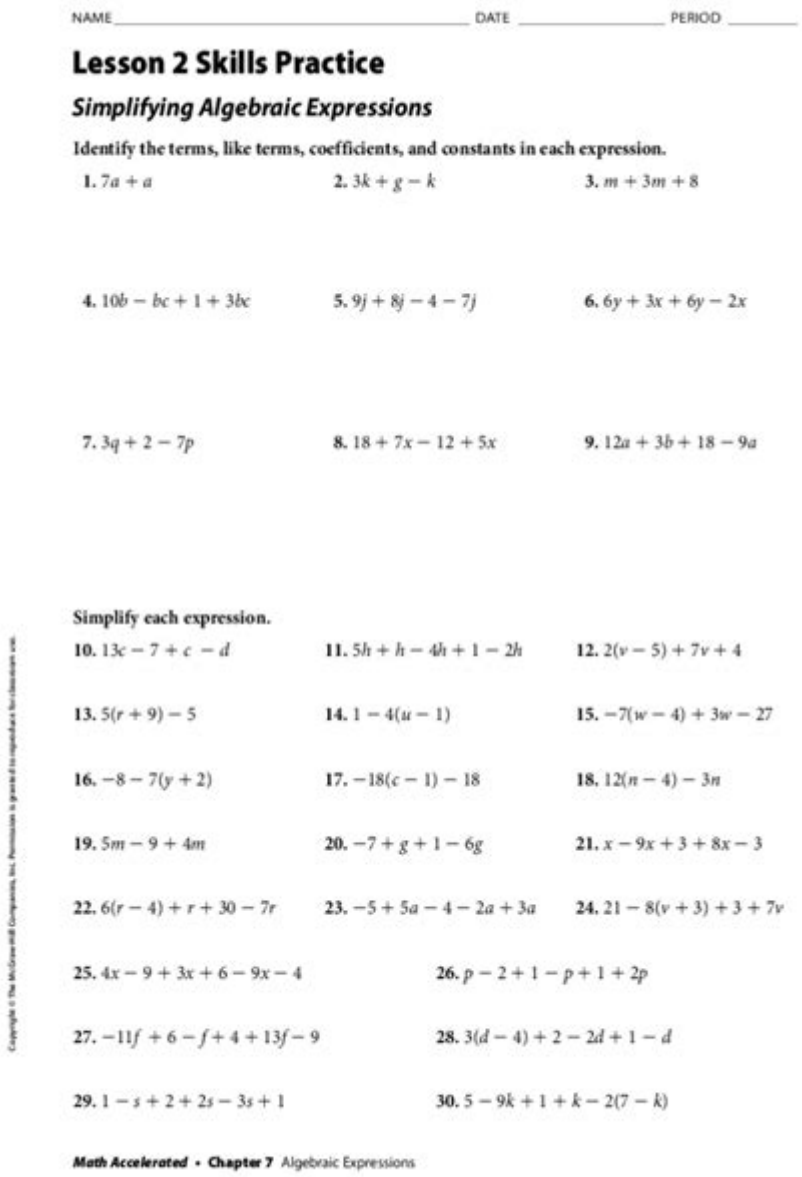
Lesson 5 Skills Practice Simplify Algebraic Expressions



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Lesson 2 Skills Practice

Simplifying Algebraic Expressions

Identify the terms, like terms, coefficients, and constants in each expression.

1. $7a + a$ **2.** $3k + g - k$ **3.** $m + 3m + 8$

4. $10b - bc + 1 + 3bc$ **5.** $9j + 8j - 4 - 7j$ **6.** $6y + 3x + 6y - 2x$

7. $3q + 2 - 7p$ **8.** $18 + 7x - 12 + 5x$ **9.** $12a + 3b + 18 - 9a$

Simplify each expression.

10. $13c - 7 + c - d$ **11.** $5h + h - 4h + 1 - 2h$ **12.** $2(v - 5) + 7v + 4$

13. $5(r + 9) - 5$ **14.** $1 - 4(u - 1)$ **15.** $-7(w - 4) + 3w - 27$

16. $-8 - 7(y + 2)$ **17.** $-18(c - 1) - 18$ **18.** $12(n - 4) - 3n$

19. $5m - 9 + 4m$ **20.** $-7 + g + 1 - 6g$ **21.** $x - 9x + 3 + 8x - 3$

22. $6(r - 4) + r + 30 - 7r$ **23.** $-5 + 5a - 4 - 2a + 3a$ **24.** $21 - 8(v + 3) + 3 + 7v$

25. $4x - 9 + 3x + 6 - 9x - 4$ **26.** $p - 2 + 1 - p + 1 + 2p$

27. $-11f + 6 - f + 4 + 13f - 9$ **28.** $3(d - 4) + 2 - 2d + 1 - d$

29. $1 - s + 2 + 2s - 3s + 1$ **30.** $5 - 9k + 1 + k - 2(7 - k)$

Math Accelerated • **Chapter 7** Algebraic Expressions

Introduction to Simplifying Algebraic Expressions

Lesson 5 skills practice simplify algebraic expressions is a fundamental concept in algebra that focuses on reducing complex expressions to their simplest form. This skill is essential for students as it lays the groundwork for solving equations, understanding functions, and tackling more advanced mathematical concepts. In this article, we will explore the process of simplifying algebraic expressions, the importance of mastering this skill, and provide strategies and examples to enhance understanding.

Understanding Algebraic Expressions

Before delving into the simplification process, it's vital to grasp what algebraic expressions are. An algebraic expression consists of numbers, variables, and mathematical operations. For example, the expression $3x + 4y - 5$ features the variables x and y, coefficients (3, 4, and -5), and operations (addition and subtraction).

Types of Algebraic Expressions

Algebraic expressions can be categorized based on their components:

1. Monomial: An expression with one term, such as $7x$ or $-3y^2$.
2. Binomial: An expression with two terms, like $3x + 4$ or $x^2 - 5x$.
3. Trinomial: An expression with three terms, for example, $x^2 + 3x + 2$.
4. Polynomial: An expression with multiple terms, such as $x^3 - 2x^2 + 3x - 5$.

The Importance of Simplifying Algebraic Expressions

Simplifying algebraic expressions is crucial for several reasons:

- Clarity: Simplified expressions are easier to read and understand, making it simpler to identify relationships and patterns.
- Efficiency: Working with simpler expressions can significantly reduce the time it takes to solve equations.
- Foundation for Advanced Topics: Mastering simplification is necessary for tackling more complex topics, such as factoring, solving equations, and calculus.

Basic Rules for Simplifying Algebraic Expressions

To simplify algebraic expressions effectively, there are several key rules to follow:

1. Combining Like Terms

Like terms are terms that have the same variable raised to the same power. For example, in the expression $2x + 3x - 4 + 5$, the terms $2x$ and $3x$ are like terms, while -4 and 5 are constants. To

simplify, combine them:

$$
2x + 3x = 5x
$$

$$
-4 + 5 = 1
$$

Thus, the simplified expression is:

$$
5x + 1
$$

2. Using the Distributive Property

The distributive property states that $a(b + c) = ab + ac$. This property is particularly helpful when dealing with expressions that include parentheses. For example, to simplify $3(x + 4)$:

$$
3(x + 4) = 3x + 12
$$

3. Applying the Laws of Exponents

Understanding the laws of exponents is crucial for simplifying expressions that involve powers. Key laws include:

- $a^m \cdot a^n = a^{m+n}$
- $\frac{a^m}{a^n} = a^{m-n}$
- $(a^m)^n = a^{m \cdot n}$

For example, the expression $x^2 \cdot x^3$ simplifies to $x^{2+3} = x^5$.

Step-by-Step Guide to Simplifying Expressions

Here's a systematic approach to simplifying algebraic expressions:

Step 1: Identify Like Terms

Start by scanning the expression for like terms. Group them together to facilitate simplification.

Step 2: Apply the Distributive Property

If the expression contains parentheses, use the distributive property to eliminate them.

Step 3: Combine Like Terms

After grouping and distributing, combine the like terms to form a simpler expression.

Step 4: Use Exponent Laws

If applicable, apply the laws of exponents to simplify further.

Step 5: Check Your Work

Finally, review the simplified expression to ensure it accurately represents the original expression.

Examples of Simplifying Algebraic Expressions

Let's look at a few examples to illustrate the simplification process.

Example 1: Simplifying a Polynomial

Consider the expression $4x^2 + 3x - 2 + 5x^2 - x + 7$.

1. Identify like terms:
- $4x^2$ and $5x^2$
- $3x$ and $-x$
- Constants: -2 and 7

2. Combine like terms:
- $4x^2 + 5x^2 = 9x^2$
- $3x - x = 2x$
- $-2 + 7 = 5$

3. Final simplified expression:
- $9x^2 + 2x + 5$

Example 2: Distributing and Simplifying

Consider the expression $2(3x + 4) - 5(2x - 1)$.

1. Apply the distributive property:
- $2(3x) + 2(4) - 5(2x) + 5(1)$
- This simplifies to $6x + 8 - 10x + 5$

2. Combine like terms:
- $6x - 10x = -4x$
- $8 + 5 = 13$

3. Final simplified expression:
- $-4x + 13$

Practice Problems

To reinforce understanding, try simplifying the following expressions:

1. $5x + 3 - 2x + 4$
2. $3(x - 2) + 4(2x + 1)$
3. $x^2 + 2x - x^2 + 3x - 5$

Conclusion

Lesson 5 skills practice simplify algebraic expressions serves as a critical stepping stone in algebra. By mastering the rules of simplification, students gain the skills necessary to tackle more complex problems in mathematics. With practice and application of the strategies outlined in this article, simplifying algebraic expressions will become an intuitive and valuable skill for any aspiring mathematician.

Frequently Asked Questions

What is the first step in simplifying the expression 3x + 4x - 2?

Combine like terms by adding the coefficients of x, resulting in 7x - 2.

How do you simplify the expression 5(2x + 3) - 4x?

First, distribute 5 to both terms inside the parentheses to get 10x + 15. Then, subtract 4x to get 6x + 15.

What does it mean to simplify an algebraic expression?

Simplifying an algebraic expression means reducing it to its simplest form by combining like terms and eliminating parentheses.

Can the expression 2(x + 5) + 3(x - 2) be simplified further? If so, how?

Yes, distribute first: 2x + 10 + 3x - 6. Then combine like terms to get 5x + 4.

What is the simplified form of the expression 4y - 3y + 6?

Combine like terms to get y + 6.

How does the order of operations affect the simplification of expressions like 2(3 + x) + 4?

You should first simplify inside the parentheses, then distribute and combine like terms, leading to 2(3) + 2x + 4, which simplifies to 6 + 2x + 4 = 2x + 10.

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