

The Equation $2x - y = 8$ Is Graphed In The Xyplane. Which Of The Following Is A True Statement About The Graph?A.

The Equation $2x - y = 8$ Is Graphed In The XY Plane. Which Of The Following Is A True Statement About The Graph?A.

Understanding the characteristics of linear equations and their graphs is fundamental in algebra. When we analyze the equation $2x - y = 8$, we delve into the core concepts of slope, intercepts, and the nature of linear graphs. This article explores the detailed features of this specific equation, helping students and enthusiasts grasp the underlying principles of graphing linear equations and identifying true statements about their graphs.

Analyzing the Equation $2x - y = 8$

Before diving into possible true statements, it's essential to understand what the equation represents. The given equation is a linear equation in two variables, x and y , which can be graphed as a straight line in the XY plane.

Rewriting the Equation in Slope-Intercept Form

The first step in analyzing the graph is to rewrite the equation in the slope-intercept form, $y = mx + b$, which makes it easier to interpret the slope and y -intercept directly.

- Starting with the original equation:

$$2x - y = 8$$

- Solve for y :

$$y = 2x - 8$$

This form reveals two critical features:

- Slope (m): 2
- Y -intercept (b): -8

Understanding these allows us to visualize the graph more accurately.

Key Features of the Graph of $2x - y = 8$

Based on the slope-intercept form, the graph has specific characteristics:

Slope

- The slope is 2, indicating that for every increase of 1 unit in x , y increases by 2 units.
- The positive slope signifies the line rises from left to right.

Y-Intercept

- The y-intercept occurs at $(0, -8)$, meaning the line crosses the y-axis at -8.

X-Intercept

- To find the x-intercept, set $y=0$ and solve for x :

$$0 = 2x - 8$$

$$2x = 8$$

$$x = 4$$

- Therefore, the x-intercept is at $(4, 0)$.

Plotting the Line in the XY Plane

Knowing the intercepts and slope allows accurate plotting:

- Mark the y-intercept at $(0, -8)$.
- Mark the x-intercept at $(4, 0)$.
- Draw a straight line passing through these points.

This straightforward approach helps visualize the line's position in the coordinate plane.

Identifying True Statements About the Graph

Given the analysis, several statements about the graph can be true or false. Let's examine

common options and determine which are accurate.

Possible True Statements

1. The line crosses the y-axis at -8.
2. The x-intercept of the line is at (4, 0).
3. The slope of the line is 2.
4. The line rises 2 units for every 1 unit it moves to the right.
5. The line is decreasing in the negative x-direction.
6. The line passes through the point (0, -8).

Let's evaluate each statement:

1. The line crosses the y-axis at -8.

- True. As shown, the y-intercept is at (0, -8).

2. The x-intercept of the line is at (4, 0).

- True. Calculated by setting $y=0$, $x=4$.

3. The slope of the line is 2.

- True. From the slope-intercept form, $m=2$.

4. The line rises 2 units for every 1 unit it moves to the right.

- True. This describes the slope accurately.

5. The line is decreasing in the negative x-direction.

- False. Since the slope is positive, the line increases as x increases, meaning it rises from left to right.

6. The line passes through the point (0, -8).

- True. As it's the y-intercept.

Understanding the Significance of These Statements

Knowing which statements are true helps in understanding the graph's behavior and in solving related problems. For instance, knowing the intercepts aids in graph plotting, and understanding the slope guides in predicting how the line behaves.

Additional Insights into the Equation and Graph

Beyond the direct intercepts and slope, we can explore other properties:

Line Equation Symmetry

- The line does not have any symmetry about the y-axis or x-axis, but it is symmetric about the origin in terms of linearity because it is a straight line.

Parallel and Perpendicular Lines

- Lines with the same slope (2) are parallel.
- Lines with slope $-1/2$ are perpendicular to this line.

Applications of the Equation in Real Life

- Such linear equations model relationships where one variable depends linearly on another, like cost vs. quantity, distance vs. time, etc.

Common Mistakes When Interpreting the Graph

Understanding the graph of $2x - y = 8$ involves avoiding typical pitfalls:

- Confusing the slope with the intercepts.
- Miscalculating the intercepts by substituting the wrong variable.

- Assuming the line is decreasing when it is actually increasing.

Being meticulous in calculations ensures accurate interpretation.

Summary of Key Takeaways

- The equation $2x - y = 8$, when rewritten as $y = 2x - 8$, reveals a line with a slope of 2 and a y-intercept at $(0, -8)$.
- The x-intercept is at $(4, 0)$.
- The line rises 2 units for every 1 unit it moves to the right.
- The line crosses the y-axis at -8 and the x-axis at 4.
- True statements about the graph include those related to intercepts and slope, while statements indicating decreasing behavior are false.

Conclusion: Recognizing True Statements About the Graph

When analyzing the graph of the equation $2x - y = 8$, the key is understanding the intercepts and slope. Most true statements are directly linked to these features:

- The y-intercept at $(0, -8)$.
- The x-intercept at $(4, 0)$.
- The slope of 2, indicating an upward trend from left to right.

By mastering these concepts, students can quickly identify true statements about similar linear equations and enhance their overall algebraic graphing skills.

Additional Resources for Learning Linear Graphs

- Interactive graphing tools like Desmos or GeoGebra.
- Practice problems on finding intercepts.
- Tutorials on rewriting equations in slope-intercept form.
- Videos explaining the significance of slope and intercepts.

Understanding these foundational concepts prepares learners for more advanced topics like systems of equations, inequalities, and analytic geometry.

Remember: The key to mastering graphing linear equations is practice. By analyzing different equations and their graphs, you develop intuition for their features, enabling you to quickly identify true statements about any linear graph in the XY plane.

Frequently Asked Questions

What type of line is represented by the equation $2x - y = 8$ in the xy-plane?

It is a straight line because the equation is linear in x and y .

What is the slope of the line given by $2x - y = 8$?

The slope is 2, since rewriting the equation as $y = 2x - 8$ shows the slope-intercept form.

Where does the line $2x - y = 8$ cross the y-axis?

It crosses the y-axis at $(0, -8)$.

What is the x-intercept of the line $2x - y = 8$?

The x-intercept is at $(4, 0)$, found by setting $y=0$ and solving for x .

Is the line $2x - y = 8$ increasing or decreasing?

The line is increasing because the slope is positive (2).

Which of the following points lies on the line $2x - y = 8$? (Options: $(0, -8)$, $(4, 0)$, $(2, 4)$)

All three points lie on the line, as they satisfy the equation.

If you graph the line $2x - y = 8$, what is the general direction of the line?

The line will slope upward from left to right due to its positive slope.

How can you verify if a point (x, y) lies on the line $2x - y = 8$?

Plug the point's coordinates into the equation and check if the equation holds true.

Additional Resources

Understanding the Equation $2x - y = 8$ and Its Graph in the XY-Plane

When exploring the graph of the equation $2x - y = 8$ in the XY-plane, it's essential to understand what this mathematical expression represents and how it translates into a visual form. This equation is a linear equation, which means its graph will be a straight line. Analyzing the properties of this line—such as its slope, intercepts, and general orientation—allows us to better interpret the geometric meaning behind the algebraic expression. In this guide, we will delve into the details of the equation, how to graph it accurately, and what true statements can be derived about its graphical representation.

Understanding the Equation: $2x - y = 8$

Before diving into the graph, let's break down the equation itself:

- Standard form of a line: The equation is written as $2x - y = 8$, which is a form of a linear equation. For easier graphing, it's often rewritten as $y = mx + b$.
- Variables: x and y are the coordinate variables representing points in the XY-plane.
- Coefficients: The number 2 in front of x indicates the rate at which y changes with respect to x , i.e., the slope.
- Constant term: The number 8 influences where the line crosses the axes.

Converting to Slope-Intercept Form

To analyze the line comprehensively, convert the equation into the slope-intercept form:

Step 1: Isolate y

Start with the original equation:

$$2x - y = 8$$

Subtract $2x$ from both sides:

$$-y = -2x + 8$$

Step 2: Multiply both sides by -1

To make y positive:

$$y = 2x - 8$$

Now, the equation is in the form $y = mx + b$, where:

- m (slope): 2
- b (y-intercept): -8

Interpreting the Slope and Intercept

The slope ($m = 2$)

- The slope indicates that for every increase of 1 unit in x , y increases by 2 units.
- The line rises steeply, reflecting a positive slope.

The y-intercept ($b = -8$)

- The point where the line crosses the y-axis is at $(0, -8)$.
- This is the initial point from which the line extends in both directions.

The x-intercept

- To find where the line crosses the x-axis, set $y = 0$:

$$0 = 2x - 8$$

$$2x = 8$$

$$x = 4$$

- So, the x-intercept is at $(4, 0)$.

Graphing the Line: Step-by-Step

1. Plot the intercepts:

- Mark the point $(0, -8)$ on the y-axis.
- Mark the point $(4, 0)$ on the x-axis.

2. Draw the line:

- Connect these points with a straight line.
- Extend the line in both directions, maintaining the slope.

3. Verify the slope:

- The rise over run between $(0, -8)$ and $(4, 0)$:

$$\text{Rise} = 8 \text{ (from } -8 \text{ to } 0)$$

$$\text{Run} = 4 \text{ (from } 0 \text{ to } 4)$$

$$\text{Slope} = 8/4 = 2, \text{ consistent with the slope found earlier.}$$

Common True Statements About the Graph

Based on the graph of the equation $2x - y = 8$, here are some key truths:

1. The line crosses the y-axis at $(0, -8)$.

- Explanation: The y-intercept is directly read from the slope-intercept form $y = 2x - 8$.

2. The line crosses the x-axis at (4, 0).

- Explanation: Found by setting $y = 0$ and solving for x .

3. The slope of the line is 2.

- Explanation: Indicates the line rises 2 units vertically for every 1 unit moved horizontally.

4. The line extends infinitely in both directions.

- Explanation: As with all lines, this one continues without end in both directions along its slope.

5. Any point (x, y) on the line satisfies the original equation.

- Explanation: For example, (4, 0):

$$2(4) - 0 = 8$$

$8 = 8$, confirming it lies on the line.

Additional Insights into the Line's Properties

Parallel and Perpendicular Lines

- Parallel lines: Any line with the same slope ($m = 2$) will be parallel and never intersect this line.

- Perpendicular lines: Lines with slope $m = -1/2$ will be perpendicular to this line.

Graphical implications

- The line is inclined steeply upward due to its positive slope.

- It crosses the coordinate axes at specific points, making it easy to locate in the plane.

Practical Applications and Contextual Understanding

Understanding the graph of $2x - y = 8$ is crucial in various scenarios, such as:

- Real-world modeling: Representing relationships like cost versus production, where the equation models a linear relationship.

- Problem-solving: Quickly identifying intercepts and slopes allows for solving systems of equations involving multiple lines.

- Coordinate geometry: Visualizing the relationships between variables and their rates of change.

Summary of Key Points

- The equation $2x - y = 8$ graphs as a straight line.

- When converted to $y = 2x - 8$, the slope is 2, and the y-intercept is at (0, -8).

- The x-intercept is at (4, 0), found by setting y to zero.

- The line extends infinitely in both directions.

- Any point on the line satisfies the original equation.

Final Thoughts

Graphing linear equations like $2x - y = 8$ serves as a fundamental skill in algebra and coordinate geometry. Recognizing the slope and intercepts, and understanding what they signify geometrically, enables students and professionals alike to interpret and analyze relationships between variables effectively. When examining multiple-choice statements about such a graph, focus on these core properties—intercepts, slope, and the line's behavior—to determine which statements are true.

In conclusion, among the potential true statements about the graph of $2x - y = 8$, the most accurate are those that relate to its intercepts, slope, and the points it passes through. Mastery of these concepts empowers you to interpret and analyze linear equations with confidence and precision.

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