

URGENT!!!! Find The Y-intercept Of The Line That Passes Through The Points (-3, 7) And (3, 9).

URGENT!!!! Find The Y-intercept Of The Line That Passes Through The Points (-3, 7) And (3, 9). Understanding how to find the y-intercept of a line passing through two points is a fundamental skill in algebra and coordinate geometry. Whether you're a student preparing for exams or a professional needing quick calculations, mastering this process is crucial. In this article, we will walk through the steps to find the y-intercept of the line passing through the points (-3, 7) and (3, 9), explain the underlying concepts, and provide tips for solving similar problems efficiently.

Understanding the Basics: Coordinates and the Equation of a Line

Before diving into the problem, it's essential to review some key concepts related to lines on the coordinate plane.

Coordinates of a Point

- Each point in the plane is represented by an ordered pair (x, y).
- The x-coordinate indicates the position along the horizontal axis.
- The y-coordinate indicates the position along the vertical axis.

Equation of a Line

- The most common form is the slope-intercept form: $y = mx + b$.
- Here, m represents the slope of the line.
- b represents the y-intercept, the point where the line crosses the y-axis.

Step-by-Step Guide to Find the Y-Intercept

The process involves two main steps:

1. Find the slope of the line passing through the given points.
2. Use the slope and one point to find the y-intercept.

Step 1: Calculate the Slope (m)

The slope is a measure of how steep the line is, calculated as:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Given the points:

$$P_1 = (-3, 7)$$

$$- (P_2 = (3, 9))$$

Substitute into the slope formula:

$$m = \frac{9 - 7}{3 - (-3)} = \frac{2}{6} = \frac{1}{3}$$

This means the line rises one unit for every three units it moves horizontally.

Step 2: Find the Y-Intercept (b)

With the slope $m = \frac{1}{3}$, use one of the points to find b. Let's choose $P_1 = (-3, 7)$:

Plug into the slope-intercept form:

$$y = mx + b$$

$$7 = \frac{1}{3} \times (-3) + b$$

Calculate:

$$7 = -1 + b$$

$$b = 7 + 1 = 8$$

So, the y-intercept is 8.

The Equation of the Line

Now that we know the slope and y-intercept, the line's equation is:

$$y = \frac{1}{3}x + 8$$

This completes the process of finding the y-intercept: the line crosses the y-axis at (0, 8).

Understanding the Significance of the Y-Intercept

The y-intercept has important implications:

- It indicates where the line crosses the y-axis.
- It helps in graphing the line quickly.
- It provides insight into the initial value or starting point of the linear relationship when $x = 0$.

In our case, since the line passes through (0, 8), it intersects the y-axis at 8.

Additional Tips and Common Mistakes

To ensure accuracy and efficiency, keep in mind these tips:

- **Always verify the slope:** Double-check your calculations to avoid errors.
- **Use the correct points:** Choose either point to substitute into the line equation after calculating the slope.

- **Watch for sign errors:** Be careful with negative signs, especially when dealing with subtraction.
- **Practice with multiple problems:** The more you practice, the quicker you'll identify the pattern and solve similar problems efficiently.

Common mistakes include:

- Confusing the order of points when calculating slope.
- Forgetting to convert the slope to a simplified fraction.
- Mixing up the points when plugging into the line equation.

Practice Problems to Reinforce the Concept

Try solving these problems to strengthen your understanding:

1. Find the y-intercept of the line passing through (2, 5) and (4, 9).
2. Determine the y-intercept of the line passing through (-1, -3) and (3, 1).
3. Given the points (-5, 2) and (0, -1), find the y-intercept of the line.

Solutions involve repeating the steps outlined above: calculating the slope first, then finding the y-intercept.

Graphing the Line for Better Visualization

Once you have the equation:

$$y = \frac{1}{3}x + 8$$

you can plot the line on graph paper or using graphing software:

- Mark the y-intercept at (0, 8).
- Use the slope $\left(\frac{1}{3}\right)$ to find another point: from (0, 8), move 3 units right and 1 unit up to (3, 9), which matches our second point.
- Draw a straight line through these points to visualize the line.

Conclusion: Mastering the Y-Intercept Calculation

Finding the y-intercept of a line passing through two points is a straightforward process once you understand the steps:

- Calculate the slope using the difference in y-values divided by the difference in x-values.
- Use the slope and one of the known points to solve for the y-intercept.
- Write the equation in slope-intercept form for easy interpretation and graphing.

In our specific problem, the line passing through (-3, 7) and (3, 9) has a y-intercept of 8, with the

equation:

$$y = \frac{1}{3}x + 8$$

By practicing these steps, you'll be able to solve similar problems efficiently and accurately, enhancing your understanding of linear equations and their graphical representations. Remember, mastering these foundational skills is essential for success in algebra, calculus, and many applied mathematics fields.

Frequently Asked Questions

What is the first step to find the y-intercept of the line passing through (-3, 7) and (3, 9)?

First, find the slope of the line using the two points.

How do you calculate the slope of the line passing through (-3, 7) and (3, 9)?

Use the formula $(y_2 - y_1) / (x_2 - x_1)$: $(9 - 7) / (3 - (-3)) = 2 / 6 = 1/3$.

What is the slope of the line passing through the points (-3, 7) and (3, 9)?

The slope is $1/3$.

How can I find the y-intercept after calculating the slope?

Use the point-slope form $y - y_1 = m(x - x_1)$ with one of the points to solve for y when $x=0$.

Using the point (-3, 7), how do I find the y-intercept?

Plug into $y - 7 = (1/3)(x + 3)$. When $x=0$, $y - 7 = (1/3)(0 + 3) = 1$, so $y = 8$.

What is the y-intercept of the line passing through (-3, 7) and (3, 9)?

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

Can I verify the y-intercept using the second point (3, 9)?

Yes, by plugging $x=0$ into the line's equation derived from the points, you should get $y=8$, confirming the intercept.

What is the equation of the line passing through these points?

The equation is $y = (1/3)x + 8$.

Why is finding the y-intercept important in graphing a line?

It provides the point where the line crosses the y-axis, helping to plot the line accurately.

Additional Resources

URGENT!!!! Find The Y-intercept Of The Line That Passes Through The Points (-3, 7) And (3, 9).

Introduction

In the realm of algebra and coordinate geometry, understanding the properties of lines—particularly their slopes and intercepts—is fundamental. When a line passes through two known points, the ability to determine its characteristics provides crucial insights into its behavior and position within the coordinate plane. The task at hand is to find the Y-intercept of the line passing through the points (-3, 7) and (3, 9). While this problem might appear straightforward at first glance, it embodies core principles of linear equations, slope calculations, and intercept determination, which are essential building blocks for more advanced mathematical concepts.

This article aims to dissect this problem comprehensively. We will explore the significance of the y-intercept, detail the step-by-step process to derive the line's equation, analyze the calculations involved, and reflect on the broader implications and applications of such an exercise.

Understanding the Y-intercept: Its Significance and Role

What is the Y-intercept?

In the context of linear equations, the y-intercept is the point where the line crosses the y-axis. It is represented as the coordinate (0, b), where 'b' is the y-value at this crossing point. The y-intercept provides immediate information about the line's position relative to the y-axis, serving as a reference point for graphing and understanding the line's behavior.

Why is the Y-intercept Important?

- Graphing Lines: Knowing the y-intercept allows for quick plotting of the line, especially when combined with the slope.
- Interpreting Data: In real-world applications, the y-intercept often represents the starting point or initial value, such as initial cost, initial population, or baseline measurement.
- Analyzing Relationships: The intercept can reveal whether the line crosses above or below the origin, indicating positive or negative relationships between variables.

Step 1: Establishing the Known Data Points

The problem provides two points:

- Point A: (-3, 7)
- Point B: (3, 9)

These points serve as anchors for our calculations. They are both located within the coordinate plane, with their respective x and y coordinates.

Step 2: Calculating the Slope of the Line

The slope (m) of a line indicates its steepness and direction. It is calculated using the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Applying the coordinates:

$$\begin{aligned} x_1 &= -3, \quad y_1 = 7 \\ x_2 &= 3, \quad y_2 = 9 \end{aligned}$$

Calculating the numerator:

$$y_2 - y_1 = 9 - 7 = 2$$

Calculating the denominator:

$$x_2 - x_1 = 3 - (-3) = 3 + 3 = 6$$

Thus, the slope is:

$$m = \frac{2}{6} = \frac{1}{3}$$

Interpretation: The line rises one unit vertically for every three units it moves horizontally, indicating a gentle upward slope.

Step 3: Deriving the Equation of the Line

With the slope known, the line's equation can be expressed in point-slope form:

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

Choosing either point for substitution, say point A (-3, 7):

$$y - 7 = \frac{1}{3}(x - (-3))$$
$$y - 7 = \frac{1}{3}(x + 3)$$

Expanding:

$$y - 7 = \frac{1}{3}x + 1$$

Adding 7 to both sides:

$$y = \frac{1}{3}x + 1 + 7$$
$$y = \frac{1}{3}x + 8$$

This is the equation of the line in slope-intercept form:

$$\boxed{y = \frac{1}{3}x + 8}$$

Step 4: Identifying the Y-intercept

From the derived slope-intercept form:

$$y = \frac{1}{3}x + 8$$

The y-intercept occurs when $(x = 0)$. Substituting:

$$y = \frac{1}{3} \times 0 + 8 = 8$$

Thus, the Y-intercept is at the point (0, 8).

Analytical Reflection: What Does the Y-intercept Tell Us?

The y-intercept at (0, 8) indicates that the line crosses the y-axis at the point where y equals 8, before considering the influence of the slope. This point serves as a baseline or starting point for the linear relationship between the variables. In real-world scenarios, this could represent an initial measurement or value before changes occur, modeled linearly.

The line's positive slope (+1/3) suggests a gradual increase in y as x increases. The line crosses the y-axis above the origin, at y=8, which indicates that at x=0, the dependent variable (y) is 8.

Broader Implications and Applications

Understanding how to find the y-intercept from two points is pivotal in various fields:

- Economics: Estimating cost functions where fixed costs correspond to the y-intercept.
- Physics: Analyzing motion graphs where initial velocity or position is represented by the y-intercept.
- Biology: Modeling population growth where the initial population is the y-intercept.
- Engineering: Designing systems and analyzing relationships between variables.

Moreover, mastery of these techniques enhances problem-solving skills and supports more advanced topics like regression analysis, calculus, and three-dimensional modeling.

Additional Considerations and Common Pitfalls

While the process appears straightforward, students and practitioners should remain vigilant:

- Sign errors: Ensuring correct subtraction when calculating the slope.
- Point selection: Confirming the correct point is used in the point-slope form.
- Equation simplification: Properly simplifying fractions and algebraic expressions.
- Interpretation: Correctly identifying the y-intercept from the slope-intercept form, especially when the line is expressed in other forms like standard form.

Summary and Final Remarks

In conclusion, the line passing through the points (-3, 7) and (3, 9) has a slope of 1/3 and a y-intercept at (0, 8). This exercise exemplifies fundamental principles in algebra, revealing how to

determine key properties of a line from given data points. The ability to find the y-intercept not only enhances graphing skills but also enriches one's understanding of the relationship between variables in diverse contexts.

Understanding this process lays a foundation for more complex analytical tasks, fostering a deeper appreciation for the elegance and utility of linear equations in mathematics and real-world applications. Whether in academic pursuits, professional work, or everyday problem-solving, these skills remain integral to interpreting and modeling the world around us.

Note: Always verify calculations and interpretations with multiple approaches to ensure accuracy and deepen comprehension.

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