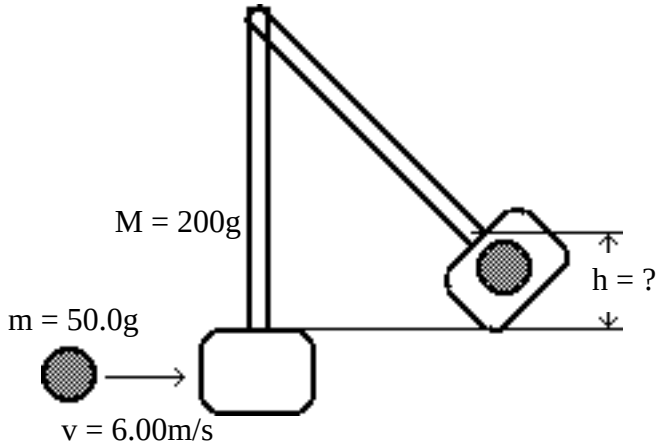
Name:_____

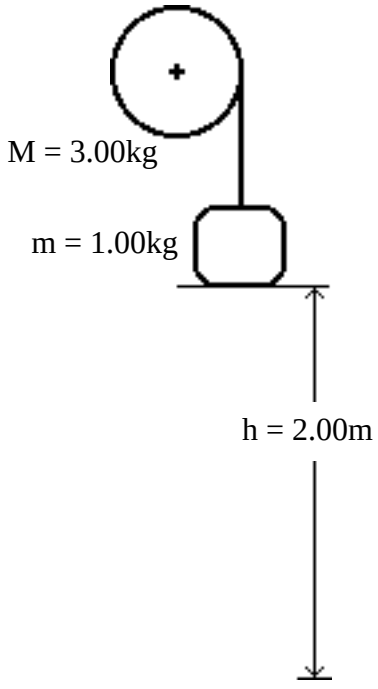
Physics 4A THIRD EXAM Chapters 1 - 12 Spring 1992

Solve the following problems in the space provided. Use the back of the page if needed. Each problem i worth 20 points. You must show your work in a logical fashion starting with the correctly applie physical principles which are on the last page. Your score will be maximized if your work is easy t follow because partial credit will be awarded.

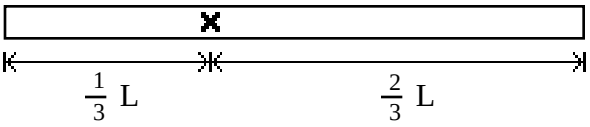
1. In lab you examined a 50.0g ball moving at 6.00m/s colliding with a 200g pendulum arm with a cup a one end. The ball becomes imbedded in the cup and the pendulum arcs upward. Find (a)the velocity o the ball and pendulum arm just after the collision and (b)the height that the center of mass of the pendulu will rise. You may assume that there is no horizontal force exerted at the pivot point.



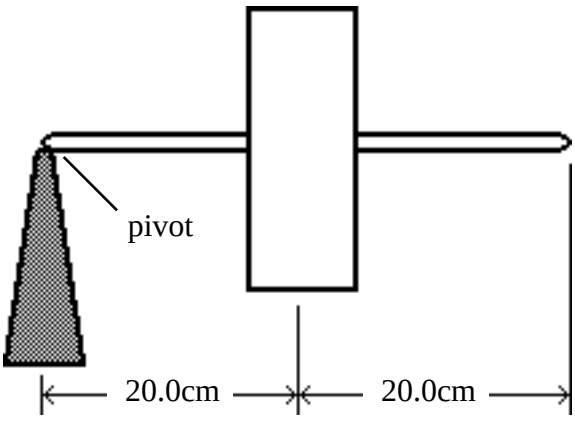

2. A 1.00kg mass hangs from a string that is wrapped around a 3.00kg cylinder with a 5.00cm radius. After the mass is released it falls as the string unwinds and the cylinder spins. After the mass has dropped 2.00m, find (a)velocity of the mass and (b)the rotation rate of the cylinder.



3. Find the rotational inertia of a 100g meterstick pivoted one-third of the way down.




4. The 3.00kg gyroscope shown below is horizontal and in the plane of the paper. It spins at 600rpm wit the part facing you moving downward and has a rotational inertia of 0.0500kg·m$^2$. (a)Find the angula momentum of the gyroscope and indicate its direction in the sketch below. (b)Name the forces that act o the gyroscope and indicate them in the sketch. (c)Find the torque on the gyroscope about the pivot an indicate the direction of the torque. Make sure the direction of the vectors is made clear.



5. A 1.50kg umbrella leans against a smooth wall making a 60˚ angle with the floor. Find the magnitud and indicate the direction in the sketch below of each of the forces acting on the umbrella. Assume th center of mass is in the middle of the umbrella.