

Monomial - a number, a variable or a product of numbers and variables

$$7 \quad 8x^3y^5$$

Polynomial - an expression involving one or more monomials

$$3x+1 \quad x^3+7x+4$$

Characteristics of Polynomials

$\frac{1}{3}x^1 + 1$ ✓ 1. variables have whole exponents

$\frac{1}{3}x^{-2}$ ✗ 2. real coefficients

3. no division by variables

Classifying Polynomials

1. Degree - largest exponent

Degree	Type
0	constant
1	linear
2	quadratic
3	cubic
4	quartic
5	quintic
≥ 6	n^{th} degree polynomial

Classifying Polynomials

2. Number of terms

Number of Terms	Type
1	monomial
2	binomial
3	trinomial
≥ 4	polynomial

ex: Classify the polynomial by the degree and number of terms.

a) $4x - 27x^2 + 3$

quadratic trinomial

b) $\pi x + \pi^2$

Linear binomial

ex: Classify the polynomial by the degree and number of terms.

c) $17,000^4$

constant monomial

d) $(x-17)^2 = x^2 - 34x + 289$

Quadratic trinomial

Standard Form of a Polynomial - a polynomial is in standard form when the terms' exponents are in descending order.

ex: Write the polynomial in standard form.

$$1 + 2x - 3x^4$$

$$-3x^4 + 2x + 1$$

Leading Coefficient - the coefficient of the term that defines the degree

ex: Identify the leading coefficient.

$$x - \frac{3x^4}{5} + 10$$

$$-\frac{3}{5}$$

ex: Consider the four polynomial functions.

$$a(x) = -5$$

$$b(x) = 5x^4 + 2$$

$$c(x) = 5x^2 + 4x - 3$$

$$d(x) = 2x - 1$$

Perform the indicated operation.

a) $a(x) + b(x)$

$$\begin{aligned} & -5 + 5x^4 + 2 \\ & 5x^4 - 3 \end{aligned}$$

ex: Consider the four polynomial functions.

$$a(x) = -5$$

$$b(x) = 5x^4 + 2$$

$$c(x) = 5x^2 + 4x - 3$$

$$d(x) = 2x - 1$$

Perform the indicated operation.

b) $b(x) - c(x)$

$$(5x^4 + 2) - (5x^2 + 4x - 3)$$

$$5x^4 - 5x^2 - 4x + 5$$

ex: Consider the four polynomial functions.

$$a(x) = -5$$

$$b(x) = 5x^4 + 2$$

$$c(x) = 5x^2 + 4x - 3$$

$$d(x) = 2x - 1$$

Perform the indicated operation.

c) $d(x) - 5b(x)$

$$(2x - 1) - 5(5x^4 + 2) = -25x^4 + 2x - 11$$
$$2x - 1 - 25x^4 - 10 = -25x^4 + 2x - 11$$

ex: Consider the four polynomial functions.

$$a(x) = -5$$

$$b(x) = 5x^4 + 2$$

$$c(x) = 5x^2 + 4x - 3$$

$$d(x) = 2x - 1$$

Perform the indicated operation.

$$\begin{aligned} \text{d) } a(x)b(x)d(x) &= -5(5x^4 + 2)(2x - 1) \\ &= -5(10x^5 - 5x^4 + 4x - 2) \\ &= -50x^5 + 25x^4 - 20x + 10 \end{aligned}$$

ex: Consider the four polynomial functions.

$$a(x) = -5$$

$$b(x) = 5x^4 + 2$$

$$c(x) = 5x^2 + 4x - 3$$

$$d(x) = 2x - 1$$

Perform the indicated operation.

e) ~~$[d(x)]^2$~~ $c(x)d(x)$

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

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

$$\begin{array}{r} 5x^2 + 4x - 3 \\ \hline 2x \sqrt{10x^3 + 8x^2 - 6x} \\ -1 \sqrt{-5x^2 - 4x + 3} \end{array}$$