

8-6 Study Guide and Intervention

Multiplying a Polynomial by a Monomial

Product of Monomial and Polynomial 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. $-4cx(10 + 3x)$ | 8. $3y(-4x - 6x^3 - 2y)$ | 9. $2x^2y^2(3xy + 2y + 5x)$ |

Simplify.

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

Lesson 8-6