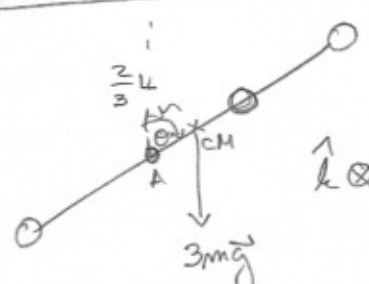


EJERCICIO 5



El CM y el punto A queda

$$R_{CM} = \frac{mL + 2mL - mL}{3m} = \frac{2}{3}L$$

$$\vec{\tau}_A = \frac{2}{3}L \cdot 3mg \sin\theta \hat{k} = 2mgL \sin\theta \hat{k}$$

$$I_A = \sum m_i r_i^2 = mL^2 + 4mL^2 + mL^2 = 6mL^2$$

$$\Rightarrow 2mgL \sin\theta = I_A \ddot{\theta} = 6mL^2 \ddot{\theta}$$

$$\Rightarrow \boxed{\ddot{\theta} = \frac{g \sin\theta}{3L}}$$

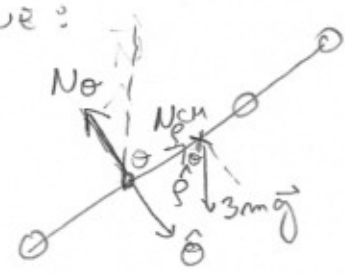
$$\Rightarrow \dot{\theta} \frac{d\dot{\theta}}{d\theta} = \ddot{\theta} \Rightarrow \int_0^{\dot{\theta}} \dot{\theta} d\dot{\theta} = \frac{g}{3L} \int_0^{\theta} \sin\theta d\theta$$

$$\dot{\theta}^2 = \frac{2g}{3L} (1 - \cos\theta)$$

En $\theta = \frac{\pi}{2}$ (HORIZONTAL)

$$\dot{\theta} = \sqrt{\frac{2g}{3L}} \Rightarrow v_{\perp} = r_i \cdot \dot{\theta} \Rightarrow \boxed{v_{\perp} = \sqrt{\frac{8gL}{3}}}$$

Ahora se tiene:



$$\hat{s}) N_{\theta} - 3mg \cos\theta = 3m R_{CM} \dot{\theta}^2$$

$$\hat{\theta}) -N_{\theta} + 3mg \sin\theta = 3m R_{CM} \ddot{\theta}$$

$$N_{\theta} = 3mg \cos\theta - 3m \frac{4}{9} g (1 - \cos\theta)$$

$$N_{\theta} = 3mg \sin\theta - 3m \frac{2}{3} L \frac{g}{3L} \sin\theta$$

$$\theta = \frac{\pi}{2}$$

$$N_p = -\frac{4}{3} mg$$

$$N_o = \frac{7}{3} mg$$

$$\Rightarrow N = \sqrt{N_p^2 + N_o^2} \Rightarrow$$

$$N = \frac{\sqrt{165}}{3} mg$$