

# Lesson 9-4b

Objective - To find the x-intercepts of a quadratic equation using the quadratic formula.

Find x-intercepts of...

$$y = x^2 + 2x - 3$$

x	y
-4	$(-4)^2 + 2(-4) - 3 = 5$
-3	$(-3)^2 + 2(-3) - 3 = 0$
-2	$(-2)^2 + 2(-2) - 3 = -3$
-1	$(-1)^2 + 2(-1) - 3 = -4$
0	$(0)^2 + 2(0) - 3 = -3$
1	$(1)^2 + 2(1) - 3 = 0$
2	$(2)^2 + 2(2) - 3 = 5$

Find x-intercepts of the equation below.

$$y = x^2 - x - 4$$

x	y
-3	$(-3)^2 - (-3) - 4 = 8$
-2	$(-2)^2 - (-2) - 4 = 2$
-1	$(-1)^2 - (-1) - 4 = -2$
0	$(0)^2 - (0) - 4 = -4$
1	$(1)^2 - (1) - 4 = -4$
2	$(2)^2 - (2) - 4 = -2$
3	$(3)^2 - (3) - 4 = 2$

Find x-intercepts of the equation below.

$$y = x^2 - x - 4$$

To find x-intercepts

Set  $y = 0$

$$0 = x^2 - x - 4$$

Can't solve!

Quadratic Equation

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

Solve.

$$x^2 - x - 4 = 0 \quad a = 1$$

$$ax^2 + bx + c = 0 \quad b = -1$$

$$c = -4$$

Quadratic Formula

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

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

$$x = \frac{1 \pm \sqrt{1+16}}{2} = \frac{1 \pm \sqrt{17}}{2}$$

$$x = \frac{1 + \sqrt{17}}{2} \text{ or } \frac{1 - \sqrt{17}}{2}$$

$x \approx \frac{1+4.12}{2}$  or  $\frac{1-4.12}{2}$

$x \approx 2.56$  or  $-1.56$

Compare to graph!

Find the x-intercepts of the equation below.

$$2x^2 + 5x - 3 = 0 \quad a = 2$$

$$b = 5$$

$$c = -3$$

$$x = \frac{-5 \pm \sqrt{49}}{4}$$

$$x = \frac{-5 \pm 7}{4}$$

$$x = \frac{-5+7}{4} \text{ or } \frac{-5-7}{4}$$

$$x = \frac{2}{4} \text{ or } \frac{-12}{4}$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{-5 \pm \sqrt{25+24}}{4}$$

$$x = \left\{ \frac{1}{2}, -3 \right\}$$

Find the x-intercepts of the graph of

$$y = -x^2 + 5x + 2. \text{ Round to the nearest tenth.}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad a = -1$$

$$b = 5$$

$$c = 2$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(-1)(2)}}{2(-1)}$$

$$x = \frac{-5 \pm \sqrt{33}}{-2}$$

$$x = \frac{-5 + \sqrt{33}}{-2} \text{ or } \frac{-5 - \sqrt{33}}{-2}$$

$$x \approx \frac{-5+5.7}{-2} \text{ or } \frac{-5-5.7}{-2}$$

$$x \approx -0.4 \text{ or } 5.4$$

## Lesson 9-4b (cont.)

Solve.

$$x^2 + 3x = 7$$

$$x^2 + 3x - 7 = 0$$

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

$a = 1$   
 $b = 3$   
 $c = -7$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-7)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{9 + 28}}{2}$$

$$x = \frac{-3 \pm \sqrt{37}}{2}$$

$$x = \frac{-3 + \sqrt{37}}{2} \text{ or } \frac{-3 - \sqrt{37}}{2}$$

$$\approx \frac{-3 + 6.08}{2} \text{ or } \frac{-3 - 6.08}{2}$$

$$x \approx 1.5 \text{ or } -4.5$$

Solve  $3x^2 - 4x - 1 = 0$ . Round to the nearest hundredth.

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

$a = 3$   
 $b = -4$   
 $c = -1$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{16 + 12}}{6}$$

$$x = \frac{4 \pm \sqrt{28}}{6}$$

$$x \approx \frac{4 \pm 5.29}{6}$$

$$\frac{4 + 5.29}{6} \quad \frac{4 - 5.29}{6}$$

$$x \approx 1.55 \text{ or } -0.22$$