10.5 A: Solve Quadratics by Completing the Square

Find the value of c that makes a perfect square trinomial.

① $x^2 + 8x + c$

$\frac{8}{2} = 4$ $\quad c = 16$

$4^2 = 16$

$x^2 + 8x + 16$

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

② $x^2 - 12x + c$

$\frac{-12}{2} = (-6)^2 = 36$ $\quad c = 36$

	x	-6
x	x^2	$-6x$
-6	$-6x$	36

$(x-6)^2$

③ $x^2 + 3x + c$

$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$

$c = \frac{9}{4}$

$\left(x + \frac{3}{2}\right)^2$

Solve for x by completing the square.

④ $x^2 - 16x = -15$

$\frac{-16}{2} = -8$

$x^2 - 16x + 64 = -15 + 64$ $\quad (-8)^2 = 64$

$\sqrt{(x-8)^2} = \sqrt{49}$

$x - 8 = \pm 7$

$+8 \quad +8$

$x = 8 \pm 7$

$x = 8+7 \quad x = 8-7$

$x = 15 \quad x = 1$

⑤ $x^2 + 6x = 1$

$\frac{6}{2} = 3^2 = 9$

$x^2 + 6x + 9 = 1 + 9$

$\sqrt{(x+3)^2} = \sqrt{10}$

$x + 3 = \pm\sqrt{10}$

$-3 \quad -3$

$x = -3 \pm \sqrt{10}$

$-3+\sqrt{10}, -3-\sqrt{10}$

⑥ $x^2 - 2x - 7 = 0$

⑦ $x^2 - 12x - 21 = 0$

⑥ $x^2 - 2x - 7 = 0$

$+7 \quad +7$

$x^2 - 2x = 7$

$\frac{-2}{2} = (-1)^2 = 1$

$x^2 - 2x + 1 = 7 + 1$

$\sqrt{(x-1)^2} = \sqrt{8}$

$x - 1 = \sqrt{2 \cdot 4}$

$x - 1 = \pm 2\sqrt{2}$

$+1 \quad +1$

$\boxed{x = 1 \pm 2\sqrt{2}}$

⑦ $x^2 - 12x - 21 = 0$

$+21 \quad +21$

$x^2 - 12x = 21$

$\frac{-12}{2} = (-6)^2 = 36$

$x^2 - 12x + 36 = 21 + 36$

$\sqrt{(x-6)^2} = \sqrt{57}$

$x - 6 = \pm\sqrt{57}$

$+6 \quad +6$

$\boxed{x = 6 \pm \sqrt{57}}$