

# Rotation – Set 3

1

Name: \_\_\_\_\_

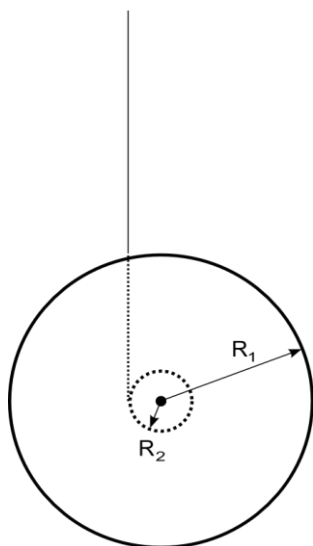
Problems Solved \_\_\_ / 2

The picture below represents the side view of a yo-yo. The inner dashed circle represents the axle that the string is wound around. The top of the string is held stationary and the yo-yo is allowed to fall, unwinding the string as it descends.

The moment of inertia of the yo-yo is:  $I_{cm} = \frac{1}{2}MR_1^2$

Use Work/Energy techniques to answer the following questions.

- a) If the yo-yo starts from rest, what is its angular velocity after a length of string,  $d$ , is unwound?
- b) What is the translational velocity of the center of the yo-yo



## Rotation – Set 3

2

In the picture below, a cylinder with mass  $m_1$ , and radius  $R$  is sitting on a table. One end of a string is wound around the cylinder. The other end of the string passes over a massless and frictionless pulley and is attached to a hanging weight of mass  $m_2$ .

What is the angular velocity of  $m_1$  after  $m_2$  has fallen a distance  $h$ ?

