

## Lesson 12-3

## Example 1

Solve  $y = -2x^2 + 8x$ .

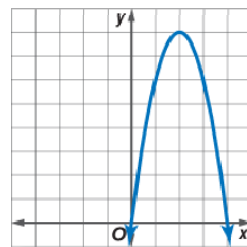
## Solution

**By graphing:**

Determine the number of solutions by graphing the equation on a graphing calculator.

Locate the points where  $y = 0$ . Estimate the  $x$ -values for these points. Use the zoom feature to more closely estimate values. The  $x$ -values are the solutions.

The graph of the equation  $y = -2x^2 + 8x$  intersects the  $x$ -axis at two points. They are located approximately at  $x = 0$  and  $x = 4$ .

**By factoring:**

To solve by factoring, let  $y = 0$ .

$$-2x^2 + 8x = 0$$

$$-2x(x - 4) = 0$$

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

$$x = 0 \quad x = 4$$

Factor.

Solve each equation.

The solutions for  $y = -2x^2 + 8x$  are  $x = 0$  and  $x = 4$ .

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**Example 2**

Solve  $y + 6x = x^2 + 9$ .

**Solution**

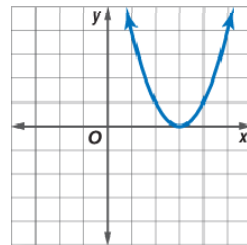
Write the equation in standard form.

$$y = x^2 - 6x + 9$$

**By graphing:**

Graph the equation to determine the number of solutions. Locate the point where  $y = 0$ . The  $x$ -value is the solution.

The graph of the equation meets the  $x$ -axis at point, approximately  $x = 3$ .

**By factoring:**

To solve by factoring, let  $y = 0$ .

$$\begin{aligned} x^2 - 6x + 9 &= 0 \\ (x - 3)(x - 3) &= 0 \\ x &= 3 \end{aligned}$$

The solution for  $y = x^2 - 6x + 9$  is  $x = 3$ .

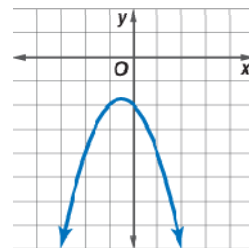
**Example 3**

Solve  $y = -x^2 - x - 2$ .

**Solution**

Graph the equation on a graphing calculator. The graph of the equation does not cross the  $x$ -axis. There are no solutions to the equation.

There are no solutions for the equation  $y = -x^2 - x - 2$ .



**Example 4**

**PHYSICS** A football is thrown with the initial velocity of 72 ft/sec. How long does it remain in the air?

**Solution**

Substitute 72 for  $v$  in the formula:  $72t - 16t^2 = 0$

Factor the equation:  $8t(9 - 2t) = 0$

Set each factor equal to 0 and solve for  $t$ :  $8t = 0$        $(9 - 2t) = 0$   
 $t = 0$        $t = 4.5$

The equation has two solutions. The first solution represents the launch time, the second represents the landing time. The football stays in the air for 4.5 sec.