

## Lesson 1-6

### Example 1 Multiplication Properties

#### Evaluate $0.5 \cdot 0.2 \cdot 8 \cdot 5$

You can rearrange and group the factors to make mental calculations easier.

$$\begin{aligned} 0.5 \cdot 0.2 \cdot 8 \cdot 5 &= 0.5 \cdot 8 \cdot 0.2 \cdot 5 && \text{Commutative } (\times) \\ &= (0.5 \cdot 8) \cdot (0.2 \cdot 5) && \text{Associative } (\times) \\ &= 4 \cdot 1 && \text{Multiply.} \\ &= 4 && \text{Multiply.} \end{aligned}$$

### Example 2 Use Addition Properties

#### Evaluate $72 + 104 + 96 + 28$

You can rearrange and group the terms to make mental calculations easier.

$$\begin{aligned} 72 + 104 + 96 + 28 &= 72 + 28 + 104 + 96 && \text{Commutative } (+) \\ &= (72 + 28) + (104 + 96) && \text{Associative } (+) \\ &= 100 + 200 && \text{Add.} \\ &= 300 && \text{Add.} \end{aligned}$$

### Example 3 Simplify an Expression

#### Simplify $\frac{1}{3}(2x+3) + \frac{1}{3}x$ .

$$\begin{aligned} \frac{1}{3}(2x + 3) + \frac{1}{3}x &= \frac{1}{3}(2x) + \frac{1}{3}(3) + \frac{1}{3}x && \text{Distributive Property} \\ &= \frac{2}{3}x + 1 + \frac{1}{3}x && \text{Multiply.} \\ &= \frac{2}{3}x + \frac{1}{3}x + 1 && \text{Commutative } (+) \\ &= \left(\frac{2}{3}x + \frac{1}{3}x\right) + 1 && \text{Associative } (+) \\ &= \left(\frac{2}{3} + \frac{1}{3}\right)x + 1 && \text{Distributive Property} \\ &= 1x + 1 && \text{Substitution} \\ &= x + 1 \end{aligned}$$

### Example 4 Write and Simplify an Expression

Use the expression *the product of 3 and the sum of  $x$  and  $y$  squared increased by the sum of  $2x$  and  $y$  squared*.

#### a. Write an algebraic expression for the verbal expression.

$$\underbrace{\text{the product of 3 and the sum of } x \text{ and } y \text{ squared}}_{3(x + y^2)} \quad \underbrace{\text{increased by}}_{+} \quad \underbrace{\text{the sum of } 2x \text{ and } y \text{ squared}}_{(2x + y^2)}$$

#### b. Simplify the expression and indicate the properties used.

$$\begin{aligned} 3(x + y^2) + (2x + y^2) &= 3(x) + 3(y^2) + 2x + y^2 && \text{Distributive Property} \\ &= 3x + 3y^2 + 2x + y^2 && \text{Multiply.} \\ &= 3x + 2x + 3y^2 + y^2 && \text{Commutative } (+) \\ &= (3x + 2x) + (3y^2 + y^2) && \text{Associative } (+) \\ &= (3 + 2)x + (3 + 1)y^2 && \text{Distributive Property} \\ &= 5x + 4y^2 && \text{Substitution} \end{aligned}$$