

10-4a Completing the Square

➤ When a trinomial is a PERFECT SQUARE, there is a relationship between the coefficient of the x term (b) and the constant (c).

$$ax^2 + \underline{\underline{bx}} + \underline{\underline{c}}$$

$$x^2 + 6x + \textcircled{9}$$
$$\left(\frac{b}{a}\right)^2 = \left(\frac{6}{1}\right)^2 = (3)^2 = \textcircled{9}$$

$$x^2 - 8x + \textcircled{16}$$
$$\left(\frac{b}{a}\right)^2 = \left(\frac{-8}{1}\right)^2 = (-4)^2 = \textcircled{16}$$

* Use the formula $\left(\frac{b}{a}\right)^2$ to form a perfect square trinomial.

EXAMPLES

Complete the square, then factor the trinomial.

1) $x^2 + 2x + \boxed{c}$

$$\left(\frac{b}{a}\right)^2 = \left(\frac{2}{1}\right)^2 = (2)^2 = \textcircled{4}$$

$$\boxed{\begin{array}{l} x^2 + 2x + 1 \\ (x+1)(x+1) \\ (x+1)^2 \end{array}}$$

2) $x^2 - 6x + \boxed{c}$

$$\left(\frac{b}{a}\right)^2 = \left(\frac{-6}{1}\right)^2 = (-3)^2 = 9$$

$$\boxed{\begin{array}{l} x^2 - 6x + 9 \\ (x-3)(x-3) \\ (x-3)^2 \end{array}}$$

3) $x^2 + 12x + \boxed{c}$

$$\left(\frac{b}{a}\right)^2 = \left(\frac{12}{1}\right)^2 = (6)^2 = 36$$

$$\boxed{\begin{array}{l} x^2 + 12x + 36 \\ (x+6)(x+6) \\ (x+6)^2 \end{array}}$$

4) $x^2 - 5x + \boxed{c}$

$$\left(\frac{b}{a}\right)^2 = \left(\frac{-5}{1}\right)^2 = \frac{25}{1}$$

$$\boxed{\begin{array}{l} x^2 - 5x + \frac{25}{4} \\ (x - \frac{5}{2})(x - \frac{5}{2}) \\ (x - \frac{5}{2})^2 \end{array}}$$