Factoring Binomials Review

If a binomial expression can be factored at all, it must be factored in one of four ways. In Math 30-2 we will use two of the four strategies.

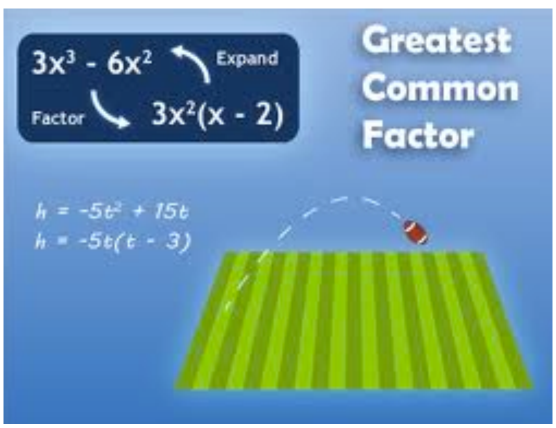
- Always find the greatest common factor (GCF) first.
- Factor the difference of two perfect squares. Some binomials might have a combination of both factoring strategies.

Let's look at a couple of examples to review.

Common Factor

When factoring numbers or factoring polynomials, you are finding numbers or polynomials that divide out evenly from the original numbers or polynomials. But in the case of polynomials, you are dividing numbers and variables out of expressions, not just dividing numbers out of numbers.

Using a factor tree (prime factorization) is extremely helpful in finding which factors are common in each term.



Example:
Factor the binomial 6x - 15.

Solution:

6x - 15	⇦ To factor binomials we always take a common factor first.
2(3)(x) - 3(5)	⇦ We do this by breaking down each term using prime factorization.
3(2x - 5)	⇦ We can see from the prime factorization that there is a 3 that is common in both terms. We divide the 3 out of both terms.

Example:

Factor the binomial $a^2b - ab^3$

Solution:

$a^2b - ab^3$ ⬅ To factor binomials we always take a common factor first.

$(a)(a)(b) - (a)(b)(b)(b)$ ⬅ We do this by breaking down each term using prime factorization.

$ab(a - b^2)$ ⬅ We can see from the prime factorization that there is an *a* and a *b* is common in both terms. We divide the *ab* out of both terms.

Difference of Squares

Before we can review the factoring technique, we need to understand some words here.

Difference means "subtraction" and squares means numbers or terms that a perfect squares. For example, 9 is a perfect square since it can be written as 3^2. Other examples of perfect squares are x^2, $49y^2$.

When we factor using difference of squares, we use the following:

Difference of Squares: $a^2 - b^2 = (a+b)(a-b)$

Example:

Factor the binomial $b^2 - 49$

Solution:

$b^2 - 49$ ⬅ To factor binomials we always take a common factor first. In this example there is no common factor. We now try difference of two squares. Are the two terms perfect squares?

$(b)^2 - (7)^2$ ⬅ Since we can take the square root of b^2 and 49 they are perfect squares.

$(b-7)(b+7)$ ⬅ Since we have two perfect squares and there is a subtraction sign between them, we can use the factoring strategy of a difference of two squares. $a^2 - b^2 = (a-b)(a+b)$

Example:

Factor the binomial $2a^2 - 200$

Solution:

$2a^2 - 200$ ⬅ To factor binomials we always take a common factor first. We notice that the greatest common factor is 2.

$2(a^2 - 100)$ ⬅ We now we should ask ourselves can this be factored more. Does the remaining binomial consist of two perfect squares?

$2(a - 10)(a + 10)$ ⬅ Since a^2 and 100 are perfect squares and we have a subtraction sign we can use the difference of two squares method to completely factor the binomial.