

# 1-2 Reteaching

## Properties of Real Numbers

The Properties of Real Numbers are relationships that are true for all real numbers except zero.

The *additive identity* for real numbers is 0. This gives the **Identity Property of Addition**, which states for any real number  $a$ :

$$a + 0 = a \text{ and } 0 + a = a$$

The *additive inverse* of a real number  $a$  is  $-a$ . By the **Inverse Property of Addition**:

$$a + (-a) = 0$$

There are two similar properties for multiplication. These use the *multiplicative identity* 1 and the *multiplicative inverse*  $\frac{1}{a}$  for any nonzero real number  $a$ .

**Identity Property of Multiplication:**  $a \cdot 1 = a$  and  $1 \cdot a = a$

**Inverse Property of Multiplication:**  $a \cdot \frac{1}{a} = 1$

### Problem

Using the Properties of Real Numbers, what is the missing number in the equation?

a.  $\square + 0 = 5$

According to the Identity Property of Addition, the missing number is 5.

b.  $7 \cdot \square = 1$

The Inverse Property of Multiplication shows that the product of a real number and its multiplicative inverse is 1. The missing number is the multiplicative inverse of 7, or  $\frac{1}{7}$ .

### Exercises

Find the missing number in the equation.

1.  $\square + (-4) = -4$

2.  $-2 + \square = 0$

3.  $1 \cdot \square = -2$

4.  $\square \cdot \frac{3}{2} = 1$

# 1-2 **Reteaching** (continued)

## Properties of Real Numbers

The Commutative and Associative Properties of Addition and Multiplication are properties that help you simplify calculations.

The **Commutative Property** states that the order of addition or multiplication does not change the sum or product.

$$a + b = b + a$$

$$ab = ba$$

The **Associative Property** states that the grouping of three or more addends or factors does not change the sum or product.

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

$$(ab)c = a(bc)$$

### Problem

What property does the equation illustrate?

$$5 \cdot \left(\frac{1}{5} \cdot 85\right) = \left(5 \cdot \frac{1}{5}\right) \cdot 85$$

This equation shows that the product of three numbers is the same regardless of the order of multiplication. Only the grouping of the factors is different. Therefore, the equation illustrates the Associative Property of Multiplication.

### Exercises

Name the property that the equation illustrates.

5.  $\left(5 \cdot \frac{1}{5}\right) \cdot 85 = 1 \cdot 85$

**Inverse Property of Multiplication**

6.  $1 \cdot 85 = 85$

**Identity Property of Multiplication**

The **Distributive Property** combines addition and multiplication:  $a(b + c) = ab + ac$ .

### Problem

What are the missing values in the equation?

$$4 \cdot (6 + 3) = 4 \cdot \boxed{\phantom{00}} + 4 \cdot \boxed{\phantom{00}}$$

By the Distributive Property, the sum of two numbers multiplied by a third number is equal to the sum of each multiplied by the third number. Because the third number is 4, the missing numbers are 6 and 3.

### Exercises

Name the missing values in each equation.

7.  $3(a + 2) = 3 \cdot \boxed{a} + \boxed{3} \cdot 2$

8.  $-2(\boxed{5} + 1) = \boxed{-2} \cdot 5 - 2 \cdot 1$

9.  $9 \cdot y + 9 \cdot \boxed{2} = \boxed{9} (y + 2)$

10.  $8(-3) + 8 \cdot x = 8(\boxed{-3 + x})$