

Quadratic in Vertex Form – Completing the Square

How to Write Quadratic Equations in Vertex Form

$$y = ax^2 + bx + c \rightarrow y = a(r - h)^2 + k$$

Step 1: Ensure $a = 1$

Step 2: $\left(\frac{b}{2}\right)^2$

Step 3: Add the $\left(\frac{b}{2}\right)^2$ term to $x^2 + bx$ to form a trinomial

Step 4: Subtract the $\left(\frac{b}{2}\right)^2$ term outside the parentheses.

Step 5: Factor the trinomial

Write the following in vertex form: $y = x^2 + 4x - 5$



Step 1: Ensure $a = 1$ – The a value is already 1.

$$x^2 + 4x - 5$$

Step 2: $\left(\frac{b}{2}\right)^2$ – The b value = 4

$$\left(\frac{4}{2}\right)^2 = 4$$

Step 3: Add the $\left(\frac{b}{2}\right)^2$ term to $x^2 + bx$ to form a trinomial

$$y = (x^2 + 4x + 4) - 5$$



Write $y = x^2 + 4x + 4$, in vertex form.
 $y = x^2 + 4x + 4$

The $\left(\frac{b}{2}\right)^2$ value is $\left(\frac{4}{2}\right)^2 = 4$

$$y = (x^2 + 4x + 4) + 4$$

$$y = (x^2 + 4x + 4) + 4 - 4$$
$$y = (x^2 + 4x + 4)$$

Factor the trinomial

$$y = (x + 2)^2$$

