

Lesson 12

*Using the Properties of Real Numbers to
Simplify Expressions*

- **Commutative Property of Addition**

Changing the *order* of the addends does not change the sum.

$$a + b = b + a$$

$$5 + 9 = 9 + 5$$

$$14 = 14$$

Think

“order”

- **Commutative Property of Multiplication**

Changing the *order* of the factors does not change the product.

$$a \times b = b \times a$$

$$3 \times 8 = 8 \times 3$$

$$24 = 24$$

- **Associative Property of Addition**

Changing the *grouping* of the addends does not change the sum.

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

$$(1 + 4) + 7 = 1 + (4 + 7)$$

$$5 + 7 = 1 + 11$$

$$12 = 12$$

Think

“grouping”

- **Associative Property of Multiplication**

Changing the *grouping* of the factors does not change the product.

$$(a \times b) \times c = a \times (b \times c)$$

$$(6 \times 5) \times 2 = 6 \times (5 \times 2)$$

$$30 \times 2 = 6 \times 10$$

$$60 = 60$$

- **Identity Property of Addition**

The sum of zero and a number is that number.

$$a + 0 = a \quad 0 + a = a$$

$$89 + 0 = 89 \quad 0 + 89 = 89$$

Think

“same”

- **Identity Property of Multiplication**

The product of one and a number is that number.

$$1 \times a = a \quad a \times 1 = a$$

$$1 \times 8 = 8 \quad 8 \times 1 = 8$$

- **Zero Property of Multiplication**

The product of zero and a number is zero.

$$0 \times a = 0 \quad a \times 0 = 0$$

$$0 \times 33 = 0 \quad 33 \times 0 = 0$$

Think

“0 product”

Name the property of addition or multiplication used.

