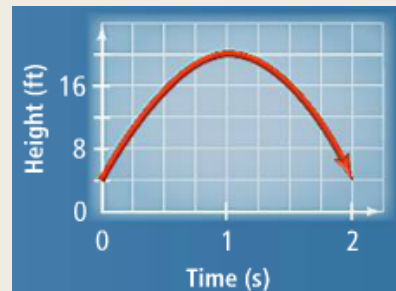


# Algebra 1

Chapter 9  
Section 9-2

## Height Function

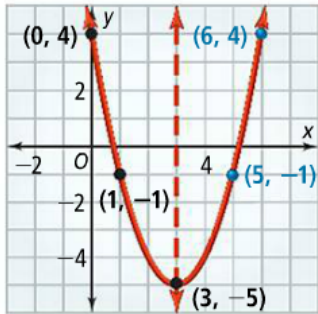
You throw a ball straight up into the air and catch it at the same height you released it. The parabola at the right shows the height  $h$  of the ball in feet after  $t$  seconds. What is the total distance the ball travels? For how long does the ball travel up? Explain your reasoning.



*What is the axis of symmetry?*

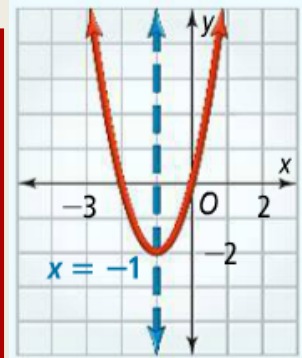
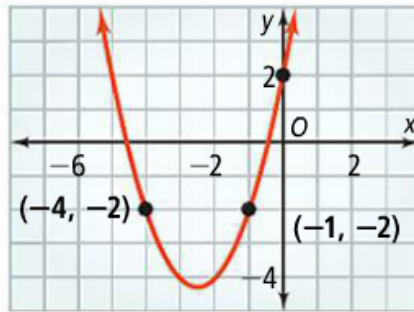
The line:  $x = 1$

# Identify the Axis of Symmetry



$$x = 3$$

$$x = -2.5$$



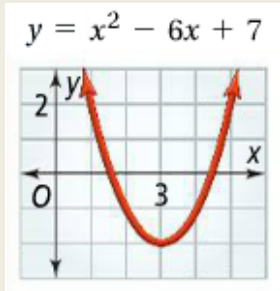
$$x = -1$$

# Finding the Axis of Symmetry and Vertex

## Key Concept Graph of a Quadratic Function

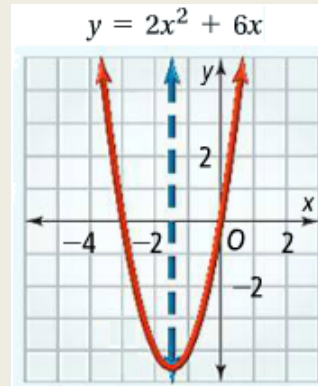
The graph of  $y = ax^2 + bx + c$ , where  $a \neq 0$ , has the line  $x = \frac{-b}{2a}$  as its axis of symmetry. The  $x$ -coordinate of the vertex is  $\frac{-b}{2a}$ .

# Identify the Axis of Symmetry



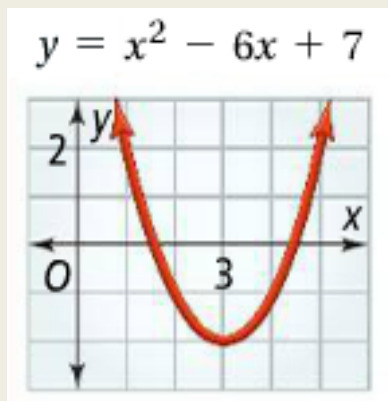
**Line:**  
 $x = \frac{-(-6)}{2(1)} = 3$

**Line:**  
 $x = \frac{-(-6)}{2(2)} = \frac{-3}{2}$



# Identify the Axis of Symmetry

**Line:**  
 $x = 3$



**Find Vertex:**  
(plug in  $x = 3$ )

$$y = 3^2 - 6(3) + 7$$

$$y = 9 - 18 + 7$$

$$y = -2$$

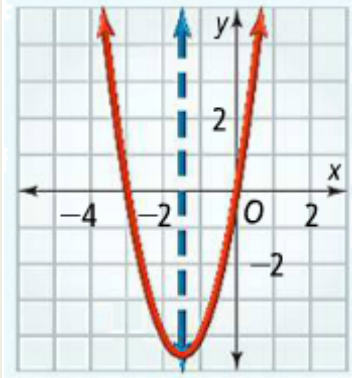
**Vertex:**  
 $(3, -2)$

# Identify the Axis of Symmetry

**Line:**

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

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



**Find Vertex:**

(plug in  $x = -3/2$ )

$$y = 2(-3/2)^2 + 6(-3/2)$$

$$y = 9/2 - 9$$

$$y = 9/2 - 18/2$$

$$y = \frac{-9}{2}$$

**Vertex:**

$$\left( \frac{-3}{2}, \frac{-9}{2} \right)$$