

## Lesson 5-2

### Example 1 Degree of a polynomial

Determine whether each expression is a polynomial. If it is a polynomial, state the degree of the polynomial.

a.  $\frac{1}{3}b^2 + \frac{4}{b} - 2$

This expression is not a polynomial because the term  $\frac{4}{b}$  is not a monomial.

b.  $an^3 - an + \frac{2}{5}n$

This expression is a polynomial because each term is a monomial. The degree of the first term is  $1 + 3$  or 4, the degree of the second term is  $1 + 1$  or 2, and the degree of the third term is 1. The degree of the polynomial is 4.

### Example 2 Subtract and Simplify

Simplify  $(-4a^3 + a^2 - 1) - (-3a^3 - a^2 + 2a + 5)$ .

$$\begin{aligned}(-4a^3 + a^2 - 1) - (-3a^3 - a^2 + 2a + 5) &= -4a^3 + a^2 - 1 + 3a^3 + a^2 - 2a - 5 \\ &= (-4a^3 + 3a^3) + (a^2 + a^2) - 2a + (-1 - 5) \\ &= -a^3 + 2a^2 - 2a - 6\end{aligned}$$

Distribute the  $-1$ .  
Group like terms.  
Combine like terms.

### Example 3 Multiply and Simplify

Find  $-2b(3b^3 - b^2 + 5b - 6)$ .

$$\begin{aligned}-2b(3b^3 - b^2 + 5b - 6) &= -2b(3b^3) + (-2b)(-b^2) + (-2b)(5b) + (-2b)(-6) \\ &= -6b^4 + 2b^3 - 10b^2 + 12b\end{aligned}$$

Distributive Property  
Multiply the monomials.

### Example 4 Multiply Two Binomials

Find  $(3x - 4z)(x + 3z)$ .

$$(3x - 4z)(x + 3z) = \underbrace{3x \cdot x}_{\text{First terms}} + \underbrace{3x \cdot 3z}_{\text{Outer terms}} + \underbrace{(-4z)x}_{\text{Inner terms}} + \underbrace{(-4z)(3z)}_{\text{Last terms}}$$

$$= 9x^2 + 6xz - 12z^2$$

Multiply monomials and add like terms.

**Example 5 Multiply Polynomials****Find  $(m + n)(2m^2 - 5mn + 8n)$ .**

$$\begin{aligned}(m + n)(2m^2 - 5mn + 8n) &= m(2m^2 - 5mn + 8n) + n(2m^2 - 5mn + 8n) \\ &= m(2m^2) + m(-5mn) + m(8n) + n(2m^2) + n(-5mn) + n(8n) \\ &= 2m^3 - 5m^2n + 8mn + 2m^2n - 5mn^2 + 8n^2 \\ &= 2m^3 - 3m^2n + 8mn - 5mn^2 + 8n^2\end{aligned}$$

Distributive Property

Distributive Property

Multiply monomials.

Combine like terms.