

Completing the square $a=1$

Goal: find a perfect square factor $\rightarrow (x+3)^2, (x-5)^2, (x-1)^2$

Steps $a x^2 + b x - c = 0$ ← must be zero

① $(x^2 + 4x + \underline{\quad}) - \underline{\quad} - 5 = 0$ add ()

② $(x^2 + 4x + \underline{(\frac{b}{2})^2}) - \underline{(\frac{b}{2})^2} - 5 = 0$ } fill in blanks
 $(x^2 + 4x + 4) - 4 - 5 = 0$ } $(\frac{b}{2})^2$

③ $(x + \frac{b}{2})^2 - 9 = 0$ } factor ()
 $(x+2)^2 - 9 = 0$

④ $(x+2)^2 = 9$
 $x+2 = \pm 3$
 $x = -2 \pm 3$

$x = -5$
$x = 1$

 } solve

examples

1. $x^2 - 6x + 3 = -4$
 $x^2 - 6x + 7 = 0$
 $(x^2 - 6x + 9) - 9 + 7 = 0$
 $(x-3)^2 - 2 = 0$
 $(x-3)^2 = 2$
 $x-3 = \pm \sqrt{2} \rightarrow x = 3 \pm \sqrt{2}$

2. $x^2 + 12x - 7 = 0$
 $(x^2 + 12x + 36) - 36 - 7 = 0$
 $(x+6)^2 - 43 = 0$
 $(x+6)^2 = 43$
 $x+6 = \pm \sqrt{43}$
 $x = -6 \pm \sqrt{43}$