

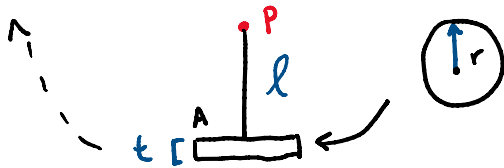
20-R-KIN-DK-3
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Beginner

Parallel Axis

Video

Inspiration: None



A circular weight is being spun on a rope in a planar motion about the point P. What is the moment of inertia of the weight? The weight has a density of $\rho = 8000 \text{ kg/m}^3$ and the radius of the disk is $r = 0.2 \text{ m}$. The rope has a length $l = 50 \text{ cm}$ and the plate is $t = 10 \text{ cm}$ thick.

Moment of Inertia of a cylinder : $I_{xx} = I_{yy} = \frac{1}{12} m (3r^2 + h^2)$

$$m = \rho V = \pi r^2 h = \pi (0.2)^2 (0.1) (8000) = 32\pi$$

$$\begin{aligned} I_P &= I_G + md^2 = \frac{1}{12} (32\pi) (3(0.2)^2 + (0.1)^2) + 32\pi (0.5)^2 \\ &= \frac{626}{75} \pi = \boxed{26.2218 \text{ kgm}^2} \end{aligned}$$