Chapter 9 Day 4:

Today you will learn how to rewrite a quadratic in Vertex Form. This process is known as completing the square.

First I will take you through a problem, then I will give you the steps. This way the steps will make more sense:)

Example: Write this equation in Vertex Form using Completing the Square.

$$y = x^2 - 16x + 15$$

$$y = x^2 - 16x + 64 + 15 - 64$$

$$y = (x - 8)^2 + -49$$

Steps to follow:

1. Factor out a GCF
2. Rewrite the problem placing a +___ and -___ in the appropriate places.
3. Below this line begin to write a ( )^2
4. Now fill the parenthesis with the letter used in the problem and 1/2 of the b term.
5. Now square the number that you just found and write it in the blanks above.
6. Combine the last two numbers and write them after your ( )^2

Example: Write this equation in Vertex Form using Completing the Square.

$$y = n^2 - 6n - 72$$

$y = n^2 - 6n + \underline{9} - 72 - \underline{9}$

$y = (n-3)^2 - 81$

Example: Write this equation in Vertex Form using Completing the Square.

$$f(x) = x^2 - 7x + 1$$

$f(x) = x^2 - 7x + \frac{49}{4} + 1 - \frac{49}{4}$

$f(x) = \left(x - \frac{7}{2}\right)^2 + -\frac{45}{4}$

$\frac{4}{4} \quad -\frac{49}{4}$

Example: Write this equation in Vertex Form using Completing the Square.

$$f(z) = z^2 + 11z + \frac{21}{4}$$

$f(z) = z^2 + 11z + \frac{121}{4} + \frac{21}{4} - \frac{121}{4}$

$f(z) = \left(z + \frac{11}{2}\right)^2 + -25$

Example: Change f(x) from Vertex Form into Standard Form.

$$f(x) = 3(x-5)^2 - 72$$

$f(x) = 3(x^2 - 10x + 25) - 72$

$f(x) = 3x^2 - 30x + 75 - 72$

$f(x) = 3x^2 - 30x + 3$