Complete The Equation Of The Line Through (-6,-5)(6,5)left Parenthesis, Minus, 6, Comma, Minus, 5, Right

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Introduction

Understanding how to find the equation of a line given two points is a fundamental skill in coordinate geometry. When provided with two distinct points, such as (-6, -5) and (6, 5), we can determine the line's equation by calculating its slope and then applying the point-slope or slope-intercept form. This process not only helps in graphing lines but also in solving various geometric problems involving lines and distances.

Step 1: Understanding the Given Points

Coordinates Provided

The points given are:

- Point 1: (-6, -5)
- Point 2: (6, 5)

These are two points in the Cartesian plane. The x-coordinates are -6 and 6, while the y-coordinates are -5 and 5. Noticing their symmetry can help us anticipate the nature of the line, but we'll proceed systematically to find its equation.

Step 2: Calculating the Slope of the Line

Understanding Slope

The slope (m) of a line measures its steepness and is calculated as the change in y over the change in x between two points:

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

Applying the Slope Formula

Let's assign:
- $(x_1, y_1) = (-6, -5)$
- $(x_2, y_2) = (6, 5)$

Compute the differences:
$$
\Delta y = 5 - (-5) = 5 + 5 = 10
$$
$$
\Delta x = 6 - (-6) = 6 + 6 = 12
$$

Calculate the slope:
$$
m = \frac{10}{12} = \frac{5}{6}
$$

Result: The slope of the line passing through these points is $\frac{5}{6}$.

Step 3: Using the Point-Slope Form to Find the Equation

Point-Slope Equation

The point-slope form of a line's equation is:
$$
y - y_1 = m(x - x_1)
$$
where (x_1, y_1) is any point on the line, and m is the slope.

Substitute Known Values

Using point $(-6, -5)$:
$$
y - (-5) = \frac{5}{6}(x - (-6))
$$
Simplify:
$$
y + 5 = \frac{5}{6}(x + 6)
$$

Step 4: Simplify to Slope-Intercept Form

Distribute the Slope

$$
y + 5 = \frac{5}{6}x + \frac{5}{6} \times 6
$$

$$
y + 5 = \frac{5}{6}x + 5
$$

Isolate y

Subtract 5 from both sides:

$$
y = \frac{5}{6}x + 5 - 5
$$

$$
y = \frac{5}{6}x
$$

Final Equation in Slope-Intercept Form:

$$
\boxed{y = \frac{5}{6}x}
$$

This is the equation of the line passing through the points $(-6, -5)$ and $(6, 5)$.

Verification of the Equation

Check with the Second Point

Substitute $x = 6$:

$$
y = \frac{5}{6} \times 6 = 5
$$

which matches the y-coordinate of the second point.

Check with the First Point

Substitute $x = -6$:

$$
y = \frac{5}{6} \times (-6) = -5
$$

which matches the y-coordinate of the first point.

Thus, the derived equation accurately represents the line passing through both points.

Additional Insights

Line Characteristics

- Slope: $\frac{5}{6}$, indicating a line that rises 5 units vertically for every 6 units horizontally.
- Line Type: Since the slope is positive, the line slopes upward from left to right.
- Symmetry: The points are symmetric with respect to the origin in terms of their coordinates, which aligns with the line's positive slope.

Graphical Representation

Plotting these points and drawing the line can help visualize the line's position. The line passes through quadrants II and IV, crossing the origin at (0, 0).

Alternative Forms of the Equation

Standard Form

The standard form of a line's equation is:

$$
Ax + By = C
$$

Starting from the slope-intercept form:

$$
y = \frac{5}{6}x
$$

Multiply both sides by 6 to clear fractions:

$$
6y = 5x
$$

Rearranged:

$$
5x - 6y = 0
$$

This is the standard form of the line.

Summary of Forms

Form	Equation	Explanation
Slope-Intercept	$y = \frac{5}{6}x$	Easy to interpret slope and y-intercept
Standard	$5x - 6y = 0$	Suitable for certain algebraic applications

Conclusion

Determining the equation of a line given two points involves calculating the slope and then using either the point-slope or slope-intercept form. For points (-6, -5) and (6, 5), the slope is \(\frac{5}{6}\), and the line's equation in slope-intercept form is \(y = \frac{5}{6}x \). This concise equation accurately describes the line passing through the given points, and it can be expressed in various forms depending on the context. Mastery of this process is essential for solving a wide range of geometric and algebraic problems involving lines in the coordinate plane.

Frequently Asked Questions

What is the slope of the line passing through the points (-6, -5) and (6, 5)?

The slope is (5 - (-5)) / (6 - (-6)) = (10) / (12) = 5/6.

What is the equation of the line passing through (-6, -5) and (6, 5)?

Using point-slope form: y - (-5) = (5/6)(x - (-6)), which simplifies to y + 5 = (5/6)(x + 6).

What is the slope-intercept form of the line through (-6, -5) and (6, 5)?

First, find the slope m = 5/6. Then, plug in one point, for example (-6, -5): y = (5/6)x + b. Solving for b: -5 = (5/6)(-6) + b => -5 = -6 + b => b = 1. So, the equation is y = (5/6)x + 1.

How do you verify that the line passes through both points (-6, -5) and (6, 5)?

Substitute x = -6 and y = -5 into y = (5/6)x + 1: (-5) = (5/6)(-6) + 1 => -5 = -6 + 1 => -5 = -5, which is true. Similarly, for x = 6: y = (5/6)(6) + 1 = 5 + 1 = 6, but since the y-value at x=6 is 5, the previous calculation indicates a mistake; rechecking shows that the correct line is y = (5/6)x + 1, which passes through (-6, -5) but not (6, 5). Therefore, the earlier calculation for b is incorrect; the correct line is y = (5/6)x - 5/6 6 + c. Let's re-derive carefully.

What is the correct equation of the line through (-6, -5) and (6, 5)?

The slope is (5 - (-5)) / (6 - (-6)) = 10 / 12 = 5/6. Using point (-6, -5): y - (-5) = (5/6)(x - (-6)) => y + 5 = (5/6)(x + 6). Simplify: y + 5 = (5/6)x + 5. Then, y = (5/6)x + 0. So, the equation is y = (5/6)x.

Is the line through (-6, -5) and (6, 5) a straight line? How do you know?

Yes, because it passes through two points and has a constant slope, which confirms it's a straight line.

What is the significance of the slope in the equation of the line through these points?

The slope (5/6) indicates the rate of change of y with respect to x between the two points, showing the line rises 5 units for every 6 units it moves to the right.

Additional Resources

Complete The Equation Of The Line Through (-6, -5) (6, 5)

Understanding how to complete the equation of the line through (-6, -5) and (6, 5) is a fundamental skill in algebra and coordinate geometry. Whether you're a student working on homework, a teacher preparing lessons, or a professional brushing up on mathematical concepts, mastering how to find the equation of a line through two points is essential. This process involves determining the line's slope, then using that slope and one of the points to formulate the line's equation in a standard or slope-intercept form. In this guide, we'll walk through each step in detail, providing clarity and confidence to handle similar problems with ease.

Understanding the Basics: The Equation of a Line

Before we delve into the specific problem, let's review the foundational concepts:

- Line through two points: Any straight line passing through two distinct points in the coordinate plane can be described by a linear equation.
- Slope (m): Measures the steepness or incline of the line. It is calculated as the change in y divided by the change in x between the two points.
- Point-slope form: An equation format using a point on the line and the slope, expressed as:
$y - y_1 = m(x - x_1)$
- Slope-intercept form: An equation format that shows the slope and y-intercept, expressed as:
$y = mx + b$

Step-by-Step Guide to Complete the Equation of the Line

Step 1: Identify the Given Points

The problem provides two points:

- Point 1: (-6, -5)
- Point 2: (6, 5)

These coordinates are in the format (x, y). Recognizing these points correctly is the first step toward forming the line's equation.

Step 2: Calculate the Slope (m)

The slope is calculated as:

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

Plugging in the values:

$$
m = \frac{5 - (-5)}{6 - (-6)} = \frac{5 + 5}{6 + 6} = \frac{10}{12}
$$

Simplify the fraction:

$$
m = \frac{5}{6}
$$

Result: The slope of the line is $\frac{5}{6}$.

Step 3: Choose a Point to Plug Into the Equation

You can use either point to write the line's equation. For clarity, let's select (-6, -5).

Step 4: Use the Point-Slope Form

The point-slope form is:

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

Substitute $m = \frac{5}{6}$, $x_1 = -6$, and $y_1 = -5$:

$$
y - (-5) = \frac{5}{6}(x - (-6))
$$

Simplify:

\[

y + 5 = \frac{5}{6}(x + 6)
\]

Step 5: Simplify to Slope-Intercept Form

Distribute the slope:

\[
y + 5 = \frac{5}{6}x + \frac{5}{6} \times 6
\]

Calculate:

\[
\frac{5}{6} \times 6 = 5
\]

Now, rewrite:

\[
y + 5 = \frac{5}{6}x + 5
\]

Subtract 5 from both sides to isolate y:

\[
y = \frac{5}{6}x + 5 - 5
\]

\[
y = \frac{5}{6}x
\]

Final Equation:

\[
\boxed{y = \frac{5}{6}x}
\]

This is the slope-intercept form of the line passing through (-6, -5) and (6, 5).

Additional Insights and Verification

Verify the Equation with the Second Point

To ensure our equation is correct, substitute \(x = 6 \):

\[
y = \frac{5}{6} \times 6 = 5

\]

which matches the y-coordinate of the second point, confirming the correctness.

Understanding the Line's Behavior

- The line passes through quadrants II and IV, indicating it slopes upward from left to right.
- The slope $\frac{5}{6}$ signifies that for every 6 units moved horizontally to the right, the line rises 5 units vertically.

Visualizing the Line

While this guide is textual, visual understanding is crucial:

- The points (-6, -5) and (6, 5) are symmetric with respect to the origin, reflecting a positive slope.
- Plotting these points on graph paper or graphing software helps visualize the line's trajectory.

Summary of Key Steps

Step	Action	Result
1	Identify points	(-6, -5) and (6, 5)
2	Calculate slope m	$\frac{5}{6}$
3	Use point-slope form with one point	$y + 5 = \frac{5}{6}(x + 6)$
4	Simplify to slope-intercept form	$y = \frac{5}{6}x$
5	Verify with second point	Confirmed

Additional Variations and Tips

Using the Other Point

You can also start with the second point (6, 5):

$$
y - 5 = \frac{5}{6}(x - 6)
$$

Distribute:

$$
y - 5 = \frac{5}{6}x - 5
$$

Add 5 to both sides:

$$
y = \frac{5}{6}x
$$

The same line results, illustrating the consistency of the method.

Converting to Standard Form

The standard form of a line's equation is:

$$
Ax + By = C
$$

Starting with $y = \frac{5}{6}x$, multiply both sides by 6 to clear the denominator:

$$
6y = 5x
$$

Rearranged:

$$
5x - 6y = 0
$$

This is another valid form of the line's equation.

Practice Tips

- Always verify your slope calculation.
- Use multiple points to confirm the equation.
- Practice converting between slope-intercept and standard forms.
- Visualize the line to understand its slope and intercepts.

Conclusion

Completing the equation of the line through points (-6, -5) and (6, 5) involves systematic steps: calculating the slope, applying the point-slope form, and simplifying to the desired form. The resulting equation, $y = \frac{5}{6}x$, accurately describes the line passing through the given points. Mastery of these steps enhances your ability to analyze linear relationships in various contexts, from academic exercises to real-world applications. Remember, consistent practice and visualization are key to developing confidence and proficiency in coordinate geometry.

Complete The Equation Of The Line Through 6 5 6 5 Left Parenthesis Minus 6 Comma Minus 5 Right

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