

What Expression Is Equivalent To $-3(6x+7)+4(7x+2)$

What Expression Is Equivalent To $-3(6x+7)+4(7x+2)$ is a common question in algebra that involves simplifying algebraic expressions by applying the distributive property and combining like terms. Understanding how to simplify such expressions is fundamental for mastering algebraic concepts, as it allows students and practitioners to manipulate and analyze expressions efficiently. In this article, we'll explore the step-by-step process to simplify the given expression, understand the principles behind it, and discuss related concepts to deepen your algebraic skills.

Understanding the Expression

Before diving into the simplification process, it's important to understand the components of the expression:

- The expression contains two terms, each involving a coefficient multiplied by a binomial.
- The first term is $-3(6x + 7)$.
- The second term is $4(7x + 2)$.

The goal is to expand and combine these terms to find an equivalent simplified expression.

Step-by-Step Simplification Process

The process involves applying the distributive property to eliminate parentheses, then combining like terms.

Step 1: Apply the Distributive Property

The distributive property states that:

$$a(b + c) = a b + a c$$

Using this, we expand both parts:

- For $-3(6x + 7)$:
 - Multiply -3 by $6x$: $-3 \cdot 6x = -18x$
 - Multiply -3 by 7 : $-3 \cdot 7 = -21$
- For $4(7x + 2)$:

- Multiply 4 by $7x$: $4 \cdot 7x = 28x$
- Multiply 4 by 2: $4 \cdot 2 = 8$

Step 2: Rewrite the Expression After Expansion

Now, the expression becomes:

$$-18x - 21 + 28x + 8$$

Step 3: Combine Like Terms

Like terms are those with the same variable raised to the same power. In this case:

- Combine the x terms: $-18x + 28x = 10x$
- Combine the constant terms: $-21 + 8 = -13$

The simplified expression is:

$$10x - 13$$

Final Result

Therefore, the expression:

$$-3(6x + 7) + 4(7x + 2)$$

is equivalent to:

$$10x - 13$$

This is the simplified form, which is easier to interpret and use in further calculations.

Additional Concepts and Tips

Understanding this process paves the way for tackling more complex algebraic expressions. Here are some related concepts and tips to enhance your algebra skills.

Distributive Property in Detail

The distributive property is a cornerstone of algebra, allowing the expansion of expressions involving multiplication over addition or subtraction. Remember:

$$a(b + c) = a b + a c$$

and

$$a(b - c) = a b - a c$$

This property ensures you can eliminate parentheses and simplify expressions systematically.

Combining Like Terms

After expansion, always look for terms with the same variables raised to the same powers to combine them. This reduces the expression to its simplest form.

- Example: $3x + 5x = 8x$
- Constants: $4 + 7 = 11$

Practice Problems

To solidify your understanding, try simplifying the following expressions:

1. $2(3x + 4) - 5(2x - 1)$
2. $-4(5x - 3) + 6(2x + 7)$
3. $(x + 3)(x - 2)$

By practicing, you'll become more confident in applying the distributive property and combining like terms.

Common Mistakes to Avoid

While working through algebraic expressions, be mindful of these common errors:

- Incorrect distribution: Forgetting to multiply both terms inside parentheses.
- Sign errors: Paying attention to positive and negative signs during distribution.
- Combining unlike terms: Only combine terms with the same variables and exponents.
- Simplification oversight: Always check if further combining is possible after expansion.

Real-World Applications of Simplifying Expressions

Simplifying algebraic expressions isn't just an academic exercise; it has practical applications in various fields:

- Engineering: Calculating forces, voltages, or other quantities where expressions need simplification for analysis.
- Economics: Modeling profit, cost, or revenue functions to optimize outcomes.
- Computer Science: Simplifying algorithms or expressions in programming for efficiency.
- Physics: Deriving formulas and simplifying equations to understand physical phenomena.

Conclusion

In summary, the expression $-3(6x + 7) + 4(7x + 2)$ simplifies to $10x - 13$. The key steps involve applying the distributive property to expand each term and then combining like terms to obtain the simplest equivalent expression. Mastering this process enhances your algebraic fluency and prepares you for more complex mathematical challenges. Remember to practice regularly, be mindful of signs and terms, and understand the underlying principles to become proficient in algebra.

By consistently applying these techniques, you'll find that simplifying expressions becomes an intuitive process, empowering you to solve a wide range of mathematical problems with confidence.

Frequently Asked Questions

What is the simplified form of the expression $-3(6x + 7) + 4(7x + 2)$?

The simplified form is $10x - 13$.

How do I distribute the coefficients in the expression $-3(6x + 7) + 4(7x + 2)$?

Distribute -3 to both terms inside the first parentheses and 4 to both terms inside the second, resulting in $-18x - 21 + 28x + 8$.

What steps should I follow to simplify $-3(6x + 7) + 4(7x + 2)$?

First, distribute the coefficients, then combine like terms: $(-18x + 28x)$ and $(-21 + 8)$.

Is the expression $-3(6x + 7) + 4(7x + 2)$ equivalent to $10x - 13$?

Yes, after simplification, both expressions are equivalent, and the simplified form is $10x - 13$.

Can you show the step-by-step process to simplify $-3(6x + 7) + 4(7x + 2)$?

Yes. Distribute: $-3 \cdot 6x = -18x$, $-3 \cdot 7 = -21$, $4 \cdot 7x = 28x$, $4 \cdot 2 = 8$. Then combine: $(-18x + 28x) = 10x$ and $(-21 + 8) = -13$, so the final expression is $10x - 13$.

What is the importance of distributing in algebraic expressions like $-3(6x + 7) + 4(7x + 2)$?

Distributing simplifies the expression by removing parentheses, making it easier to combine like terms and find an equivalent expression.

Is $-3(6x + 7) + 4(7x + 2)$ a linear expression?

Yes, after simplification, the expression is linear, specifically $10x - 13$.

How can I verify that $10x - 13$ is equivalent to $-3(6x + 7) + 4(7x + 2)$?

You can expand the original expression and simplify it to see if it equals $10x - 13$, confirming their equivalence.

Additional Resources

What Expression Is Equivalent To $-3(6x+7)+4(7x+2)$

Understanding algebraic expressions can sometimes feel like deciphering a foreign language, especially when expressions involve multiple terms and coefficients. One common task in algebra is simplifying such expressions to their most basic form. This process not only clarifies the expression but also aids in solving equations and understanding relationships between variables. Today, we explore a specific algebraic problem: What expression is equivalent to $-3(6x+7)+4(7x+2)$? We will unravel this problem step by step, using clear explanations and detailed calculations to demystify the process.

Unpacking the Problem: The Core of Simplification

At first glance, the expression $-3(6x+7)+4(7x+2)$ appears complex, but it is composed of smaller, manageable parts. The challenge lies in expanding the parentheses and then combining like terms efficiently. To do this, we need to understand the distributive property, a fundamental principle in algebra that allows us to multiply a single term outside parentheses by each term inside.

Distributive Property Recap:

The distributive property states that for any numbers a, b, and c,

$$a(b + c) = a b + a c$$

This principle is essential for expanding expressions like our example, where coefficients multiply terms within parentheses.

Step 1: Applying the Distributive Property

Let's begin by expanding each term separately:

- For the first term, $-3(6x + 7)$:

Multiply -3 by each term inside the parentheses:

$$- 3 \ 6x = -18x$$

$$- 3 \ 7 = -21$$

- For the second term, $4(7x + 2)$:

Multiply 4 by each term inside the parentheses:

$$- 4 \ 7x = 28x$$

$$- 4 \ 2 = 8$$

Now, rewriting the original expression with these expanded parts:

$$-18x - 21 + 28x + 8$$

Step 2: Combining Like Terms

Once the expression is expanded, the next step involves combining like terms, which are terms that contain the same variable raised to the same power. In this case, the like terms are those with x and the constant terms.

Grouping similar terms:

- Combine the x -terms: $-18x + 28x$

- Combine the constants: $-21 + 8$

Calculating these:

$$- 18x + 28x = (28 - 18) x = 10x$$

$$- 21 + 8 = -13$$

Thus, the simplified expression becomes:

$$10x - 13$$

Step 3: Interpreting the Result

The process reveals that the original expression:

$$-3(6x + 7) + 4(7x + 2)$$

is equivalent to:

$$10x - 13$$

This simplified form is more straightforward and easier to work with, especially when solving equations or analyzing the behavior of the algebraic expression.

Why Simplification Matters in Algebra

Simplifying expressions like the one above is more than just a mathematical exercise; it forms the foundation for solving more complex algebraic problems. Here are some reasons why simplification is vital:

- Efficiency: Simplified expressions reduce computational effort during calculations.
- Clarity: They make the structure of the expression clearer, aiding in understanding relationships.
- Problem Solving: Simplified forms are easier to substitute into equations and solve for variables.
- Error Reduction: Less clutter means fewer chances of making mistakes during calculations.

Practical Applications of Simplified Expressions

Understanding how to simplify expressions isn't just an academic skill; it has real-world applications across various fields:

- Engineering: Simplified formulas help engineers analyze systems more efficiently.
- Economics: Economists use simplified models to predict market behavior.
- Computer Science: Simplification streamlines algorithms and coding processes.
- Finance: Simplified expressions assist in calculating interests, investments, and financial forecasts.

Visualizing the Process: A Summary List

To encapsulate the process of simplifying the expression, here's a quick step-by-step

overview:

1. Identify the parts: Recognize the terms within parentheses and their coefficients.
2. Apply distributive property: Multiply each coefficient by the terms inside parentheses.
3. Write expanded form: List the products obtained after distribution.
4. Combine like terms: Add coefficients of similar variables and constants separately.
5. Write the simplified expression: Present the combined terms in standard form.

Additional Tips for Algebraic Simplification

- Be systematic: Always expand parentheses first before combining terms.
- Pay attention to signs: Negative signs can easily lead to errors if overlooked.
- Group terms logically: Keep like terms together to streamline the process.
- Check your work: Verify each step to prevent mistakes and ensure accuracy.

Final Thoughts: Mastering the Art of Simplification

The question, What expression is equivalent to $-3(6x+7)+4(7x+2)$, might seem daunting initially, but breaking it down reveals a straightforward path to the solution. By applying the distributive property, expanding, and then combining like terms, we've transformed a complex expression into a simple, elegant form: $10x - 13$.

Mastering such simplification techniques is fundamental to advancing in algebra and other mathematical disciplines. They empower students, professionals, and enthusiasts to solve problems more efficiently, analyze relationships more clearly, and develop a deeper understanding of the mathematical world around them. Whether in academia or real-life applications, the ability to simplify expressions is a vital skill that unlocks numerous possibilities in problem-solving and critical thinking.

[What Expression Is Equivalent To \$3\(6x+7\)+4\(7x+2\)\$](#)

What Expression Is Equivalent To $3(6x+7)+4(7x+2)$

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