

Solving Quadratic Equations – Best Method

$$ax^2 + bx + c = 0$$

Factorable

Ex. $6x^2 - 21x = -15$

$$6x^2 - 21x + 15 = 0$$

$$3(x^2 - 7x + 5) = 0$$

$$2x^2 - 7x + 5 = 0$$

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

$$2x - 5 = 0 \quad x - 1 = 0$$

$$2x = 5$$

$$x = 1$$

$$x = \frac{5}{2}$$

Ex. $4x^2 + 7x - 15 = 0$

$$(x + 3)(4x - 5) = 0$$

$$x + 3 = 0$$

$$4x - 5 = 0$$

$$x = -3$$

$$4x = 5$$

$$x = \frac{5}{4}$$

$$ax^2 + bx + c = 0$$

Quadratic Formula (always works) or
Completing the Square (only when $a = 1$)

Ex. $4x^2 + 28x = -49$

$$4x^2 + 28x + 49 = 0$$

$$x = \frac{-28 \pm \sqrt{28^2 - 4(4)(49)}}{2(4)}$$

$$2(4)$$

$$x = \frac{-28 \pm \sqrt{0}}{8}$$

$$x = -\frac{7}{2}$$

Ex. $2x^2 + 2x + 9 = x^2$

$$x^2 + 2x + 9 = 0$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4(9)}}{2}$$

$$x = \frac{-2 \pm \sqrt{-32}}{2}$$

$$x = \frac{-2 \pm 4i\sqrt{2}}{2}$$

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

$$ax^2 + c = 0$$

Take Square Roots when
there is NO b-value

Ex. $3x^2 - 7 = 47$

$$3x^2 = 54$$

$$x^2 = 18$$

$$x = \pm 3\sqrt{2}$$

Ex. $-\frac{3}{5}x^2 - 2 = -5$

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

$$x^2 = 5$$

$$x = \pm \sqrt{5}$$

$$(ax + c)^2 = 0$$

Take Square Roots

Ex. $(2x + 6)^2 - 8 = 24$

$$(2x + 6)^2 = 32$$

$$2x + 6 = \pm 4\sqrt{2}$$

$$2x = -6 \pm 4\sqrt{2}$$

$$x = -3 \pm 2\sqrt{2}$$

Ex. $\frac{1}{3}(x + 4)^2 - 1 = 5$

$$\frac{1}{3}(x + 4)^2 = 6$$

$$(x + 4)^2 = 18$$

$$x + 4 = \pm 3\sqrt{2}$$

$$x = -4 \pm 3\sqrt{2}$$

Ex. $5(x - 4)^2 = 125$

$$(x - 4)^2 = 25$$

$$x - 4 = \pm 5$$

$$x = 4 \pm 5 \rightarrow x = 9 \text{ or } -1$$

Special Case when x^2 is
inside

Ex. $2(x^2 - 5) = -x^2 - 1$

$$2x^2 - 10 = -x^2 - 1$$

$$3x^2 = 9$$

$$x^2 = 3$$

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