

# Multiplying Polynomials - Intermediate

## Objective 1: Types of Polynomials

- A **monomial** is a polynomial with one term.
  - Examples:  $7x^2$ ,  $-3ab$ ,  $-x^3y^2$
- A **binomial** is a polynomial with two terms.
  - Examples:  $6x - 7$ ,  $3a^2 + 2b$
- A **trinomial** is a polynomial with three terms.
  - Example:  $-3x^2y + 5xy - 2$

## Objective 2: Multiply Two Monomials

**Procedure:** To multiply two monomials,

1. Multiply their coefficients.
2. Use the product rule of exponents to find the exponent of the corresponding variable(s).

**Example:** Multiply.

$$(3x^2)(5x^3)$$

**Example:** Multiply.

$$(-2x^2y)(7x^3y^2)$$

Multiply the following:

1.  $(-8a^5)(6a^7)$

2.  $(-3a^6b^7)(9a^2b^6)$

3.  $(-4x^6y^2)(-7x^3y^9)$

### Objective 3: Multiply Any Polynomial by a Monomial

**Procedure:** To multiply a polynomial by a monomial, use the distributive property to multiply the monomial by each term of the polynomial.

**Example:** Multiply.

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

**Example:** Multiply.

$$-2a^2b(4a^3b^2 - 3ab^2)$$

Multiply the following:

1.  $3a^4(2a^3 - 4a^2 + 7)$

$$2. -4x^3(3x^5 + 6x^2 - 2)$$

$$3. 4m^3n^2(7m^2n^4 - 5m^4n^2)$$

### Objective 4: Multiply Two Binomials

**Procedure:** To multiply two binomials, use the distributive property twice or **FOIL**.

**F**irst

**O**uter

**I**nner

**L**ast

$$(a + b)(c + d)$$

**Example:** Multiply.

$$(x + 7)(2x - 3)$$

**Example:** Multiply.

$$(3x - 5y)(2x + 7y)$$

Multiply the following:

1.  $(x - 7)(x - 8)$

2.  $(x - 6)(x + 9)$

3.  $(4a - 7b)(5a + 9b)$

Objective 5: Multiply the Sum and Difference of the Same Two Terms

$$(a + b)(a - b) =$$

**Example:** Multiply.

$$(x + 4)(x - 4)$$

**Example:** Multiply.

$$(2x + 5y)(2x - 5y)$$

Multiply the following:

1.  $(x - 9)(x + 9)$

2.  $(3x - 8y)(3x + 8y)$

3.  $(5a + 7b)(5a - 7b)$

### Objective 6: Squaring a Binomial

$$(a + b)^2 =$$

$$(a - b)^2 =$$

**Example:** Multiply.

$$(a + 7)^2 =$$

**Example:** Multiply.

$$(3x - 4)^2 =$$

Multiply the following:

1.  $(x - 5)^2$

2.  $(3a - 7b)^2$

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

## Objective 7: Multiply Any Two Polynomials

**Procedure:** To multiply any two polynomials,

1. Multiply each term of the first polynomial to every term in the second polynomial.
2. Combine any like terms.

**Example:** Multiply.

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

Multiply the following:

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

2.  $(a^2 - 3a + 2)(a^2 + 2a - 4)$

## Objective 8: Multiply More than Two Polynomials

**Procedure:** To multiply more than two polynomials, multiply two polynomials at a time.

**Example:** Multiply.

$$(x + 1)(x + 2)(2x - 5)$$

Multiply the following:

1.  $(a - 3)(a + 2)(a + 1)$

2.  $(x + 1)(x + 4)(x - 2)$