

# Solving Equations Using the Quadratic Formula

## Standard Form

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

## Quadratic Formula

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

$$x^2 - 6x - 40 = 0$$

### Solve by Factoring

$$x^2 - 6x - 40 = 0$$

$$\begin{array}{r} 140 \\ \times 20 \\ \hline 910 \\ 5 \cdot 8 \end{array}$$

$$(x + 4)(x - 10) = 0$$

$$\begin{array}{l} x + 4 = 0 \quad x - 10 = 0 \\ -4 \quad -4 \quad +10 \quad +10 \end{array}$$

$$\boxed{x = -4} \quad \boxed{x = 10}$$

### Solve by the Quadratic Formula

$$\begin{array}{l} a = 1 \quad b = -6 \quad c = -40 \\ 36 + (+160) = 196 \\ x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-40)}}{2(1)} \end{array}$$

$$x = \frac{6 \pm \sqrt{196}}{2} \quad x = \frac{6 \pm 14}{2}$$

$$x = \frac{6 + 14}{2} = \boxed{10} \quad x = \frac{6 - 14}{2} = \boxed{-4}$$

1. Solve each equation using the quadratic formula.

a)  $6x^2 + 7x + 2 = 0$

$$a = 6 \quad b = 7 \quad c = 2$$

$$x = \frac{-7 \pm \sqrt{49 - 48}}{2(6)}$$

$$x = \frac{-7 \pm \sqrt{1}}{12} \quad x = \frac{-7 \pm 1}{12}$$

$$x = \frac{-7 + 1}{12} \quad x = \frac{-7 - 1}{12}$$

$$x = \frac{-6 \div 6}{12 \div 6} = \boxed{\frac{-1}{2}} \quad x = \frac{-8 \div 4}{12 \div 4} = \boxed{\frac{-2}{3}}$$

b)  $2x^2 - 5x - 12 = 0$

$$a = 2 \quad b = -5 \quad c = -12$$

$$x = \frac{-(-5) \pm \sqrt{25 - (-96)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{121}}{4} \quad x = \frac{5 \pm 11}{4}$$

$$x = \frac{5 + 11}{4} = \boxed{4} \quad x = \frac{5 - 11}{4}$$

$$x = \frac{-6 \div 2}{4 \div 2} = \boxed{\frac{-3}{2}}$$

$$c) x^2 + 4x + 1 = 0$$

$$a=1 \quad b=4 \quad c=1$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$$

$16 - 4 = 12$

$$x = \frac{-4 \pm \sqrt{12}}{2}$$

$$x = \frac{-4 \pm 3.5}{2}$$

$$x = \frac{-4 + 3.5}{2}$$

$$x = \frac{-4 - 3.5}{2}$$

$$x = \frac{-0.5}{2}$$

$$x = \frac{-7.5}{2}$$

$$x = -0.25$$

$$x = -3.75$$