1-9 Simplifying Algebraic Expressions

Warm Up

Problem of the Day

Lesson Presentation

Warm Up

Evaluate each expression for $y = 3$.

1. $3y + y$ — 12
2. $7y$ — 21
3. $10y - 4y$ — 18
4. $9y$ — 27
5. $y + 5y + 6y$ — 36
6. $10y$ — 30

Problem of the Day

Emilia saved nickels, dimes, and quarters in a jar. She had as many quarters as dimes, but twice as many nickels as dimes. If the jar had 844 coins, how much money had she saved?

$94.95

1-9 Simplifying Algebraic Expressions

Learn to simplify algebraic expressions.

1. Write your homework in your Agenda.
2. Get ready to take notes.
3. Bellringer: What is a variable???

Vocabulary

term

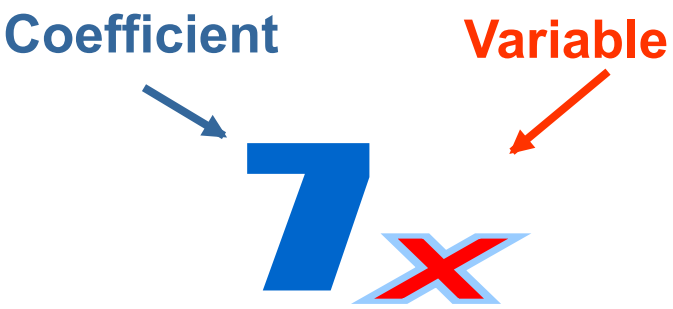
coefficient

1-9 Simplifying Algebraic Expressions

In the expression $7x + 9y + 15$, $7x$, $9y$, and 15 are called *terms*. A term can be a number, a variable, or a product of numbers and variables. Terms in an expression are separated by + and –.

$$\underbrace{7x}_{\text{term}} + \underbrace{5}_{\text{term}} - \underbrace{3y^2}_{\text{term}} + \underbrace{y}_{\text{term}} + \underbrace{\frac{x}{3}}_{\text{term}}$$

In the term $7x$, 7 is called the *coefficient*. A coefficient is a number that is multiplied by a variable in an algebraic expression. A variable by itself, like y, has a coefficient of 1. So $y = 1y$.



1-9 Simplifying Algebraic Expressions

Like terms are terms with the same variable raised to the same power. The coefficients do not have to be the same. Constants, like 5, $\frac{1}{2}$, and 3.2, are also like terms.

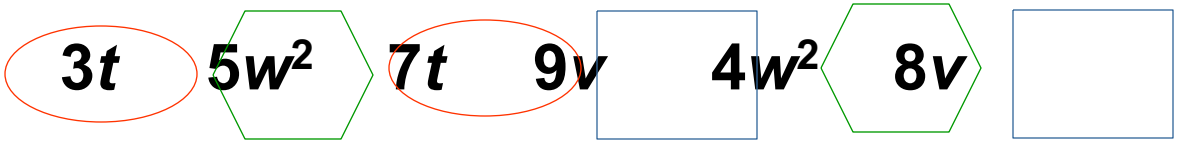
Like Terms	$3x$ and $2x$	w and $\frac{w}{7}$	5 and 1.8
Unlike Terms	$5x^2$ and $2x$ *The exponents are different.*	$6a$ and $6b$ *The variables are different*	3.2 and n *Only one term contains a variable*

Additional Example 1: Identifying Like Terms

Identify like terms in the list.

$3t$ $5w^2$ $7t$ $9v$ $4w^2$ $8v$

Look for like variables with like powers.



Like terms: $3t$ and $7t$ $5w^2$ and $4w^2$ $9v$ and $8v$

Helpful Hint

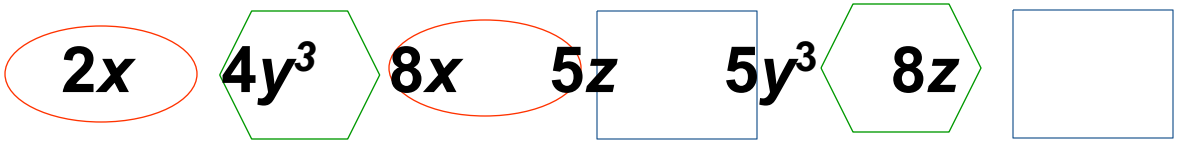
Use different shapes or colors to indicate sets of like terms.

Check It Out: Example 1

Identify like terms in the list.

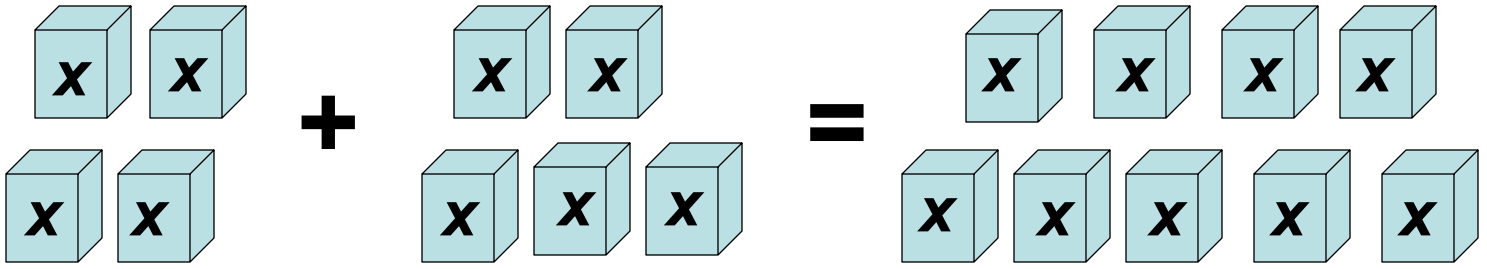
$2x \quad 4y^3 \quad 8x \quad 5z \quad 5y^3 \quad 8z$

Look for like variables with like powers.



Like terms: $2x$ and $8x$ $4y^3$ and $5y^3$ $5z$ and $8z$

Combining like terms is like grouping similar objects.



$4x + 5x = 9x$

To combine like terms that have variables, add or subtract the coefficients.

Additional Example 2: Simplifying Algebraic Expressions

Simplify. Justify your steps using the Commutative, Associative, and Distributive Properties when necessary.

A. $6t - 4t$

$6t - 4t$ — *6t and 4t are like terms.*

$2t$ — *Subtract the coefficients.*

B. $45x - 37y + 87$

In this expression, there are no like terms to combine.

Additional Example 2: Simplifying Algebraic Expressions

Simplify. Justify your steps using the Commutative, Associative, and Distributive Properties when necessary.

C. $3a^2 + 5b + 11b^2 - 4b + 2a^2 - 6$

$3a^2 + 5b + 11b^2 - 4b + 2a^2 - 6$ — *Identify like terms.*

$(3a^2 + 2a^2) + (5b - 4b) + 11b^2 - 6$ — *Group like terms.*

$5a^2 + b + 11b^2 - 6$ — *Add or subtract the coefficients.*

Check It Out: Example 2

Simplify. Justify your steps using the Commutative, Associative, and Distributive Properties when necessary.

A. $5y + 3y$

$5y + 3y$ — *5y and 3y are like terms.*

$8y$ — *Add the coefficients.*

B. $2(x^2 - 13x) + 6$

$2x^2 - 26x + 6$ — *Distributive Property.*

There are no like terms to combine.

Check It Out: Example 2

Simplify. Justify your steps using the Commutative, Associative, and Distributive Properties when necessary.

C. $4x^2 + 4y + 3x^2 - 4y + 2x^2 + 5$

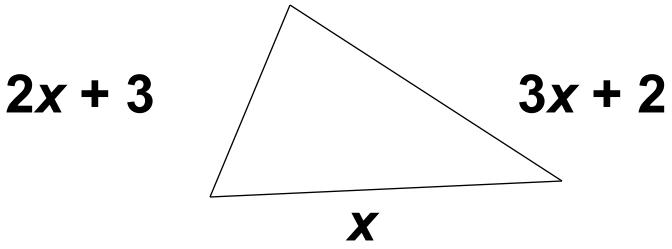
$4x^2 + 4y + 3x^2 - 4y + 2x^2 + 5$ *Identify like terms.*

$(4x^2 + 3x^2 + 2x^2) + (4y - 4y) + 5$ *Group like terms.*

$9x^2 + 5$ *Add or subtract the coefficients.*

Additional Example 3: *Geometry Application*

Write an expression for the perimeter of the triangle. Then simplify the expression.



$2x + 3 + 3x + 2 + x$

Write an expression using the side lengths.

$(x + 3x + 2x) + (2 + 3)$

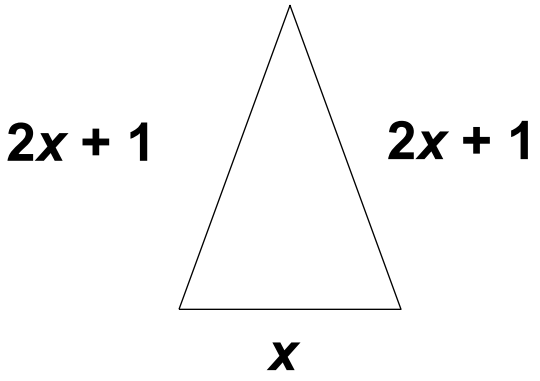
Identify and group like terms.

$6x + 5$

Add the coefficients.

Check It Out: Example 3

Write an expression for the perimeter of the triangle. Then simplify the expression.



$x + 2x + 1 + 2x + 1$

Write an expression using the side lengths.

$(x + 2x + 2x) + (1 + 1)$

Identify and group like terms.

$5x + 2$

Add the coefficients.

Lesson Quiz: Part I

Identify like terms in the list.

1. $3n^2$ $5n$ $2n^3$ $8n$ — $5n$, $8n$

2. a^5 $2a^2$ a^3 $3a$ $4a^2$ — $2a^2$, $4a^2$

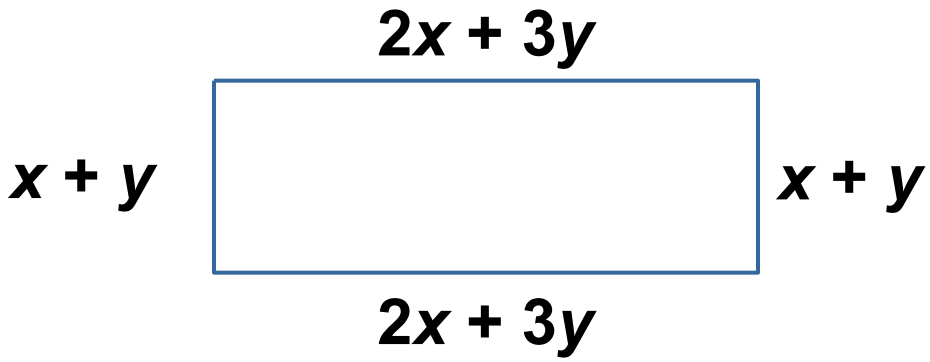
Simplify. Justify your steps using the Commutative, Associative, and Distributive Properties when necessary.

3. $4a + 3b + 2a$ — $6a + 3b$

4. $x^2 + 2y + 8x^2$ — $9x^2 + 2y$

Lesson Quiz: Part II

5. Write an expression for the perimeter of the given figure.



$6x + 8y$