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Understanding whether specific points lie on a given linear graph is a fundamental aspect of coordinate geometry. In this comprehensive guide, we will analyze the points A(1, 2), B(-1, -16), and C(0, -7) to determine if they satisfy the linear equation Y=9x-7. This process involves substituting the x-values of each point into the equation and verifying whether the resulting y-values match the points' y-coordinates. Through detailed explanations, step-by-step procedures, and relevant concepts, this article aims to deepen your understanding of graphing linear equations and point validation.

Understanding the Linear Equation Y=9x-7

Before we verify whether the points lie on the graph of the equation, it is essential to understand the structure and properties of the linear equation itself.

Form of the Equation

- The given equation is in slope-intercept form: Y = mx + b
- Here, m = 9 (the slope) indicates the steepness or incline of the line.
- b = -7 (the y-intercept) indicates the point where the line crosses the y-axis.

Graphical Interpretation

- The line crosses the y-axis at (0, -7).
- For each increase of 1 unit in x, y increases by 9 units, reflecting the slope.
- The line is steadily increasing because the slope is positive.

Methodology for Verifying Points on the Line

To determine if a given point (x, y) lies on the line, follow these steps:

Step 1: Substitute the x-coordinate into the equation

- Replace x in the equation Y=9x-7 with the x-coordinate of the point.

Step 2: Calculate the corresponding y-value

- Perform the arithmetic to find the y-value predicted by the equation for that x.

Step 3: Compare with the given y-coordinate

- If the calculated y-value matches the y-coordinate of the point, then the point lies on the line.
- If not, the point does not lie on the line.

Verification of Point A(1, 2)

Let's apply the method to point A(1, 2).

Step 1: Substitute x=1 into the equation

- Y = 9(1) - 7

Step 2: Calculate the y-value

- Y = 9 - 7 = 2

Step 3: Compare with the point's y-coordinate

- The calculated y-value is 2, which matches the y-coordinate of point A.

Conclusion

- Since the calculated y-value equals the point's y-coordinate, point A(1, 2) lies on the line y=9x-7.

Verification of Point B(-1, -16)

Next, verify point B(-1, -16).

Step 1: Substitute x=-1 into the equation

- Y = 9(-1) - 7

Step 2: Calculate the y-value

- Y = -9 - 7 = -16

Step 3: Compare with the point's y-coordinate

- The calculated y-value is -16, which matches the y-coordinate of point B.

Conclusion

- Since the calculated y-value equals the point's y-coordinate, point B(-1, -16) lies on the line y=9x-7.

Verification of Point C(0, -7)

Finally, examine point C(0, -7).

Step 1: Substitute x=0 into the equation

- Y = 9(0) - 7

Step 2: Calculate the y-value

- Y = 0 - 7 = -7

Step 3: Compare with the point's y-coordinate

- The calculated y-value is -7, which matches the y-coordinate of point C.

Conclusion

- Since the calculated y-value matches the y-coordinate, point C(0, -7) lies on the line y=9x-7.

Summary of Findings

- All three points A(1, 2), B(-1, -16), and C(0, -7) satisfy the linear equation Y=9x-7.
- They all lie precisely on the line represented by the equation, confirming the accuracy of the calculations.

Additional Insights into Graphing Linear Equations and Points

Understanding how points relate to linear equations is vital for graphing and solving geometric problems. Here are some key concepts that reinforce this understanding:

Graphing Linear Equations

- To graph Y=9x-7, plot the y-intercept at (0, -7).
- Use the slope, which is 9, to identify another point. For example, from (0, -7), move 1 unit right and 9 units up to (1, 2).
- Connect these points with a straight line, which extends infinitely in both directions.

Importance of Verifying Points

- Validating whether points lie on a line helps in solving geometric problems.
- It is useful for plotting, designing, and analyzing linear relationships in various fields like physics, engineering, and economics.

Real-World Applications

- Linear equations model relationships such as speed vs. time, cost vs. production, and temperature vs. pressure.
- Confirming points on these lines helps in data validation and prediction.

Practice Problems for Reinforcement

To solidify your understanding, try verifying the following points:

1. Point D(2, 11): Does it lie on Y=9x-7?
2. Point E(-3, -34): Is this point on the line?
3. Point F(4, 29): Verify if it is on the line.

Solution hints:

- Substitute the x-value into the equation and compare the calculated y with the point's y-coordinate.
- Remember, if they match, the point lies on the line; if not, it does not.

Conclusion

In this article, we systematically demonstrated that the points A(1, 2), B(-1, -16), and C(0, -7) all lie on the graph of the linear equation Y=9x-7. By substituting each point's x-coordinate into the equation and verifying the y-values, we confirmed that each point satisfies the line's equation. This process showcases the practical application of algebraic manipulation in coordinate geometry, essential for graphing, analysis, and real-world problem-solving involving linear relationships.

Remember, mastering the skill of point verification enhances your understanding of linear functions and prepares you for more advanced topics in mathematics. Keep practicing with different equations and points to strengthen your skills and confidence in coordinate geometry.

Frequently Asked Questions

Do the points A(1, 2), B(-1, -16), and C(0, -7) satisfy the linear equation y = 9x - 7?

Yes, all three points lie on the graph of the equation y = 9x - 7 because substituting their x-values yields the corresponding y-values.

How can we verify if a point lies on the line y = 9x - 7?

To verify, substitute the x-coordinate of the point into the equation and check if the resulting y-value matches the point's y-coordinate.

What is the y-value for point A(1, 2) using the equation y = 9x - 7?

Substituting x=1 into the equation gives y = 9(1) - 7 = 9 - 7 = 2, which matches the y-coordinate of point A.

Is point B(-1, -16) on the line y = 9x - 7?

Yes, substituting x = -1 gives y = 9(-1) - 7 = -9 - 7 = -16, matching the y-coordinate of point B.

Does point C(0, -7) satisfy the equation y = 9x - 7?

Yes, substituting x=0 yields y = 9(0) - 7 = 0 - 7 = -7, which matches point C's y-coordinate.

What does it mean if multiple points satisfy a linear equation like y = 9x - 7?

It means those points lie on the straight line represented by the equation, confirming they are solutions to the line's graph.

Additional Resources

Show That Points A(1, 2), B(-1, -16), And C(0, -7) Lie On The Graph Of The Linear Equation Y=9x–7

In the world of mathematics, especially in coordinate geometry, one fundamental skill is verifying whether given points lie on a particular line. This process not only reinforces understanding of linear equations but also sharpens analytical skills crucial for more advanced topics. Today, we focus on a

specific set of points—A(1, 2), B(-1, -16), and C(0, -7)—and demonstrate whether these points satisfy the linear equation Y=9x–7. Through systematic substitution and analysis, we will reveal the relationship between these points and the given line, illustrating key concepts in a clear and approachable manner.

Understanding the Equation Y=9x–7

Before testing the points, it's essential to understand the structure of the equation itself. The equation Y=9x–7 is a standard form of a linear equation in slope-intercept form, which is expressed as:

$$ y = mx + b $$

where:

- $ m $ represents the slope of the line.
- $ b $ is the y-intercept, indicating where the line crosses the y-axis.

In our case:

- $ m = 9 $
- $ b = -7 $

This equation describes a straight line with a steep positive slope of 9, crossing the y-axis at -7. The high slope indicates that for each unit increase in x, y increases by 9 units.

Step 1: Substituting Coordinates into the Equation

To verify if a point lies on the line, we substitute its coordinates (x, y) into the equation and check if both sides are equal. This validation hinges on the principle that points lying on the line satisfy the equation exactly.

The general approach:

1. Take the x-coordinate of the point.
2. Calculate the corresponding y-value using the equation.
3. Compare this calculated y-value with the actual y-coordinate of the point.

If they are equal, the point lies on the line; if not, it does not.

Step 2: Testing Point A(1, 2)

Let's begin with point A(1, 2):

Step 2.1: Substitute $ x = 1 $ into the equation:

$$ y = 9(1) - 7 = 9 - 7 = 2 $$

Step 2.2: Compare the calculated y-value with the given y-coordinate:

- Calculated y = 2
- Given y = 2

Conclusion: Since both values match, point A(1, 2) lies on the line.

Step 3: Testing Point B(-1, -16)

Next, analyze point B(-1, -16):

Step 3.1: Substitute $x = -1$:

$$ y = 9(-1) - 7 = -9 - 7 = -16 $$

Step 3.2: Compare with given y:

- Calculated y = -16
- Given y = -16

Conclusion: Both values are identical, so point B(-1, -16) lies on the line.

Step 4: Testing Point C(0, -7)

Finally, evaluate point C(0, -7):

Step 4.1: Substitute $x = 0$:

$$ y = 9(0) - 7 = 0 - 7 = -7 $$

Step 4.2: Compare with the provided y-coordinate:

- Calculated y = -7
- Given y = -7

Conclusion: The point C(0, -7) lies on the line.

Summarizing the Results

After performing the substitution for each point, the results are clear:

- Point A(1, 2) satisfies the equation.
- Point B(-1, -16) satisfies the equation.

- Point C(0, -7) satisfies the equation.

Therefore, all three points lie on the graph of the linear equation $y = 9x - 7$.

Significance of the Findings

Verifying that specific points lie on a line is a fundamental skill in coordinate geometry, with practical implications in various fields such as engineering, physics, economics, and computer science. Confirming these points lie on the line confirms their geometric relationship and can be useful in tasks like plotting graphs, analyzing data trends, or solving geometric problems.

Additional Insights: Graphical Interpretation

Beyond algebraic verification, visual interpretation can bolster understanding:

- Plot the line $y = 9x - 7$ on a coordinate plane.
- Mark the points A(1, 2), B(-1, -16), and C(0, -7).
- Observe how each point aligns perfectly with the line, confirming algebraic findings visually.

This dual approach—algebraic and graphical—strengthens comprehension and provides a holistic understanding of linear relationships.

Real-World Applications

Understanding how to verify whether points lie on a specific line extends beyond theoretical exercises. For instance:

- Data Analysis: Determining if data points follow a predicted trend.
- Engineering: Checking whether measurements conform to a linear model.
- Economics: Validating relationships such as cost versus production levels.

In all these cases, the process involves substituting data points into the relevant equations and confirming their validity.

Conclusion: Mastering the Verification Process

The exercise of confirming whether points lie on a particular line is a cornerstone of coordinate geometry. Through straightforward substitution, we confirmed that points A(1, 2), B(-1, -16), and C(0, -7) all satisfy the equation $y = 9x - 7$, thereby lying on its graph. This method exemplifies the power of algebraic techniques in visualizing and understanding geometric relationships. As students and professionals become proficient in these procedures, they lay a strong foundation for tackling more complex mathematical and real-world problems involving linear relationships.

In summary, verifying points on a line involves a clear sequence of substitution, calculation, and comparison. The points in question—A, B, and C—are confirmed to be on the line $y=9x-7$, illustrating both the elegance and utility of fundamental algebraic methods in understanding the geometry of lines.

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