

Lesson 3: Add, Subtract, and Expand Polynomials

A. Degree of a Polynomial

B. Addition & Subtraction of Polynomials

Monomial – sum of the exponents

$$4a^1 \quad \text{degree } \underline{1}$$

$$2ab^3 \quad \text{degree } \underline{4}$$

$$3xy^3z^2 \quad \text{degree } \underline{6}$$

Polynomial – the term with the highest degree

$$2a^3 + b^2 \quad \text{degree } \underline{3}$$

$$2x^2y^3 + y^4 \quad \text{degree } \underline{5}$$

Like terms – terms with the same variable(s) raised to the same exponent.

$$3a, 7a \quad 2x^3, -4x^3 \quad -6ab^2, 7ab^2$$

The **coefficients** of like terms are added or subtracted together to produce a single term.

Examples: Simplify.

$$1) \quad \underline{(2x + y)} + \underline{(5x - 3y)}$$

$$2x + 5x + y - 3y \\ = 7x - 2y$$

$$2) \quad \underline{(x^2 - x - 3)} + \underline{(x^2 - 2x - 3)}$$

$$= x^2 + x^2 - x - 2x - 3 - 3 \\ = 2x^2 - 3x - 6$$

$$3) \quad (2x + y) + (\bar{x} + 5y)$$

$$(2x + y) + (-x + 5y) = x + 6y$$

$$4) \quad \underline{(7a^2 + 5ab - 3b^2)} + \underline{(5a^2 + 3ab + 6b^2)}$$

$$2a^2 + 8ab + 3b^2$$

C. Expanding Polynomials

$$a^m \cdot a^n = a^{m+n}$$

We use the distributive property.

$$a(b+c) = ab+ac$$

Examples: Expand and Simplify. State the degree.

$$1) 4(3x+1) = 12x+4$$

$$2) -5(2x^2+x-6) = -10x^2-5x+30$$

$$3) -3x(7x-2y+z) = -21x^2+6xy-3xz$$

$$4) 2x(5x^2-4xy)-3y(3x^2-y^2) = 10x^3 - \underline{8x^2y} - \underline{9x^2y} + 3y^3$$

* collect like terms

$$= 10x^3 - 17x^2y + 3y^3$$

$$5) 12b^3(b-3)-2b^2(b+5) = \underline{12b^4} - \underline{36b^3} - \underline{2b^3} - 10b^2$$

$$= 12b^4 - 38b^3 - 10b^2$$

$$6) \underline{\underline{3a^2b}} - 4a(a+3) + (2a^2b - 7a)$$

$$= \underline{3a^2b} - 4a^2 - \underline{12a} - \underline{2a^2b} - \underline{7a}$$

$$= -4a^2 + a^2b - 19a$$