Algebra 2

Unit 1 Lesson 4 - Differences of Squares

- Identify and rewrite quantities as squares
- Factor differences of squares

Warm Up: Express the following quantities as something squared.

Ex 1: $81 = 9^2$

Ex 2: $49 = 7^2$

Recognizing a Square:

The following numbers can be written as squares and are called "Perfect Squares".

$1 = 1^2$

$4 = 2^2$

$9 = 3^2$

$16 = 4^2$

$25 = 5^2$ $\quad (2^2)^3 = 2^6$

$36 = 6^2$

$49 = 7^2$

$64 = 8^2$

$81 = 9^2$

$100 = 10^2$

Squares aren't limited to just numbers. Variables can be expressed as squares fairly simply, as long as their exponents are <u>even</u>.

$x^4 = \left(x^2\right)^2$

$x^6 = \left(x^3\right)^2$

$x^8 = \left(x^4\right)^2$

$x^{10} = \left(x^5\right)^2$

These are written this way because in algebra, when you have a power raised to a power you <u>Multiply</u> them together to simplify.
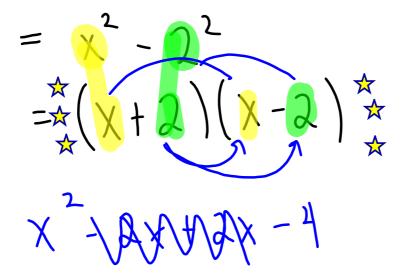
Last lesson we talked about factoring out a common factor from a list of terms. Today we will begin to use factoring formulas and shortcuts to create factors for other types of expressions.

<u>Difference of Squares:</u>

Any quantity that can be expressed as a difference of two squares can be factored using the formula...

$$a^2 - b^2 = (a+b)(a-b)$$

Example: Factor $x^2 - 4$

$$= x^2 - 2^2$$

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

$$x^2 \cancel{-2x+2x} - 4$$

[Now you try.](#)

Ex: Factor $x^2 - 16 = x^2 - 4^2$

$$(x+4)(x-4)$$

Many times, you will have to factor out a common factor first, then you will recognize that the remaining expression in the parentheses is a difference of squares, which you can factor again.

Example: Factor out GCF, then Factor using Difference of Squares.

$$2x^3 - 50x$$

GCF: $2x$

Factoring out the GCF: $2x(x^2 - 25)$

Factoring the parentheses by using difference of square:

$$x^2 - 25 = x^2 - 5^2$$

$$2x(x^2 - 5^2) = 2x(x+5)(x-5)$$

Now you try.

Ex: Factor completely. $4x^4 - 64x^2$

This example could be expressed as two squares, but it's easier to factor out the GCF first, then to factor using difference of squares.

$$4x^2\left(x^2 - 16\right)$$

$$4x^2\left(x+4\right)\left(x-4\right)$$

Homework: Difference of Squares Worksheet