

# Section Overview

## Exponents

Lessons 1-1, 1-2

**Why?** Exponents provide a shorthand notation for products in which the factor is repeated many times.

$$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^5$$

3 is the base.  
5 is the exponent.

## Order of Operations and Properties of Numbers

Lessons 1-3, 1-4

**Why?** The order of operations and properties of rational numbers are rules for simplifying expressions.

### Order of Operations

1. Perform operations within grouping symbols.
2. Evaluate powers.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

### Commutative Property

Addition:  $2 + 3 = 3 + 2$   
 Multiplication:  $2 \times 3 = 3 \times 2$

### Distributive Property

$4 \times (8 + 2) = (4 \times 8) + (4 \times 2)$   
 and  
 $4 \times (8 - 2) = (4 \times 8) - (4 \times 2)$

### Associative Property

Addition:  $(3 + 5) + 4 = 3 + (5 + 4)$   
 Multiplication:  $(3 \times 5) \times 4 = 3 \times (5 \times 4)$

## Evaluating Algebraic Expressions

Lesson 1-5

**Why?** In order to use formulas and algebraic expressions to solve problems, we must be able to substitute number values for the variables and find the resulting numerical value of the entire expression.

The **order of operations** is the same for evaluating both numerical and algebraic expressions.

**Evaluate  $5 + 4y$  for  $y = 3$ .**

$$\begin{aligned} 5 + 4y \\ 5 + 4(3) \\ 5 + 12 \\ 17 \end{aligned}$$

**Evaluate  $5 + 4y^2$  for  $y = 3$ .**

$$\begin{aligned} 5 + 4y^2 \\ 5 + 4(3)^2 \\ 5 + 4(9) \\ 5 + 36 \\ 41 \end{aligned}$$

## Writing Algebraic Expressions

Lesson 1-6

**Why?** The first step in solving real-world problems using algebra is learning to represent quantities and situations with variables and expressions.

Algebraic expressions can represent an infinite number of possibilities in a situation.

In the situation at the right, the expression  $8h$  represents many different possibilities as the variable number of hours changes.

**Situation:** \$8 per hour

**Variable:**  $h$

**Expression:**  $8h$

The **variable  $h$**  represents the number of hours.

The **expression  $8h$**  represents the amount of money earned by working  $h$  hours.