What Are The X And Y Intercepts For The Following Equation? 3x + 2y = 6a:(-3,0);(0,5) B:(0,9);(0,10)

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Understanding the concept of intercepts in a linear equation is fundamental to graphing and analyzing the behavior of lines on the coordinate plane. When given an equation like 3x + 2y = 6, it is essential to identify the points where the line crosses the x-axis and y-axis. These points are known as the x-intercept and y-intercept, respectively. This article provides a comprehensive guide to determining the x and y intercepts for the equation 3x + 2y = 6, along with detailed explanations of the provided coordinate points for two different scenarios labeled as A and B.

Understanding Intercepts in Linear Equations

What Is an X-Intercept?

An x-intercept is the point where a line crosses the x-axis in the coordinate plane. At this point, the y-coordinate is always zero because the point lies directly on the x-axis. To find the x-intercept for a given equation, you set y to zero and solve for x.

Example:
Given the linear equation 3x + 2y = 6:

- Set y = 0
- Solve for x: $3x + 2(0) = 6$ □ $3x = 6$ □ $x = 2$

X-intercept: (2, 0)

What Is a Y-Intercept?

A y-intercept is the point where a line crosses the y-axis. At this point, the x-coordinate is zero since the point lies directly on the y-axis. To find the y-intercept, set x to zero and solve for y.

Example:

Given the same equation:

- Set x = 0
- Solve for y: $3(0) + 2y = 6$ □ $2y = 6$ □ $y = 3$

Y-intercept: (0, 3)

Analyzing the Equation 3x + 2y = 6

Finding the X-Intercept

To find the x-intercept:

1. Substitute y = 0 into the equation:

$3x + 2(0) = 6$

2. Simplify:

3x = 6

3. Solve for x:

x = 6 / 3 = 2

Result:

- The x-intercept is at (2, 0).

Finding the Y-Intercept

To find the y-intercept:

1. Substitute x = 0 into the equation:

3(0) + 2y = 6

2. Simplify:

2y = 6

3. Solve for y:

y = 6 / 2 = 3

Result:

- The y-intercept is at (0, 3).

This fundamental process allows graphing the line accurately by plotting the intercepts and connecting them.

Interpreting the Given Data: Points for Scenarios A and B

The problem provides specific points related to two scenarios labeled A and B:

- Scenario A: (-3, 0); (0, 5)
- Scenario B: (0, 9); (0, 10)

However, the notation appears to associate these points with the same or different equations, which warrants clarification.

Scenario A: Points (-3, 0) and (0, 5)

Understanding the points:
- The point (-3, 0) lies on the x-axis, indicating an x-intercept at x = -3.
- The point (0, 5) lies on the y-axis, indicating a y-intercept at y = 5.

Implication:
- The line passes through these two points.
- From these points, we can derive the equation of the line.

Scenario B: Points (0, 9) and (0, 10)

Understanding the points:
- Both points are on the y-axis, at y = 9 and y = 10, respectively.
- Since both have x = 0, they are y-intercepts for different lines or perhaps different segments.

Implication:

- These points suggest different lines or different intercepts, which might correspond to separate equations or contexts.

Calculating the Equation from Given Points

Suppose we need to determine the equation of the line passing through points in Scenario A:

Points: (-3, 0) and (0, 5)

Step-by-step process:

1. Calculate the slope (m):

$$
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{0 - (-3)} = \frac{5}{3}
$$

2. Use point-slope form:

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

Using point (-3, 0):

$$
y - 0 = \frac{5}{3}(x - (-3)) \Rightarrow y = \frac{5}{3}(x + 3)
$$

\]

3. Simplify to slope-intercept form:

$$
y = \frac{5}{3}x + \frac{5}{3} \times 3 = \frac{5}{3}x + 5
$$

Final equation:

$$
y = \frac{5}{3}x + 5
$$

Interpreting intercepts:

- Y-intercept: (0, 5), confirming the point provided.
- X-intercept:

Set y = 0:

$$
0 = \frac{5}{3}x + 5 \Rightarrow \frac{5}{3}x = -5 \Rightarrow x = -5 \times \frac{3}{5} = -3
$$

- X-intercept: (-3, 0), matching the point.

Summary of Intercepts for the Derived Equation

Intercept Type	Coordinates	Calculation Details
X-Intercept	(-3, 0)	Set $y = 0$: $0 = (5/3)x + 5$ □ $x = -3$
Y-Intercept	(0, 5)	Set $x = 0$: $y = (5/3)(0) + 5$ □ $y = 5$

This confirms the two points are consistent with the derived line.

Understanding the Second Set of Points in Scenario B

Points: (0, 9) and (0, 10)

Since both are on the y-axis, they are y-intercepts for different lines or different equations. To interpret these:

- For point (0, 9):
- The y-intercept of a line is at $y = 9$.
- The line's equation can be written as:

$$
y = m x + 9
$$

- For point (0, 10):
- The y-intercept is at $y = 10$.
- Equation:

$$
y = n x + 10
$$

Note: Without additional points, slopes, or context, these y-intercepts alone indicate different lines crossing the y-axis at these points.

Conclusion and Practical Applications

Understanding and calculating x and y intercepts are critical skills in algebra and coordinate geometry. They enable students and professionals to:

- Graph lines accurately without plotting numerous points.
- Analyze the behavior of linear functions.
- Derive the equations of lines from given points.
- Interpret real-world data where intercepts represent key thresholds or starting points.

In the context of the original problem, recognizing the intercepts helps in visualizing the lines and understanding their relationships, including their slopes and positions relative to the coordinate axes.

Additional Tips for Finding Intercepts

- Always substitute $y = 0$ to find the x-intercept.
- Always substitute $x = 0$ to find the y-intercept.

- When given two points, calculating the slope is a good way to find the equation of the line.
- Confirm that the intercepts match the points provided to verify the correctness of the derived equation.

Final Thoughts

Mastering the process of finding intercepts provides a strong foundation for more advanced topics like linear equations, inequalities, and systems of equations. Whether analyzing simple lines or complex data sets, the skills outlined in this article equip learners with essential tools for mathematical and real-world problem-solving.

Remember: The intercepts often tell the story of the line's position and slope, making them invaluable for graphing and understanding relationships in algebra. Practice with different equations and points to become proficient in quickly identifying these key features.

Frequently Asked Questions

What are the x and y intercepts for the equation 3x + 2y = 6 when given points (-3, 0) and (0, 5)?

The x-intercept is at x = 2 (when y=0), and the y-intercept is at y = 3 (when x=0).

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

Set y=0 and solve for x: 3x + 2(0) = 6 □ 3x = 6 □ x=2, so the x-intercept is (2, 0).

How do you determine the y-intercept of the equation 3x + 2y = 6?

Set x=0 and solve for y: 3(0) + 2y = 6 □ 2y=6 □ y=3, so the y-intercept is (0, 3).

Are the points (-3, 0) and (0, 5) on the line represented by 3x + 2y = 6?

No, because substituting these points into the equation does not satisfy it: (-3, 0) gives 3(-3)+2(0) = -9 □ 6, and (0, 5) gives 3(0)+2(5)=10 □ 6.

What is the significance of the points (-3, 0) and (0, 5) in relation to the equation 3x + 2y = 6?

They are not points on the line since neither satisfies the equation 3x + 2y = 6.

How do the points (0, 9) and (0, 10) relate to the equation 3x + 2y = 6?

These points are on the y-axis but do not satisfy the equation: (0, 9) gives 18 □ 6, and (0, 10) gives 20 □ 6, so they are not on the line.

What are the x and y intercepts for the equation 3x + 2y = 6 with the options given?

The x-intercept is at (2, 0), and the y-intercept is at (0, 3), regardless of the provided points.

Based on the options, which points correctly represent the intercepts of the line 3x + 2y = 6?

The correct intercepts are (2, 0) for the x-intercept and (0, 3) for the y-intercept; none of the given options exactly match these points.

Additional Resources

Understanding the X and Y Intercepts of the Equation 3x + 2y = 6a

When delving into the world of algebra and coordinate geometry, one of the foundational concepts students and mathematicians alike encounter is the idea of intercepts—specifically, the x-intercept and y-intercept of a given equation. These points provide crucial insights into the graph of the equation, revealing where the line crosses the axes and offering a window into the line's slope and position within the coordinate plane.

In this article, we will explore the nature of the intercepts for the specific linear equation 3x + 2y = 6a, and analyze the given coordinate points for two cases: (a) (-3, 0) and (0, 5), and (b) (0, 9) and (0, 10). Through detailed explanations, step-by-step calculations, and contextual insights, we aim to clarify what these intercepts reveal about the equations and their graphs.

Understanding Intercepts: The Basics

Before diving into the specific examples, it's essential to understand what x- and y-intercepts are in the context of a linear equation.

- X-Intercept: The point(s) where the line crosses the x-axis. At this point, the y-coordinate is zero (y = 0). To find the x-intercept, substitute y = 0 into the equation and solve for x.

- Y-Intercept: The point(s) where the line crosses the y-axis. At this point, the x-coordinate is zero (x =

0). To find the y-intercept, substitute x = 0 into the equation and solve for y.

These intercepts are not only key features of the line but also serve as anchors for graphing and understanding the line's behavior within the coordinate plane.

The Equation in Focus: $3x + 2y = 6a$

The given equation, $3x + 2y = 6a$, introduces a parameter 'a,' making it a family of lines depending on the value of 'a.' Analyzing the intercepts requires understanding how 'a' influences the position of the line, and what the intercepts are when specific points are considered.

Clarifying the Role of 'a'

The parameter 'a' acts as a scalar multiplier that shifts or scales the line. For different values of 'a,' the equation models different lines, each with potentially different intercepts.

When dealing with intercepts, it is often helpful to consider specific values of 'a' to see how the intercepts change.

Case A: Points (-3, 0) and (0, 5)

Step 1: Understanding the Given Points

The points provided—(-3, 0) and (0, 5)—are likely intended to represent specific locations on the line described by the equation for a particular value of 'a.' These points can help us determine the value of 'a' and verify the intercepts.

Step 2: Calculating 'a' Using the Points

Suppose that the equation $3x + 2y = 6a$ holds true for both points. We can substitute each point into the equation to find the corresponding 'a.'

Using point (-3, 0):

- Substitute $x = -3$, $y = 0$:

$3(-3) + 2(0) = 6a$

$-9 + 0 = 6a$

$6a = -9$

$a = -9/6 = -3/2$

Using point (0, 5):

- Substitute $x = 0$, $y = 5$:

$3(0) + 2(5) = 6a$

$0 + 10 = 6a$

$6a = 10$

$a = 10/6 = 5/3$

Step 3: Analyzing the Results

Since the value of 'a' derived from each point differs (-3/2 vs. 5/3), it indicates that these points do not lie on the same line for a single value of 'a.'

Implication:

- The points are not consistent with a single line described by $3x + 2y = 6a$ unless the parameter 'a' varies.

- Therefore, these points are likely intended to demonstrate different intercepts or to analyze different lines within the family of lines defined by the parameter 'a.'

Step 4: Finding the Intercepts for the Equation

Now, assuming that for a specific value of 'a,' the line passes through these points or that these points are related to the line's intercepts, let's analyze the intercepts.

For the point (-3, 0):

- Since $y = 0$, this point is on the x-axis, indicating that:

- x-intercept = -3

- We can verify this by substituting $x = -3$ into the equation:

$3(-3) + 2(0) = 6a$

$-9 + 0 = 6a$

$6a = -9$

$a = -3/2$ (consistent with earlier calculation)

- Therefore, the x-intercept is at (-3, 0).

For the point (0, 5):

- Since x = 0, this point is on the y-axis, indicating that:

- y-intercept = 5

- Verify by substituting y = 5:

3(0) + 2(5) = 6a

0 + 10 = 6a

a = 10/6 = 5/3

- Thus, the y-intercept is at (0, 5).

Summary for Case A:

- The x-intercept is at (-3, 0), corresponding to the point where the line crosses the x-axis with a specific 'a' value of -3/2.

- The y-intercept is at (0, 5), corresponding to the point where the line crosses the y-axis with 'a' = 5/3.

- The line's position depends on the value of 'a,' and these intercepts serve as critical points for graphing and understanding the line's behavior.

Case B: Points (0, 9) and (0, 10)

Step 1: Understanding the Given Points

In this case, both points lie on the line where x = 0, which suggests that both are on the y-axis. However, since the points are (0, 9) and (0, 10), they are vertically aligned, which implies a special situation in the context of the linear equation.

Step 2: Analyzing the Points

- Both points are on the y-axis, indicating the y-intercept(s).

- The fact that there are two points with different y-values but the same x-coordinate (x=0) suggests a vertical line.

Step 3: Implications for the Equation

- Usually, a line with x = 0 (a vertical line) is expressed as x = c, where c is the x-intercept.

- But the original equation, 3x + 2y = 6a, describes a non-vertical line unless certain conditions are met.

- To see if the line can be vertical, set the coefficient of x to zero:

- For an equation to be x = constant, all terms involving x must cancel out or be absent.

- Since the equation is 3x + 2y = 6a, unless 3x is zero (which implies x=0), the line is not vertical.

- Therefore, these points suggest the line is passing through x=0 at two different y-values, which is only possible if the line is vertical and x=0.

Step 4: Is the Line Vertical?

- If the line is vertical at x=0, then the equation would be x=0, which is not consistent with the original equation unless the equation degenerates to x=0.

- Alternatively, these points could represent different lines for different 'a' values, or perhaps the points are meant to illustrate something else.

Step 5: Calculating 'a' for Each Point

- For point (0, 9):

$3(0) + 2(9) = 6a$

$0 + 18 = 6a$

$a = 18/6 = 3$

- For point (0, 10):

$3(0) + 2(10) = 6a$

$0 + 20 = 6a$

$a = 20/6 = 10/3$

- Since the values of 'a' differ, these points are not on the same line for a fixed 'a.'

Interpreting the Results:

- The points (0, 9) and (0, 10) lie on the line x=0, but correspond to different 'a' values, indicating they are on different lines within the family of equations.

- The y-intercepts for the lines when a=3 and a=10/3 are at y=9 and y=10, respectively.

Summary for Case B:

- Y-Intercepts:

- For a=3, the y-intercept is at (0

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