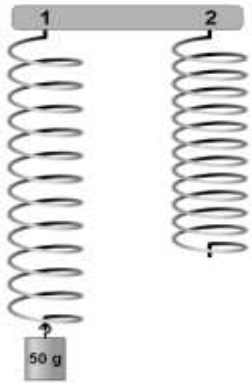
Manual to Lab 3: PHY2048C.

Florida State University – Republic of Panama

Mass and Spring



About labs in this class

The labs in this class will have general instructions, and many things need to be figured out by the students. I will be answering any specific questions the students may have without completely giving away the key to the puzzle. **Answer the questions and record your measurements in your lab notebook and then submit the notebook at the end of the activity.**

About this lab

In this lab you will use a spring to determine the gravitational and inertial masses of the mystery weight you have been provided with, **and experimentally confirm the principle of equivalence.** You will do this by measuring the elastic constant of the spring. You will need the stopwatch of your phone.

Activity 1. Measure how the equilibrium height changes when different masses are hung from the spring.

Question 1. Draw a free-body diagram of the spring at equilibrium.

Activity 2. Determine the elastic constant of one of the springs with at least a 10% error bar (standard deviation). Using more masses will narrow down the spread of the obtained value.

Activity 3. Measure the mystery mass with a minimum of a 10% error. Obtain the error by propagating the error obtained for the spring constant. This mass controls how hard the Earth pulls on the weight and hence it is called the gravitational mass.

Activity 4. Measure the period of one simple harmonic oscillator. Use at least 3 masses to show that it depends on the mass. Measure the mystery mass again with this method with a 10% error bar (to get the error you have to do multiple trials where you measure the period, then compute the standard deviation). This mass controls how difficult it is to accelerate the weight and hence it is the inertial mass.

Question 2. Does you value of the inertial mass consistent with the value of and gravitational mass (obtained by considering the force of gravity at equilibrium)? (Activity 3). That is, does the principle of equivalence hold?