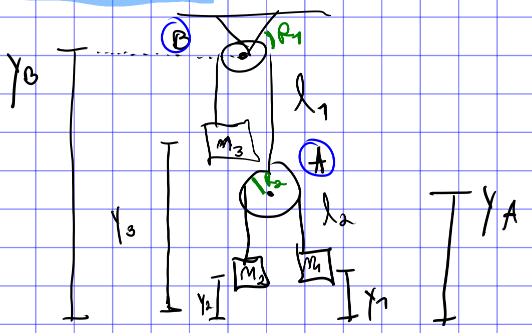
Parcial de hoy 14 feb en 8 días (21 feb)

hay preparcial de física.

ejercicio:




$$l_1 = (Y_B - Y_3) + \pi R_1 + (Y_B - Y_A)$$
$$l_2 = (Y_A - Y_2) + \pi R_2 + (Y_A - Y_1)$$

Con estos puedo relacionar la aceleración:

$$0 = (a_B - a_3) + (a_B - a_A)$$
$$0 = (-a_3 - a_A) \Rightarrow \boxed{a_3 = -a_A}$$

$$0 = 2a_A - a_2 - a_1$$
$$0 = -2a_3 - a_2 - a_1$$
$$2a_3 + a_2 + a_1 = 0 \quad (1)$$

(2) $T_1 - M_3 g = M_3 a_3$

(3) $T_1 - 2T_2 = M_A a_A \Rightarrow T_1 = 2T_2$

masa de la polea es despreciable

(4) $T_2 - M_1 g = M_1 a_1$

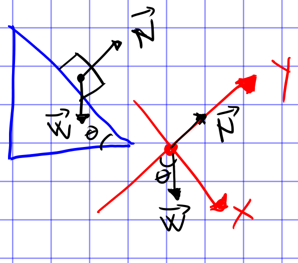
(5) $T_2 - M_2 g = M_2 a_2$

- incógnitas $T_1 = ?$, $T_2 = ?$

$a_1, a_2, a_3 = ?$

## Experimento de galileo

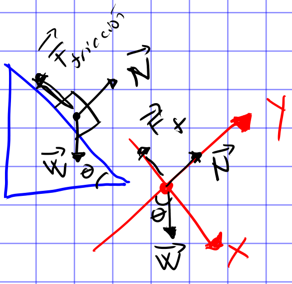
$$\cancel{(M}g) \cdot \operatorname{sen}(\theta) = \cancel{m} a$$
$$g \operatorname{sen}(\theta) = a$$




$$\Sigma F_x = W \operatorname{sen}(\theta)$$
$$\Sigma F_y = N - W\cos(\theta) = 0$$

# Fricción

- Caso estático (quieto)
- Caso dinámico (movimiento)




La fricción es proporcional a la Normal

$$\vec{F}_{fricción} \propto \vec{N}$$

$$\vec{F}_{fricción} = \underbrace{\mu}_{\text{coef. de fricción}} \vec{N}$$

## Caso estático

1. $\sum f_x = mg \cdot \operatorname{sen}(\theta) - \vec{F}_{fricción} = 0$
2. $\sum f_y = N - mg\cos(\theta) = 0$

$$N = mg\cos(\theta)$$

$$\sum F_x = mg \cdot \operatorname{Sen}(\theta) - \vec{F}_{fricción} = mg\operatorname{sen}(\theta) - \mu N = 0$$

$$= \cancel{mg}\operatorname{sen}(\theta) - \mu\,\cancel{mg}(\cos\theta) = 0$$

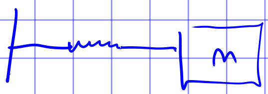
$$\operatorname{Sen}(\theta) = \mu\cos(\theta)$$

$$\boxed{\mu = \tan(\theta)}$$

## Caso dinámico:

1. $mg\operatorname{sen}(\theta) - \vec{F}_f = ma$
2. $N - mg\cos(\theta) = 0$

# ley de hooke




$F \propto \Delta x \rightarrow$ fuerza es proporcional al $\Delta x$

$$F = -K\Delta x = -Kx$$

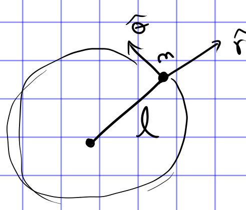
$$\sum F_x = -Kx = m \cdot a$$

$$-Kx = m\ddot{x}$$

$$m\frac{d^2x}{dt^2} = -Kx$$

$$\boxed{\frac{d^2x}{dt^2} = -\frac{Kx}{m}}$$

# Rotación 2



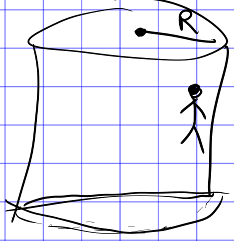

- $r = l \Rightarrow \dot{r} = \ddot{r} = 0$
- $\dot{\theta} = Cte = \omega$

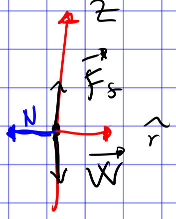
$$\sum \vec{F}_{radio} = -T = m a_r$$

$$-T = m(\ddot{r} - \dot{\theta}^2 r)$$

$$-T = -l\omega^2$$

$$T = l\omega^2$$




$$\sum \vec F_r = -\vec N = -\omega^2 R$$

$$\vec N = \omega^2 R$$

$$\sum F_z = \vec F_f - mg = 0$$

$$\mu N - mg = 0$$

la normal es contravía a $\omega^2 R$

$$N = \frac{mg}{\mu} = \omega^2 R$$

$$\omega = \sqrt{\frac{mg}{\mu R}}$$

Fuerza gravitacional

Cte de gravitación universal

$$|\vec F_g| = \left| G \frac{M_1 \cdot M_2}{R^2} \right|$$

fuerza atractiva

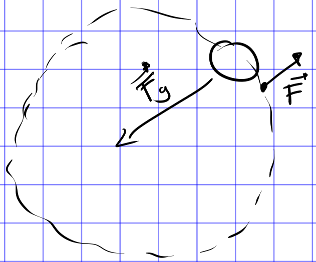
$$\vec F_g = \frac{-G M_1 M_2}{R^2} \hat r$$

Análogamente entre electrones

cargas

$$\vec F = \pm K \frac{q_1 q_2}{R^2} \hat r$$

fuerza atractiva y repulsiva




$$-F_g = -m\omega^2 r$$

$$\frac{G M_1 \cancel{M_2}}{r^2} = \cancel{m_2}\omega^2 r$$

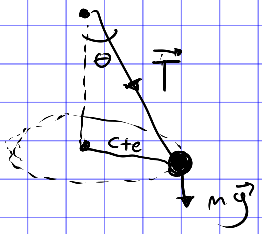
$$\frac{G M_1}{r^3} = \omega^2$$

$$\frac{G M_1}{r^3} = \frac{4\pi^2}{T^2}$$

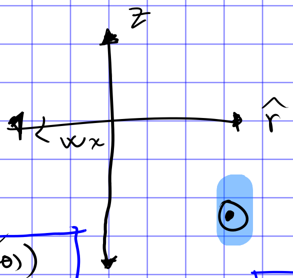
Si se evalúa para cualquier planeta es aprox. Cte.

$$\frac{r^3}{T^2} = \frac{G M_1}{4\pi^2}$$

Pendulo conico




$l$ = longitud de la cuerda.




$$-\vec{T}_x = -m\omega^2 r$$

$$T\,\text{sen}(\theta) = m\omega^2 r$$

$$\boxed{\begin{aligned} T\,\cancel{\text{sen}(\theta)} &= m\,\omega^2 (l\,\cancel{\text{sen}(\theta)}) \\ T &= m\,\omega^2 l \end{aligned}}$$

$$T\cos(\theta) - mg = 0$$

$$\boxed{T = \frac{mg}{\cos(\theta)}}$$