

STEPS FOR COMPLETING THE SQUARE
(for leading coefficient of 1)

EXAMPLE
Standard form: $y = x^2 + 4x + 3$

1. Separate the quadratic and linear term from the constant by putting parenthesis around them.

$$y = (x^2 + 4x \quad) + 3 \quad$$

2. Create a perfect square trinomial inside the parenthesis.

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

$$y = (x^2 + 4x + 4) + 3 \quad$$

3. To maintain the original equation, balance by putting the opposite number outside of the parenthesis.

$$y = (x^2 + 4x + 4) + 3 - 4$$

4. Factor and simplify.

$$y = (x+2)(x+2) - 1$$

6. You can now identify the vertex of the parabola (similar to point-slope form)

Vertex: (h, k)

vertex form: $y = (x+2)^2 - 1$
vertex: $(-2, -1)$