

CLASS: PHY\_\_\_\_

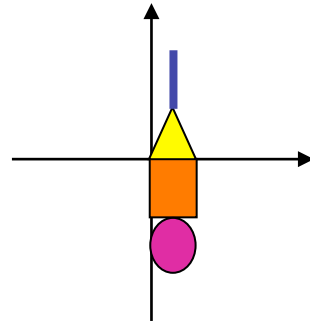
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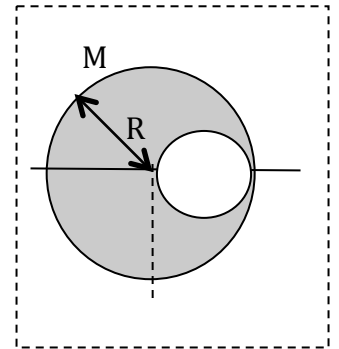
### Assignment 7: Centre of Mass And Rotations

Assigned: Oct 25 Due: Oct 31 18:00

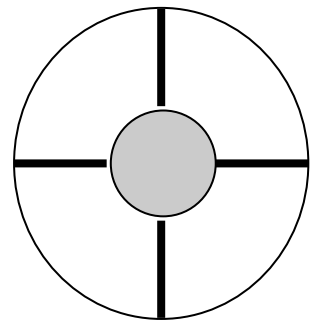
- 1 A 4.0-kg equilateral triangle, a 2.0-kg circle, a 6.0-kg square and a 1.0-kg rod form a system shown on the diagram on a side. What is the center of mass of this system?  $L_{rod}=D_{circle}=W_{triangle}=W_{square}=3m$



- 2 A sphere of radius  $R$  and mass  $M$  uniformly distributed over its whole volume, has a smaller sphere of radius  $R/2$  removed from it as shown on the cross section diagram. Find the  $x$  coordinate of the  $CM$  of the sphere.



- 3 The wheel shown on diagram has a central hub of radius  $2m$  and a mass of  $4kg$ , outside rim of radius  $6m$  and a mass  $1kg$ . Each of the four spokes is  $4m$  long and has a mass of  $2kg$ .
- a) Find the moment of inertia about an axis through the centre  
Treat the hub as a disk.
- b) find the moment of inertia about the axis through the point where the spoke is attached to the outer rim.  
Both axes are perpendicular to the plane of the wheel.



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Assignment 7: CONT.

4 A car traveling on a flat (unbanked) circular track accelerates uniformly from rest with a tangential acceleration of  $0.70 \text{ m/s}^2$ . The car makes one-quarter of the way around the circle before it skids off the track. Determine the coefficient of static friction between the car and track from these data.

5 A rotating wheel requires  $3.00 \text{ s}$  to rotate through  $37.0$  revolutions. Its angular speed at the end of the  $3.00\text{-s}$  interval is  $98.0 \text{ rad/s}$ . What is the constant angular acceleration of the wheel

6 A solid sphere and a disk of the same mass ( $M$ ) and radius ( $R$ ), are released from the same point on the incline. Given that they roll without the slipping which one has greater speed at the bottom What are these speeds?