

Simplify The Expression: $7y+9+72y$

Simplify The Expression: $7y+9+72y$ is a common algebraic task that helps students and math enthusiasts understand how to combine like terms efficiently. Simplifying algebraic expressions involves combining terms that have the same variable raised to the same power, which makes the expression easier to evaluate or solve. In this article, we'll explore how to simplify the expression $7y + 9 + 72y$ step by step, discuss the importance of like terms, and provide tips to master this fundamental algebra skill.

Understanding the Expression $7y + 9 + 72y$

Before diving into the simplification process, it's crucial to analyze the given expression:

- $7y$: A term with the variable y multiplied by 7.
- 9: A constant term.
- $72y$: Another term with the variable y multiplied by 72.

The goal is to combine like terms to reduce the expression to its simplest form. In this case, the like terms are those containing the variable y , i.e., $7y$ and $72y$.

What Are Like Terms in Algebra?

Definition of Like Terms

Like terms are terms that have exactly the same variable raised to the same power. Constants (numbers without variables) are considered like terms with each other but not with variable terms.

Examples of Like Terms

- $3x$ and $5x$ are like terms because they both contain x to the first power.
- $4y^2$ and $-2y^2$ are like terms because they both contain y^2 .
- 7 and -3 are constants and are like terms with each other.
- $7y$ and $72y$ are like terms because both contain y to the first power.

Steps to Simplify the Expression $7y + 9 + 72y$

To simplify the expression, follow these systematic steps:

Step 1: Identify Like Terms

Review the expression and determine which terms are similar:

- Like terms with y : $7y$ and $72y$
- Constant term: 9

Step 2: Group Like Terms

Arrange the expression by grouping similar terms together:

$$7y + 72y + 9$$

Step 3: Combine the Like Terms

Add the coefficients of the like terms:

- For the y -terms: $7 + 72 = 79$
- The constant remains as is: 9

The combined expression becomes:

$$79y + 9$$

Step 4: Write the Simplified Expression

Express the answer in the simplest form:

$$79y + 9$$

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

Why Is Simplifying Expressions Important?

Simplifying algebraic expressions is a foundational skill with several benefits:

- Reduces complexity, making calculations easier.
- Prepares expressions for solving equations.

- Helps in understanding the structure of algebraic formulas.
- Facilitates comparison of different expressions.
- Enhances problem-solving efficiency in higher-level mathematics.

Additional Tips for Simplifying Algebraic Expressions

Tip 1: Always Look for Like Terms

Carefully scan the expression for terms with the same variables and exponents to ensure proper combination.

Tip 2: Use the Associative and Commutative Properties

These properties allow you to rearrange and group terms conveniently:

- Associative Property: $(a + b) + c = a + (b + c)$
- Commutative Property: $a + b = b + a$

Tip 3: Keep Constants Separate

Constants should be combined only with constants, and variables with variables, to prevent errors.

Tip 4: Double-Check Your Work

After combining like terms, verify that all similar terms are properly combined and that no terms are missed.

Common Mistakes to Avoid

- Mistaking unlike terms as like terms: For example, confusing y and y^2 .
- Forgetting to include all terms: Overlooking constants or variables during combination.
- Incorrect addition of coefficients: Always double-check arithmetic when combining coefficients.

Practice Problems to Master Simplification

To reinforce your understanding, try simplifying these expressions:

1. $3a + 5a + 2$
2. $6x^2 + 4x^2 - x + 7$
3. $12m + 8n + 3m - 2n + 5$
4. $9p - 3q + 4p + 2q$

Answers:

1. $8a + 2$
2. $10x^2 - x + 7$
3. $15m + 6n + 5$
4. $13p - q$

Conclusion: Mastering the Art of Simplification

Simplifying the expression $7y + 9 + 72y$ to $79y + 9$ exemplifies a fundamental algebra skill that serves as a building block for more complex mathematics. Recognizing like terms, applying basic algebraic properties, and practicing regularly are key to becoming proficient in simplifying expressions. Whether you're a student preparing for exams, a teacher guiding learners, or a math enthusiast, mastering this skill enhances your ability to analyze and solve algebraic problems effectively.

By understanding the process and applying these tips, you'll find algebra less intimidating and more manageable. Remember, practice makes perfect—so keep working on similar problems to strengthen your skills. Simplification not only makes your calculations easier but also deepens your understanding of how algebraic expressions work, paving the way for success in advanced mathematics topics.

Frequently Asked Questions

How do I simplify the expression $7y + 9 + 72y$?

Combine like terms: $7y$ and $72y$ to get $79y$, then add 9. The simplified expression is $79y + 9$.

What are like terms in the expression $7y + 9 + 72y$?

The like terms are $7y$ and $72y$, because both contain the variable y with the same exponent.

Is it correct to write the simplified form of $7y + 9 + 72y$ as $79y + 9$?

Yes, because combining the coefficients of like terms results in $79y$, and the constant 9 remains

unchanged.

Can I factor anything out of the expression $7y + 9 + 72y$?

Yes, you can factor out y from the terms involving y : $y(7 + 72) + 9$, which simplifies to $79y + 9$.

What is the step-by-step process to simplify $7y + 9 + 72y$?

First, identify like terms: $7y$ and $72y$. Add their coefficients to get $79y$. Then, write the constant 9 separately. The simplified expression is $79y + 9$.

Does the order of addition matter when simplifying $7y + 9 + 72y$?

No, addition is commutative, so you can add the like terms in any order. The simplified form remains $79y + 9$.

How can I verify that $79y + 9$ is the correct simplification?

You can expand $79y + 9$ back to original form by distributing or add the original terms: $7y + 72y + 9$, which sums to $79y + 9$, confirming your simplification is correct.

Additional Resources

Simplify The Expression: $7y + 9 + 72y$

When delving into algebraic expressions, one of the foundational skills every student and math enthusiast needs to master is simplifying expressions—combining like terms to make the expressions more manageable and understandable. Today, we're taking an expert look at the expression $7y + 9 + 72y$, breaking down the process of simplification step-by-step, exploring the underlying principles, and illustrating best practices. Whether you're brushing up on algebra or seeking to deepen your understanding, this comprehensive review aims to clarify the key concepts involved.

Understanding the Expression: Components and Structure

Before jumping into the simplification process, it's essential to understand the components of the expression:

- Variables: The letter y is a variable, representing an unknown or a quantity that can change.
- Coefficients: Numbers multiplying the variables, such as 7 and 72 , which tell us how many units of y are involved.
- Constants: Numbers without variables, such as 9 , which are independent of the variable.

The expression $7y + 9 + 72y$ comprises two like terms involving y and one constant term:

- Like terms involving y : $7y$ and $72y$
- Constant term: 9

The goal of simplification is to combine like terms—those that share the same variable raised to the same power—while leaving constants separate unless they are also combined.

The Significance of Like Terms in Algebra

In algebra, like terms are terms that have identical variable parts. They can be combined because their coefficients are the only parts that differ. Recognizing and combining like terms is fundamental for simplifying expressions, solving equations, and performing algebraic manipulations efficiently.

Key points about like terms:

- They must have the same variable(s) raised to the same power.
- The coefficients of like terms can be added or subtracted.
- Constants (numbers without variables) are like terms with each other.

Examples of like terms:

- $3x$, $5x$, $-2x$ (all involve x to the first power)
- $4y^2$, $-7y^2$ (both involve y squared)
- 10 , -3 (both are constants)

Examples of unlike terms:

- $3x$ and $4x^2$ (different powers of x)
- $5y$ and $7x$ (different variables)
- $2x$ and $2y$ (different variables)

In our specific expression $7y + 9 + 72y$, the like terms are $7y$ and $72y$, while 9 is a separate constant.

Step-by-Step Simplification of $7y + 9 + 72y$

To simplify $7y + 9 + 72y$, we follow a systematic approach:

1. Identify Like Terms

- Like term 1: $7y$
- Like term 2: $72y$

- Constant term: 9

2. Group Like Terms

Arrange the expression to clearly see the like terms together:

$$(7y + 72y) + 9$$

3. Combine the Like Terms

Since $7y$ and $72y$ are like terms, add their coefficients:

$$- 7 + 72 = 79$$

Thus, $7y + 72y$ simplifies to $79y$.

4. Write the Simplified Expression

The simplified form becomes:

$$79y + 9$$

This is a more concise, easier-to-read expression that retains the original meaning but emphasizes the combined coefficients.

Understanding the Principles Behind the Simplification

The process of combining like terms is rooted in fundamental algebraic principles. Let's explore these principles in depth:

Associative and Commutative Properties

- Commutative Property: The order of addition does not affect the sum. For example:

$$7y + 72y = 72y + 7y$$

- Associative Property: Grouping of addition does not affect the sum. For example:

$$(7y + 72y) + 0 = 7y + (72y + 0)$$

These properties underpin the process of reorganizing and combining terms seamlessly.

Distributive Property

Although not directly used in this particular problem, the distributive property is often involved in simplifying more complex expressions:

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

Understanding how to distribute factors across terms helps in expanding and factoring expressions, which is complementary to simplifying.

Coefficients and Variables

The coefficients of like terms are numerical factors that multiply the variable part. When combining like terms, only these coefficients are added or subtracted, not the variables themselves.

In $7y + 72y$, the variable y remains unchanged; only the numerical coefficients are combined.

Additional Examples and Applications

To cement understanding, let's explore a few more examples involving similar concepts:

Example 1: Simplify $3x + 5x + 2$

- Like terms: $3x$ and $5x$
- Constants: 2
- Combine like terms: $3x + 5x = 8x$
- Final expression: $8x + 2$

Example 2: Simplify $4a - 2a + 7 - 3$

- Like terms: $4a$ and $-2a$
- Constants: 7 and -3
- Combine variables: $4a - 2a = 2a$
- Combine constants: $7 - 3 = 4$
- Final expression: $2a + 4$

Application in Solving Equations

Simplified expressions are crucial in solving algebraic equations. For instance, if you have:

$$7y + 9 + 72y = 100$$

You can simplify the left side to $79y + 9$, then proceed to solve for y :

$$79y + 9 = 100$$

Subtract 9 from both sides:

$$79y = 91$$

Divide both sides by 79:

$$y = 91 / 79$$

Best Practices for Simplifying Algebraic Expressions

To ensure accuracy and efficiency, consider these best practices:

- Always identify like terms carefully: Look for the same variable and exponent.
- Group like terms before combining: Use parentheses if necessary.
- Simplify coefficients first: Add or subtract the numerical parts.
- Be cautious with signs: Remember that plus and minus signs impact the operation.
- Check your work: Verify that only like terms have been combined and that the simplified expression maintains the original meaning.

Conclusion: The Power of Simplification

The process of simplifying $7y + 9 + 72y$ exemplifies core algebraic principles that serve as building blocks for more advanced mathematics. By recognizing like terms, applying associative and commutative properties, and carefully combining coefficients, we transform a complex-looking expression into a streamlined form: $79y + 9$.

Mastering such techniques not only improves computational efficiency but also deepens your conceptual understanding of algebra. Whether you're tackling equations, factoring expressions, or exploring polynomial operations, the ability to simplify expressions confidently is an invaluable skill that underpins successful mathematical problem-solving.

Remember, every algebraic journey begins with recognizing the structure of expressions and applying fundamental principles. As you continue to practice, these processes will become second nature, empowering you to approach more complex problems with clarity and confidence.

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