

MOMENT OF INERTIA

① circular ring

$I_1 = MR^2$

$I_2 = \frac{MR^2}{2}$

② Uniform Rod

$I_1 = \frac{ML^2}{12}$

$I_2 = \frac{ML^2}{3}$

③ Uniform Disc

$I_1 = \frac{MR^2}{2}$

$I_2 = \frac{MR^2}{4}$

④

$I_1 = \frac{ML^2}{6}$

$I_2 = \frac{ML^2}{6}$

⑤ Thin Cylinder shell

$I_1 = MR^2$

Same as Ring

⑥ Solid Cylinder

$I_1 = \frac{MR^2}{2}$

same as disc

⑦

$I_1 = \frac{2}{3} \cdot MR^2$

$I_2 = \frac{2}{5} \cdot MR^2$

⑧

$I_1 = \frac{MR^2}{2}$

Hollow cone

$I_2 = \frac{3MR^2}{10}$

Solid cone

⑨

$I_1 = \frac{MR^2}{2} + \frac{ML^2}{12}$

Hollow cylinder

$I_2 = \frac{MR^2}{4} + \frac{ML^2}{12}$

Solid cylinder

⑩

$I = \frac{ML^2}{12}$

can be anything

⑪

$I = \frac{M}{12} (a^2 + b^2)$

⑫

$I_x = \frac{Mb^2}{4}$

$I_y = \frac{Ma^2}{4}$

$I_z = \frac{M}{4} (a^2 + b^2)$

③ MAIN LAWS -

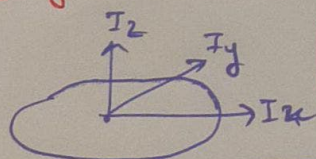
① Parallel axis theorem

$$I' = I_{com} + md^2$$

(axis shift is parallel)

② ⊥ Axis Theorem.

(only 4 1D + 2D bodies)



$$I_z = I_x + I_y$$

③ MOI of object w/ cavity

$$I_1 = I - I_2$$

I_1 = Actual MOI of object w/ cavity

I = MOI of object w/o cavity

I_2 = MOI of cavity