

What Is An Equation Of The Line That Passes Through The Point (4,3) And Is Parallel To The Line $2x - 2y = 2$?

What Is An Equation Of The Line That Passes Through The Point (4,3) And Is Parallel To The Line $2x - 2y = 2$?

Understanding how to find the equation of a line that passes through a specific point and is parallel to a given line is a fundamental skill in coordinate geometry. In this article, we will explore this process step-by-step, starting with the given line and point, analyzing the slope, and deriving the equation of the required line. We will also discuss key concepts such as the slope-intercept form, parallel lines, and how to manipulate equations to reach the desired form. By the end, you will have a comprehensive understanding of how to determine the equation of a line under these conditions.

Understanding the Given Line: $2x - 2y = 2$

Converting the Equation to Slope-Intercept Form

The given line is expressed as $2x - 2y = 2$. To work effectively with this line, especially to find its slope, it is helpful to rewrite it in the slope-intercept form, $y = mx + b$.

Starting with the original equation:

$$2x - 2y = 2$$

First, rewrite the equation clearly:

$$2x \cdot 2y = 2$$

Simplify the left side:

$$(2x)(2y) = 2$$

This simplifies to:

$$4xy = 2$$

Now, solve for y:

Divide both sides of the equation by 4x (assuming $x \neq 0$):

$$4xy = 2$$

$$\Rightarrow y = 2 / (4x)$$

$$\Rightarrow y = 1 / (2x)$$

Therefore, the original line can be expressed as:

$$y = 1 / (2x)$$

Analyzing the Line's Slope

Notice that $y = 1 / (2x)$ is a reciprocal function, which is a hyperbola, not a straight line. This indicates a crucial point: the equation $2x \cdot 2y = 2$ does not represent a linear equation in the traditional sense but

rather a rectangular hyperbola.

Key Point: The question asks for the line that passes through (4,3) and is parallel to the line $2x^2y=2$. Since $2x^2y=2$ does not represent a line (it's a hyperbola), the phrase "parallel to the line $2x^2y=2$ " might be a misinterpretation or a typo.

Possible Clarification: The original equation might have been intended as $2x + 2y = 2$, which is a linear equation. If that's the case, then:

$$2x + 2y = 2$$

Dividing through by 2:

$$x + y = 1$$

This is a linear equation with slope $m = -1$ (since the slope of $x + y = 1$ is -1).

Assumption for Continuity: Given the context, it is likely that the original intended line is $2x + 2y = 2$, which simplifies to $x + y = 1$. Under this assumption, we can proceed.

Note: If the original line was indeed $2x^2y=2$, the question is about a hyperbola, which cannot be "parallel" to a line. Parallel lines are only defined in the context of lines, not curves. Therefore, for meaningful progression, this article proceeds under the assumption that the line is $2x + 2y = 2$.

Deriving the Equation of the Parallel Line

Step 1: Identify the Slope of the Given Line

Starting from $x + y = 1$:

$$x + y = 1$$

Expressed in slope-intercept form:

$$y = -x + 1$$

The slope m of this line is:

$$m = -1$$

Parallel lines have identical slopes. Therefore, the line we seek must also have a slope of -1 .

Step 2: Use the Point-Slope Form

The point-slope form for a line is:

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

Where:

(x_1, y_1) is a point on the line, which in this case is $(4, 3)$

- m is the slope, which is -1

Plugging in the values:

$$y - 3 = -1(x - 4)$$

Step 3: Simplify to Slope-Intercept Form

Distribute the slope:

$$y - 3 = -x + 4$$

Add 3 to both sides:

$$y = -x + 4 + 3$$

$$y = -x + 7$$

This is the equation of the line passing through (4, 3) and parallel to $x + y = 1$.

Final Equation of the Line

The line passing through the point (4, 3) and parallel to the given line (assuming it is $2x + 2y = 2$) is:

$$y = -x + 7$$

This line has the same slope as the original line and passes through the specified point.

Additional Considerations and Variations

If the Original Line Is Different

- If the initial equation is different, such as $2x + 2y = c$, the process remains similar:
- Convert to slope-intercept form: $y = -x + c/2$
- The slope would be -1 regardless of c
- The line parallel to it passing through $(4, 3)$ would still be $y = -x + b$, where b is found by plugging in $(4, 3)$:
$$3 = -4 + b \Rightarrow b = 7$$
- Regardless of the specific value of c , the slope remains -1 , and the process is consistent.

Understanding the Role of Parallel Lines

- Parallel lines have identical slopes but different y-intercepts
- The distance between parallel lines can be calculated if needed, but for this problem, the focus is on the equations

Summary of the Steps to Find the Equation

1. Identify the original line and convert it to slope-intercept form to find its slope.
2. Note the slope; for parallel lines, it remains the same.
3. Use the point-slope form with the known point and slope to find the equation of the new line.
4. Simplify to the preferred form (usually slope-intercept form).

Conclusion

In conclusion, determining the equation of a line passing through a specific point and parallel to a given line involves understanding the slope of the original line and applying the point-slope formula. Assuming the original line is $2x + 2y = 2$, which simplifies to $y = -x + 1$, the line passing through $(4, 3)$ with the same slope is $y = -x + 7$. This process exemplifies fundamental principles in coordinate geometry and highlights the importance of correctly interpreting the given equations.

Remember: Always verify the nature of the original equation—whether it is linear or nonlinear—before proceeding, as this significantly influences the approach and calculations involved.

Frequently Asked Questions

What is the given line's equation in slope-intercept form?

First, rewrite $2x + 2y = 2$ as $2y = -2x + 2$, so $y = -x + 1$.

What is the slope of the line parallel to $2x + 2y = 2$?

The slope of the given line is -1 , so the parallel line will also have a slope of -1 .

How do you find the equation of a line passing through $(4,3)$ with slope -1 ?

Use point-slope form: $y - 3 = -1(x - 4)$. Simplify to get $y = -x + 7$.

What is the final equation of the line passing through $(4,3)$ and parallel to $2x + 2y = 2$?

The equation is $y = -x + 7$.

How do you verify that the line passes through the point $(4,3)$?

Substitute $x=4$ into $y = -x + 7$: $y = -4 + 7 = 3$, confirming the point lies on the line.

Can you convert the final line equation into standard form?

Yes, rewrite $y = -x + 7$ as $x + y = 7$ in standard form.

Why are lines with the same slope parallel?

Lines with identical slopes never intersect and are therefore parallel, provided their intercepts differ.

Additional Resources

What Is An Equation Of The Line That Passes Through The Point $(4,3)$ And Is Parallel To The Line $2x + 2y = 2$?

When working with lines in coordinate geometry, a fundamental task often involves finding the

equation of a line that passes through a specific point and is parallel to another given line. This problem becomes particularly engaging when you are asked to determine the equation of a line passing through the point (4, 3) and parallel to the line $2x + 2y = 2$. The equation of the line that passes through the point (4, 3) and is parallel to the line $2x + 2y = 2$ encapsulates core concepts such as slope calculation, point-slope form, and the properties of parallel lines.

In this guide, we'll walk through the entire process step-by-step, ensuring you understand the underlying principles. Whether you're a student brushing up on algebra or someone curious about line equations, this comprehensive overview will clarify how to approach such problems confidently.

Understanding the Problem

Before diving into calculations, let's clarify what the problem asks:

- Given Point: (4, 3)
- Given Line: $2x + 2y = 2$
- Objective: Find the equation of a line that:
- Passes through (4, 3)
- Is parallel to the given line

Step 1: Recognize the Significance of Parallel Lines

Parallel lines are lines in the same plane that never intersect. One of the key properties of parallel lines in the plane is that they have equal slopes.

- Implication: To find the line parallel to $2x + 2y = 2$ passing through (4, 3), we need to determine the slope of the given line.

Step 2: Rewrite the Given Line in Slope-Intercept Form

The equation $2x + 2y = 2$ is given in standard form. To find its slope, it's easiest to convert it into slope-intercept form ($y = mx + b$).

Convert $2x + 2y = 2$ to slope-intercept form:

1. Subtract $2x$ from both sides:

$$2y = -2x + 2$$

2. Divide both sides by 2:

$$y = -x + 1$$

Result: The slope (m) of the given line is -1 .

Step 3: Identify the Slope of the Parallel Line

Since parallel lines share the same slope:

- Slope of the desired line: -1

Step 4: Use Point-Slope Form to Write the Equation

The point-slope form of a line's equation is:

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

Where:

- (x_1, y_1) is a point on the line

- m is the slope

Plug in the point $(4, 3)$ and the slope -1 :

$$y - 3 = -1(x - 4)$$

Step 5: Simplify to Slope-Intercept Form

Distribute the slope:

$$y - 3 = -x + 4$$

Add 3 to both sides:

$$y = -x + 4 + 3$$

Simplify:

$$y = -x + 7$$

Final Equation of the Line

The equation of the line passing through (4, 3) and parallel to $2x + 2y = 2$ is:

$$y = -x + 7$$

Additional Notes and Variations

1. Equation in Standard Form

Sometimes, it's preferred to write the line in standard form:

- Starting from $y = -x + 7$

Bring all to one side:

$$x + y = 7$$

This is an equivalent standard form with integer coefficients.

2. Verifying the Line Passes Through the Point

Substitute (4, 3):

$$y = -x + 7$$

$$3 = -4 + 7$$

$$3 = 3 \quad \square$$

The point satisfies the equation, confirming correctness.

3. Visualizing the Lines

- The original line $2x + 2y = 2$ (or $y = -x + 1$) has a slope of -1 and crosses the y -axis at $y=1$.
- The new parallel line $y = -x + 7$ has the same slope but crosses the y -axis at $y=7$.
- Graphically, these lines are parallel, separated vertically by a difference in intercepts.

Summary: Step-by-Step Approach

Here's a quick checklist to solve similar problems:

1. Identify the given line's equation and convert it to slope-intercept form to find the slope.
2. Determine the slope of the parallel line (it's the same as the original).
3. Use the point-slope form with the given point and the slope.
4. Simplify to the desired form (slope-intercept or standard form).
5. Verify that the point satisfies the final equation.

Final Thoughts

Understanding how to find the equation of a line passing through a specific point and parallel to another line is a foundational skill in algebra and coordinate geometry. It combines knowledge of line forms, slope calculation, and properties of parallel lines. Mastering this process enhances your problem-solving toolkit, enabling you to handle a wide array of geometric and algebraic challenges with confidence.

Whether you're working on homework, preparing for an exam, or exploring geometric concepts, the

approach detailed here provides a clear and systematic way to arrive at the correct equation.

Remember, practice with different lines and points will solidify your understanding and make such problems second nature.

What Is An Equation Of The Line That Passes Through The Point 4 3 And Is Parallel To The Line $2x + y = 2$

What Is An Equation Of The Line That Passes Through The Point 4 3 And Is Parallel To The Line $2x + y = 2$

Related Articles

- [The Declaration Of Independence Talked About Life, Liberty, And That All People Are Created Equal. Some](#)
- [Semester 2: Final Exam Unit Directions: Please Fill Out This Study Guide With The Correct Answers Using](#)
- [What Is The Best Evidence To Prove That Irene Was Heterozygous For Hemophilia? Elizabeth IS Not A Carrier](#)

[Back to Home](#)