The Y-intercept Of The Line Whose Equation Is 2x - 3y = 6 Is -2 3 6

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Understanding the y-intercept of a line is fundamental in coordinate geometry and algebra. The y-intercept represents the point where the line crosses the y-axis on a graph, and it provides critical insights into the behavior and position of the line within the coordinate plane. When dealing with linear equations such as 2x - 3y = 6, identifying the y-intercept requires transforming the equation into a more accessible form, typically the slope-intercept form.

This article will explore the concept of the y-intercept, demonstrate how to find it for the equation 2x - 3y = 6, clarify common misconceptions, and offer practical applications and visualization tips. By the end, you'll not only understand why the y-intercept of this specific line is -2 but also how to determine the y-intercept of any linear equation with confidence.

Understanding the Concept of Y-intercept

What is the Y-intercept?

The y-intercept of a line is the point where the line crosses the y-axis on a coordinate plane. Since the y-axis is defined by x = 0, the y-intercept occurs at the coordinate point (0, y), where y is the value at which the line intersects the y-axis.

Key points about y-intercept:
- It always occurs at x = 0.
- It provides the initial value or starting point of the line on the y-axis.
- It helps in graphing the line quickly and efficiently.

Why is the Y-intercept Important?

Knowing the y-intercept is crucial because:
- It simplifies graphing linear equations.
- It helps identify the initial value in real-world problems modeled by lines, such as profit over time or temperature changes.
- It offers insight into the behavior of the line, especially when analyzing systems of equations.

Transforming the Equation to Find the Y-intercept

The given equation is:

$$ 2x - 3y = 6 $$

To find the y-intercept, the standard approach is to set $x = 0$ and solve for y.

Step-by-step Process:

1. Substitute $x = 0$:

$$2(0) - 3y = 6$$

2. Simplify:

$$0 - 3y = 6$$
$$-3y = 6$$

3. Solve for y:

$$y = \frac{6}{-3}$$
$$y = -2$$

Thus, the y-intercept is at the point $(0, -2)$.

Conclusion:

The y-intercept of the line $2x - 3y = 6$ is -2, which means the line crosses the y-axis at the point $(0, -2)$.

Expressing the Equation in Slope-Intercept Form

While setting $x = 0$ gives the y-intercept directly, transforming the entire equation into slope-intercept form $y = mx + b$ provides a clearer picture of the line's behavior.

Conversion Process:

Starting with:

$$2x - 3y = 6$$

1. Isolate y:

$$-3y = -2x + 6$$

2. Divide both sides by -3:

$$y = \frac{-2x + 6}{-3}$$
$$y = \frac{-2x}{-3} + \frac{6}{-3}$$

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

Now, the equation is in slope-intercept form:

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

Interpretation:
- Slope $ m = \frac{2}{3} $ indicates the line rises 2 units for every 3 units it runs to the right.
- Y-intercept $ b = -2 $ confirms the point (0, -2).

Visualizing the Line and Its Y-intercept

Visual understanding enhances comprehension. Plotting the line using the slope and y-intercept:

- Start at the y-intercept $ (0, -2) $.
- Use the slope $ \frac{2}{3} $ to find another point:
- From $ (0, -2) $, move up 2 units and right 3 units to reach $ (3, 0) $.

Plot these points:

- $ (0, -2) $
- $ (3, 0) $

Draw a straight line passing through these points. This visual representation confirms the line's position and slope, illustrating the y-intercept at $ -2 $.

Common Misconceptions About the Y-intercept

Understanding what the y-intercept is and isn’t can prevent errors:

- Misconception 1: The y-intercept is always positive.

Correction: The y-intercept can be negative, zero, or positive depending on the line's position.

- Misconception 2: The y-intercept is the same as the slope.

Correction: The y-intercept is the point where the line crosses the y-axis, not the slope.

- Misconception 3: To find the y-intercept, you need to graph the line first.

Correction: You can find it algebraically by setting $ x = 0 $ in the equation.

Practical Applications of the Y-intercept

The concept of y-intercept extends beyond pure mathematics into real-world scenarios:

- Economics: The y-intercept could represent the starting profit or cost when no units are sold.
- Physics: It may indicate initial velocity or position at time zero.
- Biology: The y-intercept could signify initial population size in growth models.
- Business: Forecasts and projections often rely on the y-intercept for initial conditions.

Summary and Key Takeaways

- The y-intercept of the line given by $2x - 3y = 6$ is at the point $(0, -2)$.
- To find the y-intercept, set $x = 0$ and solve for y.
- Converting the equation into slope-intercept form confirms the y-intercept as -2.
- Visualization involves plotting the y-intercept and using the slope to locate additional points.
- Recognizing common misconceptions ensures a clear understanding of the y-intercept's role.

Final Thoughts

Mastering the concept of the y-intercept equips students and professionals with a vital tool for analyzing and graphing linear equations. Whether for academic purposes, data analysis, or real-world problem-solving, knowing how to find and interpret the y-intercept enhances comprehension and application of linear functions.

Remember, for the specific equation $2x - 3y = 6$, the y-intercept is -2, and this point is foundational for graphing and understanding the line's behavior within the coordinate plane.

Keywords for SEO: y-intercept, linear equations, 2x - 3y = 6, how to find y-intercept, slope-intercept form, graphing lines, coordinate plane, algebra, slope, y-axis crossing, math tutorial

Frequently Asked Questions

What is the y-intercept of the line given by the equation 2x - 3y = 6?

The y-intercept is 2.

How do you find the y-intercept of the line 2x - 3y = 6?

Set x = 0 in the equation and solve for y; the y-intercept is the value of y when x = 0.

What is the y-intercept of the line 2x - 3y = 6 in coordinate form?

The y-intercept is at the point (0, -2).

Is the y-intercept of the line 2x - 3y = 6 equal to 6?

No, the y-intercept is -2, not 6.

Can the y-intercept of the line 2x - 3y = 6 be expressed as a fraction?

Yes, the y-intercept is -2, which can be written as the fraction -2/1.

Additional Resources

The Y-intercept of the Line Whose Equation Is 2x - 3y = 6 Is -2

Understanding the y-intercept of a line is fundamental in the study of coordinate geometry, as it provides insights into where a line crosses the y-axis. In the context of the linear equation 2x - 3y = 6, the y-intercept is a key feature that helps visualize and graph the line accurately. This article explores the concept of the y-intercept in detail, focusing on the specific case of the equation 2x - 3y = 6, and offers a comprehensive analysis to deepen your understanding of linear equations and their intersections with axes.

Introduction to the Y-intercept

The y-intercept of a line is the point where the line crosses the y-axis. It occurs at the coordinate (0, y), where x is zero. Knowing the y-intercept simplifies graphing since it provides a starting point on the coordinate plane. The y-intercept is also a crucial concept in algebra because it helps interpret the behavior of the line, such as whether it slopes upward or downward and how it relates to other lines.

In general, for a linear equation in the form Ax + By = C, the y-intercept can be found by setting x to zero and solving for y. This process is straightforward and forms the basis for graphing lines quickly, especially when the slope-intercept form y = mx + b is not immediately apparent.

Analyzing the Equation 2x - 3y = 6

The specific equation under discussion is 2x - 3y = 6. To find its y-intercept, the standard approach involves setting x to zero and solving for y:

- Substitute x = 0:

2(0) - 3y = 6

- Simplify:

0 - 3y = 6

- Solve for y:

-3y = 6

y = 6 / -3

y = -2

Thus, the y-intercept of the line described by 2x - 3y = 6 is at the point (0, -2).

This calculation confirms that the y-intercept is -2, not 3, 6, or any other value, which is a common misconception among students unfamiliar with the process.

Interpreting the Y-intercept

The point (0, -2) indicates that the line crosses the y-axis at y = -2. This is significant because it serves as a reference point for graphing the line and understanding its slope. The y-intercept is often denoted as the "b" in the slope-intercept form y = mx + b, where m is the slope.

Converting the equation 2x - 3y = 6 into slope-intercept form:

- Start with the original:

2x - 3y = 6

- Isolate y:

-3y = -2x + 6

y = (-2x + 6) / -3

- Simplify:

y = (2/3)x - 2

Here, the y-intercept is clearly -2, matching our previous calculation. The slope m = 2/3 indicates that for every 3 units moved horizontally, the line moves up by 2 units.

Features of this line:

- Slope: 2/3 (positive, indicating an upward trend)
- Y-intercept: -2 (point where the line crosses the y-axis)

This form simplifies graphing and analyzing the line’s behavior.

Graphical Representation and Significance

Graphing the line based on the y-intercept and slope provides a visual understanding of its position and inclination. Starting at (0, -2), the line rises 2 units for every 3 units moved to the right, consistent with the slope of 2/3.

Steps to graph:

1. Plot the y-intercept at (0, -2).
2. From that point, use the slope to find another point: move right 3 units and up 2 units to (3, 0).
3. Draw a straight line through these points.

This process emphasizes how the y-intercept anchors the line on the y-axis, and the slope guides the line’s inclination.

Features:

- Easy to plot with basic points.
- Demonstrates the relationship between algebraic equations and their geometric representations.
- Helps in understanding concepts like parallelism and perpendicularity when comparing multiple lines.

Common Misconceptions and Clarifications

While the process seems straightforward, several misconceptions can arise:

- Confusing the y-intercept with other points: Students sometimes mistakenly identify the y-intercept as the point where x equals 1 or other values, but it is always at x=0.
- Incorrectly reading the intercepts from the original equation: Some may misinterpret the coefficients or signs, leading to wrong intercepts.
- Assuming the intercepts are the coefficients: The constants in the equation are not the intercepts unless x=0 or y=0 is substituted.

Clarifications:

- The y-intercept is always found by setting x=0.
- The x-intercept is found by setting y=0.
- The coefficients of x and y are part of the equation's structure but do not directly represent intercepts unless in the slope-intercept form.

Features and Applications of the Y-intercept

Understanding the y-intercept has several features and practical applications:

Features:

- Easy to identify in slope-intercept form: $y = mx + b$.
- Provides initial conditions: useful in real-world modeling where initial values are known.
- Facilitates quick graphing: serves as a starting point for plotting lines.

Applications:

- Physics: representing initial velocity or position.
- Economics: modeling costs or revenues at zero production levels.
- Engineering: analyzing system behaviors at baseline states.

Pros:

- Simplifies the process of graphing lines.
- Offers immediate insight into the position of the line relative to the y-axis.
- Aids in solving systems of equations visually.

Cons:

- Only applicable to linear equations.
- Does not provide information about the entire line's behavior—only the intercept.
- Might be overlooked if the equation is not in a suitable form.

Additional Insights: From Equation to Graph

Transforming the equation $2x - 3y = 6$ into various forms enhances understanding:

- Standard form: $2x - 3y = 6$.
- Slope-intercept form: $y = (2/3)x - 2$.
- Point-slope form: $y - y_1 = m(x - x_1)$.

Each form emphasizes different features:

- The slope-intercept form explicitly shows the y-intercept (-2).
- The standard form is useful for quickly identifying intercepts.

Graphing tips:

- Always identify the intercepts first.
- Use the slope to find additional points.
- Draw a straight line through these points for accuracy.

Conclusion

The y-intercept of the line with the equation $2x - 3y = 6$ is definitively -2. Recognizing this intercept allows for quick graphing and deeper understanding of the line's behavior in the coordinate plane. By setting x to zero and solving for y, we find that the line crosses the y-axis at (0, -2). This insight

connects algebraic manipulation with geometric intuition, illustrating the power of simple calculations in understanding linear relationships. Whether for academic purposes or practical applications, mastering the concept of the y-intercept is essential for anyone working with linear equations. It serves as a foundational tool that bridges algebraic expressions and their graphical representations, fostering a comprehensive grasp of linear functions and their properties.

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