BRAINLIEST!!! Simplify By Combining Like Terms: -3 + 6x - 18 - 22x

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Are you struggling with simplifying algebraic expressions? Do you find it confusing to combine like terms in a complex expression? You're not alone! Many students encounter difficulty when first learning how to simplify algebraic expressions by combining like terms. This skill is fundamental in algebra because it helps simplify expressions, making equations easier to solve and understand. In this article, we will walk through the process of simplifying the algebraic expression -3 + 6x - 18 - 22x step by step. By the end, you'll understand how to identify like terms, combine them correctly, and apply these skills to various algebra problems.

Understanding Like Terms in Algebra

Before diving into the specific example, it's essential to understand what like terms are in algebra.

What Are Like Terms?

- Like terms are terms that have exactly the same variable raised to the same power.
- The coefficients (the numerical part in front of the variable) can be different.
- Constants (numbers without variables) are also considered like terms with each other.

Examples of Like Terms

- 3x and 7x (both contain the variable x to the first power)
- -5y and 2y (both contain y to the first power)
- 9 and -4 (both are constants, no variables)

Examples of Unlike Terms

- 3x and 3y (different variables)
- 5x and 5x^2 (different powers)
- 4 and 4z (constants vs. variables)

Step-by-Step Guide to Simplify -3 + 6x - 18 - 22x

Let's now focus on simplifying the specific expression -3 + 6x - 18 - 22x by combining like terms.

Step 1: Identify Like Terms

- Constants: -3 and -18
- Variable terms: 6x and -22x

Step 2: Group Like Terms

Group the constants together and the variable terms together:
- Constants: (-3) and (-18)
- x terms: (6x) and (-22x)

Expressed as:
(-3 - 18) + (6x - 22x)

Step 3: Combine Constants

Add the constants:
- -3 + (-18) = -3 - 18 = -21

Step 4: Combine Variable Terms

Add the x terms:
- 6x - 22x = (6 - 22) x = -16x

Step 5: Write the Simplified Expression

Combine the results:
-21 - 16x

This is the simplified form of the original expression.

Why Is Combining Like Terms Important?

Simplifying algebraic expressions by combining like terms helps:
- Reduce complexity: Makes expressions easier to work with.
- Prepare for solving equations: Simplified expressions are easier to manipulate.
- Improve understanding: Enhances comprehension of how algebraic expressions function.

Additional Examples of Combining Like Terms

Let's look at a few more examples to reinforce the concept.

Example 1:

Simplify: 4a + 3b - 2a + 5b

Step 1: Identify like terms:
- 4a and -2a
- 3b and 5b

Step 2: Group like terms:
(4a - 2a) + (3b + 5b)

Step 3: Combine:
- 4a - 2a = 2a
- 3b + 5b = 8b

Final answer: 2a + 8b

Example 2:

Simplify: 7x^2 + 3x - 4x^2 + 9

Step 1: Identify like terms:
- 7x^2 and -4x^2
- 3x (no other x term)

- 9 (constant)

Step 2: Group like terms:
(7x^2 - 4x^2) + 3x + 9

Step 3: Combine:
- 7x^2 - 4x^2 = 3x^2

Final answer: 3x^2 + 3x + 9

Common Mistakes to Avoid

When combining like terms, watch out for these common errors:

- **Mixing unlike terms:** Do not combine constants with variables or different powers of variables.
- **Forgetting to include all terms:** Ensure all like terms are grouped before combining.
- **Miscalculating coefficients:** Pay attention to the signs (+/-) when adding or subtracting coefficients.
- **Ignoring variables:** Make sure variables with different powers are not combined.

Practice Problems to Master Combining Like Terms

Try simplifying these expressions on your own:

1. 5x + 3 - 2x + 7
2. -4a + 6b - 3a + 2b
3. 2x^2 + 4x - x^2 + 7

4. 8y - 3y + 2 + 5

Solutions can be checked by following the steps outlined above.

Summary

Simplifying algebraic expressions by combining like terms is a foundational skill in algebra. For the expression -3 + 6x - 18 - 22x, the process involved identifying the constants and variable terms, grouping them, and then combining them to produce the simplified expression -21 - 16x. Mastery of this skill allows you to simplify more complex expressions, solve equations efficiently, and develop a deeper understanding of algebraic concepts.

Remember:
- Always identify like terms carefully.
- Group them together.
- Perform addition or subtraction on their coefficients.
- Keep the variable parts unchanged unless the powers are different.

With consistent practice, combining like terms will become a straightforward and essential part of your algebra toolkit!

In conclusion, mastering the art of simplifying algebraic expressions by combining like terms is crucial for success in mathematics. Whether you're working with simple binomials or more complex polynomials, these skills will serve as the foundation for solving equations, factoring, and graphing. Keep practicing, and soon you'll handle algebraic expressions with confidence!

Frequently Asked Questions

What is the first step to simplify the expression -3 + 6x - 18 - 22x?

The first step is to combine like terms, which are the constants (-3 and -18) and the x terms (6x and -22x).

How do you combine the constants in the expression -3 + 6x - 18 - 22x?

Add the constants: -3 + (-18) = -21.

How do you combine the x terms in the expression -3 + 6x - 18 - 22x?

Add the x coefficients: 6x + (-22x) = -16x.

What is the simplified expression after combining like terms in -3 + 6x - 18 - 22x?

The simplified expression is -21 - 16x.

Is the order important when combining like terms in this expression?

No, the order doesn't matter; only like terms need to be combined.

Can the simplified form be written with the variable first, like -16x - 21?

Yes, it's common to write the variable term first, so the simplified expression can be written as -16x - 21.

Why is combining like terms important in algebra?

It simplifies the expression, making it easier to evaluate or solve equations.

What is the final simplified form of -3 + 6x - 18 - 22x?

The final simplified form is -21 - 16x.

Additional Resources

BRAINLIEST!!! Simplify By Combining Like Terms: -3 + 6x - 18 - 22x

In the world of algebra, simplifying expressions is a fundamental skill that unlocks the door to solving more complex problems. Among these foundational techniques, combining like terms stands out as a crucial step in making expressions manageable and understandable. Today, we delve into a specific example: simplifying the algebraic expression -3 + 6x - 18 - 22x. While this may seem straightforward at first glance, understanding the process in depth — including why and how we combine like terms — transforms it from mere mechanical work into a meaningful mathematical practice. Let's explore this process step by step, uncovering the principles behind it and demonstrating how to simplify such expressions efficiently and accurately.

Understanding Algebraic Expressions and Like Terms

Before diving into the specific example, it's essential to grasp what algebraic expressions are and what we mean by "like terms."

What Is an Algebraic Expression?

An algebraic expression is a combination of numbers, variables, and operation symbols (like addition, subtraction, multiplication, and division). Unlike equations, expressions do not contain an equals sign; instead, they present a mathematical phrase that can be simplified or evaluated.

For example:
- $3x + 5$
- $-7 + 2y - y$
- $-3 + 6x - 18 - 22x$

Our focus today is on the last type, which contains both constants (numbers without variables) and variable terms.

What Are Like Terms?

Like terms are terms that have exactly the same variables raised to the same powers. The coefficients (numbers in front of variables) can differ, but the variable parts must match.

Examples:
- $6x$ and $-22x$ are like terms because both contain the variable x to the first power.
- -3 and -18 are like terms because both are constants (no variables).
- $3x^2$ and $5x^2$ are like terms because both contain x squared.

Non-like terms:
- $4x$ and $4x^2$ are not like because the exponents differ.
- 7 and $3y$ are not like because one is a constant, and the other contains a variable.

Understanding the concept of like terms is key to simplifying algebraic expressions because only like terms can be combined through addition or subtraction.

Breaking Down the Expression: -3 + 6x - 18 - 22x

Let's analyze the given expression:

-3 + 6x - 18 - 22x

At first glance, it appears to be a mixture of constants and terms with variables. Our goal is to combine the like terms — that is, the constants with constants, and the variable terms with variable terms.

To do this efficiently, it helps to organize the expression, often by grouping similar terms together:

(-3 - 18) + (6x - 22x)

This step creates a clear separation between the constants and the variable terms, making it easier to combine them.

Step-by-Step Simplification Process

Let's proceed carefully, applying the principles of algebra to simplify the expression.

Step 1: Group Like Terms

Identify all constants and variable terms:

- Constants: -3 and -18
- Variable terms: 6x and -22x

The expression, rewritten with parentheses for clarity, is:

(-3 - 18) + (6x - 22x)

Step 2: Combine Constants

Add the constant terms:

-3 + (-18) = -3 - 18 = -21

This simplifies the constant part of the expression to -21.

Step 3: Combine Variable Terms

Add the x-terms:

$6x + (-22x) = 6x - 22x = -16x$

Note: When combining, the coefficients are added, and the variable part remains the same.

Step 4: Write the Simplified Expression

Now, combine the simplified parts:

$-21 + (-16x)$

Or, more neatly:

$-21 - 16x$

This is the fully simplified form of the original expression.

Understanding the Result: Why Simplify? The Significance of Combining Like Terms

Simplifying the expression to -21 - 16x is more than just a mathematical exercise; it has practical significance.

Clarity and Efficiency

Simplified expressions are easier to evaluate, especially when substituting specific values for variables. They also make subsequent steps in problem-solving, such as solving equations, more straightforward.

Preparation for Solving Equations

In algebra, we often need to solve for an unknown variable. Having expressions in their simplest form

reduces errors and streamlines the process.

Insight into the Expression's Structure

Simplification reveals the relationship between constants and variables, allowing us to interpret the expression more meaningfully.

Common Mistakes to Avoid

While the process seems straightforward, students often stumble over certain pitfalls. Being aware of these can enhance accuracy.

- **Misidentifying like terms:** Remember, only terms with the same variable and the same exponent can be combined.
- **Sign errors:** Pay attention to signs (+ or -) when combining terms, especially with negative coefficients.
- **Forgetting to include all terms:** Ensure all parts of the expression are accounted for before combining.
- **Mixing constants and variables:** Don't combine constants with variables or vice versa.

Extending the Concept: Practice Problems and Applications

To solidify understanding, consider practicing with similar expressions:

1. Simplify $4a + 3 - 2a + 7$
2. Simplify $-5 + 9x - 3x + 2$
3. Simplify $10y - 4 + 6y + 8$

Applying the same principles:

- Group like terms
- Combine constants
- Combine variable terms

This practice not only reinforces the technique but also prepares students for more advanced algebraic operations.

Conclusion: Mastering the Art of Combining Like Terms

The process of simplifying the expression -3 + 6x - 18 - 22x illustrates a vital algebraic skill: combining like terms. By systematically grouping constants and variable terms, then performing arithmetic operations on each group, we arrive at a simplified, more manageable expression: -21 - 16x. Mastering this technique is essential for progressing in algebra, enabling students to tackle equations, inequalities, and more complex expressions with confidence. It also lays the groundwork for understanding functions, modeling real-world situations, and solving problems logically and efficiently. As with all mathematical skills, practice, patience, and attention to detail are key. With these, anyone can transform complicated expressions into clear, concise forms — a true algebraic superpower.

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