

Name: _____ Section #: _____ Date: _____

Simple Harmonic Motion

Part 1: Period vs. Amplitude

Prediction

Discuss with your group what physical variables in the mass–spring system (spring–cart) will affect the period of oscillations. List all of them below.

For a larger amplitude (the displacement from the equilibrium), would you expect the period to increase or decrease?

Part 2: Conservation of Energy

Show your work. Calculate the maximum potential energy. Calculate the maximum kinetic energy. Calculate the percent lost in the energy. Show all the equations used with the values that were plugged in.

Discuss what it means that the velocity vs. time graph shifted 90 degrees from the position vs. time graph. Write the major points of your discussion.

Part 3

3a. Measure the Spring Constant

Show your work. Use parameter B for the position-time graph to calculate the resonance frequency and spring constant of the system. Show the equations used with the values that were plugged in.

3b. Relationship Between Period and Mass

Prediction

For a larger mass (extra weight on the cart), would you expect the period to increase or decrease? Explain a mathematical relationship that could possibly describe the trend you see in your graph of T vs. \sqrt{m} . Make a sketch of the period vs. square root of mass graph.

After the Experiment

Discuss the view of the T vs. \sqrt{m} graph. Does the shape of the experimental graph resemble the one you predicted? Explain the relationship between the two physical quantities period and mass.

The theoretical value of the spring constant of each spring is given on the whiteboard. Explain how your experimental value of the spring constant is related to the one that is given. Write down the major points of your discussion.

Show all your work for calculating the theoretical period for the last mass you recorded and the percent discrepancy between experimental and theoretical values of the periods.

Have your TA sign this worksheet below and then upload it to the Inlab.

TA Signature: _____