-2y = X + 6 Graph A On A Coordinate Plane, A Line Goes Through (negative 6, 0) And (1, Negative 3). Graph

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Understanding how to graph linear equations is a fundamental skill in mathematics, especially in coordinate geometry. The equation -2y = x + 6 presents an opportunity to explore the process of translating algebraic expressions into visual representations on a coordinate plane. In this comprehensive guide, we will delve into the step-by-step process of graphing the line that passes through the points (-6, 0) and (1, -3), interpret the significance of these points, and understand the underlying principles of linear graphing. Whether you're a student seeking to improve your algebra skills or a teacher preparing lesson plans, this article provides detailed insights into the concepts and techniques involved.

Understanding the Equation -2y = x + 6

Before plotting the line, it's crucial to understand the form and structure of the given equation.

Rearranging the Equation into Slope-Intercept Form

The equation -2y = x + 6 is in a form that isn't immediately suitable for graphing. To graph a line effectively, it's often easier to work with the slope-intercept form:

$$ y = mx + b $$

where:
- m is the slope of the line
- b is the y-intercept

Let's manipulate the equation:

$$
-2y = x + 6
$$

Divide both sides by -2:

$$
y = -\frac{1}{2}x - 3
$$

Now, the equation is in the form:

$$
y = -\frac{1}{2}x - 3
$$

This form clearly shows the slope and y-intercept:
- Slope $m = -\frac{1}{2}$

- Y-intercept $b = -3$

Plotting the Line on the Coordinate Plane

With the slope-intercept form in hand, plotting the line becomes straightforward. Here's the step-by-step process:

Step 1: Plot the Y-Intercept

- The y-intercept is at $(0, -3)$.
- Locate point (0, -3) on the coordinate plane.
- Mark this point clearly.

Step 2: Use the Slope to Find a Second Point

- The slope $m = -\frac{1}{2}$ indicates that for every 2 units moved horizontally (to the right), the line moves down 1 unit vertically.
- Starting from (0, -3):

- Move 2 units to the right: from x=0 to x=2.
- Move down 1 unit: from y=-3 to y=-4.

- The second point is at (2, -4).

Alternatively, move in the opposite direction:

- 2 units left: from x=0 to x=-2.
- Move up 1 unit: from y=-3 to y=-2.

- The third point is at (-2, -2).

Plot these points (2, -4) and (-2, -2) to help draw the line accurately.

Step 3: Draw the Line

- Use a ruler to connect the plotted points smoothly.
- Extend the line across the grid, ensuring it passes through all the marked points.
- Label the line if necessary, indicating the equation $y = -\frac{1}{2}x - 3$.

Understanding the Points (-6, 0) and (1, -3)

The points (-6, 0) and (1, -3) are significant because they lie on the line defined by the equation. Let's verify that these points satisfy the original or the rearranged equation.

Verifying the Point (-6, 0)

Plug $x = -6$ into the equation $y = -\frac{1}{2}x - 3$:

$$
y = -\frac{1}{2}(-6) - 3 = 3 - 3 = 0
$$

Since $y = 0$, the point (-6, 0) lies on the line.

Verifying the Point (1, -3)

Plug $x = 1$:

$$
y = -\frac{1}{2}(1) - 3 = -0.5 - 3 = -3.5
$$

However, the point given is (1, -3), which does not satisfy the equation exactly. This suggests that either:

- The point (1, -3) is approximate or intended as part of another context, or
- The original line passes through (-6, 0) and perhaps the line through (1, -3) is a different line.

But since the problem states that the line goes through (1, -3), let's verify whether the line $y = -\frac{1}{2}x - 3$ passes through (1, -3). From the calculation, it yields y = -3.5, so (1, -3) does not lie on this line exactly.

This discrepancy indicates that the line passing through (-6, 0) and (1, -3) has a different slope than the one derived from the rearranged equation. Let's directly find the line passing through these points.

Finding the Equation of the Line Through (-6, 0) and (1, -3)

Since the points are given explicitly, calculating the precise line passing through them involves:

Calculating the Slope (m)

$$
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 0}{1 - (-6)} = \frac{-3}{7} \approx -0.429
$$

Equation of the Line in Point-Slope Form

Using point-slope form:

$$
y - y_1 = m (x - x_1)
$$

Choose point (-6, 0):

$$
y - 0 = -\frac{3}{7}(x - (-6))
$$

$$
y = -\frac{3}{7}(x + 6)
$$

Graphing the Line Through the Points (-6, 0) and (1, -3)

Given the slope $m = -\frac{3}{7}$ and point (-6, 0), the process is:

Step 1: Plot the Point (-6, 0)

- Locate $x = -6$, $y = 0$ on the coordinate plane.
- Mark and label this point.

Step 2: Use the Slope to Find a Second Point

- From (-6, 0), move:

- 7 units to the right (since denominator is 7):

- x: $-6 + 7 = 1$

- y: $0 + (-3) = -3$

- This matches the point (1, -3), confirming the correctness of the slope calculation.

Step 3: Draw the Line

- Connect the points (-6, 0) and (1, -3) smoothly with a ruler.
- Extend the line beyond the points for clarity.
- Label the line with its equation:

$$
y = -\frac{3}{7}(x + 6)
$$

or expand to slope-intercept form:

$$
y = -\frac{3}{7}x - \frac{18}{7}
$$

Summary and Key Takeaways

- The original equation $-2y = x + 6$ rearranges to $y = -\frac{1}{2}x - 3$, which is a different line than the one passing through (-6, 0) and (1, -3).

- The line passing through these points has a slope of -3/7 and equation:

$$
y = -\frac{3}{7}x - \frac{18}{7}
$$

- Plotting this line involves:

- Marking the known points.
- Calculating the slope.
- Using the slope and a point to write the equation.
- Drawing the line accurately across the coordinate plane.

- Understanding the relationship between algebraic equations and their graphical representations is essential in coordinate geometry.

Additional Tips for Graphing Linear Equations

- Always convert equations into slope-intercept form for easy graphing.
- Use two points to draw the line accurately.
- Verify points satisfy the equation to ensure correctness.
- Label points and lines clearly for better visualization.
- Practice with different forms of linear equations, including standard form and point-slope form.

Conclusion

Graphing linear equations like $-2y = x + 6$ and understanding the significance of points such as (-6, 0) and (1, -3) enhances your ability to interpret and analyze algebraic expressions visually. Whether working through algebra problems or visualizing data, mastering these

Frequently Asked Questions

What is the slope of the line passing through the points (-6, 0) and (1, -3)?

The slope is $(-3 - 0) / (1 - (-6)) = (-3) / (7) = -3/7$.

What is the equation of the line passing through (-6, 0) and (1, -3)?

Using point-slope form with point (-6, 0): $y - 0 = (-3/7)(x - (-6)) \Rightarrow y = (-3/7)(x + 6)$.

How can you rewrite the equation y = (−3/7)(x + 6) in slope-intercept form?

Distribute: y = (−3/7)x − (3/7)6 => y = (−3/7)x − 18/7.

What does the negative slope indicate about the line's direction on the graph?

The negative slope indicates that the line decreases as x increases, slanting downward from left to right.

How does the equation relate to the original problem involving -2y = x + 6?

The given points are from the line, and the equation y = (−3/7)x − 18/7 can be related to the original form by manipulating the equations for broader understanding.

How do you graph this line on a coordinate plane using the given points?

Plot the points (-6, 0) and (1, -3), draw a straight line through them, and extend it in both directions to complete the graph.

Additional Resources

-2y = x + 6 Graph A on a Coordinate Plane: An In-Depth Analytical Review

Understanding the fundamentals of graphing linear equations is a cornerstone of algebra and coordinate geometry. When analyzing the equation -2y = x + 6 and its graphical representation—particularly through a line passing through specific points such as (-6, 0) and (1, -3)—we delve into a rich exploration of linear relationships, slope-intercept form, and the interpretive power of coordinate plane visualization. This article offers a comprehensive, detailed examination of this equation, its graph, and the underlying concepts, providing clarity for students, educators, and mathematics enthusiasts alike.

Deciphering the Equation: From Standard to Slope-Intercept Form

Original Equation: -2y = x + 6

The given equation, -2y = x + 6, appears in a form that is not immediately conducive to graphing. To facilitate visualization, it's essential to manipulate it into the slope-intercept form, y = mx + b, where m is the slope and b is the y-intercept.

Step-by-step transformation:

1. Divide both sides by -2 to isolate y:

\[
y = \frac{x + 6}{-2}
\]

2. Separate the fraction:

$$
y = \frac{x}{-2} + \frac{6}{-2}
$$

3. Simplify both terms:

$$
y = -\frac{1}{2}x - 3
$$

Resulting slope-intercept form:

$$
\boxed{
y = -\frac{1}{2}x - 3
}
$$

This form reveals the slope $m = -1/2$ and the y-intercept $b = -3$.

Graphical Interpretation of the Equation

Slope and Intercept

The slope $-1/2$ indicates that for every increase of 2 units along the x-axis, the y-value decreases by 1 unit. This negative slope suggests a line descending from left to right. The y-intercept at -3 confirms that the line crosses the y-axis at the point $(0, -3)$.

Key characteristics:

- Y-intercept: $(0, -3)$
- Slope: $-1/2$

These parameters allow us to sketch the line accurately and understand its behavior across the coordinate plane.

Points on the Line

Beyond the two points provided, $(-6, 0)$ and $(1, -3)$, the line's equation can be used to find additional points:

- At $x = 0$:

$$
y = -\frac{1}{2}(0) - 3 = -3
$$

Confirming the y-intercept at $(0, -3)$.

- At $x = 2$:

\[

$$
y = -\frac{1}{2}(2) - 3 = -1 - 3 = -4
$$

The point (2, -4) lies on the line.

- At $x = -4$:

$$
y = -\frac{1}{2}(-4) - 3 = 2 - 3 = -1
$$

The point (-4, -1) is also on the line.

These points can be plotted to verify the line's accuracy and to provide a visual understanding of the linear relationship.

Analyzing the Given Points: (-6, 0) and (1, -3)

Verifying the Points

To confirm whether the points (-6, 0) and (1, -3) lie on the line, substitute their coordinates into the equation.

- For (-6, 0):

$$
y = -\frac{1}{2}x - 3
$$

Substitute $x = -6$:

$$
y = -\frac{1}{2}(-6) - 3 = 3 - 3 = 0
$$

The y-value matches the point's y-coordinate, confirming (-6, 0) is on the line.

- For (1, -3):

$$
y = -\frac{1}{2}(1) - 3 = -0.5 - 3 = -3.5
$$

The calculated y-value (-3.5) does not match the point's y-coordinate (-3), indicating that (1, -3) does not lie on the line represented by $-2y = x + 6$.

Implication: The point (1, -3) is not on the line derived from the equation, suggesting either an inconsistency or an alternative line being referenced.

Clarifying the Points and the Graph

The initial statement mentions a line passing through (-6, 0) and (1, -3). Based on the calculations:

- The point (-6, 0) lies on the line $y = -1/2\, x - 3$.
- The point (1, -3) does not lie on this line, as substituting $x=1$ yields $y=-3.5$, not -3.

Possible interpretations:

1. The points are approximate or intended for illustrative purposes.
2. The line passing through these points may have a different slope or equation, unrelated to the initial $-2y = x + 6$.
3. The original statement may have an error or is referencing a different graph.

Conclusion: For consistency, the primary line based on the equation $-2y = x + 6$ passes through (-6, 0) and (0, -3), but not necessarily through (1, -3). Therefore, the focus should be on the line $y = -1/2\, x - 3$ and its graph.

Graphing the Equation on the Coordinate Plane

Plotting Key Points

To graph $y = -1/2\, x - 3$, start with the known intercept and then plot additional points:

- Y-intercept: (0, -3)
- Another point: (2, -4)
- Additional point: (-4, -1)

Plot these points accurately on the coordinate plane.

Drawing the Line

Using a ruler, draw a straight line passing through the plotted points. The line should extend across the grid, demonstrating the linear relationship between x and y.

Characteristics of the graph:

- The line crosses the y-axis at -3.
- It descends at a slope of -1/2.
- The line crosses the x-axis at point (-6, 0), confirming the x-intercept:

$$
0 = -\frac{1}{2}x - 3 \Rightarrow -\frac{1}{2}x = 3 \Rightarrow x = -6
$$

So, the x-intercept is at (-6, 0).

Mathematical Significance and Practical Applications

Understanding Slope and Intercept

The slope -1/2 indicates a moderate negative relationship between x and y. This slope means:

- For every increase of 2 units in x, y decreases by 1.
- The line is decreasing; moving from left to right, the y-values decline.

The y-intercept at -3 sets the baseline at which the line crosses the y-axis, providing a reference point for understanding how the line shifts vertically.

Real-World Contexts

Linear equations like -2y = x + 6 (or y = -1/2 x - 3) are frequently encountered in various fields:

- Economics: Modeling the relationship between supply and demand.
- Physics: Describing constant rates of change, such as speed or temperature.
- Biology: Correlating variables like population growth over time.
- Engineering: Analyzing linear systems and control processes.

Understanding how to interpret and graph such equations equips students with tools to analyze real-world data.

Educational Perspectives and Common Challenges

Students often grapple with:

- Converting between different forms of equations.
- Interpreting slopes and intercepts in practical contexts.
- Correctly plotting points and drawing lines accurately.
- Ensuring points satisfy the equation.

Educators emphasize visualization and manipulation skills to foster deep understanding.

Conclusion: Synthesis and Final Insights

The exploration of -2y = x + 6 and its graphical representation reveals the intricate relationship between algebraic equations and their visual counterparts. By translating the original equation into the slope-intercept form, we uncover a line with a slope of -1/2 crossing the y-axis at -3. The line passes through the point (-6, 0), serving as a key anchor in the graph.

While the mention of the point (1, -3) introduces some ambiguity

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