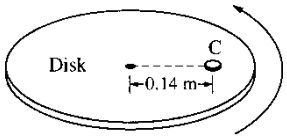
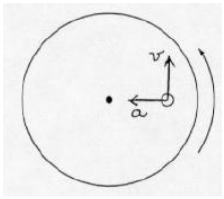
Name _____ Date _____ Period _____



1. A coin C of mass 0.0050 kg is placed on a horizontal disk at a distance of 0.14 m from the center, as shown above. The disk rotates at a constant rate in a counterclockwise direction as seen from above. The coin does not slip, and the time it takes for the coin to make a complete revolution is 1.5 s.

a. The figure below shows the disk and coin as viewed from above. Draw and label vectors on the figure below to show the instantaneous acceleration and linear velocity vectors for the coin when it is at the position shown.



b. Determine the linear speed of the coin.

v = circumference/period = $2\pi R/T = 2\pi(0.14\text{ m})/(1.5\text{ s}) = 0.6$ m/s

c. The rate of rotation of the disk is gradually increased. The coefficient of static friction between the coin and the disk is 0.50. Determine the linear speed of the coin when it just begins to slip.

The coin will slip when static friction has reached its maximum value of $\mu_s N = \mu_s mg = mv^2/r$ which gives $v = \sqrt{\mu_s gr} = 0.83$ m/s

d. If the experiment in part (c) were repeated with a second, identical coin glued to the top of the first coin, how would this affect the answer to part (c)? Explain your reasoning.

It would not affect the answer to part (c) as the mass cancelled out of the equation for the speed of the coin.