

Lesson 3 : ^{mini-day!} $+ - \times \div$ Operations on Polynomials May 25th, 2023

e.x. $2x^2 + 2x + 4$ e.x. ^{Not a poly} $2x^{-2} + 2x + 4$
 e.x. $2x^2 + 2x$ e.x. ^{Not a poly} $2x^2 + x^{1/2}$
 $2x^2 + \sqrt{x}$

Definition : a polynomial is an algebraic expression w/ constants and variables that have exponents that belong to the natural numbers. \mathbb{N} \rightarrow positive whole #

Vocabulary : $3n^2 + 2n + 5$
 coefficient \downarrow exponent \swarrow exponent (i)
 variable \uparrow variable \uparrow constant

Monomials : $3n^2$ / $10xyz^2$

Binomials : $3x^2 - y$ $3x^2 - yxz$

Trinomials : $12 - x^2 + y$ $12 - x^2 + y + 2y$
 $12 - x^2 + 3y$

Finding the Degree of a Polynomial: take the ⁺sum of the exponents ^{of variables} in the term with largest sum of exponents.

ex.	Polynomial	Degree
	$x^2 + x + 1$	2
	$2x + 1$	1
	$4x^2y + x'y + 9$	3
	$x'y + x + y$	2

nota bene: By convention, we order the terms of a polynomial from highest to lowest degree

example: Rearrange terms to follow convention, state how many terms, and state degree of polynomial

$2 - 3 = -3 + 2$

	# of terms	Degree
i. $2x^2 - 3x^3y - 2xy - 1$ $-3x^3y + 2x^2 - 2xy - 1$	4	4 th
ii. $-2a^5 + 3a^3b^3 - 2b - a$ $3a^3b^3 - 2a^5 - 2b - a$	4	6
iii. $-2xyz + 2x^2y^3z - 10$ $2x^2y^3z - 2xyz - 10$	3	6
iv. $4x^2 - 10x^4 + 10 - x^3$ $-10x^4 - x^3 + 4x^2 + 10$	4	4
v. $a - b^2 - 3a^6b^2 - 3a^7$ $-3a^6b^2 - 3a^7 - b^2 + a$	4	8

Recall: Adding Like Terms

ex.

$$\underline{3x^2y^3z} - xyz + \underline{13x^2y^3z}$$

$$16x^2y^3z - xyz$$

ex. Add like terms

$$i. \quad \underline{3x^2} - xy \quad \underline{-4x^2}$$

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

$$-x^2 - xy$$

$$ii. \quad \underline{1x^2y^3z^6} - 4x^2y^3 - \underline{3x^2y^3z^6}$$

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

$$-2x^2y^3z^6 - 4x^2y^3$$

note: We can only add like terms, that have same variables w same exponents but the coefficients can be different

2 apples + 3 apples
 2 ap²les + 3 ap²les
 (2 + 3) ap²les

Multiplying Monomials:

nota bene: only a plus (addition not positive) or a minus sign (subtraction not negative sign) introduces new term. ex one term:

ex one term: $3x^3y^2z - (3x^2y^2z)$ negative sign

e.x $3x^3y^2z - 3x^2y^2z$ subtract sign

two terms: $3mn^2 - 4m^3n^2$ one term:

one term: $3x^3y^2z \times -3x^2y^2z$ negative sign

$3 \times (-3) x^3 x^2 y^2 y^2 z \cdot z$
 $-9 x^5 y^4 z^2$

ii. $3mn^2(-4m^3n^2)$
 $3 \times (-4) m \times m^3 n^2 \times n^2$
 $-12 m^4 n^4$

Recall:
 law 3:
 $\frac{a}{m} \times \frac{a}{n}$
 $= a^{m+n}$

iii. $-1a^2 b^1 \cdot \frac{4}{3} b^2 c^3$
 $-\frac{4}{3} a^2 \cdot b^3 \cdot c^3$

iv. $-7x^4 y^1 z^3 \times -3x^2 y^2 z^2$
 $3x^6 y^3 z^5$

v. $\frac{2}{3} a^2 b^4 \cdot \frac{3}{2} b^1 c^4$
 $\frac{2}{3} \times \frac{3}{2} a^2 b^5 c^4$
 $\frac{6}{6} a^2 b^5 c^4$
 $a^2 b^5 c^4$

Dividing Monomials:

e.x

$$\frac{6x^3y^2z}{3x^2y'z}$$

$$2xy$$

law 4:

$$\frac{a^m}{a^n} = a^{m-n}$$

$$2x^{3-2}y^{2-1}z^{1-1}$$

$$2x^1y^1z^0$$

$$2xy$$

e.x.

$$-a^2b \div \frac{4}{3}b^2c^3$$

$$\frac{-1a^2b}{\frac{4}{3}b^2c^3}$$

$$-\frac{3}{4} \cdot \frac{a^2}{bc^3}$$

$$\frac{-3a^2}{4bc^3}$$

coefficient: -division

keep/change/flip

$$-1 \div \frac{4}{3}$$

$$-1 \times \frac{3}{4}$$

$$-\frac{3}{4}$$

You do: Evaluate:

i. $\frac{-4m^5n^2}{-3mn^2}$
 $= \frac{4}{3}m^4$

ii. $-m^2n(-2m^2n)$
 $= 2m^4n^2$

iii. $-m^2n - 2m^2n$
 $= -3m^2n$

iv. $4x^2 \div -x^2$
 $= 4$

v. $4x^2 - x^2$
 $= 3x^2$

vi. $5ab(-3a^3b^2)$
 $= -15a^4b^3$

vii. $5a^3b^2 - 3a^3b^2c - 10ab^2c + 2a^3b^2c$
 $- a^3b^2c + 5a^3b^2 - 10ab^2c$

Check your answers w partner or
 homework: all of pg 21 w me @
 #1,9 on page 15 the front