PHYSICS 11

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/s². Determine the relative error for your result using:

$$\frac{Experimental Value - Accepted Value}{Accepted Value} \times 100\%$$

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 and rises to a height of 6m. What was its initial velocity?
4. A bullet is fired straight up at 100 m/s. How high is it after 5 sec?