

$$y = x^2 + 6x + 8 \quad \left(\frac{b}{2}\right)^2 = \left(\frac{6}{2}\right)^2 = 3^2 = 9$$

$$y = x^2 + 6x + 9 + 8 - 9$$

$$y = (x+3)(x+3) + 8 - 9$$

$$y = (x+3)^2 - 1$$

vertex $(-3, -1)$