1.2 Evaluate and Simplify Algebraic Expressions

TEKS a.1, a.2, 2A.2.A, A.4.B

Before You studied properties of real numbers.

Now You will evaluate and simplify expressions involving real numbers.

Why? So you can estimate calorie use, as in Ex. 60.

Key Vocabulary
- **power**
- **variable**
- **term**
- **coefficient**
- **identity**

A **numerical expression** consists of numbers, operations, and grouping symbols. An expression formed by repeated multiplication of the same factor is a **power**.

A power has two parts: an *exponent* and a *base*. The **exponent** represents the number of times the **base** is used as a factor. In the power shown below, the base 7 is used as a factor 3 times.

$$\text{base} \rightarrow 7^{\overbrace{3}^{\text{exponent}}} = 7 \cdot 7 \cdot 7$$

power

You do not usually write the exponent when it is 1. For instance, you can write 8^1 simply as 8.

EXAMPLE 1 Evaluate powers

a. $(-5)^4 = (-5) \cdot (-5) \cdot (-5) \cdot (-5) = 625$

b. $-5^4 = -(5 \cdot 5 \cdot 5 \cdot 5) = -625$

In Example 1, notice how parentheses are used in part (a) to indicate that the base is -5. In part (b), the base of the power is 5, not -5. An *order of operations* helps avoid confusion when evaluating expressions.

KEY CONCEPT *For Your Notebook*

Order of Operations

Steps		Example
STEP 1	**First**, do operations that occur within grouping symbols.	$1 + 7^2 \cdot (5 - 3)$
STEP 2	**Next**, evaluate powers.	$= 1 + 7^2 \cdot 2$
STEP 3	**Then**, do multiplications and divisions from left to right.	$= 1 + 49 \cdot 2$
STEP 4	**Finally**, do additions and subtractions from left to right.	$= 1 + 98$ $= 99$