

Angular Momentum Homework 1

1. A 30 kg disk of radius 2 meters is spinning at 20 rad/sec.

a.) What is the rotational inertia of the disk?

b.) Calculate the angular momentum of the disk.

2. The angular momentum of a rod changes from 10 to $18 \frac{\text{kgm}^2}{\text{s}}$ in 6 seconds. What is the average net torque on the rod?

3. A force of 400 N acts on a 4 m long rod perpendicularly at the very end of the rod initially at rest.

a.) What is the torque acting on the rod?

b.) What is the final angular momentum of the rod if the force acts on it for 8 seconds? $m_{\text{rod}} = 5 \text{ kg}$

c.) What is the final angular speed? $I_{\text{rod}} = \frac{1}{3} m L^2$

d.) How much work was done by force? $\text{Work} = \Delta K_{\text{rotational}}$

4. A 70 kg merry-go-round with a radius of 8 m is moving at a speed of .3 rad/sec. A 30 kg child jumps on the merry-go-round at a position of 2 meters away from the center of rotation. $I_{\text{m-g-r}} = I_{\text{disc}} = \frac{1}{2} m (r)^2$

a.) What is the ^{rot.} inertia of the merry-go-round alone?

b.) What is the ^{rot.} inertia of the child on the ride?

c.) What is the final speed of the merry-go-round after the child jumps on? Assume no external torques.

5. What is the unit for angular momentum?