CP1 Algebra 2 **Projectile Motion Word Problems** **Worksheet #3** Kennedy

1. A dud missile is fired straight into the air from a military instillation. The missile's height is given by the formula; $h(t) = -16t^2 + 400t + 100$

a. How high is the missile after 4.5 seconds?

b. At what time will the missile reach its maximum height?

c. What is the maximum height the missile will reach?

d. When will the missile be 2,500 feet above the ground?

e. When will the missile be 100 feet above the ground?

2. An object is 4900 ft above the ground. The object falls, and its height is given by the quadratic function: $h(t) = -16t^2 + 4900$. The height of the object above the ground is in feet and the time, t, is in seconds. Determine when the object hits the ground.

3. The height h of an object t seconds after being released can be modeled by the equation:

$$h(t) = -\frac{1}{2}at^2 + vt + s$$

where a is the acceleration due to gravity, v is the upward speed of the object upon release, and s is the starting height of the object. (If the object starts on earth, then s = 0.) At the surface of the earth, acceleration a = 32 ft/s^2. A model rocket is launched from the top of a cliff that is 384 feet high with an upward speed of 160 ft/s.

(a) Write a specific function that represents the height of the rocket as a function of time.

(b) How many seconds after the launch does the rocket reach its maximum height?

(c) Determine the maximum height attained by the rocket (to the nearest foot)

(d) How many seconds after the launch does the rocket reach the ground?

4. (Use the same general equation found in problem #3) A juggler tosses a ball into the air. The ball leaves the juggler's hand 5 feet above the ground and has an initial velocity of 31 feet per second.

a. Write an equation that represents the height of the ball as a function of time.

b. How long will it take the ball to reach its maximum height?

c. If the juggler catches the ball when it falls back to a height of 3 feet, then how long will the ball be in the air? (A diagram may help make the problem clearer.)

Answer Key

1. a. 1576 ft b. 12.5 sec c. 2600 ft d. t = 10 sec or 15 sec e. 0 sec or 25 sec.

2. t = $\frac{70}{4}$sec (17.5 sec)

3. a. $h(t) = -16t^2 + 160t + 384$ b. 5 sec c. 784 ft d. 12 sec.

4. a. $h(t) = -16t^2 + 31t + 5$ b. $\frac{31}{32}$sec c. 2 sec.