

M= -1/8, (8, -3) Find The Slope-intercept Form Of The Equation Of The Line That Has The Given Slope M

Understanding the Problem

Let's begin by examining the problem statement: **M= -1/8, (8, -3) Find The Slope-intercept Form Of The Equation Of The Line That Has The Given Slope M.** This problem provides us with two key pieces of information:

- The slope of the line (M) is -1/8.
- The line passes through the point (8, -3).

Our goal is to find the equation of this line in slope-intercept form, which is generally written as:

$$y = mx + b$$

where:

- **m** is the slope of the line.
- **b** is the y-intercept, or the value of y when x=0.

In this context, since the slope (m) is given, and a point on the line is provided, we'll determine the y-intercept (b) by substituting the known point into the slope-intercept formula.

Step-by-Step Solution

Step 1: Write the general equation

Given the slope $m = -1/8$, the general form of the line is:

$$y = -\frac{1}{8}x + b$$

Step 2: Substitute the known point into the equation

The point (8, -3) lies on the line, which means when $x=8$, $y=-3$. Plugging these values into the equation gives:

$$-3 = -\frac{1}{8} \cdot 8 + b$$

Step 3: Simplify the equation to solve for b

Calculate the term involving x:

$$-\frac{1}{8} \cdot 8 = -1$$

So, the equation becomes:

$$-3 = -1 + b$$

To find b, add 1 to both sides:

$$-3 + 1 = b$$

Thus:

$$b = -2$$

Final Equation in Slope-Intercept Form

Now that we have both the slope and the y-intercept, we can write the complete equation of the line:

$$y = -\frac{1}{8}x - 2$$

Additional Insights and Graphical Interpretation

Understanding the Slope

The slope $-\frac{1}{8}$ indicates that for every increase of 8 units in x, y decreases by 1 unit. The negative sign suggests the line is decreasing, slanting downward from left to right.

Understanding the Y-Intercept

The y-intercept **-2** means the line crosses the y-axis at (0, -2). This point is crucial for graphing, as it provides a starting point on the y-axis from which the line extends in both directions.

Graphing the Line

Steps to Graph the Line

1. Plot the y-intercept at (0, -2).
2. Use the slope to find a second point: from (0, -2), move 8 units to the right (x=8) and 1 unit down (since slope is negative), reaching the point (8, -3).
3. Verify that the given point (8, -3) lies on the line, confirming the correctness.
4. Draw a straight line passing through these points, extending in both directions.

Alternative Methods and Tips

Using Point-Slope Form

Another approach to find the line's equation is to use the point-slope form:

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

Where:

- (x_1, y_1) is a point on the line, e.g., (8, -3).
- m is the slope, $-1/8$.

Substituting the known values:

$$y - (-3) = -\frac{1}{8}(x - 8)$$

Simplify:

$$y + 3 = -\frac{1}{8}x + 1$$

Then, subtract 3 from both sides to get the slope-intercept form:

$$y = -\frac{1}{8}x + 1 - 3 = -\frac{1}{8}x - 2$$

This confirms our earlier result, providing consistency and verifying our solution.

Common Mistakes to Avoid

- Forgetting to convert the slope fraction properly when substituting into the equation.
- Mixing up the points; ensure the coordinates are correctly identified and substituted.
- Neglecting to simplify the equation after substitution, which can lead to a less clear final answer.
- Assuming the slope-intercept form without verifying the intercept point and the slope's correctness.

Conclusion

In summary, given the slope $-\frac{1}{8}$ and a point $(8, -3)$ on the line, we derived the equation of the line in slope-intercept form as:

$$y = -\frac{1}{8}x - 2$$

This process involved substituting the point into the slope-intercept formula, solving for the y-intercept, and confirming the consistency of the solution through alternative methods. Understanding how to find the equation of a line from a given slope and point is fundamental in coordinate geometry, and mastering these steps enhances problem-solving skills applicable across various mathematical contexts.

Frequently Asked Questions

What is the slope, M, given as $-\frac{1}{8}$, and a point on

the line (8, -3)?

The slope M is $-1/8$, and the point on the line is $(8, -3)$.

How do you find the equation of a line in slope-intercept form with slope $M = -1/8$ passing through (8, -3)?

Use the point-slope form: $y - y_1 = m(x - x_1)$. Plug in $m = -1/8$, $x_1 = 8$, $y_1 = -3$, then simplify to get the slope-intercept form.

What is the step-by-step process to find the slope-intercept form from the given point and slope?

First, write $y - (-3) = -1/8(x - 8)$. Simplify to $y + 3 = -1/8(x - 8)$. Then distribute: $y + 3 = -1/8 x + 1$. Finally, subtract 3 from both sides to get $y = -1/8 x + 1 - 3$, which simplifies to $y = -1/8 x - 2$.

What is the final slope-intercept form of the line with slope $-1/8$ passing through (8, -3)?

The equation in slope-intercept form is $y = -1/8 x - 2$.

Why is it important to convert the equation to slope-intercept form?

Converting to slope-intercept form makes it easier to understand the slope and y-intercept, and allows quick graphing and analysis of the line.

Can you verify the line passes through the point (8, -3) with the derived equation?

Yes. Substitute $x = 8$ into $y = -1/8 x - 2$: $y = -1/8(8) - 2 = -1 - 2 = -3$, confirming the point lies on the line.

Additional Resources

Understanding How to Find the Slope-Intercept Form of a Line Given a Slope and a Point

When working with linear equations, one of the most fundamental skills is transforming a given slope and point into the slope-intercept form of a line. This form, expressed as $y = mx + b$, provides a clear and straightforward way to understand the line's behavior, including its slope and y-intercept. In this guide, we'll explore $M = -1/8$, $(8, -3)$ Find the Slope-intercept Form Of The Equation Of The Line That Has The Given Slope M in detail, breaking down

each step to help you master this essential algebraic technique.

Understanding the Problem

Let's break down what we're asked to do:

- Given slope (M): $-1/8$
- Given point: $(8, -3)$
- Goal: Find the line's equation in slope-intercept form, $y = mx + b$

This is a classic problem in coordinate geometry, often encountered in algebra classes, where you need to find the specific equation of a line based on a known point and slope.

Why the Slope-Intercept Form?

The slope-intercept form, $y = mx + b$, is favored because:

- It clearly displays the slope (m), indicating the rise over run.
- The intercept (b) shows where the line crosses the y-axis.
- It allows for quick graphing and understanding of the line's behavior.

Knowing how to derive this form from a point and slope is a fundamental skill that applies to many real-world and academic problems.

Step-by-Step Guide to Find the Equation

Step 1: Recall the Slope-Point Form of the Line Equation

The slope-point form is a useful starting point, expressed as:

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

where:

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

This form allows us to directly incorporate the given point and slope.

Step 2: Plug in the Known Values

Given:

- Point: $(8, -3)$
- Slope: $-1/8$

Substituting into the slope-point formula:

$$y - (-3) = -1/8 (x - 8)$$

which simplifies to:

$$y + 3 = -1/8 (x - 8)$$

Step 3: Simplify to Slope-Intercept Form

To convert this into $y = mx + b$:

1. Distribute the slope on the right-hand side:

$$y + 3 = -1/8 x + (-1/8) (-8)$$

2. Simplify each term:

- $-1/8 x$ stays as is.
- $-1/8 \cdot -8$ simplifies to:

$$(-1/8) (-8) = 1 \text{ (since negative times negative yields positive).}$$

So, the equation becomes:

$$y + 3 = -1/8 x + 1$$

3. Isolate y by subtracting 3 from both sides:

$$y = -1/8 x + 1 - 3$$

4. Simplify the constants:

$$y = -1/8 x - 2$$

Final Equation in Slope-Intercept Form

The line passing through the point (8, -3) with a slope of $-1/8$ is:

$$y = -1/8 x - 2$$

This is the desired equation in slope-intercept form.

Visualizing the Line

Understanding the line's behavior is easier with this form:

- Slope (m): $-1/8$ indicates the line is decreasing; for every increase of 8 units in x, y decreases by 1 unit.
- Y-intercept (b): -2 means the line crosses the y-axis at (0, -2).

Plotting this line involves marking the y-intercept and using the slope to find additional points.

Additional Tips and Common Mistakes

1. Always verify your substitution

Double-check that you inserted the correct point and slope into the formula.

2. Watch out for sign errors

Pay attention to negative signs during distribution and simplification.

3. Confirm your final equation

Ensure the point (8, -3) satisfies your derived equation by plugging in the x-value:

$$y = -1/8 \cdot 8 - 2 = -1 - 2 = -3$$

which matches the original point, confirming your solution.

Summary: From Slope and Point to Equation

Here's a quick recap of the process:

- Start with the slope-point form: $y - y_1 = m(x - x_1)$
- Plug in the given slope and point.
- Distribute and simplify to slope-intercept form.
- Verify the equation by plugging in the original point.

Why Mastering This Technique Matters

Being able to find the equation of a line from a slope and a point is a fundamental skill that extends beyond algebra into calculus, physics, engineering, and data analysis. It enables you to:

- Quickly sketch lines based on limited information.
- Understand the relationships between points and slopes.
- Build a foundation for more advanced topics like linear regression and vector analysis.

Final Thoughts

In this guide, we thoroughly examined $M = -1/8$, $(8, -3)$ Find the Slope-intercept Form Of The Equation Of The Line That Has The Given Slope M. By breaking down each step—from understanding the problem to deriving the final equation—you now have a clear roadmap for tackling similar problems. Practice with different points and slopes to build confidence and mastery in linear equations, and you'll find these skills invaluable for both academic and real-world applications.

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