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 (terms) → one term
Ex: $2x$, $3xy^2$, 4

Binomial (term) → two terms
Ex: $x+y$, $5a^2-7ab$

Trinomial (terms) → three terms

Polynomial (terms) → many terms (any # of terms)

Like Terms → Same variable(s) with the same exponents

Monomials

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

Monomials: x^3, a^2bc^{12}, 76

Not monomials: $y+3y^2-5y^3+10$

Identify the degree of each monomial.

Monomial	x^3	$a^2\,bc^{12}$	76
Degree	3	$2+1+12$ = 15	0

total exponents of all the variables in a term

Polynomials pg. 315

Identify the terms of the polynomial $y + 3y^2 - 5y^3 + 10$. separated by + or −

Identify the coefficient of each term. # in front of variable(s)

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 $-5y^3+3y^2+y+10$ (first term)

What is the leading coefficient of the polynomial? −5

coefficient of 1st term in standard

* What is the degree of the polynomial? 3

the highest degree that exists in a polynomial

Adding Polynomials pg. 316

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

$$\begin{array}{llll} 5x^4 & -x^3 & +4x^2 & +2 \\ +3x^4 & & +6x^2 & -x \\ \hline 8x^4 & -x^3 & +10x^2 & -x \quad +2 \end{array}$$

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

$-x^4 - 16x^3 + 11x + 3$

Add the following polynomials pg. 316

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

$-9x^7 + 17x^4 + 9x^3 + 16$

$0x^2 = 0$

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

$3x^{11} + x^6 + 4x^4 - 9x + 17$

Subtracting Polynomials pg. 317

$(12x^3 + 5x - 8x^2 + 19) + (6x^2 + 9x - 3 + 18x^3)$

Write in standard form.

Align like terms and add the opposite.

Add.

change the sign on 2nd polynomial

$12x^3$	$-8x^2$	$+5x$	$+19$
$+18x^3$	$-6x^2$	$+9x$	-3

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

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

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

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

Subtract the following polynomials pg. 317

$(23x^7 - 8x^4 + 1) + (+8x^4 - 6x^2 + 31)$

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

$0x^4 = 0$

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

$-6x^5 + 7x^3 + 11x^2 + 13x$

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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.

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

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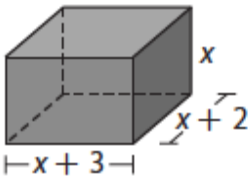
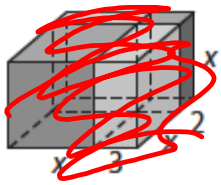
V = length × width × height
$= (x+3)(x+2)x$





Identify the volume of:

V_1 V_2 V_3 V_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

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

$= 30x^4$

$5x \cdot 6x^3$

$(5 \cdot 6)(x^1 \cdot x^3)$

$x \cdot x \cdot x \cdot x$

$30x^4$

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

$= -10x^2y^6z^2$

$-2x^2 \cdot y^4 z \cdot 5y^2 z =$

$-10x^2y^6z^2$

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

Pg. 328

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

Find the product by multiplying horizontally.

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

$= 2x^3 - 7x + 2$

Pg. 329

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

$$\begin{array}{r} -7x^2+x+2 \\ \times \quad 3x-4 \\ \hline 28x^2-4x-8 \\ -21x^3+3x^2+6x \\ \hline -21x^3+31x^2+2x-8 \end{array}$$

Multiply the following polynomials pg. 329

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

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

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

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

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

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

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

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

$-18+51x+16x^2-4x^3$

$-4x^3+16x^2+51x-18$

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

$x^4 + 2x^3 - 7x^2 + 8x - 5$