 10 units up the vertical axis.

To determine whether a point lies on a particular graph, we substitute the x-value into the function and see if the resulting y-value matches the y-coordinate of the point.

Analyzing Each Function

Let's examine each given function individually, substituting x = 2 into each to see if the corresponding y-value is 10.

1. y = 5

This function describes a horizontal line at y = 5.

- Graph type: Horizontal line
- Equation: y = 5

Check if (2, 10) lies on y = 5:

- Substitute x = 2: y = 5 (independent of x)
- Y-value at any x on this line is 5, which is not equal to 10.

Conclusion:

- The point (2, 10) does not lie on y = 5.

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2. x = 8

This function describes a vertical line at x = 8.

- Graph type: Vertical line
- Equation: x = 8

Check if (2, 10) lies on x = 8:

- The x-coordinate of the point is 2, which does not match x = 8.

Conclusion:

- The point (2, 10) does not lie on x = 8.

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3. y = 10 - x

This is a linear function with a negative slope.

- Equation: y = 10 - x

Check if (2, 10) lies on y = 10 - x:

- Substitute x = 2:

y = 10 - 2 = 8

- The calculated y-value is 8, which does not match the y-coordinate of 10.

Conclusion:

- The point (2, 10) does not lie on $y = 10 - x$.

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4. $y = x + 8$

This is a linear function with a positive slope.

- Equation: $y = x + 8$

Check if (2, 10) lies on $y = x + 8$:

- Substitute $x = 2$:

$y = 2 + 8 = 10$

- The calculated y-value matches the y-coordinate of the point.

Conclusion:

- The point (2, 10) does lie on $y = x + 8$.

Summary of Findings

Function	Does it pass through (2, 10)?	Explanation
$y = 5$	No	At $x=2$, $y=5$, not 10
$x = 8$	No	$x=2 \neq 8$
$y = 10 - x$	No	$y=8$ at $x=2$
$y = x + 8$	Yes	$y=10$ at $x=2$

Therefore, the only function among these that contains the point (2, 10) is $y = x + 8$.

Visualizing the Graphs

Visual representations can significantly aid in understanding how these functions behave.

Horizontal Line y = 5

- Drawn as a straight line crossing the y-axis at 5.
- Parallel to the x-axis.
- Does not pass through (2, 10), which is above y=5.

Vertical Line x = 8

- Crosses the x-axis at 8.
- Parallel to the y-axis.
- Does not pass through (2, 10), which is to the left of x=8.

Line y = 10 - x

- Intercepts the y-axis at y=10.
- Has a slope of -1, decreasing as x increases.
- Passes through points like (0, 10) and (10, 0).
- Does not include (2, 10), since at x=2, y=8.

Line y = x + 8

- Intercepts the y-axis at y=8.
- Has a slope of 1, increasing as x increases.
- Passes through (0, 8) and (10, 18).
- Contains the point (2, 10), since y=2+8=10.

Additional Insights and Practice Problems

Understanding how to verify if a point lies on a graph involves substituting the x-value into the function and checking if the resulting y-value matches the point's y-coordinate. This process is fundamental in graphing and analyzing functions.

Practice Problem:

Determine whether the point (3, 11) lies on each of the following functions:

- y = 5
- x = 8
- y = 10 - x

- y = x + 8

Solution:

- y=5: at x=3, y=5 ≠ 11 → No
- x=8: x=3 ≠ 8 → No
- y=10 - x: y=10-3=7 ≠ 11 → No
- y= x + 8: y=3+8=11 → Yes

Answer: Only y= x + 8 contains (3, 11).

Conclusion

In conclusion, among the functions provided, only y = x + 8 contains the point (2, 10). Recognizing whether a point lies on a graph involves simple substitution and comparison, which is an essential skill in algebra and coordinate geometry.

Understanding the graphical nature of different types of functions—horizontal lines, vertical lines, and linear equations—enhances comprehension of their behavior and relationships. This knowledge is not only fundamental for solving mathematical problems but also crucial in fields such as engineering, physics, and computer science where graphing functions plays a significant role.

Final Tips for Mastering Graph Point Verification

- Always substitute the x-value into the function.
- Check if the computed y-value matches the given y-coordinate.
- Remember that vertical lines (x = constant) are unique; the x-value must match exactly.
- For horizontal lines (y = constant), the y-value must match the constant.
- Linear functions are straightforward to verify due to their simple algebraic form.

By practicing these steps, you'll develop confidence in analyzing and understanding various functions and their graphs.

Meta Description:

Discover which functions' graphs pass through the point (2, 10). Explore detailed analysis of y = 5, x = 8, y = 10 - x, and y = x + 8 to understand their behavior and how to verify point inclusion effectively.

Frequently Asked Questions

Which of the given functions pass through the point (2, 10)?

Let's evaluate each function at x = 2:
- y = 5x → y = 5(2) = 10 → passes through (2, 10)
- y = 8 → y = 8 at x = 2 → does not pass through (2, 10)
- y = 10 - x → y = 10 - 2 = 8 → does not pass through (2, 10)
- y = x + 8 → y = 2 + 8 = 10 → passes through (2, 10)

Therefore, the functions y = 5x and y = x + 8 pass through the point (2, 10).

What is the significance of the point (2, 10) in relation to these functions?

The point (2, 10) lies on the graphs of the functions y = 5x and y = x + 8, indicating these functions pass through this point, while the others do not.

How can you verify if a point lies on a specific function's graph?

Substitute the x-coordinate of the point into the function and check if the resulting y-value matches the y-coordinate of the point. If it does, the point lies on the graph.

Are the functions y = 5x and y = x + 8 linear? How can you tell?

Yes, both y = 5x and y = x + 8 are linear functions because they are in the form y = mx + b, which represents straight lines.

At x = 2, which functions give the same y-value, and what is that value?

At x = 2, both y = 5x and y = x + 8 give y = 10. So, they intersect at the point (2, 10).

What is the y-value for y = 8 when x = 2?

For y = 8, when x = 2, y remains 8 regardless of x, so the point (2, 8) lies on this horizontal line, which does not pass through (2, 10).

Which function has a y-intercept at y = 8?

The function y = x + 8 has a y-intercept at y = 8, occurring when x = 0.

If you plot all four functions, which ones will intersect at the point (2, 10)?

The functions y = 5x and y = x + 8 will intersect at (2, 10). The others do not pass through this point.

Can the point (2, 10) be on more than one function simultaneously? If yes, which ones?

Yes, the point (2, 10) is on both y = 5x and y = x + 8 simultaneously.

Additional Resources

The Graph Of Which Function(s) Will Contain The Point (2, 10)?

Understanding the precise characteristics of functions and their graphs is a fundamental pursuit in mathematics, especially when analyzing which functions pass through specific points in the coordinate plane. In this detailed investigation, we explore the question: Which of the given functions—y = 5x, y = 8x, y = 10 - x, and y = x + 8—contain the point (2, 10)? We will methodically evaluate each function, analyze their properties, and discuss the implications of our findings within the broader context of coordinate geometry.

Introduction to the Problem

Determining whether a specific point lies on the graph of a function is a fundamental concept in algebra and calculus. It involves substituting the point's coordinates into the function's equation and verifying if the equality holds. For the point (2, 10), where x = 2 and y = 10, our task is to examine each of the given functions:

- y = 5x
- y = 8x
- y = 10 - x
- y = x + 8

and determine whether each function passes through this point.

Methodology: Testing the Point Against Each Function

The core approach involves substituting x = 2 into each function and seeing if the resulting y-value matches 10. Mathematically, for each function f(x), evaluate f(2) and compare it to 10:

- If f(2) = 10, then the point (2,10) lies on the graph of that function.
- If f(2) ≠ 10, then the point does not lie on that function's graph.

This simple substitution provides an immediate answer for each case.

Function-by-Function Analysis

1. y = 5x

Evaluation:

- Substitute x = 2:
y = 5 2 = 10

Comparison:

- The y-value at x = 2 is 10, which matches the y-coordinate of the point (2, 10).

Conclusion:

- The point (2, 10) lies on the graph of y = 5x.

Graphical Interpretation:

- The line y = 5x is a straight line with a slope of 5 passing through the origin. The point (2,10) is clearly on this line, as it satisfies the equation.

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2. y = 8x

Evaluation:

- Substitute x = 2:
y = 8 2 = 16

Comparison:

- The y-value at x = 2 is 16, which does not match 10.

Conclusion:

- The point (2, 10) does not lie on the graph of y = 8x.

Graphical Interpretation:

- The line y = 8x has a steeper slope than y = 5x, passing through (0,0) but not through the point (2,10).

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3. y = 10 - x

Evaluation:

- Substitute x = 2:
y = 10 - 2 = 8

Comparison:

- The y-value at x = 2 is 8, which does not match 10.

Conclusion:

- The point (2, 10) does not lie on the graph of y = 10 - x.

Graphical Interpretation:

- This line has a slope of -1 and intersects the y-axis at 10, but at x = 2, the y-value is 8.

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4. y = x + 8

Evaluation:

- Substitute x = 2:
y = 2 + 8 = 10

Comparison:

- The y-value at x = 2 is 10, matching the y-coordinate of the point.

Conclusion:

- The point (2, 10) lies on the graph of y = x + 8.

Graphical Interpretation:

- The line y = x + 8 has a slope of 1 and a y-intercept at 8, passing through (2,10) as well.

Summary of Findings

Function	Does the point (2,10) lie on its graph?	Explanation
y = 5x	Yes	5 2 = 10 matches y = 10.
y = 8x	No	8 2 = 16 ≠ 10.
y = 10 - x	No	10 - 2 = 8 ≠ 10.
y = x + 8	Yes	2 + 8 = 10 matches y = 10.

From this analysis, it is clear that the functions y = 5x and y = x + 8 pass through the point (2, 10), while the others do not.

Deeper Geometric and Algebraic Insights

Understanding the Equations and Their Graphs

The functions under consideration are all linear and can be characterized by their slopes and intercepts:

- y = 5x: slope = 5, y-intercept = 0
- y = 8x: slope = 8, y-intercept = 0
- y = 10 - x: slope = -1, y-intercept = 10
- y = x + 8: slope = 1, y-intercept = 8

The point (2, 10) lies on the graphs of the first and last functions because their equations satisfy the point's coordinates exactly.

Visual Interpretation:

- For y = 5x, the line is steeper than y = x + 8, but both pass through (2, 10).
- For y = x + 8, at x = 2, y is 10, confirming the point lies on this line.
- The other two functions, with different slopes, do not pass through this point, illustrating how the slope and intercept determine the line's position.

Implications in Function Analysis

This analysis underscores a fundamental principle: to verify if a point lies on a linear function, simply substitute the x-coordinate and check if the resulting y-coordinate matches. This process is essential in numerous applications, from solving systems of equations to graphical data interpretation.

Furthermore, the functions' slopes influence the "direction" and steepness of their graphs, affecting whether they pass through specific points. The intercepts provide additional context about where the lines cross the axes, which can be useful in more complex geometric analyses.

Broader Context and Applications

In education, understanding how to verify whether a point lies on a given function is a foundational skill. It helps students develop intuition about graphing, the importance of slope and intercepts, and the relationship between algebraic equations and their geometric representations.

In research and applied mathematics, such evaluations are critical when modeling real-world phenomena. For instance, in physics, the position of an object over time could be modeled by a linear function, and knowing whether certain measurements align with the model involves similar point-in-graph checks.

In software and computational geometry, algorithms often need to determine point-line relationships efficiently, which hinges on similar substitution and comparison techniques.

Conclusion

Through systematic substitution and analysis, it is clear that the functions y = 5x and y = x + 8 contain the point (2, 10), while y = 8x and y = 10 - x do not. This investigation demonstrates the straightforward yet powerful method of verifying point inclusion in the graph of a function and highlights the importance of understanding the geometric properties of linear functions.

This exercise not only clarifies the specific question at hand but also reinforces core principles of coordinate geometry, which serve as building blocks for more advanced mathematical concepts. Whether for academic purposes, practical modeling, or software development, the ability to analyze and interpret the relationship between points and functions remains an essential skill in the mathematician's toolkit.

In Summary:

- The point (2, 10) lies on the graphs of y = 5x and y = x + 8.
- It does not lie on y = 8x or y = 10 - x.
- The analysis highlights the significance of algebraic verification and geometric interpretation in understanding linear functions.

By mastering these fundamental techniques, students and professionals alike can better navigate the complex relationships within the coordinate plane, fostering deeper insights into the nature of mathematical functions and their graphical representations.

The Graph Of Which Function S Will Contain The Point 2 10 Y 5 Xy 8 Xy 10 Xy X 8

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