Name_____

Algebra 2

Lesson 6-2

Polynomials and Linear Factors

Just as we factored quadratic equations in Chapter 5, we can factor polynomials with higher degrees. When a polynomial is factored, the terms are known as **Linear Factors.** In math we liken these linear factors to the prime factors of a real number because the polynomial cannon be factored into any simpler term:

Examples: 12 $\quad$ $x^2 + 4x - 12$

$4x3$ $\quad$ $(x+6)(x-2)$ ← **linear factors**

$2x2$ ← **prime factors**

To write a polynomial in standard form from its factored form we do as in Ch. 5, and multiply the terms in each factor with each other.

Example: Write the expression in polynomial form:

$(x+1)(x+1)(x+2)$

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

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

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

x^3+4x^2+5x+2

1. multiply the last two binomials together
2. now multiply the first term with the quadratic (distribute the x and the 1)
3. simplify

We can also factor a polynomial. First look to see if there is a GCF – greatest common factor that may simplify the factoring.

Example: Factor: $6x^3 - 15x^2 - 36x$

$3x(2x^2 - 5x - 12)$ $\quad$ ac=-24: (3)(8) & 3-8=-5

$3x(2x^2 + 3x - 8x - 12)$

$3x[x(2x+3) - 4(2x+3)]$

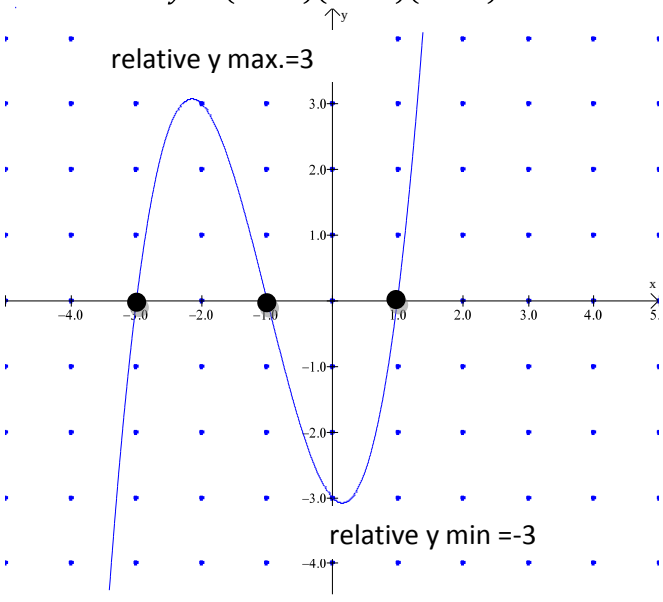
$3x(2x+3)(x-4)$ ← **linear factors**

1. Is there a variable in common? What about a number?
2. Factor the GCF out of the polynomial.
3. Factor the remaining quadratic using principles from chapter 5.

When a polynomial is in factored form, the **zero product property** may be used to find the zeros. Remember the values of the x-intercepts are called **zeros** because the value of the function is zero at each x-intercept.

With polynomials of degree greater than 2 we will have both minimum and maximum values of **y**. These are called **relative minimum** and **relative maximums** when comparing near-by points on a graph.

Example: Find the zeros and relative maximum and relative minimum of: $y = (x+1)(x-1)(x+3)$



1. Using your graphing calculator, enter the equation **Y=**
 note: you don't need to write the expression in polynomial form, enter the binomials using parentheses to separate.

2. What are the relative minimum and maximum?

3. What are the zeros?