Relationship Between Displacement of a Mass on a Spring and Other Variables Masses and Springs Simulation

Using ipad or computer, go to <u>http://www.colorado.edu/physics/phet</u> (or Google "phet") Click on **Simulations**, then **Masses and Springs** picture in the center of the screen. Choose **LAB**.

Learning Goals

- Students will be able to explain how the displacement of a spring at rest is related to the mass of the object on the spring (which is called Hooke's Law).
- Students will be able to use the displacement of a spring at rest to determine the mass of unknown objects.
- Students will be able to explain how the displacement of a spring at rest is related to the
 acceleration of gravity of the planet the spring is on.
- Students will be able to use the displacement of a spring at rest to determine the acceleration of gravity of an unknown planet.

NOTE

Move the friction slider to lots and leave the planet as Earth until stated otherwise. You are investigating the displacement of the spring when the mass is *at rest*. Using lots of or damping or friction, the mass will quickly come to rest.

1. Take and organize data that will help you analyze the relationship between the displacement of the spring at rest and the mass of the 100 g gold cylinder hanging on the spring. Use the default settings.

2. Clearly describe the relationship that you notice. Write an equation modeling this relationship and define your variables, include their units. Make sure your equation works for all of your data!

3. Determine the masses of the blue and red cylinders, showing the data you take and the calculations you do.

4. Investigate the relationship between the displacement of a spring at rest and the mass of the object hanging on the spring with the spring constant setting on large. Organize the data you take and express this relationship in an equation, defining your variables including units and identifying which is dependent and which is independent. Make sure your equation works for all of your data! How is this equation different than the first equation you created?

5. Determine the acceleration of gravity on planet X, showing the data you take and the calculations you do.