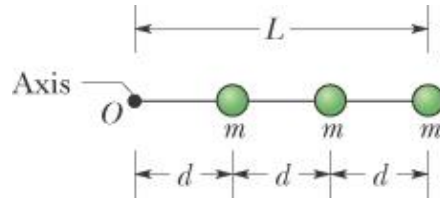


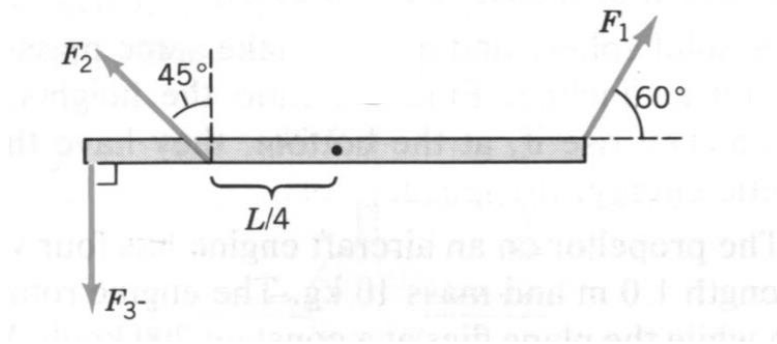
Homework #13

1) Figure 10-35 shows three 0.0100 kg particles that have been glued to a rod of length $L = 6.00$ cm and negligible mass. The assembly can rotate around a perpendicular axis through point O at the left end. If we remove one particle (that is, 33% of the mass), by what percentage does the rotational inertia of the assembly around the rotation axis decrease when that removed particle is (a) the innermost one and (b) the outermost one?



2) Two particles with masses 2.00 and 5.00 kg are connected by a light rod of length 2.00 m. Find the moment of inertia of the system about an axis perpendicular to the rod and passing through (a) the midpoint and (b) the center of mass.

3) For each of the forces depicted in the figure find the torque about the pivot (black dot at center of rod). Take $F_1 = 10.0$ N, $F_2 = 15.0$ N, $F_3 = 8.00$ N, and $L = 9.00$ m. The rod's length is L .



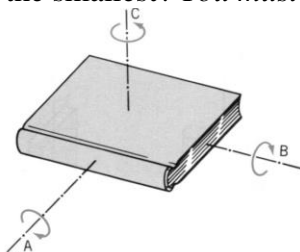
4) The angular position of a line on a disk of radius $r = 6.00$ cm is given by

$$\theta = 10.0 - 5.00t + 4t^2 \text{ rad.}$$

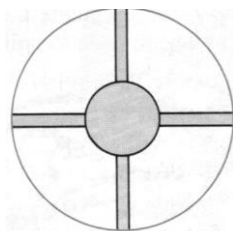
Find: (a) the average angular speed between 1.00 and 3.00 s; (b) the linear speed of a point on the rim at 2.00 s; (c) the radial and tangential accelerations of a point on the rim at 2.00 s.

Homework #13

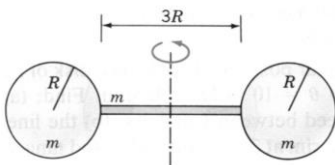
5) The book in the figure has the same shape as your physics textbook. About which axis is the rotational inertia (a) the largest; (b) the smallest? *You must justify your answer.*



6) The wheel shown in the figure below has a central hub of radius 2.00 m and a mass of 2.00 kg. Each of the four spokes is 4.00 m long and has a mass of 1.00 kg. The outer thin ring has a radius of 6.00 m and a mass of 2.00 kg. Find the rotational inertia about an axis through the center perpendicular to the plane of the wheel. Treat the hub as a disk. *Hint, you will have to use the parallel axis theorem with the spokes.*



7) Two solid spheres of mass m and radius R are stuck to the ends of a thin rod of mass m and length $3R$. Find the rotational inertia of the system about the axis at the midpoint of the rod and perpendicular to it, as shown in the figure below.



8) A light (massless) rod of length $L = 1.5$ m is freely pivoted at one end. Three forces act as shown in the figure below. The force \vec{F}_3 acts at the midpoint. What is the torque due to each force? Take $F_1 = 6.90$ N, $F_2 = 4.00$ N, $F_3 = 2.00$ N, $\theta = 20^\circ$, and $\alpha = 30^\circ$

