6.3 Polynomials

Monomials: ex) $2x^3$
(1 term Expression)

Binomials: ex) $2x^3 - 4x^2$
(2 terms Expression)

Trinomials: ex) $2x^3 - 4x^2 + 5x$
(3 terms Expression)

Polynomials: ex) $2x^3 - 4x^2 + 5x - 3$
4 and more terms

Any Algebric Expressions :

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

- $2x^3$: 1st term
- $4x^2$: 2nd term
- $5x$: 3rd term
- 3 : constant term

↑ Leading term

Ex) $2x^3 + 4x^2 - 5x^5 + x - 2$ (2nd, 3rd, 1st, 4th, Last) $= -5x^5 + 2x^3 + 4x^2 + x - 2$

Standard Form: Starting the term with the highest power.

Degree: Highest power of the variable — degree 5 or 5th degree

Ex) $3x^2y^3 - 2xy^2 + 4y$ (5, 3, 1) degree 5

Two variables: add up the power for each term, choose the largest sum for degree:

If No Variable, degree is "0" !!

Note: All constants have degree of 0! ex) 2 ; -4

Classify the polynomials by using degree and terms:

Degree	0	1	2	3	4	5	6 or more
Name	Constant	Linear	Quadratic	Cube	Quartic	Quintic	6^{th} degree...

Term	1	2	3	4 or more
Name	Monomial	Binomial	Trinomial	Polynomial

Ex) Classify $7x^4 + 5x + 3$ according to its degree and number of terms. Degree: Quartic

Term: Trinomial

Classify the following polynomials.

a) $x^2 - 2x + 1$ Quadratic Trinomial

b) $9a^6 - 8a^8 = -8a^8 + 9a^6$ 8th degree Binomial

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

d) $5x^5$ Quintic Monomial

Add or Subtract Polynomials: **Combine Like Terms!!**

Like Terms: same variable with the same exponent

Ex) x^2 and x^2; xy and xy; x^2y and x^2y (like terms)

But: xy and x^2y are NOT like term

Combine Like Terms: Add or Subtract the numbers in front of each like term. (Do NOT Touch the variables)

Ex1) $(3x^2 - 2x + 3) + (x^2 - 7x + 7)$

Add

$= 4x^2 - 9x + 10$; Classify: Quadratic Trinomial

Ex2) $(6x^2 + 3x) + (-1x^2 - 4x - 3)$

$= 5x^2 - x - 3$; Classify : Quadratic Trinomial

Ex3) $(x^3y + 3x^2y^2 - 2xy^3) + (2x^3y - 9x^2y^2 - xy^3)$

$= 3x^3y - 6x^2y^2 - 3xy^3$; Classify : Quartic Trinomial

Try) $(2x^4y^3 - 4x^3y^2 + 5x^2y - 6x) + (3x^3y^2 - 6x^2y + 11x)$

$= 2x^4y^3 - x^3y^2 - x^2y + 5x$; Classify : 7th degree Polynomial

Subtract Polynomials: Distribute the negative to EACH part on the 2nd ( ).

Ex1) $(10x^2 + 5x - 6) - (8x^2 - 2x - 1)$

$= 10x^2 + 5x - 6 - 8x^2 + 2x + 1 = 2x^2 + 7x - 5$

Ex2) $(3x^2y + 7xy^2 + 1) - (8 + 5xy^2 + 7x^2y)$

$= 3x^2y + 7xy^2 + 1 - 8 - 5xy^2 - 7x^2y = -4x^2y + 2xy^2 - 7$

Try) $(x^3y^2 + 2x^2y + 5x) - (3x^2y - x - 10)$

$= x^3y^2 + 2x^2y + 5x - 3x^2y + x + 10$

$= x^3y^2 - x^2y + 6x + 10$

6.1 – 6.2 Review

Simplify Integer Exponents:

1) $\left(x^2y^{-3}\right)^4\left(x^{-2}y^4z\right)^3$

$(x^8y^{-12})(x^{-6}y^{12}z^3)$

$x^2y^0z^3 = \boxed{x^2z^3}$

2) $\dfrac{\left(x^{-3}y^2\right)^4}{\left(4xy^3\right)^2} = \dfrac{x^{-12}y^8}{16x^2y^6}$

$= \boxed{\dfrac{y^2}{16x^{14}}}$

3) $\left(3x^2y^{-5}\right)\left(5x^{-2}y^3z\right)$

$= 15x^0y^{-2}z$

$= \boxed{\dfrac{15z}{y^2}}$

Simplify Rational Exponents:

4) $27^{\frac{2}{3}}$

$\sqrt[3]{27}^2$

$= 3^2 = \boxed{9}$

5) $216^{\frac{1}{3}}$

$\sqrt[3]{216}$

$= \boxed{6}$

6) $\sqrt[3]{x^3y^6}\left(x^{\frac{2}{3}}y^2\right)^3$

$= (x^1y^2)(x^2y^6)$

$= \boxed{x^3y^8}$

7) $\dfrac{\sqrt[4]{x^{12}y^8}}{x^5y^2}$

$= \dfrac{x^3y^2}{x^5y^2} = \boxed{\dfrac{1}{x^2}}$