6.1: Polynomials

Monomial

- A number or a product of numbers and variables with **whole number** exponents. It has **one term**, it is the simplest type of polynomial. The **degree of a monomial** is the sum of the exponents of the variables.

Polynomial

- A monomial or a sum or difference of monomials. Each monomial in a polynomial is a **term**. Polynomials have no variables in denominators or exponents, no roots or absolute values of variables, and all variables have **whole number exponents**. The **degree of a polynomial** is the greatest exponent of the polynomial.

- A **polynomial function** is a function of the form

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

where $a_n \neq 0$ and the exponents are all **whole numbers**.

For this polynomial function, $a_n x^n$ is the leading term, a_n is the leading coefficient, a_0 is the constant, and n is the degree.

- A **polynomial function** is in **standard form** if its terms are written in descending order of exponents from left to right.

Polynomials	$3x^4$	$2x^3 + 4y^3$	$\frac{3}{4}a^3b^5$	$0.25z^{12}$	$3t^2 - 5t^6$
NOT Polynomials	3^x	$\lvert 2b^3 + 4b \rvert$	$\frac{8}{5y^3}$	$\frac{1}{2}\sqrt{x}$	$3t^{0.25} - 5t^3$

CLASSIFYING POLYNOMIALS

Degree	Name Using Degree	Polynomial Example	Number of Terms	Name Using Number of Terms
0	Constant	8	1	Monomial
1	Linear	$2x + 5$	2	Binomial
2	Quadratic	$3x^2$	1	Monomial
3	Cubic	$4x^3 - 5x^2 - 2x$	3	Trinomial
4	Quartic	$2x^4 + 3x^2$	2	Binomial
5	Quintic	$-3x^5 + 2x^3 - 4x + 8$	4	Polynomial of 4 terms

Example 1) Identify the degree of each monomial.

1) $3x^4y^5$ 2) 12 3) $2a^3b^6c^4$ 4) $2x^3y^2z$

Example 2) Rewrite each polynomial in standard form. Then identify the leading term, leading coefficient, degree, and number of terms. Name the polynomial.

1) $2x + 4x^3 - 1$ 2) $8x^3 - 12x + x^5 - 2$

ADDING and SUBTRACTING POLYNOMIALS

Example 3) Simplify. Write your answer in standard form. Classify each result by the number of terms.

a) $\left(3x^2 + 8 - 5x\right) + \left(8x^3 + 2 - x^2 - 3x\right)$

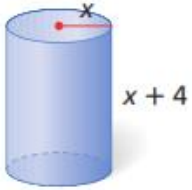
b) $\left(5x^3 + 12 - 6x^2\right) - \left(15x^4 + 2x^2 - x^3 + 4\right)$

c) $\left(30x^3 - 49x^2 + 7x\right) + \left(50x^3 - 75 - 60x^2\right)$

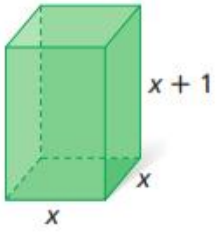
d) $\left(7x^3 + 9x^2 - 8x + 11\right) - \left(5x^3 - 13x - 16\right)$

Example 4) Find a polynomial expression in terms of x for the surface area of each figure.

a)



b)



Example 5) DO: #45a, 56-63 ALL, p. 411-412

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