Lesson 2: Review of Steps in Factoring

1. ALWAYS take out common factors first.

$$6x^3+12x^2+3x = 3x(2x^2+4x+1)$$

2. Terms in brackets:

   a. If there are identical terms in brackets, take them out as a common factor.

$$2x(\cancel{x-2})+3(\cancel{x-2}) = (x-2)(2x+3)$$

   b. If one bracket has opposite signs, be sure to change all signs for that bracket by multiplying by -1.

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

3. When there are three terms in a quadratic:

   a. "Easy" type with no coefficient in front of the x^2 term; find two factors that multiply to give the ~~first~~ last term and add to give the middle term.

$$x^2-9x+14 = (x-2)(x-7)$$

$$3x^2+3x-6 = 3(x^2+x-2) = 3(x+2)(x-1)$$

   b. "Harder" type with a number in front of the x^2 term; multiply the first and last term coefficients; find two factors that multiply to give this new number and add to give the middle term; divide each of these numbers by the x^2 coefficient.

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

-24

$$\left(x+\frac{8}{3}\right)\left(x-\frac{3}{3}\right) = (3x+8)(x-1)$$

4. If there are only two terms, look for perfect squares and factor as a difference of squares.

   a. Remember those common factors first!

$$12x^2-75 = 3(4x^2-25)$$

$$3(2x-5)(2x+5)$$

   b. The perfect squares may already be in a factored form.

$$(x+2)^2-(x-3)^2 \quad [(x+2)+(x-3)][(x+2)-(x-3)]$$

$$(2x-1)5$$

   c. Remember to check for a second set of perfect squares to factor again, but only a difference of squares can be factored, NOT a sum of squares.

$$16x^4-81 = (4x^2+9)(4x^2-9)$$

$$= (4x^2+9)(2x-3)(2x+3)$$