Algebra Section 9-1 Notes Name: _____
Adding & Subtracting Polynomials Date: _____ Block: ___

Monomial: an expression that is a number, a variable, or a product of a number and one or more variables.

These are monomials: 12 y $-3xy^2$ $\frac{g}{5}$

These are NOT: $\sqrt{x}$ $8-r$ $\frac{1}{y}$ $|2z|$

Degree of a monomial: the sum of the exponents of the variables.
For a nonzero constant, the degree is 0. Zero itself has no degree.

Example One: Find the degree of each monomial.

a. $5x$ b. $\frac{4}{7}x^2$ c. $8x^2y^3$ d. -12 e. $-9m^3$ f. $5x^0$

_____ _____ _____ _____ _____ _____

Polynomial: a monomial or the sum or difference of two or more monomials.

Ex: $6x^4+8x^2-9x+2$

The polynomial above is shown in *standard form*.

Standard form of a polynomial means the degrees of its monomial terms *decrease from left to right*. After a polynomial has been simplified by combining like terms, you can name the polynomial based on its degree or the number of monomials it contains. The **degree of a polynomial** in one variable is the same as the degree of the monomial with the greatest exponent.

Polynomial	Degree	Name Using Degree	Number of Terms	Name Using Number of Terms
$8x-3$	1	Linear	2	Binomial
$2z^2+4z+1$	2	Quadratic	3	Trinomial
$7m^3$	3	Cubic	1	Monomial
$8x^4+5x$	4	Fourth power	2	Binomial
4	0	Constant	1	Monomial

Example Two: Classifying Polynomials
Write each polynomial in standard form. Name each polynomial based on degree and number of terms.

a. $6-5x$ _____ _____

b. $4x^2+5+2x^4$ _____ _____

c. $8+7v-12v$ _____ _____

Combining Polynomials: You can add two or more polynomials by adding like terms.

Example 3: Adding Polynomials

Simplify $(5x^2 + 6x + 7) + (3x^2 - 8x + 2)$.

Vertical method:

$$\begin{array}{r} 5x^2 + 6x + 7 \\ 3x^2 - 8x + 2 \\ \hline 8x^2 - 2x + 9 \end{array}$$

Horizontal method: Group like terms, then add coefficients.

$$\begin{aligned} &(5x^2 + 6x + 7) + (3x^2 - 8x + 2) \\ &= (5x^2 + 3x^2) + (6x - 8x) + (7 + 2) \\ &= 8x^2 - 2x + 9 \end{aligned}$$

a. $(12m^2 + 4) + (8m^2 + 5)$

b. $(t^2 - 6) + (3t^2 + 11)$

c. $(9w^3 + 8w^2) + (7w^3 + 4)$

Example 4: Subtracting Polynomials

Simplify $(3x^3 + 5x^2 - 4x) - (x^3 - 7x^2 + 10)$

Method 1: Subtract vertically

$$\begin{array}{rrrl} 3x^3 & +5x^2 & -4x & \\ -(x^3 & -7x^2 & +10) & \text{Line up like terms} \\ \hline \end{array}$$

$$\begin{array}{rrrl} 3x^3 & +5x^2 & -4x & \\ -x^3 & +7x^2 & -10 & \text{Add the } \textit{opposites}. \\ \hline 2x^3 & +12x^2 & -4x-10 & \end{array}$$

Method 2: Subtract horizontally

$$\begin{aligned} &(3x^3 + 5x^2 - 4x) - (x^3 - 7x^2 + 10) \\ &= 3x^3 + 5x^2 - 4x - x^3 + 7x^2 - 10 \\ &= (3x^3 - x^3) + (5x^2 + 7x^2) - 4x - 10 \\ &= 2x^3 + 12x^2 - 4x - 10 \end{aligned}$$

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

b. $(30d^3 - 29d^2 - 3d) - (2d^3 + d^2)$

c. $(4x^2 + 5x + 1) - (6x^2 + x + 8)$

Homework: Textbook problems: Pages 459-460, #1 to 8, 10, 11, 12, 18, 20, 24, 26, 29, 31, 47.