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 cannoy be factored into any simpler term:

The polynomial $x^3 + 4x^2 + 5x + 2$ in factored form is: $(x + 1)(x + 1)(x + 2)$

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.

Multiplicity: If a linear factor of a polynomial is repeated, then the zero is repeated. A **repeated zero** is called a **multiple zero** and has a **multiplicity** equal to the number of times the zero occurs. The exponent of a binomial would indicate the multiplicity

Find the zeros of each function, state the multiplicity

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

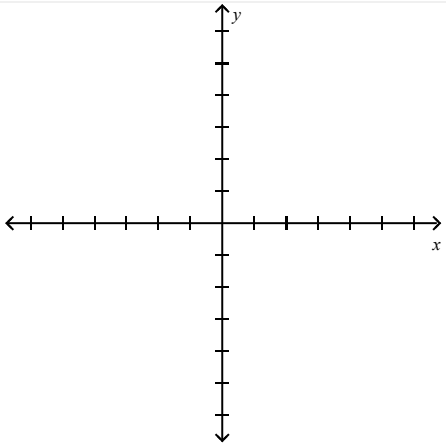
Write a polynomial function given the following zeros

$x = -2, 0, 1$	$x = -5, -5, 1$

Factor each polynomial completely

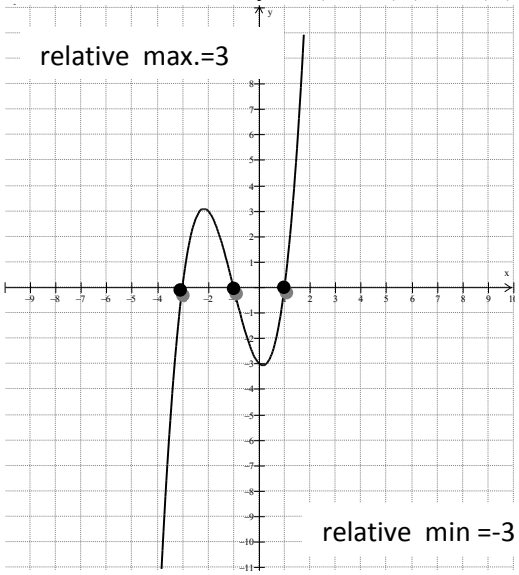
$9x^3 + 6x^2 - 3x$	$x^3 + 8x^2 + 16x$

Find the zeros and sketch the graph

$y = (x - 1)(x + 2)(x - 4)$	

With polynomials of degree greater than 2 we may 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?

FACTOR THEOREM: The expression $x - a$ is a linear factor of a polynomial if and only if the value **a** is a zero of the related polynomial factors. In other words: when $x - a$ is a factor,

1. **a** is a solution to the polynomial
2. **a** is an x-intercept of the graph
3. **a** is a zero of the polynomial