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How to Solve Quadratic Equations

Key

Iams

Get the equation in standard form, $ax^2 + bx + c = 0$

Factor out any Greatest Common Factors

yes

Is $b = 0$? — no → Is $a*c$ that adds to b easy? — no → Is $a = 1$ & b even? — no → Solve by: Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

yes

Get x^2 alone
$\sqrt{}$ both sides

$\frac{3x^2 - 15}{3} = \frac{0}{3}$

$3\frac{(x^2 - 5)}{3} = \frac{0}{3}$

$x^2 - 5 = 0$
$+5 \quad +5$

$\sqrt{x^2} = \sqrt{5}$

$x = \pm\sqrt{5}$

$\frac{2(x-1)^2}{2} = \frac{32}{2}$

$(x-1)^2 = 16$

$\sqrt{(x-1)^2} = \sqrt{16}$

$x - 1 = \pm 4$
$+1 \quad +1$

$x = 1 \pm 4$ → 5 or -3

yes

Solve by Factoring

$x^2 - x - 56 = 0$
$-8x \quad +7x$
-1

$(x-8)(x+7) = 0$

$x = 8$ or -7

$5x^2 + 11x + 2 = 0$
$10 \quad 11$

$5x^2 + 10x + x + 2 = 0$
$5x \quad\quad 1$

$5x(x+2) + 1(x+2) = 0$
$(x+2)$

$(x+2)(5x+1) = 0$

$x = -2$ or $-\frac{1}{5}$

yes

Solve by: Completing the Square

$x^2 - 4x - 2 = 0$
$+2 \quad +2$

$x^2 - 4x + \_\_ = 2 + \_\_$

$x^2 - 4x + 4 = 2 + 4$
$4 \quad -4$

$(x-2)(x-2) = 6$

$(x-2)^2 = 6$

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

$x - 2 = \pm\sqrt{6}$
$+2 \quad +2$

$x = 2 \pm \sqrt{6}$

$\frac{4x^2 + 10x + 2}{2} = 0$

$2(2x^2 + 5x + 1) = 0$
2

$2x^2 + 5x + 1 = 0$

$a = 2 \quad b = 5 \quad c = 1$

$\frac{-5 \pm \sqrt{25 - 4 \cdot 2 \cdot 1}}{2 \cdot 2}$

$\frac{-5 \pm \sqrt{17}}{4}$