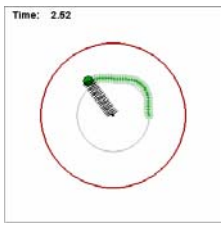
Worksheet for Exploration 5.4: Circular Motion and a Spring Force



A 1-kg mass is attached to the end of a spring of spring constant k = 10 N/m and natural length l_0 = 5 m **(position is shown in meters and time is shown in seconds)**. You are to set the spring in motion by setting its initial position (x_0, 0) and its initial velocity (0, v_{0y}). Restart.

a. Find the v_{0y} needed for circular motion at a radius of 10 m (the red circle).

   i. Set x_o to 10 m and play with the simulation to find an initial velocity that gives circular motion.

   v_o(measured)=_____

   ii. Now see if you can predict the initial velocity using the given information.

      a. You may want to sketch a force diagram to indicate the direction of the force on the ball, and also the direction of the acceleration (what type of acceleration is this).

      b. Use Newton's 2nd law for this situation. This should give you an equation that you can use to solve for v_{oy}.

   iii. How does your prediction compare with your measured value? They should agree.

b. Determine the period of such a motion.

   i. Use your predicted value of the initial speed. You should be able to write out a relation between the distance traveled, the speed, and the radius for the case of UNIFORM CIRCULAR MOTION.