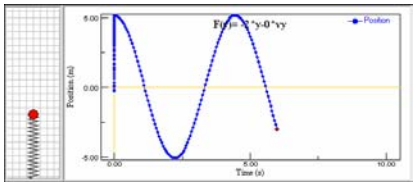
Worksheet for Exploration 16.3: Simple Harmonic Motion with and without Damping



Enter a value for the damping coefficient, the spring constant of the restoring force, or check the "show velocity" box, then press the "set parameters, then drag the ball" button. When you have done this, drag the ball into position and press "play" to run the animation (**position is given in meters and time is given in seconds**). Restart. *When you get a good-looking graph, right-click on it to clone the graph and resize it for a better view.*

a. Find the mass of the ball by using your knowledge of simple harmonic motion.

m=_____

b. Enable the velocity graph. Does the velocity lead or lag the position graph during simple harmonic motion?

c. How do the frequencies compare if the restoring force is -2*y, -4*y, and -8*y N/m? You may right-click on the graph to create a copy at any time.

Now focus on the damping coefficient and how it affects the motion.

d. Set the restoring force to -2*y and the initial displacement from equilibrium to 5 m. Vary b from 0 to 2 Ns/m in steps of 0.25 Ns/m. What can you say about the frequency of motion as a function of b?
   i. First predict what you think will happen qualitatively to the oscillation period and or frequency.

   ii. Discuss why you think this will happen (your prediction).

   iii. Make the measurements indicated to fill out the table below.

b	T	frequency