Name: Key
Date: _____ Period: ___

Quadratic Formula Word Problems

1. Jason jumped off of 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?

.5 seconds

b. What was the highest point that Jason reached?

484 ft.

c. Jason hit the water after how many seconds?

6 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 equation $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

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

8 seconds

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

t = 1 sec
t = 7 sec

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

4 sec

d. What is the maximum height?

256 ft.

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. Use the quadratic formula to find out how long the rocket will take to hit the ground after it is launched. Round to the nearest tenth of a second.

$h(t) = -16t^2 + 116t + 101$

$a = -16$
$b = 116$
$c = 101$

$b^2 - 4ac = 116^2 - 4(-16)(101)$

$13456 + 6464$

$19920 \approx 141$

$x = \frac{-116 \pm 141}{-32} \rightarrow$ 8 sec

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?

$x = \frac{-b}{2a} = \frac{+32}{-32} = 1 \text{ sec}$

$a = -16$
$b = -32$

$h(1) = -16 - 32 + 5$

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 form the platform with an initi8al 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?

$-16t^2$