Which Are Correct Representations Of The Inequality 3(2x 5) < 5(2 X)? Select Two Options.

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Understanding inequalities is fundamental in algebra, as they allow us to compare quantities and determine ranges of solutions. When given an inequality such as 3(2x - 5) < 5(2x), it is crucial to interpret and manipulate the expression correctly to find its valid representations. Selecting the correct forms of this inequality requires careful algebraic processing, attention to sign changes, and awareness of how inequalities behave under various operations. In this article, we explore the step-by-step process of transforming the given inequality, analyze multiple potential representations, and identify which options accurately reflect the original inequality.

Understanding the Original Inequality

Breaking Down the Expression

The initial inequality is:

```plaintext
3(2x - 5) < 5(2x)
```

This expression involves algebraic terms with coefficients and variables, and the goal is to simplify and interpret the inequality correctly.

Expanding the Terms

Applying the distributive property to both sides:

- Left side: 3(2x - 5) = 3 2x - 3 5 = 6x - 15
- Right side: 5(2x) = 10x

Thus, the inequality simplifies to:

```plaintext
6x - 15 < 10x
```

Isolating the Variable

To better understand the solution set, we need to isolate x:

Subtract 6x from both sides:

```plaintext
6x - 15 - 6x < 10x - 6x
```

which simplifies to:

```plaintext
-15 < 4x
```

Then, divide both sides by 4:

```plaintext
\frac{-15}{4} < x
```

Alternatively, written as:

```plaintext
x > -\frac{15}{4}
```

This is the solution in its simplest form: x is greater than -3.75.

Representations of the Inequality

The simplified form, x > -15/4, is a fundamental representation. However, multiple algebraic expressions can represent the same inequality, especially when considering equivalent transformations. The question asks for two correct representations of the original inequality, so we need to analyze various forms and determine which are valid.

Option 1: The Simplified Form x > -\frac{15}{4}

This straightforward representation is derived directly from the algebraic steps:

- Starting from the expanded inequality: 6x - 15 < 10x
- Subtracting 6x: -15 < 4x

- Dividing both sides by 4: $x > -15/4$

Why is this correct?
- Each step is valid because we performed the same operation on both sides.
- Dividing by a positive number (4) maintains the inequality sign.
- The final form clearly states the set of x-values satisfying the original inequality.

Conclusion: This is a correct and direct representation of the original inequality.

Option 2: Rewriting as $3(2x - 5) < 5(2x)$

This form is the original inequality itself.

Why is this correct?
- It accurately reflects the problem statement before any algebraic manipulation.
- It maintains all components of the inequality.

Conclusion: The original inequality is always a valid representation of itself; thus, it is correct.

Other Potential Forms and Their Validity

While the above two are straightforward, other forms might be proposed, and their correctness depends on whether they are algebraically equivalent to the original inequality.

Analyzing Other Possible Representations

Option 3: The inequality written as $6x - 15 < 10x$

Derivation:
- From the original expression, we expanded to get $6x - 15 < 10x$.
- This form is a direct algebraic form before isolating x.

Validity:
- It is equivalent to the original inequality since it results from valid expansion.
- Therefore, this is also an acceptable representation.

Option 4: The inequality written as 4x > -15

Derivation:
- From previous steps: -15 < 4x
- Reversing the inequality: 4x > -15

Validity:
- Since the inequality sign was reversed when dividing both sides by a positive number (4), this is valid.
- It is equivalent to the previous form x > -15/4.

Conclusion: This is a correct representation.

Option 5: The inequality expressed as x < -\frac{15}{4}

Analysis:
- This is the inverse of the correct solution x > -15/4.
- It would only be correct if the inequality sign were reversed, which it isn't.

Validity:
- It is incorrect because the original inequality indicates x is greater than -15/4, not less.

Summary of Correct Representations

Based on the algebraic steps and transformations, the two correct representations are:

1. x > -15/4
2. 6x - 15 < 10x

These two forms are directly derived or equivalent to the original inequality and preserve the inequality's meaning.

Conclusion: Selecting the Two Correct Options

In multiple-choice settings, options often include various algebraic forms. The two correct

representations of the inequality $3(2x - 5) < 5(2x)$, based on the analysis above, are:

- The simplified form: $x > -15/4$
- The expanded form before isolating x: $6x - 15 < 10x$

Both are algebraically equivalent and valid, confirming their correctness.

Final Remarks

Understanding how to manipulate inequalities correctly is essential for solving and representing them accurately. Always verify each step, especially when multiplying or dividing by negative numbers (which would reverse the inequality sign). Recognizing equivalent forms helps in simplifying and solving inequalities efficiently. In this case, the key was expanding, simplifying, and understanding the relationship between the original and derived inequalities.

Mastering these transformations ensures clarity in algebraic reasoning and prepares you for more complex inequality problems in mathematics.

Frequently Asked Questions

What are the two correct representations of the inequality $3(2x + 5) < 5(2x)$?

The two correct options are: $6x + 15 < 10x$ and $6x + 15 < 10x$.

How do you simplify the inequality $3(2x + 5) < 5(2x)$?

Expand both sides to get $6x + 15 < 10x$, which is a simplified form.

Which options correctly represent the inequality after expansion?

Options showing $6x + 15 < 10x$ and $6x + 15 < 10x$ are correct representations.

Are both forms $6x + 15 < 10x$ and $6x + 15 < 10x$ valid representations of the original inequality?

Yes, both are valid and equivalent representations after expanding.

What does the inequality 6x + 15 < 10x imply about x?

It implies that x > -3, after simplifying the inequality.

Which steps are necessary to identify the correct representations of the inequality?

Expand both sides, simplify, and verify that the forms match the original inequality.

Is the inequality 3(2x + 5) < 5(2x) equivalent to 6x + 15 < 10x?

Yes, expanding both sides confirms they are equivalent.

Additional Resources

Understanding Correct Representations of the Inequality 3(2x + 5) < 5(2x)

When dealing with inequalities in algebra, it's essential to understand how to correctly translate word problems and expressions into mathematical symbols and vice versa. The inequality in question is:

3(2x + 5) < 5(2x)

This inequality involves algebraic expressions with variables, coefficients, and constants. Choosing the correct representations requires a thorough understanding of algebraic expansion, simplification, and the properties of inequalities. This detailed review will explore the correct ways to represent this inequality, clarify common misconceptions, and guide you through the process of selecting the correct options.

Fundamental Concepts in Inequality Representation

Before analyzing the specific inequality, it’s crucial to revisit some fundamental concepts:

1. Algebraic Expressions and Their Expansion

- Expressions like 3(2x + 5) involve distributive properties:
- 3(2x + 5) = (3 × 2x) + (3 × 5) = 6x + 15
- Similarly, 5(2x) = 10x

2. Inequalities and Their Properties

- Inequalities compare two expressions, indicating one is less than, greater than, or equal to the other.
- The main inequality symbols:
- '<' (less than)
- '>' (greater than)
- '≤' (less than or equal to)
- '≥' (greater than or equal to)

3. Valid Transformations and Equivalence

- When manipulating inequalities, the fundamental rules include:
- Adding or subtracting the same number on both sides
- Multiplying or dividing both sides by a positive number (inequality sign remains the same)
- Multiplying or dividing both sides by a negative number reverses the inequality sign

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Step-by-Step Analysis of the Inequality 3(2x + 5) < 5(2x)

To identify correct representations, we must first simplify and analyze the original inequality.

1. Expand Both Sides

- Left side:
- 3(2x + 5) = 6x + 15
- Right side:
- 5(2x) = 10x

2. Write the Simplified Inequality

- Substituting the expanded forms:
- 6x + 15 < 10x

3. Rearrange to Standard Form

- To compare the expressions, bring all to one side:
- 6x + 15 < 10x
- Subtract 6x from both sides:
- 15 < 10x - 6x
- 15 < 4x
- Alternatively, the inequality can be written as:

- $4x > 15$ (by reversing the inequality upon multiplying both sides by 1/4)

4. Final Representation

- The inequality can be expressed as:
- $4x > 15$

Identifying Correct Representations: Which Are Correct?

Given this analysis, the primary goal is to determine which representations accurately reflect the original inequality.

Option 1: $6x + 15 < 10x$

- Assessment: This is the expanded form directly derived from the original inequality.
- Validity: Correct, since it's the straightforward expansion of both sides.
- Implication: This form is suitable for solving for x and understanding the inequality's structure.

Option 2: $4x > 15$

- Assessment: Derived after rearranging the inequality from the expanded form.
- Validity: Correct, as it accurately represents the original inequality after algebraic manipulation.
- Implication: Useful for solving and interpreting the solution set.

Option 3: $3(2x + 5) < 5(2x)$

- Assessment: The original inequality as given.
- Validity: Correct as an initial representation but less useful for direct solving unless expanded.
- Implication: Serves as the initial expression before algebraic manipulation.

Option 4: $6x + 15 < 10x$

- Assessment: Same as Option 1.
- Validity: Correct, as it results directly from expanding the original inequality.
- Implication: Alternative to the original, often preferred for solving.

Option 5: 10x > 6x + 15

- Assessment: Rearranged form, similar to Option 2.
- Validity: Correct, derived by subtracting 6x from both sides.
- Implication: Equally valid for solving inequalities involving x.

Selecting the Two Correct Options: Deep Dive

Given the options discussed, the question asks to select two options that correctly represent the inequality.

Why Options 1 and 2 are Correct

- Option 1 (6x + 15 < 10x):
- It is the direct expanded form of the original inequality.
- It maintains the inequality's structure without any algebraic manipulation.
- It is suitable for solving or graphing the inequality.

- Option 2 (4x > 15):
- This is the simplified, rearranged form after subtracting 6x from both sides.
- It reflects the inequality's core relationship.
- It is straightforward for solving for x, and hence, is a correct representation.

Why Other Options May Be Less Suitable or Incorrect

- Original form (Option 3): 3(2x + 5) < 5(2x)
- Correct as an initial statement but less practical for solving directly.
- Alternative rearranged form (Option 5): 10x > 6x + 15
- Correct mathematically but less direct than Option 2.
- Both are valid, but since the question asks for two options, Options 1 and 2 are more standard.

Common Mistakes and Misconceptions in Representing Inequalities

Understanding common pitfalls helps prevent misinterpretations:

1. Forgetting to Expand Expressions

- Many students may attempt to compare the expressions without expanding, leading to incorrect conclusions.
- Correct expansion clarifies the inequality's structure.

2. Incorrectly Reversing Inequality Signs

- When multiplying or dividing both sides by a negative number, the inequality sign must be reversed.
- In this problem, division is by positive coefficients, so no reversal is necessary.

3. Omitting Constants or Coefficients

- Dropping terms or constants during rearrangement can lead to invalid representations.
- Always ensure each step maintains algebraic equivalence.

4. Confusing the Original and Transformed Inequalities

- The initial inequality (original form) is different from the simplified forms.
- Both forms are correct but serve different purposes.

Visual and Graphical Interpretation of the Inequality

Understanding how the inequality translates graphically helps solidify comprehension:

1. Graphing $6x + 15 < 10x$

- Rearranged form:
- $15 < 4x$
- $x > 15/4$ (or 3.75)
- Graphically: The solution is all x-values greater than 3.75.
- Shading: The region to the right of $x = 3.75$, often represented with an open circle at 3.75.

2. Graphing $4x > 15$

- Solution: $x > 15/4$
- Graphically: Same as above, emphasizing the equivalence of the forms.

3. Significance of Correct Representation

- Properly representing the inequality ensures accurate graphing and interpretation.
- Both algebraic and graphical methods reinforce understanding.

Practical Applications and Problem-Solving Strategies

In real-world scenarios or exams, correctly translating and manipulating inequalities is vital.

Strategies include:
- Always expand expressions to simplify comparison.
- Rearrange inequalities carefully, maintaining the inequality sign.
- Check the solution by substituting values within and outside the solution set.
- Use number line diagrams to visualize solutions.

Summary and Key Takeaways

- The original inequality $3(2x + 5) < 5(2x)$ simplifies to $6x + 15 < 10x$.
- Further rearrangement yields $4x > 15$, which is a valid and often more straightforward representation.
- The two most correct and useful options are:
- Option 1: $6x + 15 < 10x$
- Option 2: $4x > 15$
- Understanding the process of expansion, rearrangement, and interpretation is crucial to correctly represent inequalities.
- Be cautious of common mistakes, such as improper expansion or sign reversal, and always verify solutions.

Conclusion

Mastering the correct representations of inequalities like 3(2x

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