

2.3 Mult Polynomials

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2.3 Multiplication of Polynomials

Use the **DISTRIBUTIVE LAW** to multiply polynomials:

- Multiply each term of the first polynomial by each term of the second polynomial.
- Combine like terms

Example 1: Expand and simplify if possible

a) $-3x(4x + 1)$

$$\begin{aligned} & -3x(4x) + (-3x)(1) \\ & -12x^2 - 3x \end{aligned}$$

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

$$\begin{aligned} & 3a(a^2) + 3a(-2a) + 3a(7) \\ & \underline{3a^3} - \underline{6a^2} + \underline{21a} \end{aligned}$$

c) $3 - x(4x^2 - 3x + 1)$

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

d) $2(x + 1) + 3(x - 4)$

$$\begin{aligned} & 2(x) + 2(1) + 3(x) + (3)(-4) \\ & 2x + 2 + 3x - 12 \\ & 5x - 10 \end{aligned}$$

FOIL

e) $(x + 1)(x - 4)$

$$\begin{aligned} & x(x) + x(-4) + 1(x) + 1(-4) \\ & x^2 - 4x + x - 4 \\ & x^2 - 3x - 4 \end{aligned}$$

Example 2: Expand each expression and simplify if possible

a) $(3x - 5y)^2$

$$(3x - 5y)(3x - 5y)$$

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

$$9x^2 - 15xy - 15xy + 25y^2$$

$$\boxed{9x^2 - 30xy + 25y^2}$$

b) $3(y + 9)(y - 8)$

$$3[y(y) + y(-8) + 9(y) + 9(-8)]$$

$$3[y^2 - 8y + 9y - 72]$$

$$3[y^2 + y - 72]$$

$$\boxed{3y^2 + 3y - 216}$$

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

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

$$4x^2 - 16x + 3x^3 + 6x^2$$

$$3x^3 + 10x^2 - 16x$$

FOIL

d) $(2x - 1)(3x + 1) - 4(6x - 5)$

$$2x(3x) + 2x(1) - 1(3x) - 1(1) - 4(6x) - 4(-5)$$

$$6x^2 + 2x - 3x - 1 - 24x + 20$$

$$\boxed{6x^2 - 25x + 19}$$