

Adding, Subtracting, and Multiplying Polynomials

To add or subtract polynomials, add or subtract the coefficients of like terms. You can use a vertical or horizontal format.

ADDING POLYNOMIALS VERTICALLY AND HORIZONTALLY

a.
$$\begin{array}{r} 3x^3 + 2x^2 - x - 7 \\ + x^3 - 10x^2 + 8 \\ \hline 4x^3 - 8x^2 - x + 1 \end{array}$$

b.
$$(9x^3 - 2x + 1) + (5x^2 + 12x - 4)$$

$$9x^3 - 2x + 1 + 5x^2 + 12x - 4$$

$$9x^3 + 5x^2 + 10x - 3$$

SUBTRACTING POLYNOMIALS VERT. AND HORIZ.

a.
$$\begin{array}{r} 8x^3 - 3x^2 - 2x + 9 \\ - (2x^3 + 6x^2 - x + 1) \\ \hline 6x^3 - 9x^2 - x + 8 \end{array}$$

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

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

$$-x^2 + 2x + 4$$

$$-x^2 + 2x + 4$$

To multiply two polynomials, each term of the first polynomial must be multiplied by each term of the second polynomial.

MULTIPLY POLYNOMIALS VERTICALLY

Multiply the polynomials $(-x^2 + 2x + 4)(x - 3)$

$$\begin{array}{r} \times \\ \times - 3 \\ \times x^2 - 6x - 12 \\ -x^3 + 2x^2 + 4x + 0 \\ \hline -x^3 + 5x^2 - 2x - 12 \end{array}$$

MULTIPLY POLYNOMIALS HORIZONTALLY

Multiply the polynomials $(x - 3)(3x^2 - 2x - 4)$

$$3x^3 - 2x^2 - 4x - 9x^2 + 6x + 12$$

$$3x^3 - 11x^2 + 2x + 12$$

Multiply three binomials $(x - 1)(x + 4)(x + 3)$

$$\begin{array}{r} x^2 + 4x - x - 4 \\ (x^2 + 3x - 4)(x + 3) \\ x^3 + 3x^2 + 3x^2 + 9x - 4x - 12 \\ x^3 + 6x^2 + 5x - 12 \end{array}$$

Some binomial products occur so frequently that it is worth memorizing their special product patterns.

SUM AND DIFFERENCE

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

$$(x + 3)(x - 3) = x^2 - 9$$

SQUARE OF A BINOMIAL

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

$$(y + 4)^2 = y^2 + 8y + 16$$

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

$$(3t^2 - 2)^2 = 9t^4 - 12t^2 + 4$$

CUBE OF A BINOMIAL

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(x+1)^3 = x^3 + 3x^2 + 3x + 1$$

$$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(p-2)^3 = p^3 - 6p^2 + 12p - 8$$

USING SPECIAL PRODUCT PATTERNS

a. $(4n - 5)(4n + 5)$ $a^2 - b^2$

$$\underline{\underline{16n^2 - 25}}$$

b. $(9y - x^2)^2$ $a^2 - 2ab + b^2$

$$81y^2 - 18yx^2 + x^4$$

c. $(ab + 2)^3$

Assignment:

p. 341

14-62 even

Quiz 6.1-6.3 Tomorrow