

## Lesson 8-6

### Example 1 Multiply a Polynomial by a Monomial

Find  $3xy(2x - y - 1)$

**Method 1** Horizontal

$$\begin{aligned} 3xy(2x - y - 1) &= 3xy(2x) - 3xy(y) - 3xy(1) && \text{Distributive Property} \\ &= 6x^2y - 3xy^2 - 3xy && \text{Multiply.} \end{aligned}$$

**Method 2** Vertical

$$\begin{array}{r} \phantom{(\times)} \phantom{3xy} 2x - y - 1 \\ (\times) \phantom{2x - y - 1} \phantom{3xy} 3xy \\ \hline 6x^2y - 3xy^2 - 3xy \end{array} \quad \begin{array}{l} \text{Distributive Property} \\ \text{Multiply.} \end{array}$$

### Example 2 Simplify Expressions

Simplify  $\frac{1}{2}b(2b - 4) + 4(b^2 - 6b - 3)$ .

$$\begin{aligned} &\frac{1}{2}b(2b - 4) + 4(b^2 - 6b - 3) \\ &= \frac{1}{2}b(2b) - \frac{1}{2}b(4) + 4(b^2) - 4(6b) - 4(3) && \text{Distributive Property} \\ &= b^2 - 2b + 4b^2 - 24b - 12 && \text{Product of Powers} \\ &= (b^2 + 4b^2) + [-2b + (-24b)] - 12 && \text{Commutative and Associative Properties} \\ &= 5b^2 + (-26b) - 12 && \text{Combine like terms.} \\ &= 5b^2 - 26b - 12 && \text{Simplify.} \end{aligned}$$

### Example 3 Use Polynomial Models

**CAR RENTAL** Jenny pays a fee of \$75 dollars to rent a car. She is charged an additional \$15 for each weekday and \$20 for each weekend day she uses the car. Jenny rents the car for 7 days where  $w$  of those days are weekdays. Find an expression for Jenny's car rental bill.

**WORDS** The bill is the sum of the fee, the weekday charges, and the weekend charges.

**VARIABLES** If  $w$  = the number of weekdays she rented the car, then  $7 - w$  = the number of weekend days she rented the car. Let  $C$  = the total charge for renting the car for the 7 days.

**EQUATION**

$$\begin{aligned} \underbrace{\text{charge}} &= \underbrace{\text{fee}} + \underbrace{\text{number of weekdays}} \cdot \underbrace{15} + \underbrace{\text{number of weekend days}} \cdot \underbrace{20} \\ C &= 75 + w \cdot 15 + (7 - w) \cdot 20 \\ &= 75 + 15w + 7(20) - w(20) && \text{Distributive Property} \\ &= 75 + 15w + 140 - 20w && \text{Simplify.} \\ &= 215 - 5w && \text{Simplify.} \end{aligned}$$

An expression for Jenny's car rental charge for 7 days is  $215 - 5w$ , where  $w$  is the number of weekdays she rents the car.

#### Example 4 Polynomials on Both Sides

**Solve**  $-2(2a + 7) - 2a = 4(-a - 3) + 4$ .

$-2(2a + 7) - 2a = 4(-a - 3) + 4$	Original equation
$-4a - 14 - 2a = -4a - 12 + 4$	Distributive Property
$-6a - 14 = -4a - 8$	Combine like terms.
$-14 = 2a - 8$	Add $6a$ to each side.
$-6 = 2a$	Add 8 to each side.
$-3 = a$	Divide each side by 2.

The solution is  $-3$ .

<b>Check</b>	$-2(2a + 7) - 2a = 4(-a - 3) + 4$	Original equation
	$-2[2(-3) + 7] - 2(-3) = 4[-(-3) - 3] + 4$	$a = -3$
	$-2(-6 + 7) + 6 = 4(3 - 3) + 4$	Simplify.
	$-2(1) + 6 = 4(0) + 4$	Add and subtract.
	$-2 + 6 = 0 + 4$	Multiply.
	$4 = 4 \checkmark$	Add.