

Consider The Equation $1.5x + 4.5y = 18$ If We Graph The Equation, What Is The Slope Of The Graph? A.3B.

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Understanding the slope of a linear equation is fundamental in algebra and analytical geometry. When given a linear equation such as $1.5x + 4.5y = 18$, determining its slope provides insight into the graph's incline and direction. This article offers a comprehensive guide to calculating the slope from such an equation, explaining the concepts step-by-step, and clarifying common misconceptions. Whether you're a student preparing for exams or a math enthusiast, this guide will help you understand how to derive the slope from any linear equation presented in standard form.

Understanding the Equation of a Line

Standard Form of a Linear Equation

The general standard form for a linear equation in two variables is:

$$Ax + By = C$$

where:

- A , B , and C are constants,
- x and y are variables representing points on the line.

In our case, the equation is:

$$1.5x + 4.5y = 18$$

This form is useful because it allows us to identify coefficients directly related to the slope.

What is the Slope?

The slope of a line, often denoted as m , describes its steepness and direction. It represents the rate at which y changes with respect to x . A positive slope indicates the line rises as it moves from left to right; a negative slope indicates it falls.

The slope is fundamental in understanding the behavior of the line and solving various algebraic and geometric problems.

Converting Standard Form to Slope-Intercept Form

Why Convert to Slope-Intercept Form?

The slope-intercept form of a line is:

$$y = mx + b$$

where:

- m is the slope,
- b is the y-intercept (the point where the line crosses the y-axis).

Converting the given equation into this form makes it straightforward to read off the slope.

Steps to Convert $1.5x + 4.5y = 18$

Let's convert the equation into slope-intercept form:

1. Start with the original equation:

$$1.5x + 4.5y = 18$$

2. Isolate y :

$$4.5y = -1.5x + 18$$

3. Divide every term by 4.5:

$$y = \frac{-1.5x}{4.5} + \frac{18}{4.5}$$

4. Simplify the fractions:

- $\frac{-1.5}{4.5} = -\frac{1.5}{4.5} = -\frac{1}{3}$
- $\frac{18}{4.5} = 4$

So, the equation becomes:

$$y = -\frac{1}{3}x + 4$$

Now, the equation is in slope-intercept form, and the slope is clearly visible.

Determining the Slope of the Line

From the Slope-Intercept Form

In the form:

$$y = mx + b$$

the coefficient (m) directly represents the slope.

For our equation:

$$y = -\frac{1}{3}x + 4$$

the slope (m) is:

$$m = -\frac{1}{3}$$

Answer to the Question

Given the options:

- A. 3
- B. (unspecified in the prompt, but presumably the other option)

The slope is $(-\frac{1}{3})$, which does not match either positive value. If the question only offers options like A. 3 and B. (some other value), then the correct answer would be none of these unless B is $(-\frac{1}{3})$.

Therefore, the slope of the graph of the equation $(1.5x + 4.5y = 18)$ is $(-\frac{1}{3})$.

Graphing the Equation and Visualizing the Slope

Plotting the Line

To graph the line, we need at least two points:

1. Find the y-intercept (b) :

When $(x = 0)$:

$$y = -\frac{1}{3}(0) + 4 = 4$$

So, the point $((0, 4))$.

2. Find another point by choosing a value for (x) :

For $(x = 3)$:

$$y = -\frac{1}{3}(3) + 4 = -1 + 4 = 3$$

So, the point $((3, 3))$.

Plotting these points $((0, 4))$ and $((3, 3))$, and drawing a line through them, visually demonstrates the negative slope.

Understanding the Slope from the Graph

The slope is calculated as:

$$m = \frac{\text{change in } y}{\text{change in } x}$$

Between points $((0, 4))$ and $((3, 3))$:

$$\Delta y = 3 - 4 = -1$$

$$\Delta x = 3 - 0 = 3$$

Thus:

$$m = \frac{-1}{3}$$

which confirms the earlier calculation.

Common Questions and Clarifications

What if the Equation is in Different Forms?

- If the equation is in standard form $(Ax + By = C)$, convert it to slope-intercept form as shown.
- If the equation is already in slope-intercept form, read the slope directly.

What if the Slope is Zero or Undefined?

- A horizontal line has a slope of 0.
- A vertical line has an undefined slope (division by zero).

Our line has a slope of $(-\frac{1}{3})$, indicating a downward incline as we move from left to right.

How Do Different Coefficients Affect the Slope?

- Larger absolute value of the coefficient of x or y affects the steepness.
- The sign indicates the direction: positive for upward, negative for downward.

Summary and Key Takeaways

- To find the slope of a line given in standard form, convert the equation into slope-intercept form.
- The slope m is the coefficient of x when expressed as $y = mx + b$.
- For the equation $1.5x + 4.5y = 18$, the slope is $-\frac{1}{3}$.
- Visualizing the line helps reinforce the concept of slope as rate of change.
- Understanding these concepts is essential for solving algebraic problems and analyzing graphs.

Additional Resources for Learning Linear Equations and Graphs

- Interactive graphing calculators online
- Algebra textbooks and practice problems
- Educational videos explaining slope and line equations
- Math tutoring and online courses

In conclusion, the slope of the line represented by the equation $1.5x + 4.5y = 18$ is $-\frac{1}{3}$. Mastering the process of converting equations to slope-intercept form and calculating the slope is a vital skill in algebra that provides foundational understanding for more advanced mathematical concepts.

Remember: Always identify the coefficients carefully, perform the correct algebraic manipulations, and visualize your graph for better comprehension!

Frequently Asked Questions

What is the slope of the line represented by the equation $1.5x + 4.5y = 18$?

The slope is $-1/3$.

How do you find the slope of a line from the equation $1.5x + 4.5y = 18$?

Rewrite the equation in slope-intercept form ($y = mx + b$) and identify the coefficient of x as the slope.

What is the slope of the line given by $1.5x + 4.5y = 18$ in decimal form?

The slope is approximately -0.333.

If the equation is $1.5x + 4.5y = 18$, what is the value of the slope in fractional form?

The slope is $-1/3$.

Is the slope of the line negative or positive for the equation $1.5x + 4.5y = 18$?

The slope is negative, specifically $-1/3$.

What does the slope $-1/3$ indicate about the line's inclination?

It indicates that for every 3 units increase in x , y decreases by 1 unit.

Can the slope of the equation $1.5x + 4.5y = 18$ be simplified further?

Yes, dividing all terms by 1.5 simplifies the equation to $x + 3y = 12$, with a slope of $-1/3$.

If A is 3, what is the slope of the line $1.5x + 4.5y = 18$?

The slope remains $-1/3$; the value of A does not change the slope.

What is the significance of the slope in understanding the graph of the equation?

The slope indicates the steepness and direction of the line; here, it's negative and indicates a downward trend.

Additional Resources

Consider The Equation $1.5x + 4.5y = 18$. If We Graph The Equation, What Is The Slope Of The Graph? A.3 B. — this question invites us to explore the fundamental concepts of graphing linear equations and understanding how to determine the slope from an equation presented in standard

form. Understanding the slope of a line is crucial in algebra and coordinate geometry, as it describes the rate of change between the variables and helps us visualize the behavior of the line on a graph. In this guide, we will break down the process of finding the slope step-by-step, analyze the given equation, and clarify common misconceptions surrounding the topic.

Understanding the Question: Why Is the Slope Important?

Before diving into calculations, it's essential to understand why the slope is a critical feature of a linear graph. The slope, often denoted as 'm', signifies:

- The steepness of the line.
- The direction of the line (positive slope indicates an upward trend from left to right, negative indicates downward).
- The rate at which y changes with respect to x.

Knowing the slope allows us to predict the behavior of the line, draw it accurately, and understand relationships between variables.

The Equation in Context: Standard Form of a Linear Equation

The given equation is:

$$\text{\textbackslash} [1.5x + 4.5y = 18 \text{\textbackslash}]$$

This form is known as the standard form of a linear equation:

$$\text{\textbackslash} [Ax + By = C \text{\textbackslash}]$$

where A, B, and C are constants.

Our goal: Convert this standard form into a slope-intercept form, $(y = mx + b)$, where 'm' is clearly visible as the slope.

Step-by-Step: Converting to Slope-Intercept Form

Step 1: Isolate y

Start with the original equation:

$$\text{\textbackslash} [1.5x + 4.5y = 18 \text{\textbackslash}]$$

Subtract $(1.5x)$ from both sides:

$$\text{\textbackslash} [4.5y = -1.5x + 18 \text{\textbackslash}]$$

Step 2: Divide through by the coefficient of y

Divide every term by 4.5:

$$y = \frac{-1.5x}{4.5} + \frac{18}{4.5}$$

Simplify each term:

- For the first term:

$$\frac{-1.5x}{4.5} = -\frac{1.5}{4.5} x$$

- For the second term:

$$\frac{18}{4.5} = 4$$

Step 3: Simplify the fraction

Calculate $\left(\frac{1.5}{4.5}\right)$:

$$\frac{1.5}{4.5} = \frac{15}{45} = \frac{1}{3}$$

So,

$$-\frac{1}{3} x$$

Final form:

$$y = -\frac{1}{3} x + 4$$

Extracting the Slope

In the slope-intercept form $(y = mx + b)$, the coefficient 'm' directly indicates the slope.

- Slope (m): $\left(-\frac{1}{3}\right)$

This tells us that for every 3 units increase in x, y decreases by 1 unit.

Analyzing the Multiple Choice Options

The question provides options for the slope: A. 3 and B. ? (assuming there might be more options in the complete question). Based on our calculation:

- The slope is $\left(-\frac{1}{3}\right)$, which is neither 3 nor a simple positive integer.

Therefore, neither option A (3) nor B (if it's a placeholder) is correct unless the options are meant to be interpreted differently.

Common Misconceptions and Clarifications

1. Confusing Standard Form and Slope

Many students mistakenly believe the coefficients A and B directly give the slope. In standard form, the slope is not simply A or B, but rather derived after converting to slope-intercept form.

2. Sign of the Slope

Remember, the sign indicates the direction:

- Negative slope: line slopes downward from left to right.
- Positive slope: line slopes upward from left to right.

In our case, the slope is $(-\frac{1}{3})$: a downward trend.

3. Interpreting Fractions

Always convert to decimal if needed:

$$\left[-\frac{1}{3} \approx -0.333 \right]$$

which might help in visualizing the slope.

Visualizing the Graph

Visualizing the line helps reinforce understanding:

- The y-intercept is at (0, 4).
- The slope is $(-\frac{1}{3})$.

To plot:

1. Start at (0, 4).
2. Move down 1 unit and right 3 units to find another point.
3. Connect the points to draw the line.

This visualization confirms the negative slope and helps illustrate how the line behaves across the coordinate plane.

Summary of Key Takeaways

- The given equation in standard form is $(1.5x + 4.5y = 18)$.
- Converting to slope-intercept form yields $(y = -\frac{1}{3}x + 4)$.
- The slope of the graph is $(-\frac{1}{3})$.

- The slope indicates a line decreasing slowly from left to right.

Final Notes on the Multiple Choice Question

Given the options:

- A. 3
- B. ? (assuming another option exists)

Our analysis shows the slope is $(-\frac{1}{3})$. Since neither 3 nor positive, it's essential to double-check the options or the question context.

If the question only offers 'A. 3' and no other options, then the correct answer is neither.

However, if options include $(-\frac{1}{3})$, that would be the correct choice.

Conclusion

Understanding how to identify the slope from a linear equation is a fundamental skill in algebra. By converting the standard form to slope-intercept form, we clearly see that the slope of the line represented by $(1.5x + 4.5y = 18)$ is $(-\frac{1}{3})$. Recognizing the sign and magnitude of the slope helps us interpret the line's behavior visually and analytically. Always remember to perform the conversion carefully and double-check your work to avoid common mistakes. With practice, determining the slope from any linear equation becomes a straightforward step in your mathematical toolkit.

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