MI CM RM

1) if net force on a rigid body is zero , then match the following

	Table 1		Table 2
A	Linear velocity of COM	P	Is zero
B	Angular velocity of rigid body	Q	Is constant
C	Angular momentum about an axis passing through COM	R	May be varying.
D	Angular momentum about an axis not passing through COM		

2)A thin rod of mass M and length L is subjected to rotation about two different axes. For the first case, axis of rotation passes through center and is perpendicular to the length of the rod. for the second case, axis of rotation is passing through one end and perpendicular to the length of the rod. Find the ratio of radius of gyration in second case to first case.

1:2 2:1 3:4 4:3

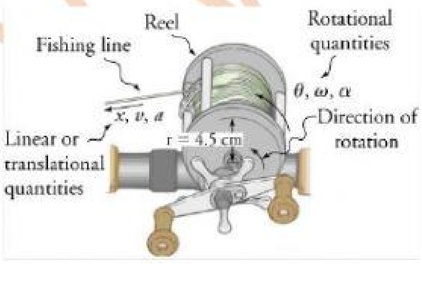
3) Two rings of radius R and nR made up of same material and same thickness have the ratio of moment of inertia about an axis passing through the centre as 1:8 . the value of n is ______________________.

4 2 ½ $2\sqrt{2}$

4) A rigid body can be hinged about any point on the x- axis. when it is hinged such that the hinge is at coordinate x, the moment of inertia is given by $I = (2x^2 - 12x + 276)$ kg m^2. The x- coordinate of the centre of mass is_____________

0 1 2 3

5) A thin horizontal circular disc is rotating about a vertical axis passing through its centre. An insect is at rest at a point near the rim of the disc. The insect now moves along a diameter of the disc to reach the other end. During the Journey of the insect, the angular speed of the disc.



6) A deep-sea fisherman uses a fishing rod with a reel of radius 4.50 cm. A big fish takes the bait and swims away from the boat, pulling the fishing line from his fishing reel. As the fishing line unwinds from the reel, the reel spins at an angular velocity of 220 rad/s. The fisherman applies a brake to the spinning reel, creating an angular acceleration of −300 rad/s^2. How long does it take the reel to come to a stop?

0.7 s 0.8 s 0.9 s 1.0 s

7) An ice skater is spinning with an angular velocity of 3.0 rad s^{-1} with her arms outstretched. The skater draws in her arms and her angular velocity increases to 5.0 rad s^{-1}.

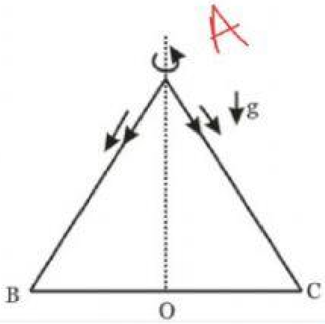
(a) Explain why the angular velocity increases. ______________________

(b) When the skater's arms are outstretched her moment of inertia about the spin axis is 4.8 kg m^2 . Calculate her moment of inertia when her arms are drawn in.______________

(c) Calculate the skater's change in rotational kinetic energy.________________

(d) Explain why there is a change in kinetic energy.____________

An equilateral triangle ABC formed from a uniform wire has two small identical beads initially located at A. The triangle is set rotating about the vertical axis AO. Then the beads are released from rest simultaneously and allowed to slide down, one along AB and other along AC as shown. Neglecting frictional effects, the quantities that are conserved as beads slides down are



8)

a) angular velocity and total energy (KE & PE)

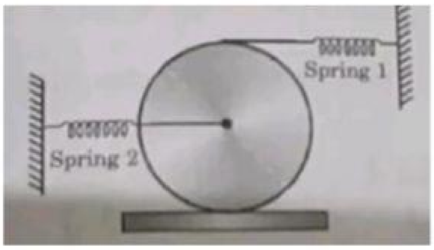
b) total angular momentum and total energy

c) angular velocity and moment of inertia about the axis of rotation

d) Total angular momentum and moment of inertia about the axis of rotation.

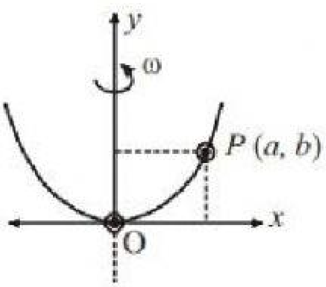
9) A disc of mass m and radius R is connected to springs as shown in figure .

Find the time period of oscillation________________



$2\pi\sqrt{\frac{3m}{k}}$ $2\pi\sqrt{\frac{3m}{5k}}$ $2\pi\sqrt{\frac{3m}{10k}}$ $2\pi\sqrt{\frac{3m}{15k}}$

10) A bead of mass m stays at point P (a,b) on a wire bent in the shape of a parabola $y=4Cx^2$ and rotating with an angular speed of ω is ___________________________(neglect friction).



$2\sqrt{2gC}$ $2\sqrt{3gC}$ $3\sqrt{2gC}$