Notes: Classifying, Adding/Subtraction/Multiplication of Polynomials

Standard Form: Largest Exponent → Smallest Exponent

$3x^5 + 4x^4 + 5x^2 + 6$

Degree

Leading Coefficient

4 Terms

Classifying Polynomials be Degree		
Name	Degree	Example
Constant	0	$-9\ x^0$
Linear	1	$x^1 - 4$
Quadratic	2	$x^2 + 3x - 1$
Cubic	3	$x^3 + 2x^2 + x + 1$
Quartic	4	$2x^4 + x^3 + 3x^2 + 4x - 1$
Quintic	5	$7x^5 + x^4 - x^3 + 3x^2 + 2x - 1$

Polynomial	Number of Terms	Name of Function
$2x^6$	1	monomial
$7x - 4$	2	binomial
$x^5 + 3x^3 - 2$	3	trinomial
$3x^5 - 5x^3 + 2x^2 - x + 7$	14+	~~polynomial~~ or polynomial

a) $2x^2 - 5x^4 + 3 - 6x$

Standard Form: $-5x^4 + 2x^2 - 6x^1 + 3x^0$

Leading Coefficient: -5 Degree: 4 Terms: 4

Name: Quartic Polynomial

b) $3x - 8x^4 - x^5 + 3x^2 - 1$

Standard Form: $-x^5 - 8x^4 + 3x^2 + 3x - 1$

Leading Coefficient: -1 Degree: 5 Terms: 5

Name: Quintic Polynomial

Identifying Like Terms:

→ same variable raised to the same power

Examples: 4y and 7y $8x^2$ and $-4x^2$ $7m^5y$ and m^5y

Non Examples: $3x^2$ and 3x 8m and 6n

Like Terms?

$3x^2y$ and $-3yx^2$	$15xy^2$ and $12x^2y$	13 and -4
✓	X	✓

Adding Polynomials:

$3x^2 + 4x + 5x^2 + 6x$

Identify Like Terms

$3x^2 + 5x^2 + 4x + 6x$

Rearrange terms so that like terms are together

$8x^2 + 10x$

Combine Like terms

EX: $(5y^2 + 7y + 2) + (4y^2 + y + 8)$

$9y^2 + 8y + 10$

EX: $(6x^2y - 4xy + 8y^2x) + (4x^2y - 12y^2x)$

$10x^2y - 4xy - 4y^2x$

Subtracting Polynomials:

$(6y^4+3y^2-7)-(2y^4-y^2+5)$

$6y^4+3y^2-7-2y^4+y^2-5$

$4y^4+4y^2-12$

★ Distribute the negative

Identify Like Terms

Rearrange terms so that like terms are together

Combine like terms.

EX: $(4x^3-x^2+10)-(2x^3-x^2-15)$

$4x^3-x^2+10-2x^3+x^2+15$

$2x^3+25$

EX: $(10a^7+3a^2b-ab)-(8a^7-a^2b+2)$

$10a^7+3a^2b-ab-8a^7+a^2b-2$

$2a^7+4a^2b-ab-2$

Multiplying Monomials:

$(5x^2)(4x^3)$

$(5\cdot4)(x^2\cdot x^3)$

$20x^5$

$(12x^3y^6)(-4xy^2)$

$(12\cdot-4)(x^3\cdot x^1)(y^6\cdot y^2)$

$-48x^4y^8$

Multiplying Monomials by Polynomials:

$5(2x^2+x+4)$

$2x^2(5)+x(5)+4(5)$

$10x^2+5x+20$

$\frac{1}{3}x^2(9x^2-6x+12)$

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

Multiplying Binomial by Binomial:

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

$2x^2-10x+x-5$

$2x^2-9x-5$

$(x+4)(x-6)$

F O I L

$x\cdot x$ First; $x\cdot-6$ Outer; $4\cdot x$ Inner; $4\cdot-6$ Last

$x^2-6x+4x-24$

$x^2-2x-24$

$(2x+4)(2x-6)$

	$2x$	$+4$
$2x$	$4x^2$	$8x$
-6	$-12x$	-24

$4x^2+8x-12x-24$

$4x^2-4x-24$

1) $2y^2 + 3y + 7y - y^2$

2) $12x^5 + 10x^4 - 8x^5$

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

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

5) $(2y^5 - 6y^3 + 1) + (y^5 + 8y^4 - 2y^3 - 1)$

6) $(t^3 - 2t) - (t^2 + 2t + 6)$

$t^3 - 2t - t^2 - 2t - 6$

$t^3 - t^2 - 4t - 6$

7) $(m^2 - 10m + 5) + (8m + 2)$

8) $(6x^3 + 5x) + (4x^3 + x^2 - 2x + 9)$

$10x^3 + x^2 + 3x + 9$

9) $(4c^5 + 8c^2 - 2c - 2) - (c^3 - 2c + 5)$

10) $(4x + 3)(x - 6)$

$4x^2 - 24x + 3x - 18$

$4x^2 - 21x - 18$

11) $4a(3a^2 - a + 2) - (a^3 + 2a^2 + 4)$

12) $8a - 2(3a + 4)$

$8a - 6a - 8$

$2a - 8$

13) $(4xy + 3x - 7x^3y) - 3x(y - 2 + x^2y)$

$4xy + 3x - 7x^3y - 3xy + 6x - 3x^3y$

$-10x^3y + xy + 9x$

14) $(x^2 + 1)(2x + 3)$

	x^2	$+1$
$2x$	$2x^3$	$2x$
$+3$	$3x^2$	3

$2x^3 + 3x^2 + 2x + 3$