PARALLEL AXIS THEOREM:

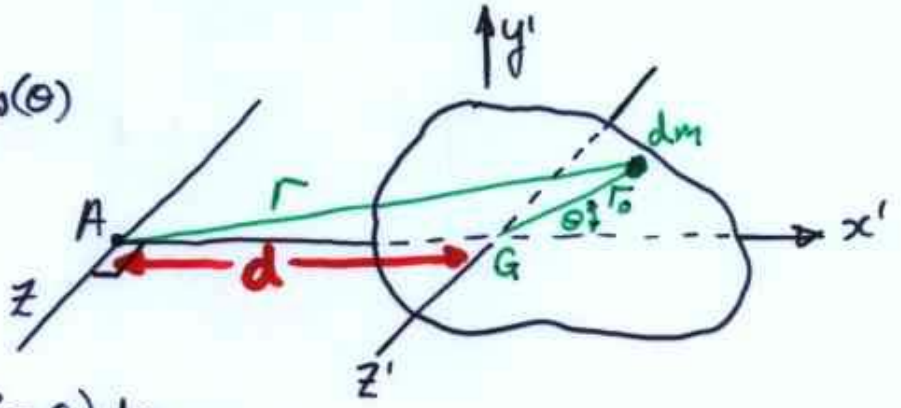
IF I_G is KNOWN, then I for another parallel axis is

$$\boxed{I = I_G + md^2}$$

d is $\perp$ distance between the axes

$$r^2 = r_o^2 + d^2 + 2r_o d\cos(\theta)$$

$$I = \int r^2\, dm$$



$$I = \int (r_o^2 + d^2 + 2r_o d\cos\theta)\, dm$$

$$= \int r_o^2\, dm + d^2 \int dm + 2d \underbrace{\int r_o \cos\theta\, dm}_{\text{ZERO BECAUSE of definition of center of mass.}}$$

$$\therefore \boxed{I = I_G + md^2}$$

RADIUS OF GYRATION k

$$\boxed{k = \sqrt{\frac{I}{m}}} \quad \text{i.e.} \quad \boxed{I = k^2 m}$$

if you are told k, m, then you know "I."

N.B. k is "about an axis", just LIKE I

BODY WILL HAVE DIFFERENT k for DIFFERENT axes... in general.