A Linear Function Goes Through The Points (-3,1) And (1,-3). What Are The Coordinates For The Y-intercept

A Linear Function Goes Through The Points (-3,1) And (1,-3). What Are The Coordinates For The Y-intercept

Understanding how to find the y-intercept of a linear function that passes through specific points is a fundamental skill in algebra. In this article, we will explore the step-by-step process of determining the y-intercept for the linear function passing through the points (-3, 1) and (1, -3). Whether you're a student brushing up on algebra or someone seeking a clear explanation, this guide will help you grasp the concepts involved and apply them confidently.

What Is a Linear Function and Its Components?

Before diving into calculations, it's important to understand what a linear function is and the key elements involved.

Definition of a Linear Function

A linear function is a mathematical expression that models a straight line when graphed on a coordinate plane. It can be written in the form:

- **y = mx + b**

where:
- **m** is the slope of the line, indicating its steepness
- **b** is the y-intercept, the point where the line crosses the y-axis

Understanding the Y-intercept

The y-intercept is the value of y when x equals zero. It is a crucial point because it tells us where the line intersects the y-axis, providing insight into the line’s position in the coordinate plane.

How to Find the Equation of the Line Passing Through Two Points

Given two points, we can determine the linear function that passes through them by calculating the slope and then using point-slope form to find the equation.

Calculating the Slope (m)

The slope of a line passing through two points, (x_1, y_1) and (x_2, y_2), is given by:

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

For our points:
- $(-3, 1)$
- $(1, -3)$

the slope calculation is:

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

This slope indicates the line decreases by 1 unit in y for each increase of 1 unit in x.

Using Point-Slope Form to Find the Equation

The point-slope form of a line is:

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

Using the point $(-3, 1)$ and the slope $m = -1$:

$$
y - 1 = -1(x - (-3))
$$

$$
y - 1 = -1(x + 3)
$$

$$
y - 1 = -x - 3
$$

Adding 1 to both sides:

$$
y = -x - 3 + 1
$$

$$
y = -x - 2
$$

So, the equation of the line in slope-intercept form is:

$$
\boxed{y = -x - 2}
$$

Determining the Y-intercept

Now that we have the equation of the line, finding the y-intercept involves identifying the point where the line crosses the y-axis, i.e., where $x=0$.

Calculating the Y-intercept

Substitute $x=0$ into the line equation:

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

Therefore, the y-intercept point is:

$$
\boxed{(0, -2)}
$$

This means the line crosses the y-axis at the point $(0, -2)$.

Summary of Key Concepts

- The slope of the line passing through (-3, 1) and (1, -3) is -1.
- The equation of the line in slope-intercept form is $y = -x - 2$.
- The y-intercept, the point where the line crosses the y-axis, is at $(0, -2)$.

Additional Tips for Solving Similar Problems

Practice with Different Points

Try applying the same method with different pairs of points to strengthen your understanding of calculating slopes and y-intercepts.

Understanding the Significance of the Y-intercept

Remember that the y-intercept provides a starting point for graphing the line and understanding its behavior.

Use Graphing Tools

Utilize graphing calculators or online graphing tools to visualize the line once you have its equation. This visual aid can help reinforce your understanding of the relationship between the algebraic form and the graph.

Conclusion

Finding the y-intercept of a line passing through two points involves calculating the slope, deriving the line’s equation, and then substituting $x=0$. In our case, the line passing through (-3, 1) and (1, -3) has a y-intercept at $(0, -2)$. Mastering these steps enhances your algebra skills and deepens your understanding of linear functions, which are foundational to many areas of mathematics and applied sciences.

Whether you're preparing for exams, tutoring others, or just expanding your math knowledge, practicing how to find the y-intercept from given points is an essential skill that will serve you well in many mathematical contexts.

Frequently Asked Questions

How do you find the y-intercept of a linear function passing through the points (-3, 1) and (1, -3)?

First, find the slope using the points, then use the point-slope form to find the equation, and substitute x=0 to find the y-intercept.

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

The slope is $(-3 - 1) / (1 - (-3)) = (-4) / 4 = -1$.

How do you determine the equation of the line passing through (-3, 1) and (1, -3)?

Use point-slope form with one point and the slope, then simplify to slope-intercept form.

What is the y-intercept of the line passing through (-3, 1) and (1, -3)?

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

Can you verify the y-intercept of the line given the points (-3, 1) and (1, -3)?

Yes, by deriving the line's equation and setting x=0, you find y=2, confirming the y-intercept at (0, 2).

What is the general form of the linear equation passing through the points (-3, 1) and (1, -3)?

The equation is y = -x + 2, with the y-intercept at (0, 2).

Additional Resources

A Linear Function Goes Through The Points (-3,1) And (1,-3). What Are The Coordinates For The Y-intercept? — this question embodies a fundamental concept in algebra that helps students and learners understand how to interpret and analyze linear functions based on given data points. Determining the y-intercept of a line when you know two points it passes through is a common problem that combines understanding of slope, linear equations, and coordinate geometry. This guide aims to walk you through the process step-by-step, ensuring clarity and confidence in solving such problems.

Understanding the Problem

When a linear function passes through two known points, such as (-3, 1) and (1, -3), the main goal is often to find the equation of the line itself. Once you have the equation, determining the y-intercept—the point where the line crosses the y-axis—is straightforward.

In this context:

- The points are given: (-3, 1) and (1, -3).
- The question asks: What are the coordinates for the y-intercept of this line?

The y-intercept, often denoted as b in the slope-intercept form y = mx + b, is the value of y when x = 0. Finding this involves calculating the line's slope, deriving its equation, and then evaluating at x = 0.

Step 1: Calculate the Slope of the Line

What is the slope?

The slope (m) measures the steepness and direction of the line. It is calculated using the two points with the formula:

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

where:

- $(x_1, y_1) = (-3, 1)$
- $(x_2, y_2) = (1, -3)$

Calculation:

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

Result: The slope of the line is -1.

Step 2: Write the Equation of the Line in Slope-Intercept Form

Once the slope is known, the next step is to find the equation of the line.

Using the point-slope form:

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

Choose one point to substitute. Let's pick (-3, 1) for simplicity.

Substituting:

$$
y - 1 = -1 (x - (-3)) = -1 (x + 3)
$$

Simplify:

$$
y - 1 = -x - 3
$$

Add 1 to both sides:

$$
y = -x - 3 + 1
$$

$$
y = -x - 2
$$

$$
$$

Equation of the line:

$$
\boxed{y = -x - 2}
$$

Step 3: Find the Y-intercept

The y-intercept occurs where $x = 0$. To find the y-intercept:

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

Coordinates of the y-intercept:

$$
(0, -2)
$$

Answer: The y-intercept of the line passing through (-3, 1) and (1, -3) is (0, -2).

Additional Insights

Why is the y-intercept important?

The y-intercept provides a starting point of the line on the coordinate plane. It’s the point where the line crosses the y-axis, which is useful for graphing, understanding the behavior of the function, and solving real-world problems.

How does this process generalize?

The method used here can be applied to any two points:

1. Calculate the slope.
2. Use the slope and one point to find the line's equation.
3. Substitute $x = 0$ into the equation to find the y-intercept.

Visualizing the Line

Although a visual isn't provided here, imagine plotting the two points:

- (-3, 1): 3 units left of the y-axis, 1 unit up.

- (1, -3): 1 unit right of the y-axis, 3 units down.

Drawing a line through these points with a slope of -1 will cross the y-axis at (0, -2).

Summary of the Key Steps

Step	Description	Result
1	Calculate slope using two points	-1
2	Use point-slope form to find the line's equation	y = -x - 2
3	Substitute x = 0 into the equation to find y-intercept	(0, -2)

Additional Practice Problems

To reinforce this process, consider practicing with different points:

- Find the y-intercept of the line passing through (2, 5) and (4, 1).
- Determine the y-intercept when the points are (-1, 4) and (3, -2).

Final Thoughts

Understanding how to find the y-intercept of a line passing through known points is a foundational skill in algebra that underpins many advanced topics, including linear modeling, graphing, and calculus. By mastering the steps of calculating the slope, deriving the linear equation, and evaluating at x=0, you develop a toolkit that applies to a wide range of mathematical and real-world problems. Remember, practice makes perfect—so try working through multiple examples to build confidence and fluency.

A Linear Function Goes Through The Points 3 1 And 1 3 What Are The Coordinates For The Y Intercept

A Linear Function Goes Through The Points 3 1 And 1 3 What Are The Coordinates For The Y Intercept

Related Articles

- Assume Accountants And Teachers Have Identical Marginal Revenue Product Schedules. Which Of The Following
- Find The Volume Of The Solid Generated By Revolving The Region Bounded By The Given Curve And Lines About
- Consider The Following System. G (s)= 1/ (s + 1)(s+2)a) Sketch The Nyquist Plot Of The

System Given Above

Back to Home