

Combine The Like Terms To Create An Equivalent Expression. $9y + y$

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When working with algebraic expressions, one of the fundamental skills is simplifying expressions by combining like terms. Like terms are terms that have identical variable parts raised to the same power. Combining these terms simplifies the expression, making it easier to evaluate or manipulate further. In this article, we will explore how to combine the terms in the expression $(9y + y)$ to create an equivalent, simplified expression. We will discuss the concepts of like terms, the process of combining them, and demonstrate the steps with detailed explanations.

Understanding Like Terms

What Are Like Terms?

Like terms are terms within an algebraic expression that:

- Contain the same variable(s).
- Are raised to the same power(s).
- Have coefficients that can be different or the same.

For example:

- $(3x)$ and $(7x)$ are like terms because they both contain the variable (x) to the first power.
- $(4y^2)$ and $(-y^2)$ are like terms because they both contain (y^2) .
- $(5a^2b)$ and $(-2a^2b)$ are like terms because they contain the same variables raised to the same powers.

Conversely:

- $(3x)$ and $(3x^2)$ are not like terms because their variable parts differ in powers.
- $(2y)$ and $(3z)$ are not like terms because they contain different variables.

The Importance of Combining Like Terms

Combining like terms simplifies algebraic expressions, making them easier to:

- Evaluate for specific values.
- Solve equations.

- Factor expressions.
- Perform further algebraic manipulations.

This process reduces clutter and helps reveal the structure of the mathematical expression.

Applying the Concept to $\text{\texttt{\large{9y + y}}}$

Identify Like Terms in the Expression

Let's analyze the expression:

$$\text{\texttt{9y + y}}$$

- Both terms involve the variable $\text{\texttt{y}}$.
- Both are to the first power (since no exponents are shown).
- Therefore, these are like terms.

Combine the Coefficients

To combine the terms, follow these steps:

1. Add the numerical coefficients:

$$9 + 1 = 10$$

Note: The second term $\text{\texttt{y}}$ can be thought of as $\text{\texttt{(1 \times y)}}$.

2. Keep the variable part unchanged:

$$\text{\texttt{y}}$$

3. Form the simplified expression:

$$10\text{\texttt{y}}$$

Result:

$$9y + y = \boxed{10y}$$

This is the simplified, equivalent expression with like terms combined.

Step-by-Step Process for Combining Like Terms

Step 1: Identify the Like Terms

- Look for terms that have the same variable(s) raised to the same power(s).
- In the given expression, $9y$ and y are like terms because both are linear terms in y .

Step 2: Rewrite the Terms to Clarify Coefficients

- Express each term with a coefficient explicitly:

$$9y = 9 \times y$$

$$y = 1 \times y$$

- This makes it easier to combine the coefficients.

Step 3: Add the Coefficients

- Sum the numerical parts:

$$9 + 1 = 10$$

Step 4: Write the Simplified Expression

- Multiply the sum of the coefficients by the common variable:

$$10 \times y = 10y$$

\]

- The simplified expression is:

\[

\boxed{10y}

\]

Additional Examples of Combining Like Terms

Example 1: Simplify $(5a + 3a - 2a)$

- All terms involve (a) .
- Combine coefficients:

\[

$5 + 3 - 2 = 6$

\]

- Result:

\[

$6a$

\]

Example 2: Simplify $(4x^2 + 7x^2 - x^2)$

- All involve (x^2) .
- Combine coefficients:

\[

$4 + 7 - 1 = 10$

\]

- Result:

\[

$10x^2$

\]

Example 3: Simplify $(2m + 3n + 4m - n)$

- Identify like terms:

- $(2m)$ and $(4m)$ are like terms.
- $(3n)$ and $(-n)$ are like terms.

- Combine (m) terms:

$$2m + 4m = 6m$$

- Combine (n) terms:

$$3n - n = 2n$$

- Final simplification:

$$6m + 2n$$

Common Mistakes to Avoid

While combining like terms, students often make errors. Here are some pitfalls:

- **Confusing unlike terms:** Attempting to combine terms with different variables or powers.
- **Ignoring coefficients:** Forgetting the coefficient of 1 in terms like (y) and treating it differently.
- **Misadding coefficients:** Making arithmetic errors when adding or subtracting coefficients.
- **Overlooking signs:** Failing to account for negatives, leading to incorrect results.

Tip: Always verify that the variable parts match before combining, and carefully handle signs during addition or subtraction.

Conclusion

Combining like terms is a vital skill in algebra that streamlines expressions and facilitates solving equations. In the specific case of the expression $(9y + y)$, recognizing that both terms are like terms allows us to combine their coefficients straightforwardly,

resulting in the simplified expression $\boxed{10y}$. This process involves identifying the like terms, rewriting them with explicit coefficients, summing those coefficients, and maintaining the variable part. Mastery of this technique lays a strong foundation for tackling more complex algebraic manipulations and solving equations efficiently.

Remember, always check for like terms before combining, and carefully perform arithmetic operations to ensure accuracy. Whether working with simple expressions like $9y + y$ or more complex polynomials, the principle remains the same: combine like terms to create an equivalent, simpler expression that is easier to understand and work with.

Frequently Asked Questions

What is the first step to simplify the expression $9y + y$?

The first step is to identify like terms, which are terms that have the same variable raised to the same power. In this case, $9y$ and y are like terms because both have the variable y .

How do you combine $9y$ and y in the expression $9y + y$?

You add their coefficients: $9 + 1 = 10$, so $9y + y$ simplifies to $10y$.

What is the simplified form of the expression $9y + y$?

The simplified form is $10y$.

Why is it important to combine like terms in algebraic expressions?

Combining like terms simplifies the expression, making it easier to evaluate or further manipulate in solving equations.

Can the expression $9y + y$ be simplified further?

No, $9y + y$ simplifies to $10y$, and there are no other like terms to combine.

Additional Resources

Combine The Like Terms To Create An Equivalent Expression: $9y + y$

When it comes to mastering algebra, one of the foundational skills students learn is combining like terms to simplify expressions. The expression $9y + y$ is a perfect example of this principle in action. By understanding how to identify and combine like terms, learners can transform complex expressions into simpler, more manageable forms. This process not only enhances algebraic fluency but also lays the groundwork for solving equations and understanding more advanced mathematical concepts. In this article, we'll

explore the significance of combining like terms, break down the steps involved, analyze the specific expression $9y + y$, and discuss the broader implications for algebraic problem-solving.

Understanding Like Terms and Their Importance

What Are Like Terms?

Like terms are terms that have identical variables raised to the same powers. They can be constants or algebraic expressions with the same variable factors. For example, in the expression $3x + 5x$, both terms are like terms because they contain the variable x raised to the first power. Similarly, $7y$ and $2y$ are like terms because they both contain y to the first power. Contrarily, $3x$ and $3y$ are not like terms because their variables differ.

The Role of Combining Like Terms

Combining like terms simplifies algebraic expressions, making them easier to evaluate or manipulate. This process reduces clutter, helps identify equivalent expressions, and is essential in solving equations efficiently. It is a fundamental skill that supports deeper understanding of algebraic structures and operations.

Features of Combining Like Terms:

- Simplifies complex expressions
- Prepares expressions for solving equations
- Clarifies the structure of algebraic formulas
- Builds a foundation for advanced topics like polynomial operations

Pros:

- Promotes efficient problem-solving
- Enhances understanding of variable relationships
- Facilitates accurate manipulation of algebraic expressions

Cons:

- Mistakes in identifying like terms can lead to incorrect simplifications
- Overlooking coefficients or signs may cause errors

Step-by-Step Breakdown of Combining $9y + y$

Step 1: Identify Like Terms

In the expression $9y + y$, both terms share the variable y and are raised to the first power. Since they are like terms, they can be combined.

Step 2: Combine the Coefficients

Combine the numerical coefficients attached to y . The coefficients are 9 and 1 (since y is equivalent to $1y$). Add these numbers:

$$9 + 1 = 10$$

Step 3: Write the Simplified Expression

Attach the combined coefficient to the variable:

$$10y$$

Thus, $9y + y$ simplifies to $10y$.

Summary of the Process:

- Recognize like terms (both contain y)
- Add their coefficients ($9 + 1$)
- Write the new term with the summed coefficient and the common variable

Final Equivalent Expression:

$$10y$$

Why Simplify Expressions? The Broader Context

Simplifying algebraic expressions like $9y + y$ is more than just a procedural task; it has significant implications for understanding and solving mathematical problems. Here's why this process is vital:

- **Efficiency:** Simplified expressions are easier to evaluate, especially when plugging in values or solving for variables.
- **Clarity:** Clearer expressions help identify relationships between variables and constants.
- **Foundation for Equations:** Simplification is crucial before solving equations or inequalities.
- **Polynomial Operations:** Combining like terms is essential when performing polynomial addition, subtraction, multiplication, and division.

Applications and Examples

Example 1: Basic Simplification

Suppose you are asked to simplify $9y + y + 3y$.

- Identify like terms: all contain y
- Combine coefficients: $9 + 1 + 3 = 13$
- Write the simplified expression: $13y$

Example 2: Solving Equations

Given the equation $9y + y = 20$, simplify first:

- Combine like terms: $10y = 20$
- Solve for y : $y = 20 / 10 = 2$

This illustrates how combining like terms streamlines the solving process.

Advanced Considerations and Tips

Handling Negative Coefficients and Variables

When combining like terms involving negatives, pay attention to signs. For example:

$$-3y + 5y = 2y$$

Dealing With Multiple Variables

In expressions with multiple variables, ensure you only combine like terms with identical variable parts. For instance:

$3x + 4y + 2x$ can be simplified to $5x + 4y$, but not further.

Using Distributive Property First

In more complex expressions, applying the distributive property before combining like terms can be helpful. For example:

$$2(4y + 3) + y$$

First distribute: $8y + 6 + y$

Then combine like terms: $9y + 6$

Common Mistakes and How to Avoid Them

Mistake 1: Combining unlike terms

Solution: Always verify that variables and their exponents match before combining.

Mistake 2: Forgetting the coefficient of a lone variable

Solution: Recognize that y is $1y$ and include this in calculations.

Mistake 3: Ignoring signs

Solution: Carefully track plus and minus signs during addition or subtraction.

Conclusion

The process of combining like terms, exemplified by the expression $9y + y$, is a cornerstone of algebraic manipulation. By systematically identifying like terms and summing their coefficients, students and mathematicians can simplify expressions, making subsequent calculations more straightforward and less error-prone. The simplified form, $10y$, not only represents an equivalent expression but also exemplifies the power of algebraic simplification in solving real-world problems. Whether dealing with basic expressions or complex polynomial operations, mastering this skill is essential for advancing in mathematics. As with any mathematical technique, attention to detail, careful analysis, and consistent practice will ensure proficiency and confidence in combining like terms and creating equivalent expressions.

In summary:

- Recognize like terms based on variable and exponent consistency
- Sum the coefficients accurately, considering signs
- Rewrite the expression with the combined coefficient and common variable
- Use this skill as a foundation for solving equations and handling more complex algebraic tasks

Embracing these principles will enhance mathematical understanding and problem-solving skills, making expressions like $9y + y$ not just simplified, but also a stepping stone toward more advanced algebraic mastery.

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