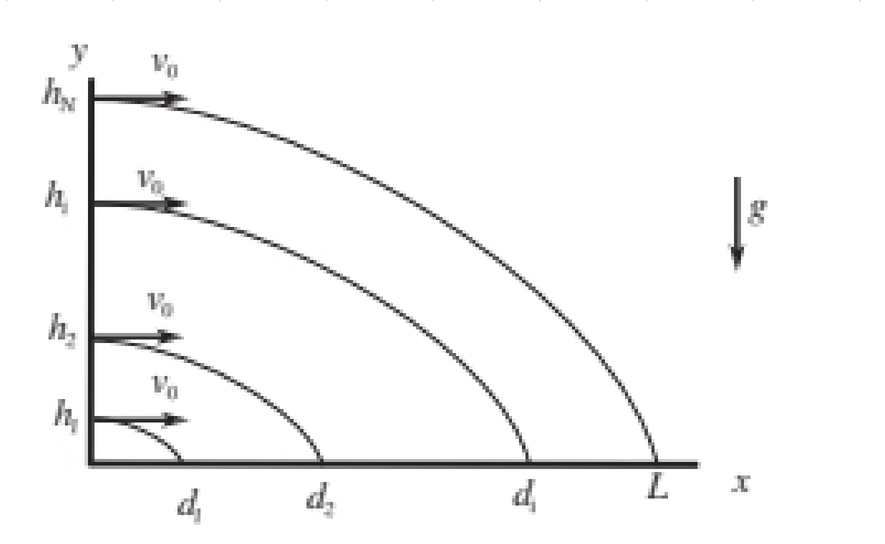


Importante: el último llega a L

- n partículas
- $V_{ox} = V_0 =$ cte

$$y(t) = y_0 + V_{oy} t - \frac{1}{2} g t^2$$

i) $0 = h_i - \frac{1}{2} g t_i^2$ t_i: tiempo que tarda i en llegar al suelo

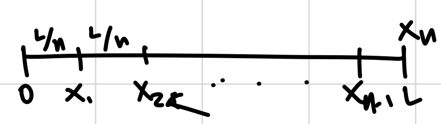
$$h_i = \frac{1}{2} g t_i^2 \leftarrow$$

$\hat{x}$) $x(t) = \cancelto{0}{x_0} + \cancelto{V_0}{V_{ox}} t + \frac{1}{2} \cancel{a_x} t^2$

$$x_i = V_0 \cdot t_i$$

x_i uniforme/. espaciado

$x_{i\,max} = L$. $\rightarrow \Delta x$



$$x_i = i\left(\frac{L}{n}\right) \checkmark$$

$$x_i = V_0 t_i = i\left(\frac{L}{n}\right)$$

$$t_i = \frac{i}{V_0}\left(\frac{L}{n}\right)$$

$$h_i = \frac{1}{2} g t_i^2 = \frac{1}{2} g \left(\frac{iL}{V_0 n}\right)^2$$

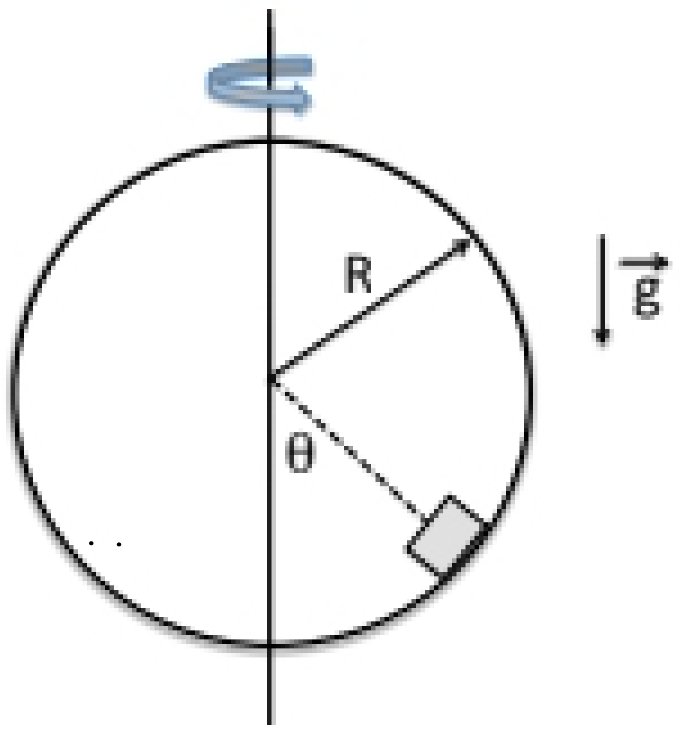
b) $h_i = \frac{1}{2} g t_i^2$

$$t_i = \sqrt{\frac{2h_i}{g}} = \sqrt{\cancel{\frac{2}{g} \cdot \frac{1}{2} g} \left(\frac{iL}{V_0 n}\right)^2} = \boxed{t_i = \frac{iL}{V_0 n}}$$

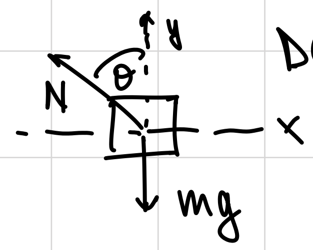
$i \rightarrow (i+1)$ $t_{i+1} = \frac{(i+1)L}{V_0 n}$

$$\Delta t = t_{i+1} - t_i = \frac{(i+1)L}{V_0 n} - \frac{iL}{V_0 n} = \cancel{\frac{iL}{V_0 n}} + \frac{L}{V_0 n} - \cancel{\frac{iL}{V_0 n}} = \Delta t = \frac{L}{V_0 n}$$

Tengo que lanzar i+1 un tiempo $\frac{L}{V_0 n}$ antes que i //



DCL



DCL: - Fuerzas
- Ángulos

$\hat{x}$ | $N \operatorname{sen}\theta = m\vec{a} \Rightarrow \vec{a}_c$

$\hat{y}$ | $N\cos\theta - mg = 0$

$R_c = R \operatorname{sen}\theta$; $N \operatorname{sen}\theta = m\vec{a} = m\vec{a}_c \Rightarrow \vec{a}_c = \dfrac{N\operatorname{sen}\theta}{m}$

$$a_c = \omega^2 R_c = \frac{N\operatorname{sen}\theta}{m}$$

$$\omega^2 = \frac{N\cancel{\operatorname{sen}\theta}}{m R \cancel{\operatorname{sen}}} = \frac{N}{mR}$$

$$\omega = \sqrt{\frac{N}{mR}}$$

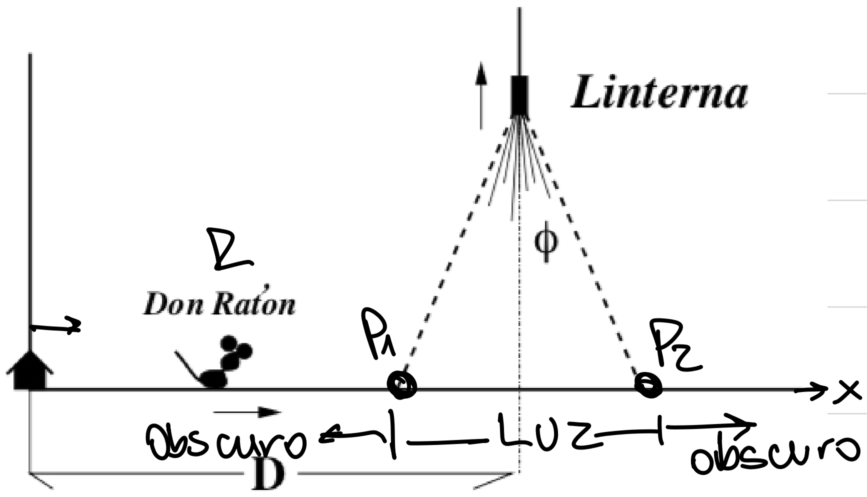
$$\omega = \frac{2\pi}{T} = \sqrt{\frac{N}{mR}} \longrightarrow T = 2\pi\sqrt{\frac{mR}{N}}$$

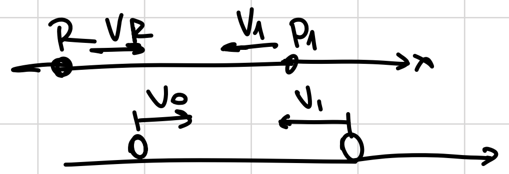
No tenemos la N

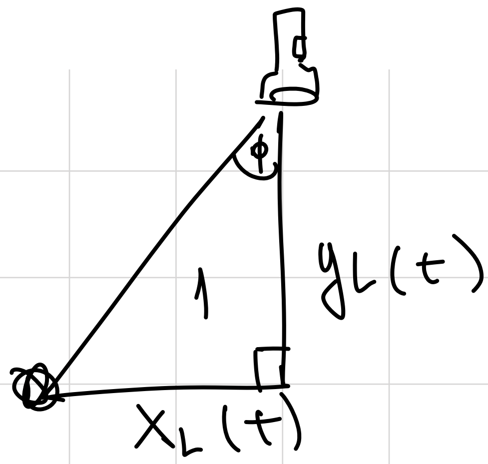
$$N\cos\theta - mg = 0 \rightarrow N = \frac{mg}{\cos\theta}$$

$$T = 2\pi\sqrt{\frac{\cancel{m}R\cos\theta}{\cancel{m}g}} = 2\pi\sqrt{\frac{R\cos\theta}{g}}$$

$$\boxed{V_R = V_0} \rightarrow \text{Dato}$$







$$y_L = u \cdot t$$

$$\tan\phi = \frac{x_L}{y_L} = \underbrace{\tan\phi = \frac{x_L}{u \cdot t}} \rightarrow x_L = u \cdot t \cdot \tan\phi$$

$$\left.\begin{aligned} x_{p_1} &= D - u \cdot t \cdot \tan\phi \\ x_R &= V_0 t \end{aligned}\right\} \quad \text{imponemos} \quad x_R \stackrel{!}{=} x_{p_1} \rightarrow \text{Ratón comienza a estar iluminado}$$

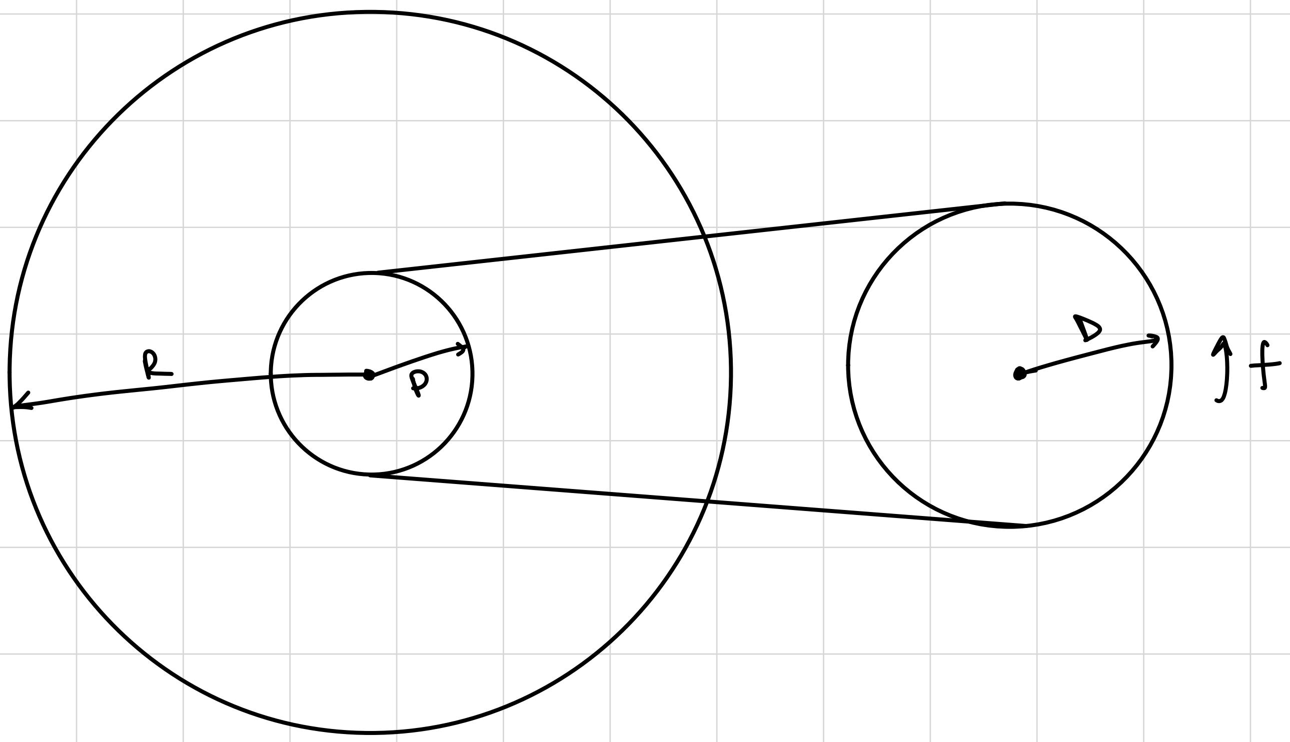
$$V_0 t^* = D - u \cdot t^* \cdot \tan\phi$$

$$t^* (V_0 + u \cdot \tan\phi) = D \rightarrow t^* = \frac{D}{V_0 + u\tan\phi}$$

$$\left.\begin{aligned} x_{p_2} &= D + u \cdot t \cdot \tan\phi \\ x_R &= V_0 t \end{aligned}\right\} \quad \begin{aligned} V_0 t^{**} &\stackrel{!}{=} D + u \cdot t^{**} \cdot \tan\phi \\ t^{**} &= \frac{D}{V_0 - u\tan\phi} \end{aligned}$$

$$\Delta t = t^{**} - t^* = \frac{D}{V_0 - u\tan\phi} - \frac{D}{V_0 + u\tan\phi} = \frac{\cancel{DV_0} + uD\tan\phi - \cancel{DV_0} + uD\tan\phi}{V_0^2 - u^2 \tan^2\phi}$$

$$\Delta t = \frac{2uD\tan\phi}{V_0^2 - u^2\tan^2\phi} \blacksquare$$



Pedal: $f \rightarrow \omega_D = 2\pi f$

$V_{T_D} = 2\pi f D$

$\downarrow$

Piñon: $V_{TP} = V_{TD} = 2\pi f D$

$\omega_P = \frac{V_{TP}}{P} = \frac{2\pi f D}{P}$

Rueda: $\omega_R = \omega_P = \frac{2\pi f D}{P}$

$V_{TR} = \frac{2\pi f D}{P} R$ □

Ciclista: $V_c = V_{TR} = \frac{2\pi f D R}{P}$

b) $V_c' = 3 V_c \longrightarrow f$

$V_c = \frac{2\pi f D R}{P} \longrightarrow f = \frac{V_c P}{2\pi D R}$

$\downarrow$

$f' = \frac{V_c' P}{2\pi D R} = \frac{3 V_c P}{2\pi D R} = 3f$

$f' = 3f$