

# Solving Quadratic Equations

Can be done by:

- ✓ Completing the Square
- ✓ Factoring
  - Quadratic Formula
  - Graphing
  - Guess n' Check.

TODAY Solve by Factoring

Prerequisite Knowledge

- ⇒ (1) Zero Principle  
 ✓ (2) Factoring!

$$a \cdot b = 0$$

means either  $a=0$  or  $b=0$  or both

$$a \cdot b \cdot c = 0$$

$$\begin{array}{ccc} \textcircled{x-2} & \textcircled{x+3} & = \underline{\underline{0}} \\ \uparrow & \uparrow & \\ \textcircled{x=2} & \textcircled{x=-3} & \\ \text{because} & \text{because} & \\ 2-2=0 & -3+3=0 & \end{array}$$

→  $x^2 + x - 6 = 0$  Quadratic Eq<sup>n</sup>

$$\underline{\underline{(x+3)(x-2) = 0}}$$

$$\begin{array}{l} x+3=0 \text{ or } x-2=0 \\ \underline{\underline{x=-3}} \text{ or } x=2 \end{array}$$

Check:  $(-3)^2 + (-3) - 6 \stackrel{?}{=} 0$

$$9 + -3 - 6 \stackrel{?}{=} 0$$

$$(2)^2 + (2) - 6 \stackrel{?}{=} 0$$

$$4 + 2 - 6 \stackrel{?}{=} 0$$

$$\underline{x^2} - \underline{11x} + \underline{10} = 0$$

$$(x - 1)(x - 10) = 0$$



$$\underline{x = 1}$$



$$\underline{x = 10}$$

$$x^2 - 4 = 0$$

$$(x - 2)(x + 2) = 0$$



$$\underline{\underline{x = 2}} \quad \underline{\underline{x = -2}}$$

$$\Rightarrow \sqrt{x^2} = \sqrt{4}$$

$$x = \pm 2$$

# Solve for x

①  $x^2 - 15x + 50 = 0$

$(x - 5)(x - 10) = 0$

$x = 5$  or  $x = 10$

②  $3x^2 + 7x + 2 = 0$

$(3x + 1)(x + 2) = 0$

$x = -\frac{1}{3}$  or  $x = -2$

$3x + 1 = 0$   
 $-1 \quad -1$

$3x = -1$   
 $\frac{3}{3} \quad \frac{3}{3}$

$x = -\frac{1}{3}$

③  $6x^2 + 11x - 10 = 0$

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

$x = \frac{2}{3}$

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

$3x - 2 = 0$   
 $+2 \quad +2$

$3x = 2$   
 $\frac{3}{3} \quad \frac{3}{3}$

$x = \frac{2}{3}$

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

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

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

$$\underline{\underline{x^2 + 1x - 20}} = (x + 5)(x - 4)$$

5, -4

$$(x + 5)(x - 4) = x^2 - 4x + 5x - 20$$
$$= \underline{\underline{x^2 + x - 20}}$$

$$\underline{\underline{x^2 + 7x + 12}} = (x + 4)(x + 3)$$

# 1

$$\rightarrow \underline{2x^2} + \underline{12x} + \underline{18} = 2(\underline{x^2 + 6x + 9})$$

$$= 2 \cdot (x+3)(x+3)$$

$$\cdot \begin{array}{c} \underline{-21} \\ \underline{+7, 3} \end{array} \cdot 3x^2 + \underline{4x} - 7 = \underline{(x-1)(3x+7)}$$

$$\underline{(3x^2 + 7x)} - \underline{(3x + 7)}$$

$$\underline{x(3x+7)} - \underline{1(3x+7)}$$

$$(3x+7)(x-1)$$

$$\begin{aligned} (x-2)(x+2) &= x^2 + 2x - 2x - 4 \\ &= x^2 - 4 \end{aligned}$$

$$\begin{aligned} (x-3)(x+3) &= x^2 + 3x - 3x - 9 \\ &= x^2 - 9 \end{aligned}$$

$$(x+12)(x-12) = x^2 - 144$$

$\begin{matrix} \downarrow & & \uparrow \\ x \cdot x & & 12 \cdot 12 \end{matrix}$

$$\underline{x^2 - 0x - 144} = (x-12)(x+12)$$

$$\underline{x^2} - \underline{100} = (x-10)(x+10)$$

$$\begin{aligned} 2x^2 - 50 &= 2(x^2 - 25) \\ &= 2(x+5)(x-5) \end{aligned}$$

$$\underline{4x^4} - \underline{9y^4} = (2x^2 + 3y^2)(2x^2 - 3y^2)$$

$$\begin{aligned} 16x^4 - 1 &= (4x^2 + 1)(4x^2 - 1) \\ &\quad \swarrow \quad \searrow \\ &= (4x^2 + 1)(2x - 1)(2x + 1) \end{aligned}$$

