

**Projectiles** Suppose a ball thrown into the air has its height (in feet) given by the function

$$h(t) = 6 + 96t - 16t^2$$

where  $t$  is the number of seconds after the ball is thrown.<sup>1</sup>

Before we start answering the questions, let's make sure we know what this equation is telling us.

$t$  represents the number of seconds after the ball is thrown.

$h(t)$  gives the height of the ball (in feet) for a particular value of  $t$ . It doesn't matter if the ball is thrown straight up or if it is thrown some distance away. We are only looking at the ball's height off the ground some number of seconds after it is thrown.

**a.** Find  $h(1)$  and explain what it means.

Here,  $t = 1$ , so we are being asked to find the height of the ball after 1 second.

$$\begin{aligned} h(1) &= 6 + 96(1) - 16(1)^2 \\ &= 6 + 96 - 16 \\ &= 86 \end{aligned}$$

After 1 second, the height of the ball is 86 feet.

**b.** Find the height of the ball 3 seconds after it is thrown.

For this part,  $t = 3$ , so we are being asked to find the height of the ball after 3 seconds.

$$\begin{aligned} h(3) &= 6 + 96(3) - 16(3)^2 \\ &= 6 + 288 - 16 \cdot 9 \\ &= 6 + 288 - 144 \\ &= 150 \end{aligned}$$

After 3 seconds, the height of the ball is 150 feet.

**c.** Test other values of  $h(t)$  to decide if the ball eventually falls. When does the ball stop climbing?

Let's make a table and then a graph with  $t =$  time on the horizontal axis and  $h =$  height on the vertical axis.

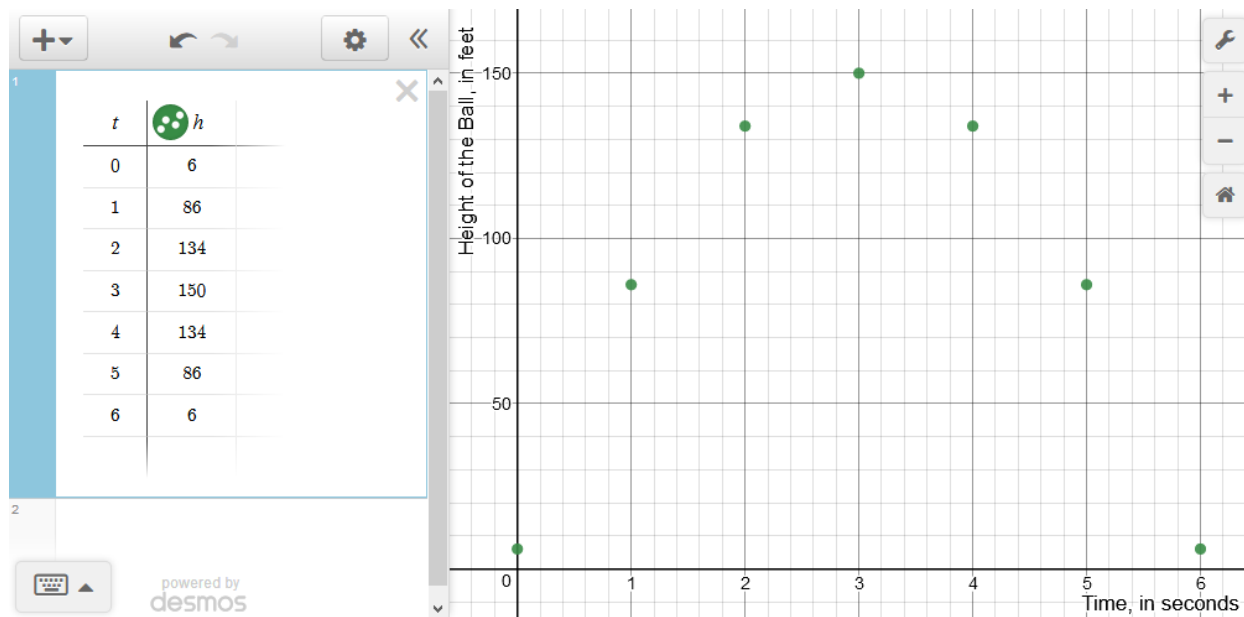
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<sup>1</sup>Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 26, #64.

# College Algebra

## Functions and Models

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Remember, each point on the graph shows the height of the ball after some number of seconds. The points DO NOT show the path of the ball.

We can see from either the table or the graph that the ball reaches its maximum height (150 feet) and stops climbing after 3 seconds.