General Algebra 2 Worksheet #2 Unit 9 Selected Solutions

A slingshot was used to launch a small rock upward from a cliff 100 feet above a river. The function $h(t) = -16t^2 + 96t + 100$ (where $t \geq 0$) gives the height, h, in feet of the rock above the river after t seconds.

5. How long will it take the rock to hit the river?

Find t when h = 0.

$$0 = -16t^2 + 96t + 100$$
$$4t^2 - 24t - 25 = 0$$
$$t = \frac{24 \pm \sqrt{976}}{8}$$
$$t \approx 6.9 \text{ or } t \approx -.9$$

It will take about 6.9 seconds to hit the river.

6. What is the maximum height reached by the rock above the river? How long did it take the rock to reach its maximum height?

Find the vertex. There are two common methods used to find the vertex.

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

$$t = -96/-32 = 3$$

The maximum value of h is

$$h(3) = -16(3)^2 + 96(3) + 100$$
$$h(3) = 244$$

$$h = -16t^2 + 96t + 100$$
$$h - 100 = -16(t^2 - 6t)$$
$$h - 100 - 144 = -16(t^2 - 6t + 9)$$
$$h - 244 = -16(t - 3)^2$$

The vertex is (3, 244).

The maximum height is 244 feet.
It will take 3 seconds to reach that height.