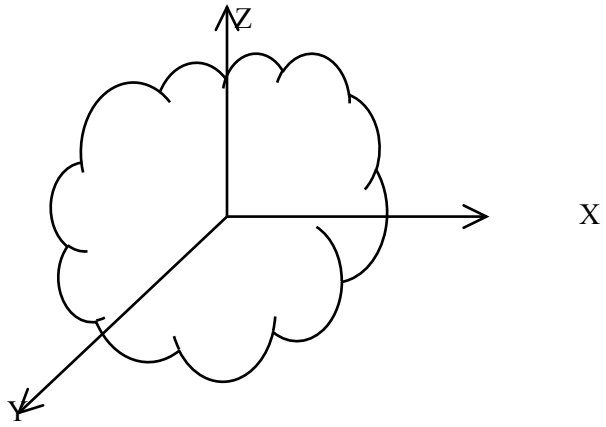
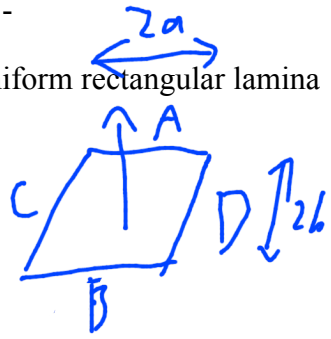
Perpendicular Axes Theorem (**for lamina ONLY**)



If $\mathbf{I_x}$, $\mathbf{I_y}$ are MI of lamina about OX and OY in the plane of the lamina, $\mathbf{I_z}$ is the MI about the perpendicular axis OZ, then $\mathbf{I_z = I_x + I_y}$

Examples:-

1. Uniform rectangular lamina



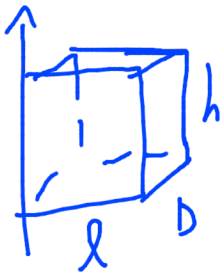
MI about CD $= \frac{1}{3} mb^2$

MI about AB $= \frac{1}{3} ma^2$

$\therefore$ MI about perpendicular axis

$= \frac{1}{3} m(a^2 + b^2)$

2. Uniform cuboid of mass m. Calculate MI about an edge of length h.



MI about center

$= \frac{1}{3} m \left(\frac{1}{2}D\right)^2 + \left(\frac{1}{2}l\right)^2$

distance from center to corner

$\left(\frac{1}{2}l\right)^2 + \left(\frac{1}{2}D\right)^2$

MI about edge $= \frac{1}{3} m \left(\left(\frac{1}{2}D\right)^2 + \left(\frac{1}{2}l\right)^2\right) + m\left(\frac{1}{2}D\right)^2 + \left(\frac{1}{2}l\right)^2$

$= \frac{4}{3} m \left(\frac{1}{4}\right)(l^2 + D^2)$

$= \frac{1}{3} m (l^2 + D^2)$

Note:- The MI of lamina and cuboid are equal (stretch rule)

MI of lamina and rod is also the same (depending on the direction of stretch)