Algebra II Worksheet #1 Unit 8 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 $h = -16t^2 + 80t + 224$, 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. $288 = -16t^2 + 80t + 224$

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

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

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

   $t = 1$ 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 $h = -16t^2 + 80t + 224$.

   $$h - 224 = -16(t^2 - 5t)$$
   $$h - 224 - 100 = -16(t^2 - 5t + 6.25)$$
   $$h - 324 = -16(t - 2.5)^2$$
   $$\text{Vertex: } (2.5, 324)$$

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