Calculus AB

2-2a
(Day 1)
Position

Position Function - $s(t) = \frac{1}{2}at^2 + v_0 t + s_0$

s -

t -

a -

v -

v_0 -

s_0 -

g -

Velocity-

units -

Average Velocity   **Instantaneous Velocity**

Acceleration-

units -

Average Acceleration   **Instantaneous Acceleration**

$$s(t) = \tfrac{1}{2}at^2 + v_0 t + s_0$$

$$\underline{\qquad} = v(t) = at + v_0$$

$$\underline{\qquad} = \underline{\qquad} = a(t) = a$$

The French fort Michilimacinac looked over the Straits of Mackinac, the narrowest section of water separating the Upper and Lower Peninsula of Michigan. A cannon was located in the watch tower looking out over the lake. The cannon is mounted 64 ft. above the waterline. If the cannon fires at an initial velocity of 240 ft/sec, answer the following questions:

   a) Write a function that gives the height (position) of the cannon ball as a function of time.

   b) Determine the average velocity of the shot between the 2nd and 3rd seconds of flight.

   c) Write a function that gives the instantaneous velocity as a function of time.

   d) Find the instantaneous velocity of t=2 and t=3.

   e) Find acceleration of the shot.

   f) Find how long it takes the cannonball to hit the water.

   g) Find the velocity of the shot at the instant it hits the water.