

A Line Intersects The Points(4, 2) And (7, 8).What Is The Slope Of The Line In simplest Form? $m = [?]$

A Line Intersects The Points(4, 2) And (7, 8).What Is The Slope Of The Line In simplest Form? $m = [?]$

Understanding the concept of slopes and how to compute the slope of a line passing through two points is fundamental in coordinate geometry. Whether you're a student preparing for exams, a teacher designing lessons, or an enthusiast exploring the fascinating world of mathematics, mastering how to find the slope in simplest form is a crucial skill. In this article, we'll explore the process of calculating the slope of a line that intersects two given points: (4, 2) and (7, 8). We'll delve into the significance of the slope, the step-by-step method to compute it, and why expressing the slope in simplest form is important for clarity and precision.

Understanding the Concept of Slope in Coordinate Geometry

What Is a Slope?

In the realm of coordinate geometry, the slope of a line measures its steepness or inclination. It describes how much the y-coordinate changes with respect to the change in the x-coordinate between two points on the line. The slope is often represented by the letter 'm'.

Mathematically, the slope between two points $((x_1, y_1))$ and $((x_2, y_2))$ is given by:

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

This ratio indicates the rate of change of y with respect to x.

Why Is Slope Important?

- Determines the nature of the line: whether it is increasing, decreasing, horizontal, or vertical.
- Helps in graphing lines accurately: knowing the slope allows for quick sketching.
- Crucial for equations of lines: the slope-intercept form $(y = mx + b)$ relies on the slope.
- Applied in real-world problems: such as calculating gradients, rates of change, and in various engineering and physics applications.

Calculating the Slope of a Line Passing Through Two

Points

Given Points: (4, 2) and (7, 8)

These points are located in the Cartesian plane at coordinates:

- Point A: $((x_1, y_1) = (4, 2))$
- Point B: $((x_2, y_2) = (7, 8))$

Step-by-Step Calculation

1. Identify the coordinates of the two points.
2. Substitute these coordinates into the slope formula:

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

3. Compute the numerator: $(y_2 - y_1)$

$$8 - 2 = 6$$

4. Compute the denominator: $(x_2 - x_1)$

$$7 - 4 = 3$$

5. Calculate the slope:

$$m = \frac{6}{3}$$

6. Simplify the fraction:

$$m = 2$$

Thus, the slope of the line passing through the points (4, 2) and (7, 8) is 2.

Expressing the Slope in Simplest Form

Why Simplify the Slope?

Simplifying the slope makes it easier to interpret and compare with other lines. It ensures the ratio is in the lowest terms, avoiding unnecessary complexity and making the value more meaningful.

How to Simplify a Fraction?

- Find the greatest common divisor (GCD) of the numerator and denominator.
- Divide both numerator and denominator by this GCD.

In our example:

- Numerator = 6
- Denominator = 3
- GCD of 6 and 3 is 3.

Divide both by 3:

$$\left[\frac{6 \div 3}{3 \div 3} = \frac{2}{1} \right]$$

which simplifies to 2/1, or simply 2.

Since the slope is already an integer, it is inherently in its simplest form.

Additional Considerations in Slope Calculation

Vertical and Horizontal Lines

- Vertical lines: The x-coordinates are the same ($x_1 = x_2$), making the denominator zero, which means the slope is undefined.
- Horizontal lines: The y-coordinates are the same ($y_1 = y_2$), resulting in a slope of 0.

In our case, since $x_2 \neq x_1$, the slope is well-defined and finite.

Real-World Applications of Slope

- Physics: calculating velocity or acceleration.
- Economics: marginal cost or revenue.
- Engineering: determining gradients in structural designs.
- Geography: measuring the incline of terrains.

Conclusion: Calculating the Slope of a Line Through Two Points

Understanding how to find the slope between two points is a foundational skill in mathematics that extends into numerous scientific and practical fields. For the points (4, 2) and (7, 8), the calculations reveal that the slope of the line passing through these points is 2 in its simplest form. This simple ratio provides insight into the line's steepness, indicating that for every unit increase in x, y increases by 2 units.

Summary of the key steps:

- Use the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$.
- Substitute the coordinates into the formula.
- Simplify the resulting fraction to its lowest terms.
- Interpret the slope in the context of the problem.

Mastering this process enhances your ability to analyze linear relationships, graph lines accurately, and solve complex geometric problems with confidence. Whether you're tackling homework, preparing for exams, or applying mathematics in real-world scenarios, understanding how to compute and simplify the slope is an essential skill that will serve you well.

Remember: Always check if the line is vertical or horizontal to avoid division by zero, and strive to express your slope in simplest form for clarity and precision.

Frequently Asked Questions

How do you find the slope of a line passing through points (4, 2) and (7, 8)?

The slope is calculated using the formula $m = (y_2 - y_1) / (x_2 - x_1)$. Substituting the points gives $m = (8 - 2) / (7 - 4) = 6 / 3 = 2$.

What is the slope of the line passing through (4, 2) and (7, 8) in simplest form?

The slope in simplest form is 2.

Why do we subtract the y-coordinates and x-coordinates when finding the slope?

Subtracting the y-coordinates and x-coordinates gives the rate of change of y with respect to x between the two points, which is the slope.

Can the slope of the line through (4, 2) and (7, 8) be expressed as a fraction?

Yes, the slope is $6/3$, which simplifies to 2.

What is the importance of finding the slope in coordinate geometry?

The slope indicates the steepness and direction of the line passing through two points.

Is the slope of the line between (4, 2) and (7, 8) positive or negative?

The slope is positive, specifically 2.

How would you write the equation of the line passing through (4, 2) with slope 2?

Using point-slope form: $y - 2 = 2(x - 4)$.

What is the significance of simplifying the slope to its lowest terms?

Simplifying makes the slope easier to interpret and use in equations, ensuring clarity and accuracy.

If the points were different, say (1, 3) and (5, 11), how would you find the slope?

Use $m = (11 - 3) / (5 - 1) = 8 / 4 = 2$.

Are the given points (4, 2) and (7, 8) collinear with other points that have the same slope?

Yes, any points with the same slope of 2 and lying on the same line are collinear with these points.

Additional Resources

A Line Intersects The Points(4, 2) And (7, 8). What Is The Slope Of The Line In Simplest Form? $m =$ [?]

Understanding the slope of a line passing through two points is a fundamental concept in coordinate geometry. It provides essential insight into the line's inclination and direction. When asked to find the slope of a line that intersects the points (4, 2) and (7, 8), the task involves applying the basic principles of algebra to derive a simplified answer. This process not only enhances problem-solving skills but also reinforces the foundational concepts that underpin more advanced topics in mathematics. In this comprehensive review, we will explore the step-by-step method to determine the slope, discuss the significance of the slope in various contexts, and analyze related concepts that enrich our understanding of lines and their properties.

Understanding the Concept of Slope

What Is Slope?

The slope of a line, often denoted by the symbol m , measures how steep the line is. It quantifies the rate of change of the y -coordinate relative to the x -coordinate as you move along the line. In simple terms, the slope tells us how much y increases or decreases for a unit increase in x .

Mathematically, the slope between two points $((x_1, y_1))$ and $((x_2, y_2))$ is given by:

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

This formula is fundamental in coordinate geometry and serves as the basis for many other calculations involving lines.

Why Is Slope Important?

- Determines the angle of inclination: The slope indicates whether a line rises or falls as it moves from left to right.
- Helps in graphing lines: Knowing the slope simplifies plotting the line on a coordinate plane.
- Facilitates the equation of a line: Slope-intercept form $(y = mx + b)$ directly incorporates the slope.
- Applied in real-world problems: Slope calculations are used in economics, physics, engineering, and more.

Calculating the Slope for Points (4, 2) and (7, 8)

Step-by-Step Method

Given the points:

- $((x_1, y_1) = (4, 2))$
- $((x_2, y_2) = (7, 8))$

The slope (m) is computed as:

$$m = \frac{8 - 2}{7 - 4}$$

Calculating numerator and denominator:

$$m = \frac{6}{3}$$

Simplify the fraction:

$$m = 2$$

$$m = 2$$

\]

Thus, the slope of the line intersecting the points (4, 2) and (7, 8) is 2.

Expressing the Slope in Simplest Form

Since the fraction $\frac{6}{3}$ reduces to 2, the slope in simplest form is simply 2. This indicates that for every 1 unit increase in x, y increases by 2 units.

Interpreting the Result

The Significance of the Slope Value

- A slope of 2 indicates a line that ascends steeply as you move from left to right.
- The positive value signifies that the line rises, rather than falls.
- The magnitude (2) reflects the rate of increase, making it easier to predict y-values for given x-values.

Graphical Representation

Plotting the points and drawing the line:

- The point (4, 2) is on the line.
- Moving 1 unit to the right from x=4 to x=5, y increases by 2 units from 2 to 4.
- Moving from (4, 2) to (7, 8), the line rises consistently with the slope of 2.

Additional Considerations in Slope Calculations

Special Cases

- Vertical Lines: When $(x_1 = x_2)$, the denominator becomes zero, and the slope is undefined. For example, a line passing through (3, 1) and (3, 5) is vertical.
- Horizontal Lines: When $(y_1 = y_2)$, the numerator is zero, and the slope is zero. For example, a line through (2, 4) and (5, 4) is horizontal.

Implications of Simplification

- Expressing the slope in simplest form ensures clarity and ease of understanding.
- It helps in comparing slopes of different lines effectively.

Related Concepts and Applications

Equation of the Line in Slope-Intercept Form

Knowing the slope $(m = 2)$ and a point on the line, say $(4, 2)$, allows us to write the equation:

$$y = mx + b$$

Substitute $(m = 2)$, $(x = 4)$, and $(y = 2)$:

$$2 = 2(4) + b$$

$$2 = 8 + b$$

$$b = 2 - 8 = -6$$

So, the equation of the line is:

$$\boxed{y = 2x - 6}$$

This equation can be used to find y-values for any x-value along the line.

Real-World Applications

- Physics: Calculating velocity or acceleration.
- Economics: Analyzing cost vs. production levels.
- Engineering: Designing slopes in infrastructure.
- Data Analysis: Fitting lines to data points in regression.

Pros and Cons of Slope Calculation

Pros:

- Provides a straightforward measure of line inclination.
- Essential for understanding linear relationships.
- Facilitates the derivation of line equations.
- Useful in multiple disciplines.

Cons:

- Cannot be calculated for vertical lines (undefined slope).
- Assumes a linear relationship; not applicable to curves.
- Sensitive to measurement errors in data points.

Conclusion

Determining the slope of a line passing through two points is a fundamental skill in mathematics, underpinning many concepts in geometry, algebra, and applied sciences. In the specific case of points (4, 2) and (7, 8), the slope simplifies to 2, indicating a line that rises at a consistent rate as x increases. This value not only helps in graphing and equation formulation but also enhances understanding of how points relate spatially. Mastery of calculating and interpreting slopes is essential for further exploration of linear functions, equations, and their applications across various fields.

Whether you're a student tackling introductory geometry or a professional applying mathematical models, understanding the slope and its significance remains a vital part of analytical thinking and problem-solving.

[A Line Intersects The Points 4 2 And 7 8 What Is The Slope Of The Line Insimplest Form M](#)

A Line Intersects The Points 4 2 And 7 8 What Is The Slope Of The Line Insimplest Form M

Related Articles

- [Give An Example How Robert M Fallaute Helped With People Doing Direct Primary, PLEASE HELPNO LINKS](#)
- [In Your Own Words, Explain Why Some People Think That Advertising In Schools Is Not A](#)

[Good Idea](#)

- [Watercolor Paper, A Paper That Can Get Wet, Is Need If You Are Going To Use Solvent Blending.](#)

[Back to Home](#)