Algebra 2 w/ Trigonometry (Honors and Regular)

Unit 5 : Polynomials and Polynomial Equations

Chapter 5: Sections 5-1 through 5-8.

Definitions:

1) Polynomial in x : $a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0$ (monomial, binomial, trinomial)
2) Example: $5x^3 - 2x + 7$
   a) Terms: $5x^3$, $-2x$, 7 (← Note: the minus in -2x)
   b) Coefficients: 5 , -2 , 7
   c) Degree of term: 3 , 1 , 0
   d) Note: if we had a term like $4x^3y^6$, than the degree of the term is 9: The sum of degrees of all independent variables in the term
   e) Degree of Polynomial: 3 (degree of highest term)
3) Like terms: Same variables raised to the same power. $2x^3y^6 + 3y^6x^3 = 5x^3y^6$

Addition and subtraction of polynomials

Multiplication (product) of polynomials : multiply everything! (FOIL is a special case for binomials)

$$(2y^2 + y)(5x^3 - 2x + 7) = 10y^2x^3 - 4y^2x + 14y^2 + 5yx^3 - 2xy - 7y$$

Factoring: write an expression as a product.

Special common cases to remember, useful for simplifying and for factoring:

1. $(A+B)^2 = A^2 + 2AB + B^2$; $(A-B)^2 = A^2 - 2AB + B^2$
2. $(A+B)^3 = A^3 + 3A^2B + 3AB^2 + B^3$; $(A-B)^3 = A^3 - 3A^2B + 3AB^2 - B^3$
3. $(A+B)(A-B) = A^2 - B^2$
4. $A^3 + B^3 = (A+B)\,(A^2 - AB + B^2)$; $A^3 - B^3 = (A-B)\,(A^2 + AB + B^2)$

Solving equations by factoring:

$x^2 - 3x - 28 = 0$ ➔ $(x-7)(x+4) = 0$ ➔ $x = 7$ or $x = -4$

General techniques for factoring:

1. Common factor
2. Known formulae: Trinomial Squares, Difference of squares, Difference and sum of Cubes
3. Grouping (polynomial of 4 terms or more)
4. General trinomial of type $ax^2 + bx + c$ into $(\square\, x + \square)(\square x + \square)$ by finding the right terms in the □'s. (factors). Various tricks: X-form, Box-form, Slip-n-slide