

Chapter 9 Day 5:

Today you will learn how to rewrite a quadratic in Vertex Form. This process is known as completing the square. ($a \neq 1$)

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. A \neq 1

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

$$\begin{aligned} y &= 2(x^2 - 8x) + 15 \\ y &= 2\left(x^2 - 8x + \frac{16}{1}\right) + 15 - \underline{32} \\ y &= 2(x - 4)^2 - 17 \end{aligned}$$

Steps to follow:

1. Factor out a GCF of the a and b only
2. Rewrite the problem placing a +____ and -____ in the appropriate places.
3. Below this line begin to write $\text{GCF}(\quad)^2$
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. Redistribute the GCF that you factored out to fill in the blank above that.
6. Combine the last two numbers and write them after your $\text{GCF}(\quad)^2$

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

$$y = \underline{9}n^2 + 36n + 11$$

$$y = 9(n^2 + 4n) + 11$$

$$y = 9(n^2 + 4n + \underline{4}) + 11 - \underline{36}$$

$$y = 9(n + 2)^2 + -25$$

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

$$f(x) = 3x^2 - 18x - 20$$

$$\begin{aligned} f(x) &= 3(x^2 - 6x) - 20 \\ f(x) &= 3\left(x^2 - 6x + \frac{9}{1}\right) - 20 - \underline{27} \\ f(x) &= 3(x - 3)^2 - 47 \end{aligned}$$

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

$$f(z) = -4z^2 + 4z - 7$$

$$\begin{aligned} f(z) &= -4(z^2 - z) - 7 \\ f(z) &= -4\left(z^2 - z + \frac{1}{4}\right) - 7 + 1 \\ f(z) &= -4\left(z - \frac{1}{2}\right)^2 - 6 \end{aligned}$$

Now this should make sense!

Steps to follow:

1. Factor out a GCF of the a and b only
2. Rewrite the problem placing a +____ and -____ in the appropriate places.
3. Below this line begin to write $\text{GCF}(\quad)^2$
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.
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6. Combine the last two numbers and write them after your $\text{GCF}(\quad)^2$

