## Physics 11

NAME(S): $\qquad$

## Acceleration Due to Gravity Lab Part I

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 $\rightarrow$ 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 $9.8 \mathrm{~m} / \mathrm{s}^{2}$. Determine the relative error for your result using:

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

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

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 6 m . What was its initial velocity?
4. A bullet is fired straight up at $100 \mathrm{~m} / \mathrm{s}$. How high is it after 5 sec ?
