

$-8(6x - 7y) - (24x - 3y)$

$-8(6x - 7y) - (24x - 3y)$ is a mathematical expression that involves algebraic concepts such as distributive property, combining like terms, and simplifying expressions. Understanding how to manipulate and simplify such expressions is fundamental in algebra and forms the basis for solving more complex equations. This article will explore the step-by-step process to simplify this expression, delve into related algebraic principles, and provide tips for mastering similar problems.

Breaking Down the Expression: $-8(6x - 7y) - (24x - 3y)$

When faced with an algebraic expression like $-8(6x - 7y) - (24x - 3y)$, the first step is to understand its structure. Notice that the expression contains two parts:

- -8 times a binomial: $(6x - 7y)$
- $-$ a second binomial: $(24x - 3y)$

Our goal is to simplify this entire expression by applying algebraic properties, primarily the distributive property, and then combining like terms.

Applying the Distributive Property

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

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

Using this property, we can expand the given expression.

Step 1: Distribute -8 across $(6x - 7y)$

Multiplying each term inside the parentheses by -8 :

- $-8 \cdot 6x = -48x$

- $-8 - 7y = +56y$

So, the first part becomes:

$$-8(6x - 7y) = -48x + 56y$$

Step 2: Rewrite the entire expression with the distributed form

Now, the expression looks like:

$$-48x + 56y - (24x - 3y)$$

Next, notice that the second binomial is subtracted, so we need to distribute the negative sign across $(24x - 3y)$.

Distributing the Negative Sign

The negative sign in front of the second parentheses means subtracting each term inside:

$$- (24x - 3y) = -24x + 3y$$

Thus, the entire expression now becomes:

$$-48x + 56y - 24x + 3y$$

Combining Like Terms

Now that the expression is fully expanded, the next step involves combining like terms—terms that have the same variables raised to the same powers.

Identify like terms:

- Terms with x : $-48x$ and $-24x$
- Terms with y : $56y$ and $+3y$

Combine the x terms:

$$-48x - 24x = (-48 - 24) x = -72x$$

Combine the y terms:

$$56y + 3y = (56 + 3) y = 59y$$

Final Simplified Expression

Putting it all together, the simplified form of the original expression is:

$$-72x + 59y$$

This is the most simplified form, as no further like terms can be combined.

Why Understanding Algebraic Expressions Matters

Mastering the process of simplifying expressions like $-8(6x - 7y) - (24x - 3y)$ is crucial for several reasons:

- **Foundation for Solving Equations:** Simplifying expressions allows students to solve for variables more easily.
- **Real-World Applications:** Algebraic expressions model real-world problems in finance, engineering, and science.
- **Develops Critical Thinking:** Breaking down complex expressions enhances problem-solving skills.

Common Mistakes to Avoid

While working through algebraic expressions, students often encounter pitfalls. Being aware of these can improve accuracy and confidence.

1. Forgetting to Distribute the Negative Sign

Always remember that a negative sign in front of parentheses affects every term inside. Missing this step can lead to incorrect signs and answers.

2. Combining Unlike Terms

Only terms with identical variables and exponents can be combined. Combining unlike terms leads to errors.

3. Overlooking the Distributive Property

Forgetting to distribute across parentheses is a common mistake. Practice helps reinforce this step.

Tips for Simplifying Algebraic Expressions

To become proficient in simplifying similar expressions, consider these tips:

- **Write out each step:** Don't skip distributing or combining like terms.
- **Double-check signs:** Negative signs are often tricky; verify each step.
- **Group like terms early:** Organize terms to make combining straightforward.
- **Practice regularly:** Consistent practice with different expressions builds confidence.

Additional Examples for Practice

Practicing with variants of the original problem can solidify understanding. Here are a few exercises:

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

Attempt these problems to reinforce the concepts of distribution and combining like terms.

Conclusion

Simplifying algebraic expressions like $-8(6x - 7y) - (24x - 3y)$ involves a systematic approach: applying the distributive property, carefully handling signs, and combining like terms. Mastering these steps is essential for success in algebra and beyond. By understanding these fundamental principles, students can confidently tackle more complex problems, develop critical thinking skills, and apply algebraic reasoning to real-world situations. Remember, practice makes perfect—so keep working through various problems to sharpen your skills and deepen your understanding of algebraic expressions.

Frequently Asked Questions

How do you simplify the expression $-8(6x - 7y) - (24x - 3y)$?

First, distribute -8 to $(6x - 7y)$: $-8 \cdot 6x = -48x$ and $-8 \cdot -7y = +56y$. Then, distribute -1 to $(24x - 3y)$: $-1 \cdot 24x = -24x$ and $-1 \cdot -3y = +3y$. Combine all: $-48x + 56y - 24x + 3y$. Finally, combine like terms: $(-48x - 24x) = -72x$ and $(56y + 3y) = 59y$. The simplified expression is $-72x + 59y$.

What is the value of the expression $-8(6x - 7y) - (24x - 3y)$ when $x=1$ and $y=2$?

Substitute $x=1$ and $y=2$ into the simplified expression $-72x + 59y$: $-72(1) + 59(2) = -72 + 118 = 46$.

Can the expression $-8(6x - 7y) - (24x - 3y)$ be factored further?

Yes. After simplification to $-72x + 59y$, no common factors exist between the two terms, so it cannot be factored further in terms of common factors.

How is the expression related to linear algebra concepts?

The expression $-8(6x - 7y) - (24x - 3y)$ simplifies to a linear form in x and y , which can represent a linear equation or vector in two-dimensional space, useful in solving systems or analyzing geometric relationships.

What is the significance of distributing in this algebraic expression?

Distributing allows us to eliminate parentheses and combine like terms, simplifying the expression to a standard linear form for easier evaluation or further algebraic manipulation.

How do you verify the correctness of the simplified expression?

You can verify by substituting specific values for x and y into both the original expression and the simplified form to see if they yield the same result.

Additional Resources

Mathematical Expression Simplification

Introduction

Mathematics is often regarded as the universal language, transcending cultural and linguistic barriers to provide clarity and precision in problem-solving. Within this vast realm, algebra stands out as a fundamental branch that introduces students and enthusiasts alike to the art of manipulating symbols and understanding relationships between variables. One of the core skills in algebra is simplifying expressions, which involves transforming complex-looking formulas into more manageable and meaningful forms.

Today, we will explore a specific algebraic expression: $-8(6x - 7y) - (24x - 3y)$. While at first glance it might seem intimidating due to multiple terms and coefficients, a systematic approach reveals its underlying structure and simplicity. This detailed analysis aims to dissect each component, demonstrate the step-by-step process of simplification, and highlight the importance of mastering such techniques for advanced mathematical applications.

Understanding the Expression

The given expression is:

```
\[
-8(6x - 7y) - (24x - 3y)
\]
```

At its core, this expression involves two parts:

1. The product of -8 and a binomial: $(6x - 7y)$
2. The subtraction of another binomial: $(24x - 3y)$

Before diving into calculations, it's essential to understand the components:

- Coefficients: Numbers multiplying variables, such as 6, 7, 24, and 3.
- Variables: x and y , which can represent any quantities.
- Signs: The positive or negative signs indicating addition or subtraction.

The goal is to simplify this expression into a form where like terms are combined, leading to a concise algebraic expression.

Step-by-Step Simplification Process

Step 1: Distribute the Multiplication

The first step involves applying the distributive property, which states that:

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

In this case:

- For the first term: $(-8(6x - 7y) = -8 \times 6x + (-8) \times (-7y))$
- For the second term: $(-(24x - 3y) = -1 \times 24x + -1 \times -3y)$

Calculating each:

- $(-8 \times 6x = -48x)$
- $(-8 \times -7y = +56y)$ (since a negative times a negative is positive)
- $(-1 \times 24x = -24x)$
- $(-1 \times -3y = +3y)$

So, after distribution, the expression becomes:

$$-48x + 56y - 24x + 3y$$

Step 2: Group Like Terms

Now, group the terms involving the same variables:

- x -terms: $(-48x)$ and $(-24x)$
- y -terms: $(56y)$ and $(3y)$

Expressed as:

$$(-48x - 24x) + (56y + 3y)$$

Step 3: Combine Like Terms

Add the coefficients of similar terms:

- For x :

$$-48x - 24x = (-48 - 24) x = -72x$$

- For y :

$$56y + 3y = (56 + 3) y = 59y$$

Thus, the simplified form of the expression is:

$$\boxed{-72x + 59y}$$

Significance of the Simplification

This process demonstrates the power of algebraic manipulation, transforming a seemingly complicated expression into a straightforward linear combination of variables. Such skills are vital in various mathematical contexts, including solving equations, analyzing functions, and modeling real-world situations.

The simplified expression, $(-72x + 59y)$, makes it easier to:

- Evaluate the expression for specific values of x and y .
- Graph the relationship between the variables.
- Solve for one variable in terms of the other, if needed.

Practical Applications and Insights

Understanding how to simplify expressions like this has broad implications beyond theoretical mathematics:

- Engineering: Simplified expressions help in designing systems where variables represent physical quantities like force, velocity, or voltage.
- Economics: Simplifying cost or revenue functions for analysis.
- Computer Science: Optimizing algorithms that involve algebraic computations.
- Data Science: Creating models that depend on multiple variables.

In all these fields, clear and concise algebraic expressions facilitate better analysis and decision-making.

Common Mistakes to Avoid

While the process appears straightforward, several pitfalls can hinder correct simplification:

- Neglecting the negative signs: Always pay attention to signs during distribution and combination.
- Forgetting to distribute: Omitting the multiplication across parentheses leads to incorrect results.
- Mixing variables: Ensure like terms are correctly identified (e.g., x with x , y with y).
- Incorrect arithmetic: Double-check addition and subtraction of coefficients.

Practicing these steps and being vigilant helps in mastering algebraic simplification.

Summary of the Key Steps

Step	Action	Explanation
1	Distribute	Apply distributive property to remove parentheses
2	Group like terms	Separate terms involving the same variable
3	Combine coefficients	Perform addition/subtraction for like terms
4	Write simplified expression	Present the final concise form

By following this structured approach, even complex expressions become manageable, fostering a deeper understanding of algebra's foundational principles.

Final Thoughts

The journey from the initial expression to its simplified form underscores the elegance of algebraic manipulation. Mastery of such techniques empowers students and professionals alike to handle more sophisticated mathematical challenges with confidence. Whether in academic pursuits or real-world problem-solving, the ability to simplify expressions efficiently is an invaluable skill that enhances analytical capabilities and mathematical literacy.

In conclusion, the expression $\begin{aligned} & -8(6x - 7y) - (24x - 3y) \\ & \boxed{-72x + 59y} \end{aligned}$ reduces neatly to $\boxed{-72x + 59y}$, exemplifying the clarity that algebra brings to complex relationships. Embracing these methods paves the way for success across numerous scientific and technical disciplines, affirming the timeless relevance of algebra in understanding and shaping our world.

[8 6x 7y 24x 3y](#)

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