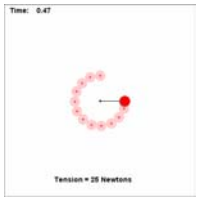
Worksheet for Exploration 5.1: Circular Motion



A puck travels in a circular path on a frictionless table, propelled by a string pulling from the center of the circle **(position is shown in meters and time is shown in seconds)**. You may adjust the mass (10 g < m < 500 g), the speed (1 m/s < v < 50 m/s), and/or the radius (0.5 m < r < 3.5 m). The tension is displayed on the screen. Restart.

How does the tension in the string depend upon the mass, the speed of the block, and the radius of the circle?

a. If you only vary the mass, how does the tension change?

   i. Select a small initial mass, and for your chosen conditions (m,v,r) predict the Tension required. Does this agree with the animation?

   ii. Now double the mass, and triple the mass to see how the tension changes.

b. If you only vary the velocity, how does the tension change?

   i. Again select some initial conditions with a slow velocity, predict the tension.

   ii. Double and triple the velocity and predict the tension required.

c. If you only vary the radius, how does the tension change?

i. Again select some initial conditions with a small radius, predict the tension.

ii. Double and triple the radius and predict the tension required.

Additional Question

If the string you are given can support a maximum weight of 100N, then what is the maximum speed with which it can swing a 0.250kg mass in a 1.0m radius circle?