

Simplify: $5(-8 + 6x) - 9(-5 - 8x)$

Simplify: $5(-8 + 6x) - 9(-5 - 8x)$ is a mathematical expression that involves applying the distributive property, combining like terms, and understanding basic algebraic principles. Simplifying such an expression is a fundamental skill in algebra, allowing students and learners to better understand how to manipulate algebraic formulas efficiently. Whether you're a student preparing for exams or someone interested in honing your algebra skills, mastering the simplification process is crucial. This article will guide you step-by-step through the process, explaining key concepts and providing practical examples to ensure clarity and confidence in handling similar expressions.

Understanding the Components of the Expression

Before diving into the simplification process, it's essential to understand the structure of the given expression:

- The expression involves two main parts: $5(-8 + 6x)$ and $-9(-5 - 8x)$.
- Each part contains a coefficient (5 or -9) multiplied by a binomial (a two-term expression), which may include a constant and a variable term (x).

Key concepts to understand here include:

- **Distributive Property:** how to distribute the coefficient across each term inside the parentheses.
- **Like Terms:** terms that have the same variable raised to the same power, which can be combined during the simplification process.

Step-by-Step Guide to Simplify the Expression

Step 1: Apply the Distributive Property

The first step involves distributing the coefficients to each term inside the parentheses.

- For the first part: $5(-8 + 6x)$

Multiply 5 by each term:

- $5 \cdot -8 = -40$

- $5 \cdot 6x = 30x$

- For the second part: $-9(-5 - 8x)$

Be careful with the negative sign:

- $-9 \cdot -5 = 45$

- $-9 \cdot -8x = 72x$

Note: When distributing, remember that multiplying two negatives results in a positive.

Step 2: Rewrite the Expression with Distributed Terms

Now, rewrite the entire expression with the distributed terms:

- $-40 + 30x + 45 + 72x$

Step 3: Combine Like Terms

Next, group the constant terms and the variable terms:

- Constants: -40 and $+45$

- Variable terms: $30x$ and $72x$

Combine constants:

- $-40 + 45 = 5$

Combine variable terms:

- $30x + 72x = 102x$

Step 4: Write the Final Simplified Expression

Putting it all together, the simplified form is:

$5 + 102x$

This is the most simplified version of the original expression, combining all like terms.

Understanding the Importance of Each Step

Each step in the process serves a specific purpose:

- Distributive property ensures that coefficients are correctly applied to each term within parentheses.
- Rearranging and grouping like terms make it easier to combine similar components, such as constants and variables.
- Simplification results in a cleaner, more manageable expression suitable for further calculations or solving equations.

Common Mistakes to Avoid

While simplifying algebraic expressions, learners often encounter mistakes. Here are some common pitfalls and tips to avoid them:

- Neglecting the negative sign during distribution, especially with negative coefficients.
- Forgetting to distribute to all terms inside the parentheses.
- Incorrectly combining unlike terms, such as adding constants and variables together.
- Misapplying the distributive property when negative signs are involved.

Tip: Always write out each step carefully and double-check your work to ensure signs and coefficients are correctly handled.

Practice Problems for Mastery

To reinforce your understanding, try simplifying these similar expressions:

1. $3(4x - 7) - 2(5x + 3)$
2. $-6(2x + 9) + 4(3x - 5)$
3. $7(-3 + 2x) - 5(-4 - x)$

Solutions:

- For each, apply the distributive property, combine like terms, and simplify.

Real-World Applications of Simplifying Algebraic Expressions

While at first glance, algebraic expressions may seem abstract, they have practical applications:

- Finance: calculating total costs with multiple variables.
- Physics: simplifying formulas involving variables like velocity, time, or distance.
- Engineering: manipulating equations to solve for unknowns.
- Statistics: combining data expressions for analysis.

Mastering the art of simplifying expressions like $5(-8 + 6x) - 9(-5 - 8x)$ equips you with a valuable tool for analyzing and solving real-world problems efficiently.

Conclusion

Simplifying the expression $5(-8 + 6x) - 9(-5 - 8x)$ involves a systematic approach—distributing coefficients, combining like terms, and carefully managing signs. By following the steps outlined above, you can confidently tackle similar algebraic expressions, laying a solid foundation for more advanced math topics. Remember, practice makes perfect, so keep working through various problems to enhance your skills and understanding. With consistent effort, you'll find that algebra becomes more intuitive and accessible, opening doors to numerous academic and real-life applications.

Frequently Asked Questions

How do I simplify the expression $5(-8 + 6x) - 9(-5 - 8x)$?

First, distribute the coefficients: $5(-8 + 6x) - 9(-5 - 8x)$, which simplifies to $-40 + 30x + 45 + 72x$. Then combine like terms: $(-40 + 45) + (30x + 72x) = 5 + 102x$.

What is the simplified form of $5(-8 + 6x) - 9(-5 - 8x)$?

The simplified form is $5 + 102x$.

Can you walk me through the steps to simplify $5(-8 + 6x) - 9(-5 - 8x)$?

Sure! Step 1: distribute: $5(-8 + 6x) = -40 + 30x$, and $-9(-5 - 8x) = 45 + 72x$. Step 2: combine all terms: $-40 + 45 + 30x + 72x = 5 + 102x$.

What is the distribution process for the expression $5(-8 + 6x) - 9(-5 - 8x)$?

You multiply each term inside the parentheses by the outside coefficient: 5 -8 and $5 \cdot 6x$ for the first part, and $-9 \cdot -5$ and $-9 \cdot -8x$ for the second part, resulting in $-40 + 30x + 45 + 72x$.

Why do we combine like terms after distributing in this expression?

Because combining like terms simplifies the expression into a single, more manageable form, making it easier to interpret or solve.

Is the simplified form $5 + 102x$ always correct for the expression $5(-8 + 6x) - 9(-5 - 8x)$?

Yes, as long as the distribution and combination of like terms are done correctly, the simplified form $5 + 102x$ is always correct.

How can I check if my simplified expression for $5(-8 + 6x) - 9(-5 - 8x)$ is correct?

You can expand the original expression and your simplified form to see if they are equivalent. If both expand to the same expression, your simplification is correct.

Additional Resources

Simplify: $5(-8 + 6x) - 9(-5 - 8x)$ is a fundamental algebraic expression that provides a great opportunity to explore the process of simplifying algebraic expressions step-by-step. Whether you're a student brushing up on algebra skills or someone looking to sharpen your problem-solving toolkit, understanding how to simplify such expressions is essential. In this article, we will break down this expression methodically, illustrating key concepts like distributive property, combining like terms, and careful arithmetic to arrive at the simplest form possible.

Understanding the Expression

Before diving into the solution, let's first understand what we're working with:

Expression: $5(-8 + 6x) - 9(-5 - 8x)$

This expression involves two parts, each with a coefficient multiplying a binomial (a sum or difference of two terms). The key operations involved are:

- Distributive property (to eliminate parentheses)
- Combining like terms (to simplify the expression further)

Step 1: Applying the Distributive Property

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

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

Similarly,

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

Applying this to our expression:

First Part: $5(-8 + 6x)$

- Distribute 5 over both terms:

$$5(-8) + 5(6x)$$

Which simplifies to:

$$-40 + 30x$$

Second Part: $-9(-5 - 8x)$

- Distribute -9 over both terms:

$$-9(-5) + (-9)(-8x)$$

Simplify each:

$$-9(-5) = 45$$

$$-9(-8x) = +72x$$

Note: When multiplying two negatives, the result is positive.

Now, rewrite the original expression with these distributed forms:

Simplified expression:

$$(-40 + 30x) + (45 + 72x)$$

Step 2: Combine Like Terms

Now, combine the expressions:

- Constants: $-40 + 45$
- Terms with x : $30x + 72x$

Calculations:

- Constants: $-40 + 45 = 5$
- Coefficients of x : $30x + 72x = 102x$

Thus, the simplified form of the original expression is:

$$5 + 102x$$

Final Answer:

$$\text{Simplify: } 5(-8 + 6x) - 9(-5 - 8x) = 5 + 102x$$

Additional Tips and Insights

1. Always Distribute Carefully

In algebra, the distributive property is foundational. Always remember to multiply every term inside the parentheses by the outside coefficient, including signs. Missing a negative sign can lead to incorrect results.

2. Watch for Sign Changes

Negative signs before parentheses can be tricky. When distributing a negative, remember:

- Negative times a positive gives a negative.
- Negative times a negative gives a positive.

3. Combine Like Terms Strategically

After distribution, combine constants and variables separately. This keeps the expression organized and reduces errors.

4. Double-Check Your Work

Review each step, especially signs and arithmetic. Algebraic simplification is straightforward but easy to make small mistakes.

Practice Problems

Enhance your understanding by practicing similar problems:

1. Simplify: $3(4x - 7) + 2(-5x + 9)$
2. Simplify: $-4(2x + 3) - 6(x - 4)$
3. Simplify: $7(2 - x) + 5(x + 3)$

Conclusion

Simplifying algebraic expressions like $5(-8 + 6x) - 9(-5 - 8x)$ involves a systematic approach:

- Applying the distributive property to eliminate parentheses
- Carefully handling signs during multiplication
- Combining like terms to reach the simplest form

Mastering this process will improve your algebra skills and prepare you for more complex equations. Remember, practice makes perfect – so keep working through similar problems until the process becomes second nature. Happy calculating!

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