# Find The Equation Of The Line That Contains The Point (-1,-6) And Is Parallel To The Line 5x+3y=8. Write

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When working with straight lines in coordinate geometry, a common problem involves finding the equation of a line that passes through a specific point and is parallel to a given line. In this article, we will explore how to find the equation of the line that contains the point (-1, -6) and is parallel to the line 5x + 3y = 8. This problem combines understanding of slope, parallel lines, and the point-slope form of the line equation. By following a step-by-step approach, you'll be able to solve similar problems with confidence.

## Understanding the Problem

Before diving into the solution, it’s important to understand what the problem is asking for:

- Given Point: (-1, -6)
- Given Line: 5x + 3y = 8
- Goal: Find the equation of the line that passes through the given point and is parallel to the given line.

Since the line must be parallel to 5x + 3y = 8, it will have the same slope as this line. The key steps involve:

1. Finding the slope of the given line.
2. Using the point (-1, -6) and the slope to write the equation of the new line.

## Step 1: Find the Slope of the Given Line

To find the slope of the line 5x + 3y = 8, we need to rewrite it in slope-intercept form (y = mx + b), where m is the slope.

### Rearranging the Equation

Starting with:

$5x + 3y = 8$

Solve for y:

- Subtract 5x from both sides:

$3y = -5x + 8$

- Divide both sides by 3:

$y = (-5/3)x + 8/3$

## Identify the Slope

From the slope-intercept form $y = mx + b$, the coefficient of x is the slope:

- Slope of the given line: $m = -5/3$

Since the new line must be parallel to this, it will have the same slope:

- Slope of the new line: $m = -5/3$

# Step 2: Use the Point-Slope Form to Find the Equation

The point-slope form of a line with slope m passing through point $(x_1, y_1)$ is:

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

Given:

- Point: (-1, -6)
- Slope: -5/3

Plugging these into the point-slope formula:

$y - (-6) = -5/3(x - (-1))$

Simplify:

y + 6 = -5/3(x + 1)

## Step 3: Write the Equation in Slope-Intercept Form

Distribute the slope on the right:

y + 6 = -5/3 x - 5/3 1

Simplify:

y + 6 = -5/3 x - 5/3

Subtract 6 from both sides to solve for y:

y = -5/3 x - 5/3 - 6

Express 6 as a fraction with denominator 3:

6 = 18/3

Now:

y = -5/3 x - 5/3 - 18/3

Combine the constants:

-5/3 - 18/3 = -23/3

Final equation:

y = -5/3 x - 23/3

# Final Equation of the Line

The equation of the line that passes through the point (-1, -6) and is parallel to 5x + 3y = 8 is:

**`y = -5/3 x - 23/3`**

This is the slope-intercept form, clearly showing the slope and the y-intercept.

## Additional Tips for Solving Similar Problems

To effectively solve problems involving finding lines parallel or perpendicular to a given line, keep in mind:

- **Always convert the given line to slope-intercept form** to identify its slope easily.
- **Parallel lines share the same slope**, so use the slope from the original line for the new line.
- **Use the point-slope form** with the given point and the slope to write the equation.
- **Convert to slope-intercept form** for the final, easy-to-interpret equation.

## Common Mistakes to Avoid

While solving these types of problems, be cautious of:

- Not simplifying the equation fully — always aim for the most simplified form.
- Mixing up the signs when substituting and simplifying constants.
- Forgetting to use the same slope as the original line when lines are parallel.
- Confusing the point coordinates; double-check that the point is correctly inserted into the formula.

## Practice Problems to Strengthen Your Skills

To master this concept, try solving these practice problems:

1. Find the equation of the line passing through (2, 3) and parallel to the line 2x - y = 4.
2. Determine the line passing through (0, 5) and parallel to 4x + y = 7.
3. Find the equation of the line that contains the point (4, -2) and is parallel to y = 3x + 1.

By practicing these problems, you'll develop confidence in identifying slopes, applying the point-slope formula, and converting equations into various forms.

## Conclusion

Finding the equation of a line that contains a specific point and is parallel to a given line is a fundamental skill in coordinate geometry. The key steps involve determining the slope of the given line, then using the point-slope form to find the new line's equation. Remember to always write your equations in a clear, simplified form for easy interpretation. With consistent practice, you'll be able to solve such problems efficiently and accurately, strengthening your understanding of linear equations and their properties.

Whether you're preparing for a math test, working on homework, or just seeking to deepen your understanding of algebra, mastering the process of finding parallel lines is an essential part of your mathematical toolkit.

## Frequently Asked Questions

### What is the slope of the line 5x + 3y = 8?

First, rewrite the equation in slope-intercept form: 3y = -5x + 8, so y = (-5/3)x + 8/3. Therefore, the slope is -5/3.

### How do you find the equation of a line parallel to 5x + 3y = 8 that passes through the point (-1, -6)?

Since the lines are parallel, they have the same slope, -5/3. Use the point-slope form $y - y_1 = m(x - x_1)$ with point (-1, -6): y + 6 = (-5/3)(x + 1).

### What is the step-by-step process to find the equation of the parallel line

## through (-1, -6)?

Step 1: Identify the slope m = -5/3. Step 2: Use point-slope form with the point (-1, -6): y + 6 = (-5/3)(x + 1). Step 3: Simplify to slope-intercept form: y = (-5/3)x - 11/3.

## What is the final equation of the line passing through (-1, -6) and parallel to 5x + 3y = 8?

The final equation is y = (-5/3)x - 11/3.

## Can you verify that the point (-1, -6) lies on the line y = (-5/3)x - 11/3?

Yes. Substitute x = -1: y = (-5/3)(-1) - 11/3 = 5/3 - 11/3 = -6/3 = -2. Since y ≠ -6, check calculation: Wait, this indicates a discrepancy—let's re-verify the calculation.

## Is there an error in the previous calculation? How do you correct it?

Yes. Let's re-calculate: y = (-5/3)(-1) - 11/3 = 5/3 - 11/3 = (5 - 11)/3 = -6/3 = -2. Since the point is (-1, -6), and the y-value is -6, not -2, the earlier line equation is incorrect. The correct line should pass through (-1, -6). Let's find the correct equation.

## What is the correct equation of the line passing through (-1, -6) and parallel to 5x + 3y = 8?

The slope is -5/3. Using point-slope form: y + 6 = (-5/3)(x + 1). Simplify: y + 6 = (-5/3)x - 5/3. Subtract 6: y = (-5/3)x - 5/3 - 6. Convert 6 to thirds: 6 = 18/3. So, y = (-5/3)x - 5/3 - 18/3 = (-5/3)x - 23/3. Therefore, the correct equation is y = (-5/3)x - 23/3.

# Additional Resources

**Finding the Equation of a Line Parallel to a Given Line and Passing Through a Specific Point**

In the realm of coordinate geometry, understanding how to determine the equation of a line that satisfies specific conditions is a fundamental skill. Whether you're a student delving into algebra or a professional applying geometric principles, mastering this process unlocks a wide array of analytical capabilities. This article explores an intriguing problem: "Find the equation of the line that passes through the point (-1, -6) and is parallel to the line 5x + 3y = 8." Through detailed explanations, step-by-step procedures, and insightful analysis, we aim to provide a comprehensive understanding of this problem, its underlying concepts, and the techniques used to solve it.

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# Understanding the Problem: Key Concepts and Terminology

Before diving into calculations, it's essential to grasp the core concepts involved:

## 1. The Equation of a Line

A line in a two-dimensional plane can be represented mathematically in various forms, with the most common being:

- Slope-Intercept Form: $y = mx + b$, where m is the slope, and b is the y-intercept.
- Standard Form: $Ax + By = C$, where A, B, and C are constants.

Understanding these forms allows us to manipulate and interpret lines efficiently.

## 2. Parallel Lines and Their Properties

Two lines are parallel if they have the same slope and are distinct lines (i.e., they do not coincide). This property is crucial because it simplifies the problem: once we identify the slope of the given line, any line parallel to it will share that slope.

## 3. The Significance of the Point (-1, -6)

The point (-1, -6) lies on the line we seek. This condition constrains the line's position, ensuring our final equation not only shares the slope but also passes through this specific point.

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# Analyzing the Given Line: 5x + 3y = 8

The starting point of our problem is the line given by the equation:

$5x + 3y = 8$

To find a line parallel to it, we first need to understand its slope.

## 1. Converting to Slope-Intercept Form

Transforming $5x + 3y = 8$ into $y = mx + b$ form:

- Subtract 5x from both sides:

$3y = -5x + 8$

- Divide both sides by 3:

$y = (-5/3)x + 8/3$

Result: The slope of the given line, $m_1$, is -5/3.

## 2. Significance of the Slope

Since the line we are to find is parallel to this given line, it will have the same slope, $m_2 = m_1 = -5/3$.

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# Formulating the Equation of the Parallel Line

Having identified the slope, the next step involves constructing the line's equation passing through the point (-1, -6).

## 1. Using the Point-Slope Form

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

Applying the known values:

- $x_1 = -1$
- $y_1 = -6$
- $m = -5/3$

The equation becomes:

$y - (-6) = (-5/3)(x - (-1))$

Simplify:

$y + 6 = (-5/3)(x + 1)$

## 2. Expanding and Simplifying to Slope-Intercept Form

Multiply out the right side:

$y + 6 = (-5/3)x - (5/3)(1)$

which simplifies to:

$y + 6 = (-5/3)x - 5/3$

Subtract 6 from both sides:

$y = (-5/3)x - 5/3 - 6$

Express 6 as a fraction with denominator 3:

$6 = 18/3$

So:

$y = (-5/3)x - 5/3 - 18/3$

Combine like terms:

$y = (-5/3)x - (5/3 + 18/3)$

$y = (-5/3)x - 23/3$

Final Equation in Slope-Intercept Form:

y = (-5/3)x - 23/3

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# Alternative Forms and Verification

While the slope-intercept form is often most straightforward for analysis, in some contexts, standard form might be preferable.

## 1. Converting to Standard Form

Starting from y = (-5/3)x - 23/3:

- Multiply through by 3 to clear denominators:

3y = -5x - 23

Rearranged to standard form:

5x + 3y = -23

This confirms the form and provides an alternative perspective.

## 2. Verification of the Solution

To ensure the correctness:

- Check that the point (-1, -6) satisfies the equation:

Plug x = -1:

y = (-5/3)(-1) - 23/3 = (5/3) - 23/3 = (5 - 23)/3 = -18/3 = -6

which matches the y-coordinate, confirming the point lies on the line.

- Confirm the slope matches the original line:

Original line slope: -5/3

Our line's slope: -5/3

They are identical, confirming the lines are parallel.

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## Implications and Broader Context

Understanding how to find lines parallel to a given line and passing through a specific point is fundamental in various mathematical and real-world applications, including:

- Design and Engineering: Creating parallel components or pathways.
- Navigation and Mapping: Plotting parallel routes or boundaries.
- Computer Graphics: Rendering lines with specific orientations through points.
- Physics: Analyzing trajectories or force vectors in parallel directions.

Moreover, mastering these techniques enhances problem-solving skills, allowing for the efficient handling of more complex geometric configurations, such as lines with multiple constraints, intersecting lines, and systems of equations.

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## Summary and Key Takeaways

This comprehensive exploration underscores several important points:

- The slope of the given line (5x + 3y = 8) is -5/3.
- Lines parallel to this will share the same slope.
- Using the point-slope form provides an efficient pathway to derive the equation.
- The resulting line passing through (-1, -6) is:

y = (-5/3)x - 23/3

- Converting between slope-intercept and standard forms offers flexibility in analysis.
- Validating the solution through substitution ensures accuracy.

By understanding each step in this process, learners not only solve a specific problem but also develop a deeper grasp of the principles governing lines, slopes, and their relationships within the coordinate plane.

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## Conclusion

The problem of finding a line that passes through a specific point and is parallel to another line encapsulates essential concepts in coordinate geometry. Through systematic analysis—starting from understanding the original line, determining its slope, and applying the point-slope formula—we arrive at a precise and verified solution. This process exemplifies the power of algebraic manipulation and geometric reasoning, skills that are invaluable across numerous scientific and mathematical disciplines. As you continue exploring the fascinating world of geometry, remember that each problem is an opportunity to reinforce foundational concepts and sharpen analytical skills.

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