Polynomial

Example	Name	Terms
7 $6x$	monomial	1 term
$3t - 1$ $12xy^3 + 5x^4y$	binomial	2 terms
$2x^2 + 3x - 7$	trinomial	3 terms

Nonexample	Reason
$5m^{n} - 8$	variable exponent
$n^{-3} + 9$	negative exponent

Degree of a Polynomial

The largest exponent or the largest sum of exponents of a term within a polynomial

Polynomial	Degree of Each Term	Degree of Polynomial
$-7m^3n^5$	$-7m^3n^5 \rightarrow$ degree 8	8
$2x + 3$	$2x \rightarrow$ degree 1 $3 \rightarrow$ degree 0	1
$6a^3 + 3a^2b^3 - 21$	$6a^3 \rightarrow$ degree 3 $3a^2b^3 \rightarrow$ degree 5 $-21 \rightarrow$ degree 0	5

Add Polynomials

(Group Like Terms – Horizontal Method)

Example:

$$h(g) = 2g^2 + 6g - 4;\ k(g) = g^2 - g$$

$$h(g) + k(g) = (2g^2 + 6g - 4) + (g^2 - g)$$

$$= 2g^2 + 6g - 4 + g^2 - g$$

(Group like terms and add)

$$= (2g^2 + g^2) + (6g - g) - 4$$

$$h(g) + k(g) = 3g^2 + 5g - 4$$

Add Polynomials

(Align Like Terms – Vertical Method)

Example:

$h(g)=2g^3+6g^2-4;\ k(g)=g^3-g-3$

$h(g)+k(g)=(2g^3+6g^2-4)+(g^3-g-3)$

(Align like terms and add)

$$\begin{array}{rr} & 2g^3+6g^2 \quad -4 \\ + & g^3 \quad -g-3 \\ \hline h(g)+k(g)= & 3g^3+6g^2-g-7 \end{array}$$

Subtract Polynomials
(Group Like Terms - Horizontal Method)

Example:

$f(x)=4x^2+5;\ g(x)=-2x^2+4x-7$

$f(x)-g(x)=(4x^2+5)-(-2x^2+4x-7)$

(Add the inverse)

$=(4x^2+5)+(2x^2-4x+7)$

$=4x^2+5+2x^2-4x+7$

(Group like terms and add.)

$=(4x^2+2x^2)-4x+(5+7)$

$f(x)-g(x)=6x^2-4x+12$

Subtract Polynomials
(Align Like Terms - Vertical Method)

Example:

$f(x)=4x^2+5;\ g(x)=-2x^2+4x-7$

$f(x)-g(x)=(4x^2+5)-(-2x^2+4x-7)$

(Align like terms then add the inverse and add the like terms.)

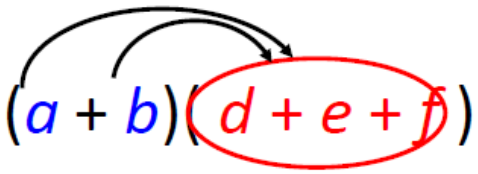
$$\begin{array}{rrcrr} 4x^2 & +5 & \rightarrow & 4x^2 & +5 \\ -(-2x^2 & +4x-7) & \rightarrow & +2x^2 & -4x+7 \end{array}$$

$f(x)-g(x)=6x^2-4x+12$

Multiply Polynomials

Apply the distributive property.

$$(a + b)(d + e + f)$$



$$= a(d + e + f) + b(d + e + f)$$

$$= ad + ae + af + bd + be + bf$$

Divide Polynomials

(Monomial Divisor)

Divide each term of the dividend by the monomial divisor

Example:

$$f(x) = 12x^3 - 36x^2 + 16x;\ g(x) = 4x$$

$$\frac{f(x)}{g(x)} = (12x^3 - 36x^2 + 16x) \div 4x$$

$$= \frac{12x^3 - 36x^2 + 16x}{4x}$$

$$= \frac{12x^3}{4x} - \frac{36x^2}{4x} + \frac{16x}{4x}$$

$$\frac{f(x)}{g(x)} = 3x^2 - 9x + 4$$

Divide Polynomials
(Binomial Divisor)

Factor and simplify

Example:

$$f(w) = 7w^2 + 3w - 4;\ g(w) = w + 1$$

$$\frac{f(w)}{g(w)} = (7w^2 + 3w - 4) \div (w + 1)$$

$$= \frac{7w^2 + 3w - 4}{w + 1}$$

$$= \frac{(7w - 4)(w + 1)}{w + 1}$$

$$\frac{f(w)}{g(w)} = 7w - 4$$

Prime Polynomial

Cannot be factored into a product of lesser degree polynomial factors

Example
r
$3t + 9$
$x^2 + 1$
$5y^2 - 4y + 3$

Nonexample	Factors
$x^2 - 4$	$(x + 2)(x - 2)$
$3x^2 - 3x - 6$	$3(x + 1)(x - 2)$
x^3	$x \cdot x^2$