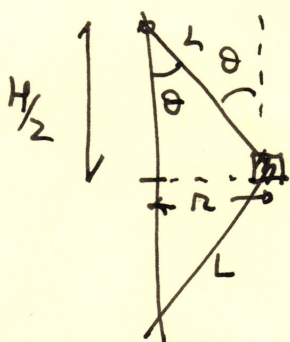


Control Rempeativo

Problema # 2

a. Procedimiento: * Determinamos el ángulo θ
* conocido θ determinamos la velocidad crítica ω_0 .

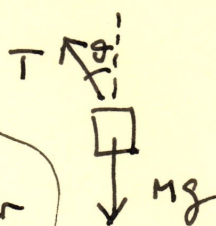
2 pts



$$\cos \theta = \frac{H}{2L}$$

$$\sin \theta = \frac{r}{L} \Rightarrow r = L \sin \theta$$

DCL de la masa M



$$1) T \cos \theta = Mg$$

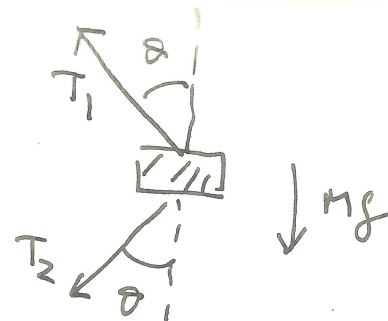
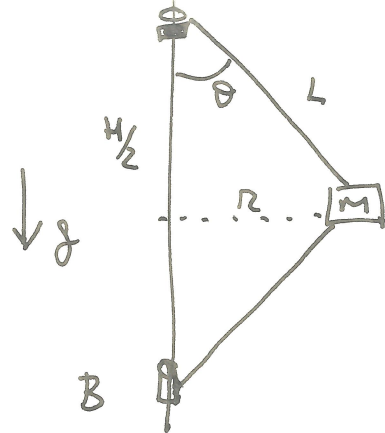
$$2) T \sin \theta = M \omega_0^2 r$$

La tensión en la cuerda inferior es nula.

$$\Rightarrow \omega_0^2 = \frac{T \sin \theta}{M r} = \frac{Mg \tan \theta}{M L \sin \theta}$$

$$\boxed{\omega_0^2 = \frac{g}{L \cos \theta}} = \frac{2g}{H} = \frac{g}{(H/2)}$$

(4 pts.)



$$\omega^2 = (2\omega_0)^2 = 4\omega_0^2 =$$

$$\omega^2 = \frac{8g}{H}$$

$$R = L \sin \theta$$

$$\cos \theta = \frac{(H/2)}{L}$$

$$1) T_1 \cos \theta - T_2 \cos \theta - Mg = 0$$

$$2) T_1 \sin \theta + T_2 \sin \theta = + M \omega^2 R$$

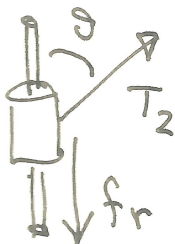
↓ Despejamos

$$\frac{1)}{\cos \theta} + \frac{2)}{\sin \theta} \Rightarrow 2T_1 = Mg \left[\frac{1}{\cos \theta} + \frac{8L}{H} \right]$$

$$-\frac{1)}{\cos \theta} + \frac{2)}{\sin \theta} \Rightarrow 2T_2 = Mg \left[\frac{8L}{H} - \frac{1}{\cos \theta} \right]$$

⇓

SOPORTE B



$$3) T_2 \cos \theta - f_r^{\max} = 0$$

$$4) f_r^{\max} = \mu T_2 \sin \theta$$

$$T_1 = \frac{Mg}{2} \left[\frac{2L}{H} + \frac{8L}{H} \right] = \frac{5MgL}{H}$$

$$T_2 = \frac{Mg}{2} \left[\frac{8L}{H} - \frac{2L}{H} \right] = \frac{3MgL}{H}$$

$$3) + 4) \Rightarrow T_2 \cos \theta = \mu T_2 \sin \theta \Rightarrow$$

$$\mu = \frac{1}{\tan \theta}$$

$$\mu = \frac{H}{\sqrt{4L^2 - H^2}}$$