# Line A Passes Through The Points (-1, 5) And (3, 21). Line B Passes Through The Points (4, -2) And (-3,

**Line A Passes Through The Points (-1, 5) And (3, 21). Line B Passes Through The Points (4, -2) And (-3,**.

Understanding the properties and equations of lines passing through specific points is fundamental in coordinate geometry. By analyzing the given points, we can determine the equations of the lines, their slopes, intercepts, and other related properties. This article provides an in-depth exploration of the lines passing through these points, covering the derivation of their equations, comparison of their slopes, and insights into their geometric relationships.

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## Analyzing Line A: Passing Through (-1, 5) and (3, 21)

### Calculating the Slope of Line A

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 Line A, the points are:

- $(-1, 5)$
- $(3, 21)$

Applying the formula:

$$
m_A = \frac{21 - 5}{3 - (-1)} = \frac{16}{4} = 4
$$

Thus, the slope of Line A is 4.

## Deriving the Equation of Line A

Using the point-slope form:

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

Choose the point $(-1, 5)$:

$$
y - 5 = 4 (x - (-1)) \implies y - 5 = 4 (x + 1)
$$

Simplify:

$$
y - 5 = 4x + 4
$$

Add 5 to both sides:

$$
y = 4x + 9
$$

Equation of Line A:

$$
\boxed{y = 4x + 9}
$$

## Graphical Representation and Properties

- Y-intercept: When $x=0$, $y=9$, so the line crosses the y-axis at (0,9).
- Slope: 4, indicating the line rises 4 units vertically for every 1 unit horizontally.
- Points on the line: As expected, substituting $x=-1$ yields $y=4(-1)+9=5$, and $x=3$ yields $y=4(3)+9=21$.

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# Analyzing Line B: Passing Through (4, -2) and (-3, ?)

Note: The user’s message appears incomplete regarding the second point for Line B.

Assuming a typical problem, perhaps the second point was meant to be $(-3, y_2)$. For completeness, we analyze the line passing through (4, -2) and a second point $(-3, y_2)$. To proceed, we'll consider a general approach and then pick an example for clarity.

## General Approach to Find the Equation of Line B

Given two points:

- $(x_3, y_3) = (4, -2)$
- $(x_4, y_4) = (-3, y_4)$ (unknown $y_4$)

The slope:

$$
m_B = \frac{y_4 - (-2)}{x_4 - 4} = \frac{y_4 + 2}{x_4 - 4}
$$

Once $y_4$ and $x_4$ are known, the line's equation can be derived similarly to Line A.

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# Case Study: Complete the Second Point and Derive Line B

Suppose, for illustration, the second point for Line B is $(-3, 4)$. This choice allows us to compute the line's properties concretely.

## Calculating the Slope of Line B

Points:

- $(4, -2)$
- $(-3, 4)$

Applying the slope formula:

$$
m_B = \frac{4 - (-2)}{-3 - 4} = \frac{6}{-7} = -\frac{6}{7}
$$

## Equation of Line B

Using the point-slope form with point $(4, -2)$:

$$
y - (-2) = -\frac{6}{7} (x - 4)
$$

Simplify:

$$
y + 2 = -\frac{6}{7} (x - 4)
$$

Distribute:

$$
y + 2 = -\frac{6}{7} x + \frac{24}{7}
$$

Subtract 2 from both sides:

$$
y = -\frac{6}{7} x + \frac{24}{7} - 2
$$

Express 2 as $\frac{14}{7}$:

$$
y = -\frac{6}{7} x + \frac{24}{7} - \frac{14}{7} = -\frac{6}{7} x + \frac{10}{7}
$$

Equation of Line B:

$$
\boxed{y = -\frac{6}{7} x + \frac{10}{7}}
$$

## Properties of Line B

- Y-intercept: $\frac{10}{7} \approx 1.43$, crossing the y-axis at approximately (0, 1.43).
- Slope: $-\frac{6}{7}$, indicating the line decreases as $x$ increases.

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# Comparing the Lines: Slopes and Intercepts

## Slope Comparison

- Line A: $m_A = 4$ (positive, steep upward slope)
- Line B: $m_B = -\frac{6}{7}$ (negative, gentle downward slope)

Since the slopes have opposite signs, the lines are inclined in opposite directions.

## Y-intercept Comparison

- Line A: $b_A = 9$
- Line B: $b_B = \frac{10}{7} \approx 1.43$

Line A intersects the y-axis much higher than Line B.

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# Geometric Relationships Between the Lines

## Are the Lines Parallel?

Two lines are parallel if their slopes are equal.

- $m_A = 4$
- $m_B = -\frac{6}{7}$

Since $4 \neq -\frac{6}{7}$, the lines are not parallel.

## Are the Lines Perpendicular?

Lines are perpendicular if the product of their slopes equals $-1$:

$$
m_A \times m_B = -1
$$

Calculate:

$$
4 \times -\frac{6}{7} = -\frac{24}{7} \neq -1
$$

Thus, the lines are not perpendicular.

## Intersection Point

To find the point where the lines intersect, set their equations equal:

$$
4x + 9 = -\frac{6}{7} x + \frac{10}{7}
$$

Multiply through by 7 to clear denominators:

$$
7(4x + 9) = 7 \left(-\frac{6}{7} x + \frac{10}{7}\right)
$$

Simplify:

$$
28x + 63 = -6x + 10
$$

Bring like terms together:

$$
28x + 6x = 10 - 63
$$
$$
34x = -53
$$
$$
x = -\frac{53}{34}
$$

Calculate $x$:

$$
x \approx -1.5588
$$

Substitute back into one of the equations to find $y$:

Using Line A:

$$
y = 4x + 9
$$
$$
y = 4 \times -\frac{53}{34} + 9 = -\frac{212}{34} + 9
$$

Simplify:

$$
-\frac{212}{34} + 9 = -\frac{106}{17} + 9
$$

Express 9 as $\frac{153}{17}$:

$$
-\frac{106}{17} + \frac{153}{17} = \frac{47}{17} \approx 2.76
$$

Intersection Point:

$$
\boxed{\left(-\frac{53}{34}, \frac{47}{17}\right)} \quad \text{or approximately} \quad (-1.5588, 2.76)
$$

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# Summary and Practical Applications

Understanding how to derive the equations of lines from given points is a foundational skill in algebra and coordinate geometry. This process involves calculating slopes, applying point-slope or slope-intercept forms, and analyzing relationships such as parallelism or perpendicularity. These concepts are crucial in various fields

# Frequently Asked Questions

## What is the slope of Line A passing through the points (-1, 5) and (3, 21)?

The slope of Line A is (21 - 5) / (3 - (-1)) = 16 / 4 = 4.

## What is the equation of Line A in slope-intercept form?

Using point-slope form with point (-1, 5) and slope 4: y - 5 = 4(x + 1), which simplifies to y = 4x + 9.

## How do you find the slope of Line B passing through (4, -2) and (-3, y)?

You need the y-coordinate of the second point; once known, the slope is (y - (-2)) / (-3 - 4) = (y + 2) / -7.

## If Line B passes through (4, -2) and (-3, 4), what is its slope?

Slope = (4 - (-2)) / (-3 - 4) = 6 / -7 = -6/7.

## How can you determine whether lines A and B are parallel, perpendicular, or neither?

Calculate their slopes; if slopes are equal, lines are parallel; if slopes are negative reciprocals, lines are perpendicular; otherwise, neither.

# Additional Resources

Line A Passes Through The Points (-1, 5) And (3, 21). Line B Passes Through The Points (4, -2) And (-3,

In the world of mathematics, understanding the properties and equations of lines is fundamental, especially when analyzing relationships between points on a coordinate plane. Today, we delve into two specific lines: Line A and Line B, each passing through a distinct pair of points. By exploring their equations, slopes, and intersections, we can uncover the geometric and algebraic features that define them.

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Introduction: The Significance of Line Equations in Coordinate Geometry

Coordinate geometry, or analytic geometry, bridges algebra and geometry by representing geometric figures through algebraic equations. Lines, being the simplest yet most essential figures, serve as the building blocks for more complex shapes and serve numerous practical applications—from engineering to data analysis.

When given two points, the goal is often to determine the equation of the line passing through them. This involves calculating the slope, which indicates the steepness and direction of the line, and then deriving the equation in slope-intercept or point-slope form. Understanding these concepts allows us to analyze relationships, intersections, and distances with precision.

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Defining Line A: Passing Through (-1, 5) and (3, 21)

Calculating the Slope of Line A

Given two points, $P_1(-1, 5)$ and $P_2(3, 21)$, the slope $m_A$ is calculated as:

$$
m_A = \frac{y_2 - y_1}{x_2 - x_1} = \frac{21 - 5}{3 - (-1)} = \frac{16}{4} = 4
$$

This indicates that for every unit increase in $x$, $y$ increases by 4 units. The positive slope signifies an upward trend from left to right.

### Deriving the Equation of Line A

Using the point-slope form:

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

Substituting $P_1(-1, 5)$ and $m_A = 4$:

$$
y - 5 = 4(x + 1)
$$

Simplify to slope-intercept form:

$$
y - 5 = 4x + 4 \\
y = 4x + 9
$$

Equation of Line A:

$$
\boxed{ y = 4x + 9 }
$$

This linear equation succinctly captures the relationship between $x$ and $y$ for Line A.

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### Defining Line B: Passing Through (4, -2) and (-3, y)

### Clarifying the Points and Unknowns

The provided points for Line B are $(4, -2)$ and $(-3, y)$. Since $y$ is not specified, the line's equation will be expressed in terms of $y$, or further context is needed to determine its value.

Assuming the goal is to derive the general form of the line passing through these points, let's proceed with the variable $y$ as an unknown.

### Calculating the Slope of Line B

The slope $m_B$ is:

$$

$$
m_B = \frac{y - (-2)}{-3 - 4} = \frac{y + 2}{-7}
$$

Thus,

$$
m_B = - \frac{y + 2}{7}
$$

The slope depends on $y$, indicating that without a specific $y$-coordinate for the second point, the slope remains a variable expression.

Expressing the Equation of Line B

Using the point-slope form with point $(4, -2)$:

$$
y - (-2) = m_B (x - 4)
$$

$$
y + 2 = - \frac{y + 2}{7} (x - 4)
$$

This relation involves $y$ on both sides, complicating direct solution. To clarify, suppose the problem intends to analyze the line assuming a specific $y$-coordinate for the second point, or perhaps to explore how the slope varies with $y$.

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Exploring the Relationship and Intersection of Lines A and B

When Are the Lines Parallel or Perpendicular?

- Parallel lines have identical slopes.
- Perpendicular lines have slopes that are negative reciprocals.

Given the slope of Line A is 4, for Line B to be parallel:

$$
m_B = 4
$$

From earlier:

$$
m_B = - \frac{y + 2}{7}
$$

Set equal to 4:

$$
- \frac{y + 2}{7} = 4 \\
\Rightarrow y + 2 = -28 \\
\Rightarrow y = -30
$$

If the second point for Line B is $(-3, -30)$, then the slope of Line B is 4, making both lines parallel.

Determining the Intersection Point

Suppose both lines are not parallel; their intersection point $(x_{int}, y_{int})$ can be found by equating their equations.

From earlier:

- Line A: $y = 4x + 9$
- Line B: $y = m_B (x - 4) - 2$ (rearranged)

But since $m_B$ depends on $y$, a specific $y$ value is necessary to proceed.

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Practical Implications and Applications

Understanding how to derive and manipulate line equations is critical in multiple fields:

- Engineering: Designing structures requires precise calculations of slopes and intersections.
- Computer Graphics: Rendering lines and calculating intersections between objects.
- Data Analysis: Fitting linear models to data points to identify trends.
- Navigation & Mapping: Calculating routes and intersections between paths.

In particular, the ability to handle points with unknown coordinates, as in Line B, highlights the importance of algebraic flexibility. The concepts of slope and line equations are foundational for more complex geometric and algebraic problem-solving.

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Conclusion: From Coordinates to Equations and Beyond

In this exploration, we've established the equations of two lines based on given points, highlighting key concepts such as slope calculation, point-slope form, and the conditions for lines to be parallel. While Line A is straightforward with fixed points, Line B introduces an element of variability, emphasizing the importance of understanding how parameters influence line equations.

Mastering these fundamental techniques enhances our capacity to model, analyze, and interpret the relationships between points in a plane. Whether in academic pursuits or practical applications, the principles outlined here serve as essential tools for navigating the geometric landscape of coordinate systems.

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Understanding the intricacies of lines through specific points not only deepens mathematical comprehension but also empowers us to solve real-world problems with clarity and precision.

## Line A Passes Through The Points 1 5 And 3 21 Line B Passes Through The Points 4 2 And 3

Line A Passes Through The Points 1 5 And 3 21 Line B Passes Through The Points 4 2 And 3

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