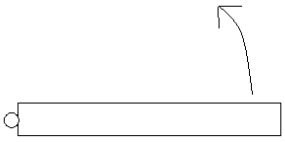
Name_____

Date _____ **Pd**____

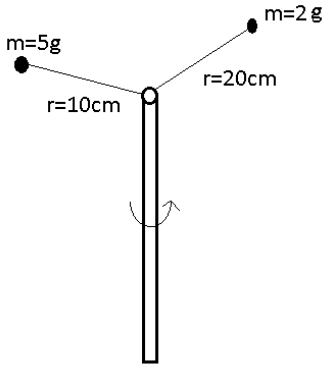
UNIT V: Worksheet 3



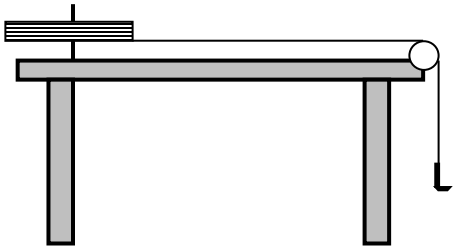
1. A rod with length L and mass m is rotating around an axis at the left side of the rod as shown above (top-down view). The rod has a moment of inertia *I*. Derive the moment of inertia for the rod if its length doubles while its cross-sectional radius and density remain constant.

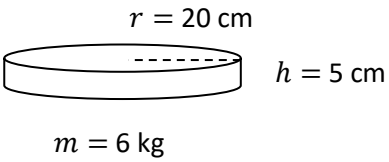
2. You throw a 170g Frisbee whose radius is 7 cm. Your friend throws a 140g Frisbee whose radius is 10 cm. Explain how the experience of throwing the two Frisbees differs from one another.

3. Calculate the moment of inertia for the system shown: two point masses attached to the 20g, 1cm diameter axis as shown below.



4. A solid cylindrical disc spins freely around a spool. A string wound around the spool is thread over a pulley and connected to a hanging mass. The hanger is 40 centimeters above the ground. The properties of the disc are shown below:





a. Calculate the moment of inertia of the disc.

b. Draw two force diagrams, one for the disc and one for the hanging mass. Write summation equations for your diagrams.

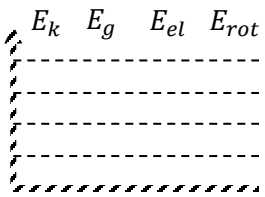
c. Suppose that the mass and hanger were 80 g. Calculate the angular acceleration of the disc.

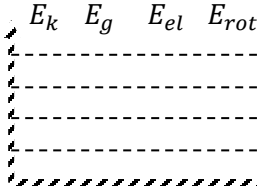
d. Calculate the final angular velocity of the spool.

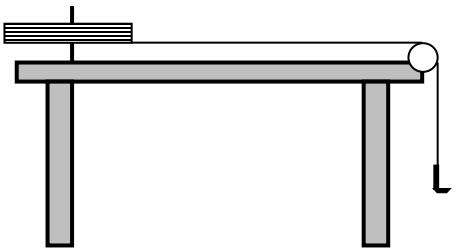
The apparatus is reset to its original status:

5.

a. Set up energy bar charts for the apparatus:







b. Set up an energy conservation equation and put the equation in terms of angular velocity.

c. Use the result above to solve for the final angular velocity of the spool.

6. Solve for the new final velocity of the hanging mass if 15% of the energy was dissipated by friction.