NAME(S): _____

Acceleration Due to Gravity Lab Part I

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Purpose: To determine the acceleration due to gravity by video collection from a ball in free fall.

Procedure:

1. Find a suitable location for dropping your small object. The background should be a consistent colour. Set up a meter stick to provide a scale.
2. Video the object as it falls from rest. The video must show the entire meter stick as the object falls.
3. Repeat 1 or 2 times to get the 'best possible' video.
4. Use Logger Pro to analyze the video:
   Using Logger Pro for video analysis
   Login to school network
   Desk Tools -> Logger Pro 3
   Insert menu –> select movie
   Enable video analysis (button on bottom right of video window)
   Add points to selected portion of the object
   Click the set scale button and click/drag the length of the meter stick (a green line should appear)
   Click on the blue Y on the XY axis and select Y velocity
   Select the linear fit button at top of screen (near the right hand side)
   Record the slope of the graph
5. Copy and paste the graph into a MS Word document

Observations & Analysis

1. Record the acceleration due to 'g' from your graph

2. The accepted value for the acceleration due to gravity is 9.8 m/s^2. Determine the relative error for your result using:

$$\frac{ExperimentalValue - AcceptedValue}{AcceptedValue} \times 100\%$$

3. You decide to do this experiment on Mars. You release the ball 5.0 m from the surface and it takes 1.64 sec. to hit the ground. What is the gravitational acceleration on Mars?

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Acceleration Due to Gravity Lab Part II

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Conclusion: State your measured value of 'g', error %, sources of error and ways to follow up or enhance the lab.

Discussion Questions:

1. A marble is released from a cliff of unknown height. It hits a pool of water 2.5 secs after release. How high is the cliff?

2. A rock is released from a height of 25 m.
   a) How long will it take to hit the ground?

   b) What will be its velocity just before impact?

3. An object is throw upward from a cliff of height 76m. It hits the ground 5.2 later. What was its initial velocity?

4. A bullet is fired straight up at 40 m/s from a 100 m high cliff. How fast is it going after 6.0 s? How long until it hits the ground?