Quadratic Word Problems

1. Jason jumped off a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16t^2 + 16t + 480$, where t is the time in seconds and h is the height in feet.

   a. How long did it take for Jason to reach his maximum height?

   b. What was the highest point that Jason reached?

   c. Jason hit the water after how many seconds?

2. If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height h after t seconds is given by the equations $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

   a. How long will it take for the rocket to return to the ground?

   b. After how many seconds will the rocket be 112 feet above the ground?

   c. How long will it take the rocket to hit its maximum height?

   d. What is the maximum height?

3. A rocket is launched from atop a 101 foot cliff with an initial velocity of 116 ft/s.

   a. Substitute the values into the vertical motion formula $h(t) = -16t^2 + vt + h_0$. Let $h(t) = 0$

   b. How long will the rocket take to hit the ground after it is launched? Round to the nearest tenth of a second.

4. You and a friend are hiking in the mountains. You want to climb to a ledge that is 20 ft above you. The height of the grappling hook you throw is given by the function $h(t) = -16t^2 + 32t + 5$. What is the maximum height of the grappling hook? Can you throw it high enough to reach the ledge?

5. You are trying to dunk a basketball. You need to jump 2.5 ft in the air to dunk the ball. The height that your feet are above the ground is given by the function $h(t) = -16t^2 + 12t$. What is the maximum height your feet will be above the ground? Will you be able to dunk the basketball?

6. A diver is standing on a platform 24 ft above the pool. He jumps from the platform with an initial upward velocity of 8 ft/s. Use the formula $h(t) = -16t^2 + vt + s$, where h is his height above the water, t is the time, v is his starting upward velocity and s is his starting height. How long will it take for him to hit the water?