AP Physics B
(Lab) Activity: Freely Falling Objects
Due Date_____

Purpose: To predict the launch angle necessary to launch a projectile into a specified target.

Background:
- kinematic equations can be applied:

$$x = x_0 + v_0 t + \tfrac{1}{2} at^2$$

$$v = v_0 + at$$

$$v^2 = v_0{}^2 + 2a(x - x_0)$$

- assumptions:
   - no air resistance
   - ball launched <u>straight</u> up and down
   - ball starts from ground level

Materials: Kulik Kannon (version 2.1), ball, stopwatches

Procedure:
1) Use Kulik Kannon to launch a ball straight upward.
2) Record the time it takes to return to the ground.

Questions:
1) How high did the ball go?
2) How fast was it moving AND what was its acceleration when it was...
   a. halfway to the top (on the way up)?
   b. at the top?
   c. halfway to the bottom (on the way down)?
   d. just about to hit the ground?
3) For the motion of the ball, sketch a...
   a. position vs. time graph
   b. velocity vs. time graph
   c. acceleration vs. time graph

<Remember: Because this is a Lab <u>Activity</u>, a full write-up is not required. The title, the data, and your calculations/answers to the questions are sufficient.>