PHYSICS INTRODUCTION TO SIMPLE HARMONIC OSCILLATORS LAB

(CAPT STYLE!... work together, hand in individually!)

For each section:

Design the experiment to measure

(Be sure to indicate independent and dependent variables)

Write a procedure

Make a data table

Make a prediction

Carry out the experiment and collect the data

Note any problems and/or difficulties

Graph all results

Make general conclusions

A) For a string pendulum: Find a mathematical relationship to predict the period of a pendulum.

Find the determining factor (weight, length, angle <<15 degrees)

Measure its distance, height, or velocity vs time. Measure time accurately (10 swings, then divide by 10)

Plot at least three points to decide the most direct relationship. Use data from regression equations and correlations to prove your results.

Once you have found the property that determines the period, find the exact mathematical relationship (linear, quadratic, etc...), so use at least three to seven points. (Hint: 0,0 is a point).

Check your result with the theoretical relationship as described in your text.

** In at least one of your trials try to measure distance,height, velocity vs. time

B) For a weight hanging off a spring, Find the determining factor (weight, spring size, initial distance).

Measure its height, velocity, acceleration vs. time. Measure time accurately (10 swings, then divide by 10)

Plot at least three points to decide the most direct relationship. Use data from regression equations and correlations to prove your results.

Once you have found the property that determines the period, find the exact mathematical relationship (linear, quadratic, etc...), so use at least three to seven points. (Hint: 0,0 is a point).

Check your result with the theoretical relationship as described in your text.

** In at least one of your trials try to measure distance,height, velocity vs. time

C) Use a circular object to turn and measure displacement vs time. Try different rates and radii. Use your results to explain how this is simple harmonic oscillation.

1. In your own words, clearly state the problem you are going to investigate. Include a clear definition of the independent and dependent variables that will be studied.

2. Design an experiment to solve the problem. Your experimental design should match your statement of the problem, should control the variables, and should be clearly described so that someone else could easily replicate your experiment. Include a control if appropriate. Show your design to your teacher before you begin your experiments.

3. After receiving permission from your teacher, work with your partner to carry out your experiments. Your teacher's approval does not necessarily mean that your teacher thinks your experiments are well designed. It simply means that in your teacher's judgement your experiments are not dangerous or likely to cause an unnecessary mess.

4. While conducting your experiments, take careful notes. Make sure to use appropriate charts, tables, or graphs. Your notes will not be scored, but they will be helpful to you later as you work independently to write about your experiments and the results. You must keep your own notes because you will not work with your lab partner when you write your report.

Directions for Writing Your Laboratory Report

Working on your own, summarize your experiments and results. You may use your own notes that you took previously while working with your partner. You may wish to write a first draft of your lab report on scratch paper.

Your report should include the following general sections:

- A clear statement of the problem you investigated. Include a clear identification of the independent and dependent variables that were studied.

- A description of the experiment you carried out. Your description should be clear and complete enough so that someone could easily replicate your experiment.

- The results of your experiment. Tables, charts, and/or graphs should be used where appropriate and should be properly labeled.

- Your conclusions from your experiment. Your conclusions should be fully supported by data, and include appropriate calculations and analysis.

- Comments about how valid you think your conclusions are. In other words, how much confidence do you have in your results and conclusions? Any factors that contribute to a lack of confidence in the results or conclusions should be discussed. Also, include the ways that your experiment could be improved if you were to do it again.