

General Algebra 2 Worksheet #1 Unit 9 Selected Solutions

A steel ball is propelled upward from a point that is 224 feet above the ground. Its height, h (in feet), above the ground after t seconds is given by the function $h(t) = -16t^2 + 80t + 224$, where $t \geq 0$. Use this equation to answer the following questions.

1. How high above the ground will the ball be after 3 seconds?

Find h when $t = 3$. $h = -16(3)^2 + 80(3) + 224$

$$h = -16(9) + 240 + 224$$

$$h = -144 + 240 + 224 = 320$$

The ball will be 320 feet high after 3 seconds.

3. When will the ball be 288 feet above the ground?

Find t when $h = 288$. $288 = -16t^2 + 80t + 224$

$$16t^2 - 80t + 64 = 0$$

$$t^2 - 5t + 4 = 0$$

$$(t - 1)(t - 4) = 0$$

$$t = 1 \text{ or } t = 4$$

The ball will be 288 feet high after 1 second and again after 4 seconds.

7. What is the maximum height that the ball will reach and how long will it take it to reach that height?

Find the vertex of the function $h = -16t^2 + 80t + 224$.

There are two common methods used to find the vertex.

At the vertex, $t = -B/2A$.

$$t = -80/-32 = 2.5$$

the maximum height is

$$h(2.5) = -16(2.5)^2 + 80(2.5) + 224$$

$$h(2.5) = 324$$

$$h - 224 = -16(t^2 - 5t)$$

$$h - 224 - 100 = -16(t^2 - 5t + 6.25)$$

$$h - 324 = -16(t - 2.5)^2$$

Vertex: (2.5, 324)

The maximum height is 324 feet. It will take 2.5 seconds to reach that height.