2-1 Operations with Polynomials

Objectives:

- I can identify the parts of a polynomial

- I can perform operations with polynomials including addition, subtraction, and multiplication

Vocabulary

Monomial → one term
term
Ex: x, $3a^2b$, 5

Binomial → two terms
term
Ex: $x+y$, $4ab+3b^2$

Trinomial → three terms
term

Polynomial → many terms (any # of terms)
term

Like Terms → same variables w/ the same exponents

Ex: $5x$, $3x$

$5x^2y$, $10x^2y$

Monomials

Identify the monomials: x^3, ~~$y + 3y^2 - 5y^3 + 10$~~, $a^2\,bc^{12}$, 76

Monomials: _____

Not monomials: _____

Identify the degree of each monomial.

total exponents of the variables in monomial

$2+1+12$

Monomial	x^3	$a^2\,bc^{12}$	76
Degree	3	15	0

$76x^0$

$76 \cdot 1 = 76$

Polynomials pg. 315

Identify the terms of the polynomial $y + 3y^2 - 5y^3 + 10$. _____

separated by + or −

Identify the coefficient of each term.

Term	y	$3y^2$	$-5y^3$	10
Coefficient	1	3	−5	10

Identify the degree of each term.

Term	y	$3y^2$	$-5y^3$	10
Degree	1	2	3	0

Write the polynomial in standard form. $-5y^3 + 3y^2 + y + 10$

highest deg. to lowest deg.

What is the leading coefficient of the polynomial? −5

★ What is the degree of the polynomial? 3

Adding Polynomials pg. 316

Ex 1 $(4x^2 - x^3 + 2 + 5x^4) + (-x + 6x^2 + 3x^4)$

$$\begin{array}{rrrrr} 5x^4 & -x^3 & +4x^2 & & +2 \\ +3x^4 & & +6x^2 & -x & \\ \hline \end{array}$$

$$\boxed{8x^4 - x^3 + 10x^2 - x + 2}$$

Ex 2 $(10x - 18x^3 + 6x^4 - 2) + (-7x^4 + 5 + x + 2x^3)$

$$\boxed{-x^4 - 16x^3 + 11x + 3}$$

Add the following polynomials pg. 316

$(17x^4 + 8x^2 - 9x^7 + 4 - 2x^3) + (11x^3 - 8x^2 + 12)$

$(-8x + 3x^{11} + x^6) + (4x^4 - x + 17)$

Subtracting Polynomials pg. 317

$(12x^3 + 5x - 8x^2 + 19) + -(6x^2 + 9x \overset{-}{\cancel{+}} 3 + 18x^3)$

Write in standard form.

Align like terms and add the opposite.

Add.

$$\begin{array}{rrrr} 12x^3 & -8x^2 & +5x & +19 \\ +18x^3 & -6x^2 & +9x & -3 \\ \hline \end{array}$$

$30x^3 - 14x^2 + 14x + 16$

$(-4x^2 + 8x^3 + 19 - 5x^5) - (9 \overset{-}{\cancel{+}} 2x^2 \overset{-}{\cancel{+}} 10x^5)$

$(-4x^2 + 8x^3 + 19 - 5x^5) + (-9 - 2x^2 - 10x^5)$

$-15x^5 + 8x^3 - 6x^2 + 10$

Subtract the following polynomials pg. 317

$(23x^7 - 9x^4 + 1) + (-9x^4 \overset{-}{\cancel{+}} 6x^2 + 31)$

$23x^7 - 6x^2 + 32$

$(7x^3 + 13x - 8x^5 + 20x^2) - (-2x^5 + 9x^2)$

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The data from the U.S. Census Bureau for 2005–2009 shows that the number of male students enrolled in high school in the United States can be modeled by the function $M(x) = -10.4x^3 + 74.2x^2 - 3.4x + 8320.2$, where x is the number of years after 2005 and $M(x)$ is the number of male students in thousands. The number of female students enrolled in high school in the United States can be modeled by the function $F(x) = -13.8x^3 + 55.3x^2 + 141x + 7880$, where x is the number of years after 2005 and $F(x)$ is the number of female students in thousands. Estimate the total number of students enrolled in high school in the United States in 2009.

male

female

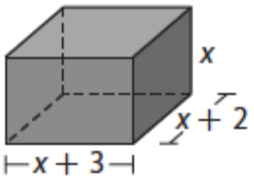
In the equation $\boxed{T(x) = M(x) + F(x)}$, $T(x)$ is the total number of students in thousands.

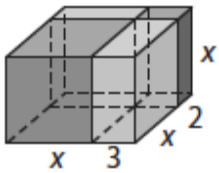
$$\begin{array}{rl} & -10.4x^3 + 74.2x^2 - 3.4x + 8320.2 \\ + & -13.8x^3 + 55.3x^2 + 141x + 7880 \\ \hline & -24.2x^3 + 129.5x^2 + 137.6x + 16200.2 \end{array}$$

4 4

Pg. 327

$V = \text{length} \times \text{width} \times \text{height}$
$= (x+3)(x+2)x$





Identify the volume of:

V_1 V_2 V_3 V_4

$(x^2)(x^2) = x^4$

$(x+3)(x+2)x$

$(x^2 + 2x + 3x + 6)x$

$(x^2 + 5x + 6)x = x^3 + 5x^2 + 6x$

Multiplying Polynomials pg. 328

$$5x \cdot 6x^3 = 30x^{1+3}$$
$$= 30x^4$$

$$-2x^2y^4z \cdot 5y^2z = -10x^2y^{4+2}z^{1+1}$$
$$= -10x^2y^6z^2$$

$$(2+3x)(1+x) = 2(1+x) + 3x(x+1)$$
$$= 2(1) + 2(x) + 3x(x) + 3x(1)$$
$$= 2 + 2x + 3x^{1+1} + 3x$$
$$= 2 + 5x + 3x^2$$

Pg. 328

Ex 1 $(x+2)(1-4x+2x^2)$

Find the product by multiplying horizontally.

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

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

$2x^3 - 4x^2 + x + 4x^2 - 8x + 2$

$2x^3 - 7x + 2$

Therefore, $(x+2)(2x^2-4x+1) = 2x^3 - 7x + 2$.

$(3x-4)(2+x-7x^2)$

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$$\begin{array}{r} -7x^2+x+2 \\ \times \quad 3x-4 \\ \hline \end{array}$$

$28x^2 \quad -4x \quad -8$

$-21x^3 \quad 3x^2 \quad 6x$

$-21x^3+31x^2+2x-8$

Multiply the following polynomials pg. 329

$(3+2x)(4-7x+5x^2)$

$12 \quad -21x \quad +15x^2$

$8x \quad -14x^2 \quad +10x^3$

$12-13x+x^2+10x^3$

$\boxed{\text{S.F.}: 10x^3+x^2-13x+12}$

$(x-6)(3-8x-4x^2)$

$(x-6)(-4x^2-8x+3)$

$-4x^3-8x^2+3x$

$+24x^2 \quad +48x \quad -18$

$\boxed{-4x^3+16x^2+51x-18}$

Multiplying with a table

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

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

$$\boxed{x^4+2x^3-7x^2+8x-5}$$

add along diagonals