Solve Quadratic Equations BY COMPLETING THE SQUARE

TO COMPLETE THE SQUARE FOR THE EXPRESSION $x^2 + bx$, ADD THE SQUARE OF HALF THE COEFFICIENT OF THE TERM bx.

$$c = \left(\frac{b}{2}\right)^2 \qquad x^2 + bx + \left(\frac{b}{2}\right)^2 = \left(x + \frac{b}{2}\right)^2$$

Find the value of c that makes each expression below a perfect square trinomial. Then, write the expression as the square of the binomials.

Example 1a: $x^2 + 12x + c$

$c = \left(\frac{12}{2}\right)^2 = (6)^2 = 36$

$x^2 + 12x + 36 = (x+6)^2$

Example 1b: $x^2 - 6x + c$

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

$x^2 - 6x + 9 = (x-3)^2$

Solve each equation by completing the square.

Example 2a: $x^2 - 14x = 15$

$x^2 - 14x + 49 = 15 + 49$

$\sqrt{(x-7)^2} = \sqrt{64}$

$x - 7 = \pm 8$

$x - 7 = 8$ → $x = 15$

$x - 7 = -8$ → $x = -1$

Example 2b: $x^2 - 12x + 5 = 0$

$x^2 - 12x = -5$

$x^2 - 12x + 36 = 31$

$\sqrt{(x-6)^2} = \sqrt{31}$

$x - 6 = \pm\sqrt{31}$

$+6 \quad +6$

$x = 6 \pm \sqrt{31}$

example 3:

SOLVE A QUADRATIC EQUATION IN STANDARD FORM