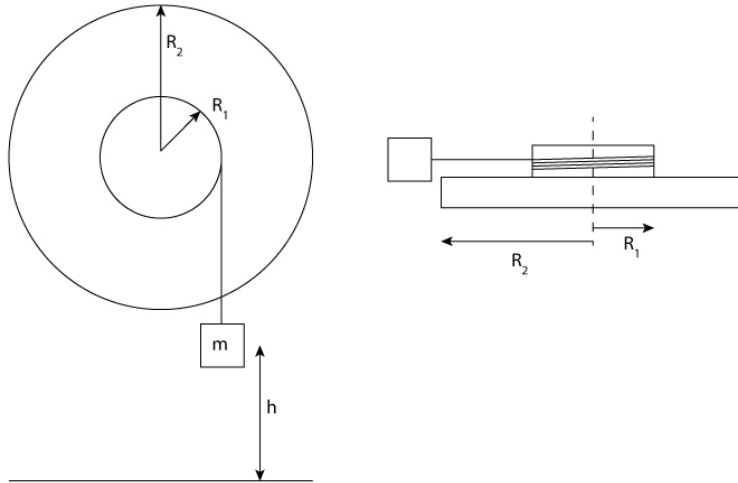


1) A block of mass m hangs from rope that is wrapped around a disk of mass m and radius r_1 . The disk is glued onto a another disk of radius r_2 and mass m and $r_2 > r_1$. The two disks rotate on a fixed axle(See Figure). The block is released a height h above the ground. What is the speed of the block right before it hits the ground? What is the angular momentum of the wheel?



2) A rod of length L has a non uniform density has endpoints at $x = -L/2$ and $x = L/2$. The density of this rod can be modeled as $\rho = \rho_o + \alpha x$ and $\rho_o > \alpha L/2$ so that the density is never negative.

1. Sketch the density profile of the rod.
2. What is the mass of the rod?
3. Where is the center of mass?
4. What is the moment of inertia about the center of the rod? Express your answer in terms of M . For comparison, the moment of inertia of a uniform rod is $\frac{1}{12}ML^2$. How does your answer compare to this and why?