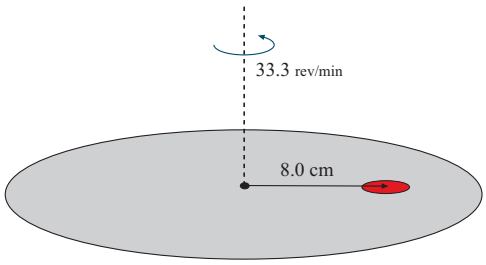
Name_____

Phys 2010 (NSCC), Fall 2005
Problem Set #7

1. A coin of mass 2.50 g rests on top of a record (on an old turntable) which is turning at 33.3 $\frac{\text{rev}}{\text{min}}$. The coin is 8.0 cm from the center of the turntable.

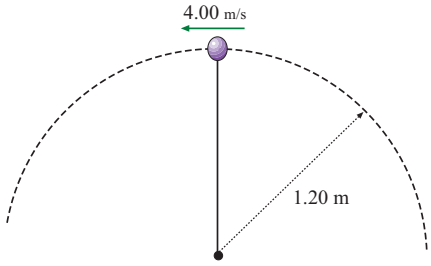
How long does it take for the turntable and coin to make one revolution? What is the speed of the coin?



2. In Problem 1, what is the centripetal acceleration of the coin? What is the centripetal force on the coin? Where does this force come from?

3. Suppose that the coin in Prob 1 is *just about slip*, so that the static friction force has its maximum value (namely, $\mu_s F_N$). Find the value of μ_s.

4. A rock is attached to end of a string of length 1.20 m and is swinging in a vertical circle. If the speed of the rock is constant at $4.00\,\frac{\text{m}}{\text{s}}$, find the tension in the string when the rock is at the top of its swing.



5. A shopper in a supermarket pushes a cart with a force of 35 N directed at an angle of 25° downward from the horizontal. Find the work done by the shopper as she moves down a 50.0-m length of aisle.

6. A 7.00-kg bowling ball moves at $3.00\,\frac{\text{m}}{\text{s}}$. How fast does a 2.45 g Ping-Pong ball move so that the two balls have the same kinetic energy?

7. On a frozen pond a 10-kg sled is given a kick that imparts to it an initial speed of $v_0 = 2.0\,\frac{\mathrm{m}}{\mathrm{s}}$. The coefficient of kinetic friction between the sled and ice is $\mu_\mathrm{k} = 0.10$. Use the work–energy theorem to find the distance the sled moves before coming to rest.

8. A child and a sled with a combined mass of 50.0 kg slide down a frictionless slope. If the sled starts from rest and has a speed of $3.00\,\frac{\mathrm{m}}{\mathrm{s}}$ at the bottom, what is the height of the hill?