

**8-2 Study Guide and Intervention****Multiplying a Polynomial by a Monomial**

**Polynomial Multiplied by Monomial** The Distributive Property can be used to multiply a polynomial by a monomial. You can multiply horizontally or vertically. Sometimes multiplying results in like terms. The products can be simplified by combining like terms.

**Example 1** Find  $-3x^2(4x^2 + 6x - 8)$ .

**Horizontal Method**

$$\begin{aligned} & -3x^2(4x^2 + 6x - 8) \\ &= -3x^2(4x^2) + (-3x^2)(6x) - (-3x^2)(8) \\ &= -12x^4 + (-18x^3) - (-24x^2) \\ &= -12x^4 - 18x^3 + 24x^2 \end{aligned}$$

**Vertical Method**

$$\begin{array}{r} 4x^2 + 6x - 8 \\ (\times) \quad \quad \quad -3x^2 \\ \hline -12x^4 - 18x^3 + 24x^2 \end{array}$$

The product is  $-12x^4 - 18x^3 + 24x^2$ .

**Example 2** Simplify  $-2(4x^2 + 5x) - x(x^2 + 6x)$ .

$$\begin{aligned} & -2(4x^2 + 5x) - x(x^2 + 6x) \\ &= -2(4x^2) + (-2)(5x) + (-x)(x^2) + (-x)(6x) \\ &= -8x^2 + (-10x) + (-x^3) + (-6x^2) \\ &= (-x^3) + [-8x^2 + (-6x^2)] + (-10x) \\ &= -x^3 - 14x^2 - 10x \end{aligned}$$

**Exercises**

Find each product.

1.  $x(5x + x^2)$

2.  $x(4x^2 + 3x + 2)$

3.  $-2xy(2y + 4x^2)$

4.  $-2g(g^2 - 2g + 2)$

5.  $3x(x^4 + x^3 + x^2)$

6.  $-4x(2x^3 - 2x + 3)$

7.  $-4ax(10 + 3x)$

8.  $3y(-4x - 6x^3 - 2y)$

9.  $2x^2y^2(3xy + 2y + 5x)$

Simplify each expression.

10.  $x(3x - 4) - 5x$

11.  $-x(2x^2 - 4x) - 6x^2$

12.  $6a(2a - b) + 2a(-4a + 5b)$

13.  $4r(2r^2 - 3r + 5) + 6r(4r^2 + 2r + 8)$

14.  $4n(3n^2 + n - 4) - n(3 - n)$

15.  $2b(b^2 + 4b + 8) - 3b(3b^2 + 9b - 18)$

16.  $-2z(4z^2 - 3z + 1) - z(3z^2 + 2z - 1)$

17.  $2(4x^2 - 2x) - 3(-6x^2 + 4) + 2x(x - 1)$