

Problems Class 6

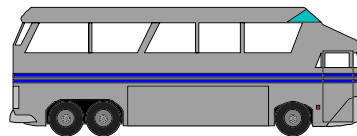
Use the cross product to work out the torque exerted by a force $F = (0 \ 4 \ 0)\text{N}$ acting at a position $r = (2 \ 1 \ 0)\text{m}$.

Compare the above number with that obtained by taking the product of the magnitude of the force and the perpendicular distance between its line of action and the axis about which rotation occurs.

What is the angular momentum associated with the moon's rotations about its axis? Assume the moon is a uniform sphere of mass $m = 7.3 \times 10^{22} \text{ kg}$ and radius $r = 1700 \text{ km}$. The moment of inertia of a sphere for rotations about its axis is given by $I = \frac{2}{5}mr^2$.

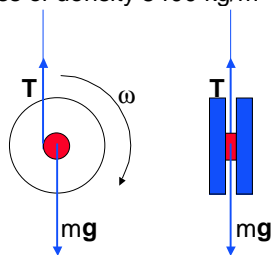
Problems Class 6

An "environmentally friendly" bus, mass 15000 kg, works by storing energy in a fly-wheel while parked at the bus station and then using the energy to power the bus. How often can the bus be accelerated to 30 mph from rest with one "charging" of the flywheel if its maximum safe speed is 60000 rpm? The fly-wheel is a cylinder of mass 175 kg, length 50 cm and radius 20 cm. The moment of inertia of a cylinder rotating about its axis is $\frac{1}{2}MR^2$



Problems Class 6

Find the acceleration when released from rest of a yo-yo which consists of two 5 mm discs of radius $R = 4$ cm separated by a third 2 mm disc of radius $r = 0.5$ cm. All discs are made of brass of density 8400 kg/m^3



Moment of inertia of disc of mass M and radius R about axis through centre normal to plane of disc is $\frac{1}{2}MR^2$