9. Which Of The Following Graphs Represents The Solution Set For 5x + 38 4(2 5x)?

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Understanding how to interpret and graph algebraic expressions is a fundamental skill in mathematics, especially in algebra and coordinate geometry. When presented with an expression such as 5x + 38 4(2 5x), the key challenge is to simplify the expression, analyze its components, and determine which graph accurately represents its solution set. This article explores the process of solving such an expression, simplifying it step-by-step, and understanding the visual cues that help identify the correct graph among multiple options.

Deciphering the Expression: Breaking Down 5x + 38 4(2 5x)

Before selecting the appropriate graph, it's essential to interpret the algebraic expression properly. The expression appears complex, but with careful analysis, it can be simplified into a standard form.

Common Misinterpretations and Clarifications

- Ambiguity in the Expression:
The expression written as 5x + 38 4(2 5x) may seem confusing due to the absence of explicit operators or parentheses. It is crucial to clarify whether the expression is:

1. 5x + 38 4(2 − 5x), or
2. 5x + 38 + 4(2 − 5x), or
3. Something else entirely.

- Assumption Based on Context:
Given typical algebraic notation, it's likely that the expression is intended as:

5x + 38 + 4(2 − 5x)

This is because the presence of a number (38) and a coefficient (4) multiplying a parenthesis suggests a standard algebraic expression.

Step 1: Clarify the Expression

Assuming the intended expression is:

5x + 38 + 4(2 − 5x)

Step 2: Simplify the Expression

Let's simplify this step-by-step.

1. Distribute the 4 across the parentheses:

4(2 - 5x) = 4 2 - 4 5x = 8 - 20x

2. Substitute back into the original expression:

5x + 38 + 8 - 20x

3. Combine like terms:

- Combine the x terms: 5x - 20x = -15x
- Combine constants: 38 + 8 = 46

4. Final simplified form:

-15x + 46

Understanding the Simplified Expression: y = -15x + 46

The simplified linear expression y = -15x + 46 represents a straight line on the coordinate plane. Knowing this, we can analyze its key features to understand what the graph of the solution set looks like.

Key Features of the Line

- Slope (m): -15
Indicates the line is decreasing steeply from left to right.

- Y-intercept (b): 46
The point where the line crosses the y-axis.

- X-intercept:
To find the x-value where y = 0:

0 = -15x + 46
15x = 46
x = 46 / 15 ≈ 3.07

Visual Characteristics

- The line cuts through the y-axis at (0, 46).
- Crosses the x-axis approximately at (3.07, 0).
- The steep negative slope suggests a sharp downward trend.

How To Identify The Correct Graph For The

Solution Set

Given multiple graphs, selecting the correct one involves understanding the algebraic properties of the line and matching them with visual cues.

Key Steps to Identify the Correct Graph

1. Check the Y-Intercept:
Look for a line crossing the y-axis at approximately 46.

2. Assess the Slope:
Confirm that the line decreases steeply from left to right, matching a slope of -15.

3. Verify the X-Intercept:
Find the point where the line crosses the x-axis near $x \approx 3.07$.

4. Examine the Overall Orientation:
The line should have a steep downward slope, not a gentle incline or flat.

Common Graph Types and Their Features

- Graph A:
Shows a line crossing the y-axis at around 0, with a gentle slope. Not matching the steep negative slope or the y-intercept of 46.

- Graph B:
Crosses the y-axis at 46 and slopes downward sharply. Likely the correct graph.

- Graph C:
Has a positive slope, increasing from left to right. Not matching the negative slope.

- Graph D:
Horizontal or flat line, which doesn't fit the slope.

Additional Considerations and Context

Why Is Graph Selection Important?

Understanding which graph corresponds to the algebraic solution set helps in:

- Validating algebraic solutions visually.
- Enhancing comprehension of linear equations.
- Applying these concepts to real-world problems involving graphs.

Real-World Applications of Linear Graphs

- Economics: modeling cost vs. revenue.
- Physics: representing constant velocity.
- Statistics: trend analysis.

Common Mistakes to Avoid

- Misreading the expression due to ambiguous notation.
- Confusing the slope or intercept with other graph features.
- Choosing a graph that appears similar but doesn't match the calculated intercepts.

Summary of Key Points

- The original complex expression simplifies to $y = -15x + 46$.
- The graph representing this solution set should have:
- A y-intercept at (0, 46).
- A steep negative slope of −15.
- An x-intercept near (3.07, 0).
- Visual cues such as the y-intercept and slope are essential for accurate graph identification.
- Always verify the algebraic calculations before matching to a graph.

Conclusion: How To Approach Such Problems

When faced with complex algebraic expressions and multiple graphs, follow a systematic approach:

1. Clarify the expression: Ensure you understand the notation and intended operations.
2. Simplify algebraically: Reduce the expression to its simplest form.
3. Identify key features: Calculate slope, intercepts, and points.
4. Match features with graphs: Use the visual cues to select the correct graph.

This methodical process enhances accuracy and deepens understanding of linear equations and their graphical representations.

Final Tips for Success in Graphing Algebraic Expressions

- Always double-check your algebraic simplifications.
- Remember that the slope indicates steepness and direction.
- Use intercepts as anchor points for graphing.
- Practice with various equations to become comfortable with visual patterns.

By mastering these skills, you'll be well-equipped to interpret, analyze, and graph complex algebraic expressions confidently, leading to better performance in mathematics and related fields.

Keywords for SEO Optimization:
- algebraic expression interpretation
- graphing linear equations
- solution set visualization
- slope and intercept analysis
- algebraic simplification methods
- identifying correct graphs in math
- linear equations in coordinate plane
- understanding algebraic graphs
- solving for x and y intercepts
- math problem-solving strategies

Frequently Asked Questions

How do I interpret the graph that represents the solution set for 5x + 38 4(2 5x)?

You need to first clarify the inequality or equation involving 5x + 38 and 4(2 5x). Once identified, the graph will show the region satisfying the inequality, such as shaded areas indicating solutions. The correct graph will reflect the boundary line and the solution region accordingly.

What steps should I follow to determine which graph represents the solution set for 5x + 38 4(2 5x)?

First, rewrite the expression clearly, solving for x if possible. Then, identify the inequality type (>, <, ≥, ≤). Plot the boundary line based on the equality, and shade the region that satisfies the inequality. The graph matching this shaded region is the correct solution.

Is the expression 5x + 38 4(2 5x) an inequality or an equation?

Based on the question, it appears to be an inequality involving 5x + 38 and 4(2 5x). Clarifying the inequality sign (>, <, ≥, ≤) is necessary to determine the solution set.

How do I simplify 4(2 5x) in the expression?

Assuming the expression is 4(2 – 5x), you distribute to get 8 – 20x. If '2 5x' was meant as 2 minus 5x, then simplify accordingly. Clarify the expression for precise simplification.

What common mistakes should I avoid when identifying the correct graph for this solution set?

Avoid misinterpreting the inequality symbol, neglecting to plot the boundary line accurately, or choosing a graph that doesn't correctly represent the solution region. Always verify the boundary and shading match the inequality's solution.

Can you provide an example of how to graph the solution set for an inequality similar to 5x + 38 4(2 – 5x)?

Certainly. For example, if the inequality is 5x + 38 > 4(2 – 5x), you would first expand and simplify both sides, then solve for x. Plot the boundary line where equality holds, and shade the region satisfying the inequality. The graph with this shaded region is the correct one.

How does the coefficient of x in the inequality affect the graph?

The coefficient determines the slope of the boundary line. A larger absolute value results in a steeper line. The sign indicates whether the line slopes upward or downward, influencing which side is shaded for the solution region.

What information do I need to choose the correct graph among multiple options?

You need the simplified inequality, the correct boundary line, and the proper shading of the solution region. Comparing these features with each provided graph will help identify the correct one.

Why is it important to correctly interpret the expression 5x + 38 4(2 5x) before selecting a graph?

Because misinterpreting the expression can lead to plotting the wrong boundary or shading the incorrect region. Accurate interpretation ensures the graph accurately represents the solution set.

What tools or methods can I use to verify the correct graph for this inequality?

You can simplify and solve the inequality algebraically, then plot the boundary and test points to see if they satisfy the inequality. Using graphing calculators or software can also help verify the correct solution graph.

Additional Resources

Which Of The Following Graphs Represents The Solution Set For 5x + 38 4(2 5x)?

When approaching the question of which graph correctly depicts the solution set for the algebraic expression 5x + 38 4(2 5x), it’s essential to first interpret and simplify the given expression accurately. This involves understanding the structure of the expression, the operations involved, and how these translate into a graphical representation. In this article, we’ll delve into the process of solving the expression algebraically, analyze how different graphs can represent the solution set, and explore key features to identify the correct graph.

Understanding the Expression: Breaking Down the Problem

Before we analyze the graphs, we need to clarify and interpret the expression:

5x + 38 4(2 5x)

At first glance, the notation appears ambiguous due to missing operators or possible typographical errors. Typically, in algebraic expressions, we expect clear operators such as addition (+), subtraction (−), multiplication (or ·), or division (/). Given the context, it's reasonable to assume the expression might be:

5x + 38 = 4(2 − 5x)

or perhaps:

5x + 38 = 4(2 + 5x)

or another similar variation. Since the original question is somewhat ambiguous, the most common and logical interpretation is that the expression is:

5x + 38 = 4(2 − 5x)

This assumption aligns with standard algebraic problems involving solving for x, and the structure makes sense for forming an equation.

Note: If the original expression differs, the approach remains similar—just adapt the steps accordingly.

Algebraic Solution of the Equation

Assuming the expression is:

5x + 38 = 4(2 − 5x)

Let's proceed to solve for x.

Step 1: Expand the right side

Distribute the 4:

4(2 − 5x) = 4 2 − 4 5x = 8 − 20x

So, the equation becomes:

5x + 38 = 8 − 20x

Step 2: Rearrange the terms to isolate x

Bring all x terms to one side and constants to the other:

$5x + 20x = 8 - 38$

Combine like terms:

$25x = -30$

Step 3: Solve for x

Divide both sides by 25:

$x = -30 / 25 = -6/5 = -1.2$

Solution: $x = -1.2$

Graphical Representation of the Solution Set

The solution set for the equation is a single value: $x = -1.2$.

Graphically, this corresponds to the point of intersection between the two functions represented by the expressions $y = 5x + 38$ and $y = 4(2 - 5x)$.

Understanding the Graphs

When visualizing the solution, the typical approach involves plotting the two expressions as functions of x and identifying their intersection point.

- The first function: $y = 5x + 38$, which is a straight line with a slope of 5 and y-intercept at 38.
- The second function: $y = 4(2 - 5x)$, which simplifies to $y = 8 - 20x$, another straight line with a slope of -20 and y-intercept at 8.

The solution to the original equation is the x-coordinate where these two lines intersect.

Analyzing the Graphs: Which One Represents the Solution Set?

Given the two functions:

- Line 1: $y = 5x + 38$
- Line 2: $y = 8 - 20x$

The point of intersection (x, y) satisfies both equations simultaneously. To find this point algebraically, we set:

$$5x + 38 = 8 - 20x$$

which we solved earlier as $x = -1.2$.

Plugging $x = -1.2$ into either equation:

- For $y = 5x + 38$:

$$y = 5(-1.2) + 38 = -6 + 38 = 32$$

- For $y = 8 - 20x$:

$$y = 8 - 20(-1.2) = 8 + 24 = 32$$

Both yield $y = 32$, confirming the intersection point is at $(-1.2, 32)$.

Features of the Correct Graph

The graph that correctly represents the solution set will have:

- Two straight lines intersecting at the point $(-1.2, 32)$
- The intersection point marked clearly on the graph
- The lines crossing exactly at the solution point, not just approaching it

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Common Mistakes and Misinterpretations in Graph Selection

Selecting the correct graph requires careful analysis. Here are some common errors and how to avoid them:

- Incorrect slopes or intercepts: Ensure the lines plotted match the algebraic expressions. For example, $y = 5x + 38$ should have a slope of 5 and y-intercept at 38.

- Wrong intersection point: Verify the point of intersection by plugging the x-value into both equations to confirm y is the same.

- Mislabeling axes: Confirm that the axes are labeled correctly with x and y, and that the graph's scale accurately reflects the values.

Features to look for in the correct graph:

- The two lines intersect at $x = -1.2$ and $y = 32$.
- The intersection point is marked or easily identifiable.

- The lines are straight, consistent with linear equations.

Pros and Cons of Graph-Based Solution Representation

Pros:

- Visual clarity: Graphs provide an intuitive understanding of the solution set.
- Identifies multiple solutions: For more complex equations, graphs reveal all solutions.
- Enhanced comprehension: Visualizing equations helps reinforce algebraic concepts.

Cons:

- Precision issues: Exact intersection points may be difficult to pinpoint visually, especially with approximate scales.
- Misinterpretation risk: Incorrect plotting or scale distortions can lead to misjudging the solution.
- Limited for complex equations: Nonlinear or higher-degree equations are more challenging to accurately represent graphically.

Conclusion: Determining the Correct Graph

To identify which graph correctly depicts the solution set for the given expression, the key steps involve simplifying the algebraic expression, solving for x, and then verifying the intersection point. The correct graph will showcase two straight lines intersecting precisely at (−1.2, 32). Features such as the slopes, intercepts, and the intersection point's accuracy are crucial indicators.

In practical terms, when faced with multiple graph options, verify the intersection point algebraically, then examine the graphs to see which one aligns with these calculations. The graph that accurately portrays the lines crossing at $x = -1.2$ and $y = 32$ is the correct representation of the solution set.

In summary, understanding the algebraic solution, translating it into a graphical context, and analyzing key features are essential in selecting the correct graph. This process not only helps in solving the specific problem but also enhances overall comprehension of how algebraic equations are represented visually.

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