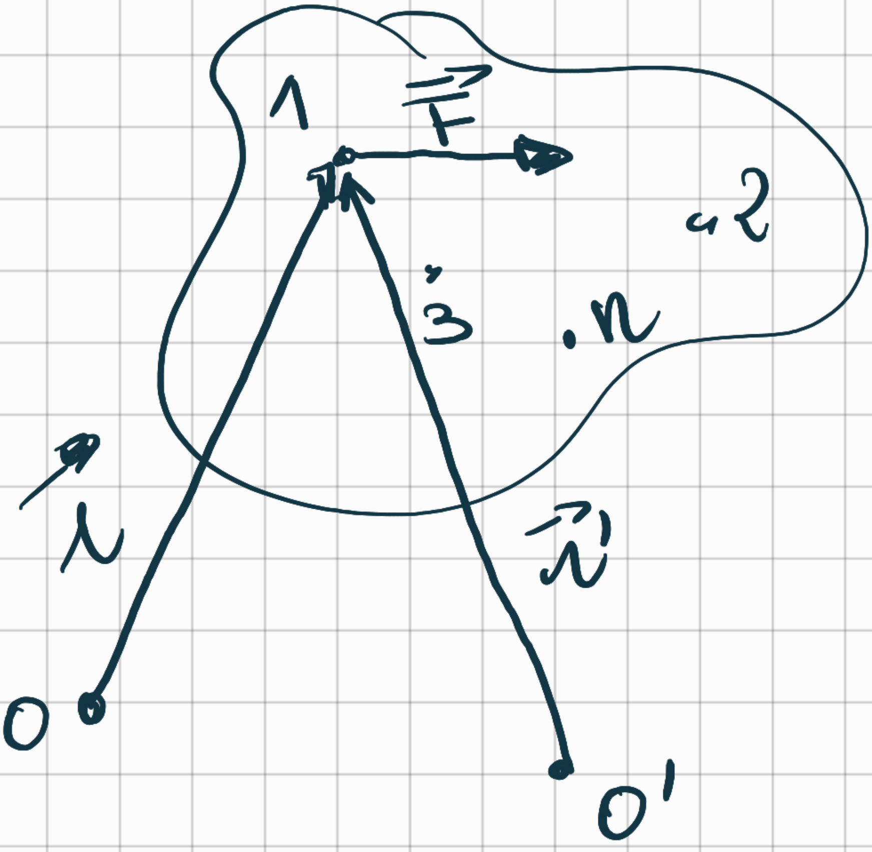
INDIPENDENZA POLO



$$\vec{\tau}_O = \vec{r} \times \vec{F}$$

$$\sum_{i=1}^{n} \vec{r}_i \times \vec{F}_i$$

$$\overline{OO'} + \vec{r'} = \vec{r}_i$$

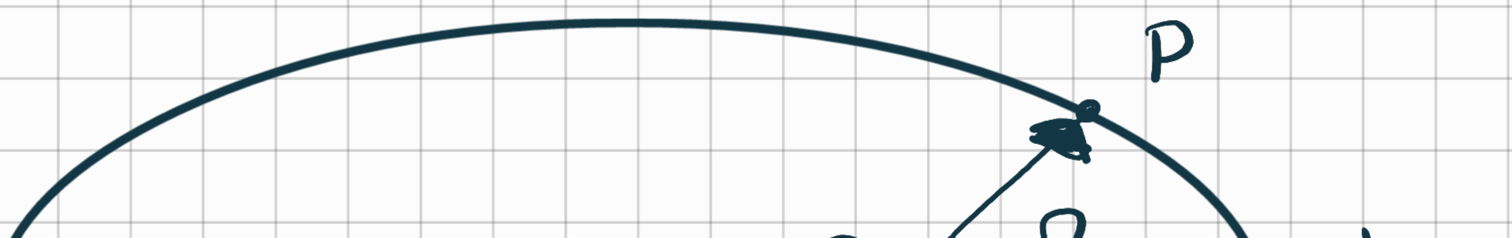
$$\sum_{i=1}^{n} (\overline{OO'} + \vec{r_i}') \times \vec{F_i} =$$

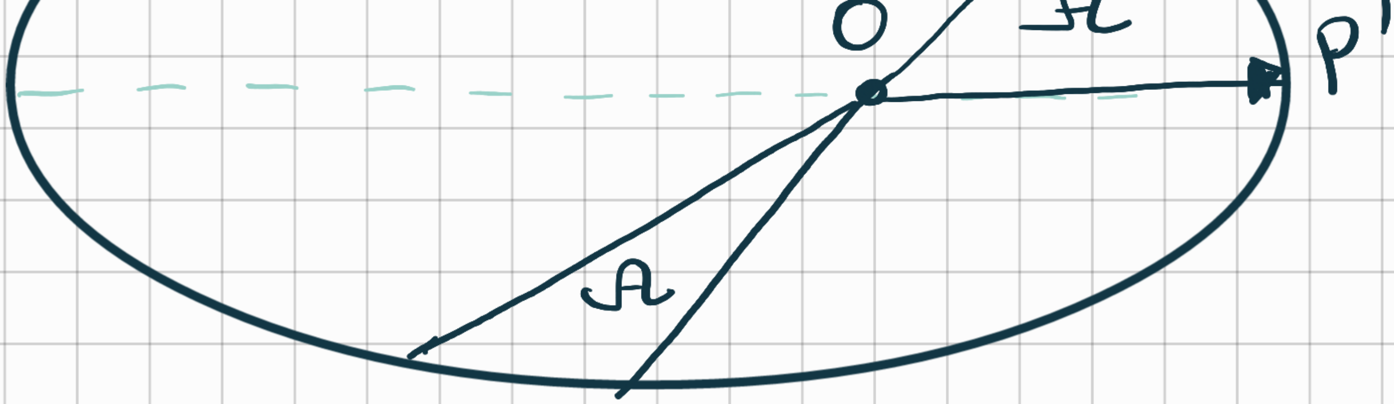
$$\sum \overline{OO'} \times \vec{F_i} + \sum \vec{r_i}' \times \vec{F_i}$$

$$\underbrace{\overline{OO'} \times \sum \vec{F_i}}_{0} + \sum \vec{r_i}' \times \vec{F_i}$$

$$\vec{\tau}_O^{(e)} = \sum_{i=1}^{n} \vec{r_i}' \times \vec{F_i}$$

$$\vec{\tau}_O^{(e)} = \vec{\tau}_{O'}^{(e)}$$





$$\vec{A} = \frac{1}{2}\,\vec{OP} \times \vec{OP'}$$

$$d\vec{A} = \frac{1}{2}\,\vec{OP} \times \vec{OP'}$$

$$d\vec{s} = \overset{\frown}{PP'}$$

$$OP' = OP + PP'$$

$$d\vec{A} = \frac{1}{2}\,\vec{OP} \times (\vec{OP} + \vec{PP'})$$

$$= \frac{1}{2}\,\underbrace{\vec{OP} \times \vec{OP}}_{0} + \vec{OP} \times \vec{PP'}$$

$$= \frac{1}{2}\,\overrightarrow{OP} \times \overrightarrow{PP'}$$

$V = \frac{S}{T}$ $\overrightarrow{PP'} = VT$

$$= \frac{1}{2}\,\overrightarrow{OP} \times \vec{v}\,dt$$

$$d\vec{A} = \frac{1}{2}\,\overrightarrow{OP} \times \vec{v}\,dt$$

$$\dot{\vec{A}} = \frac{1}{2}\,\overrightarrow{OP} \times \vec{v}$$

$\vec{r}$

$$= \frac{1}{2m}\,\overrightarrow{OP} \times m\vec{v}$$

$$= \frac{1}{2m}\,\vec{L}$$

$$\dot{\vec{A}} = \frac{1}{2m}\,\vec{L}$$

$$\dot{\vec{L}} = 0$$

$$\vec{\tau}^{(e)}_0 = \dot{\vec{L}}^{(e)}_0$$

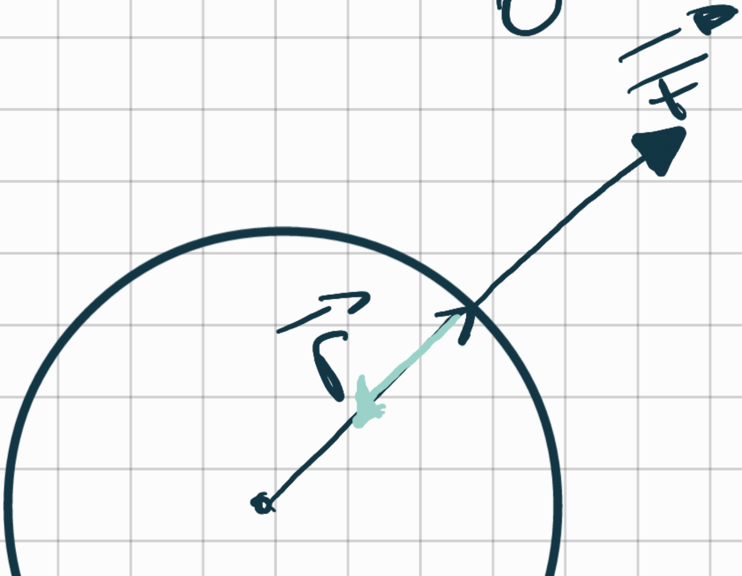
$$\vec{\tau}^{(e)} = 0$$

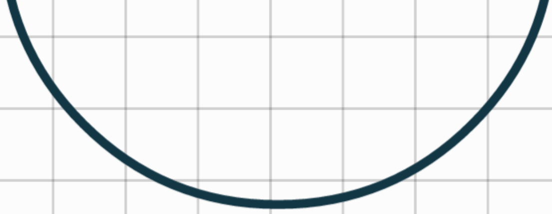
$$\vec{r} \times \vec{F}$$

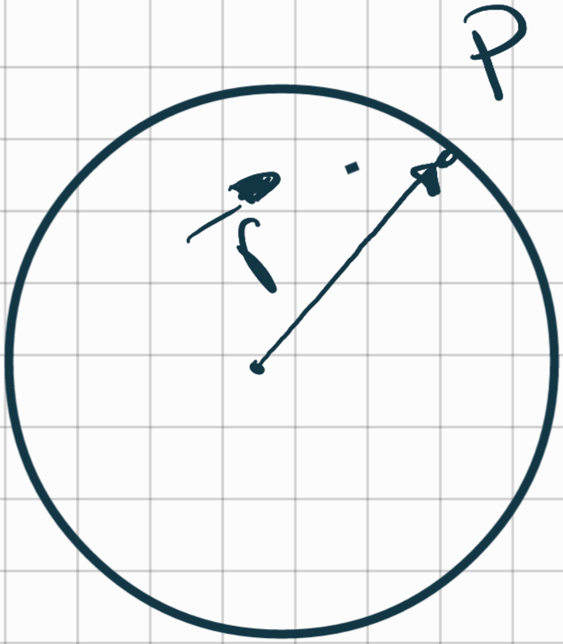
$$rF\sin\alpha$$

180

0







$$V = \frac{S}{T} = \frac{2\pi R}{T}$$

$$\frac{V^2}{R} = \left(\frac{2\pi r}{T}\right)^2 \cdot 1/r$$

dovuto

Se momento angolare è uguale a zero allora dico che la velocità non dipende dal tempo

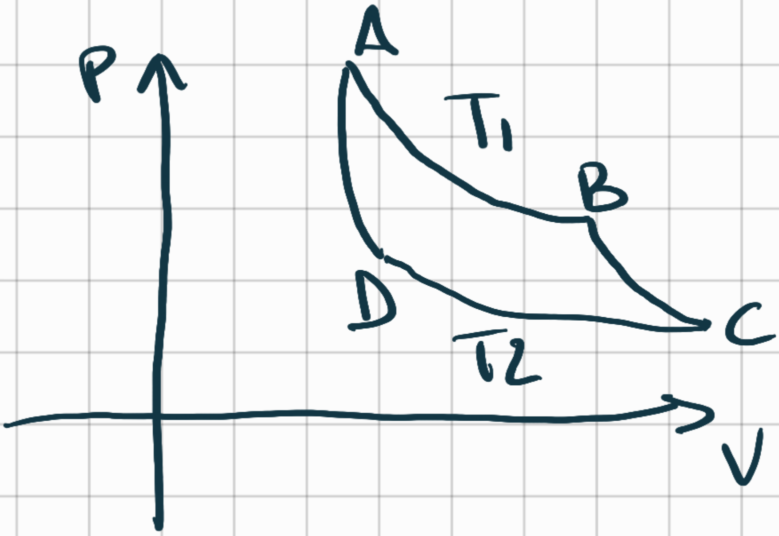
$$\frac{V^2}{R} = \left(\frac{2\pi r}{T}\right)^2 \cdot 1/r = \frac{4\pi^2 r^2}{T^2} \cdot 1/r$$

$$= \frac{4\pi^2 r}{T^2} = \frac{4\pi^2 C}{r^2}$$

$$C = \frac{a^3}{T^2}$$

$$\vec{F} = \frac{4\pi^2 C m}{r^2}$$

Ciclo Carnot



$$\Delta U = 0$$

$$Q = L$$

$$L = Q_{ASS} + Q_{CED}$$

)

$$\frac{L}{Q_{ASS}} = \eta$$

$$\eta = \frac{L}{Q_{ASS}} = 1 - \frac{|Q_{CED}|}{Q_{ASS}}$$

$$Q = nRT \ln\left(\frac{V_2}{V_1}\right)$$

$$Q_{AB} = nRT_1 \ln\left(\frac{V_B}{V_A}\right)$$

$$V_B > V_A \qquad Q_{AB} > 0$$

$$Q_{CD} = nRT_2 \ln\left(\frac{V_D}{V_C}\right)$$

$$V_C > V_D \qquad Q_{CD} < 0$$

$$\eta = 1 - \frac{\left|\cancel{nR}T_2 \ln\left(\frac{V_D}{V_C}\right)\right|}{\cancel{nR}T_1 \ln\left(\frac{V_B}{V_A}\right)}$$

$$TV^{\gamma-1} = COST$$

$BC \rightarrow DA$

$$T_B V_B^{\gamma-1} = T_C V_C^{\gamma-1} \qquad T_A = T_B = T_1$$

$$T_A V_A^{\gamma-1} = T_D V_D^{\gamma-1} \qquad T_C = T_D = T_2$$

$$\left(\frac{V_B}{V_A}\right)^{\cancel{\gamma-1}} = \left(\frac{V_C}{V_D}\right)^{\cancel{\gamma-1}}$$

$$\eta = 1 - \frac{\left| -T_2 \ln\left(\frac{V_C}{V_D}\right) \right|}{T_1 \ln\left(\frac{V_B}{V_A}\right)}$$

$$\eta = 1 - T_2$$

$$T_1$$

$$\frac{Q_{CED}}{Q_{ASS}} = \frac{T_2}{T_1}$$

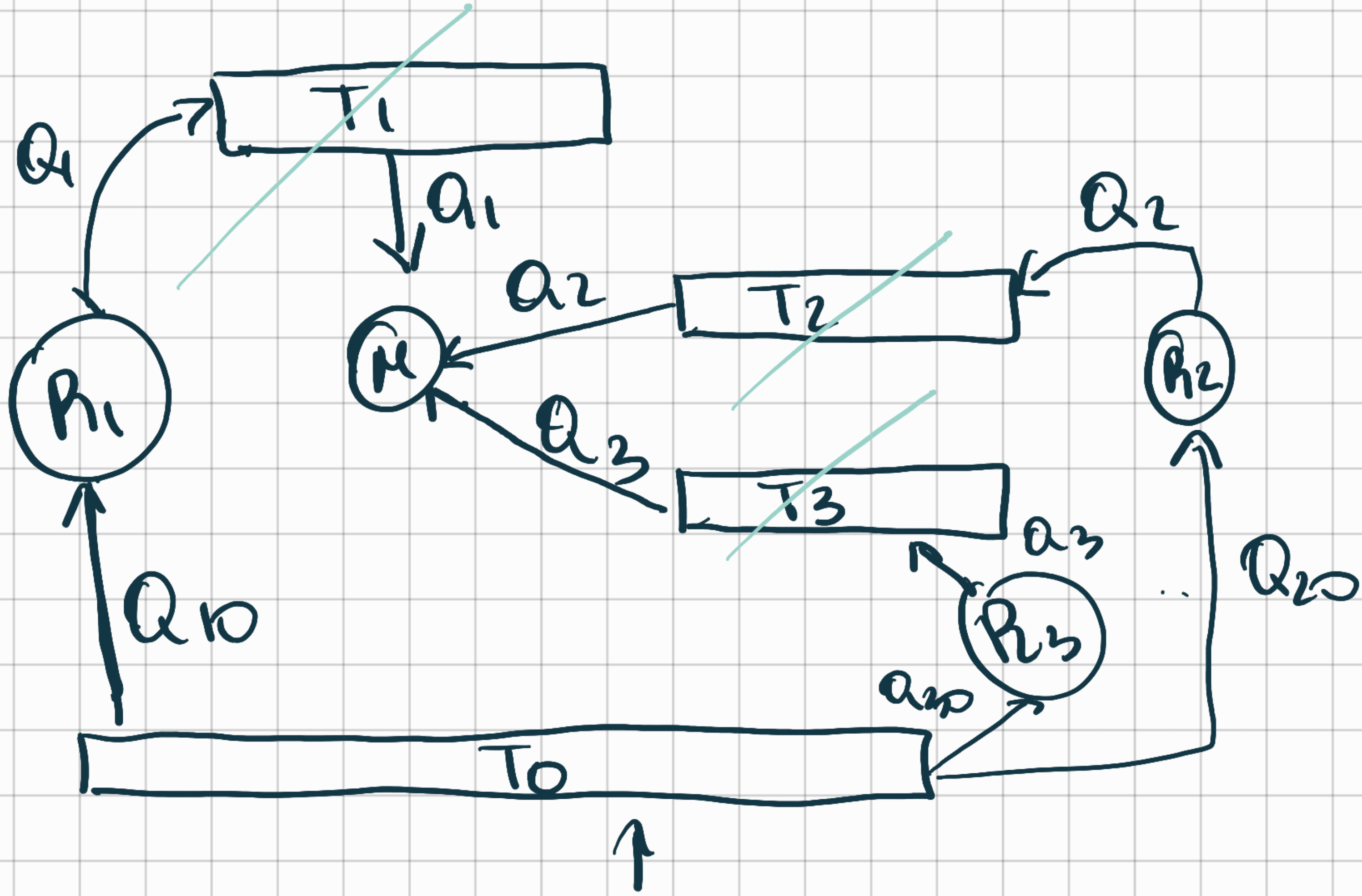
$$\frac{Q_{CED}}{T_2} = \frac{Q_{ASS}}{T_1}$$

FORMULA CON LAVORO

$$1 - \frac{|Q_{CED}|}{Q_{ASS}} = 1 - \frac{T_2}{T_1}$$

$$\cancel{1} + \frac{Q_{CED}}{Q_{ASS}} = \cancel{1} - \frac{T_2}{T_1}$$

$$\frac{Q_{CED}}{T_2} + \frac{Q_{ASS}}{T_1} = 0$$



$$\frac{Q_1}{Q_{10}} = \frac{T_1}{T_0} \Rightarrow \frac{Q_1}{T_1} = \frac{Q_{10}}{T_0}$$

$$\frac{Q_2}{Q_{20}} = \frac{T_2}{T_0} \Rightarrow \frac{Q_2}{T_2} = \frac{Q_{20}}{T_0}$$

$$\frac{Q_3}{Q_{30}} = \frac{T_3}{T_0} \Rightarrow \frac{Q_3}{T_3} = \frac{Q_{30}}{T_0}$$

$$\frac{Q_{10}}{T_0} + \frac{Q_{20}}{T_0} + \frac{Q_{30}}{T_0} = \frac{Q_1}{T_1} + \frac{Q_2}{T_2} + \frac{Q_3}{T_3}$$

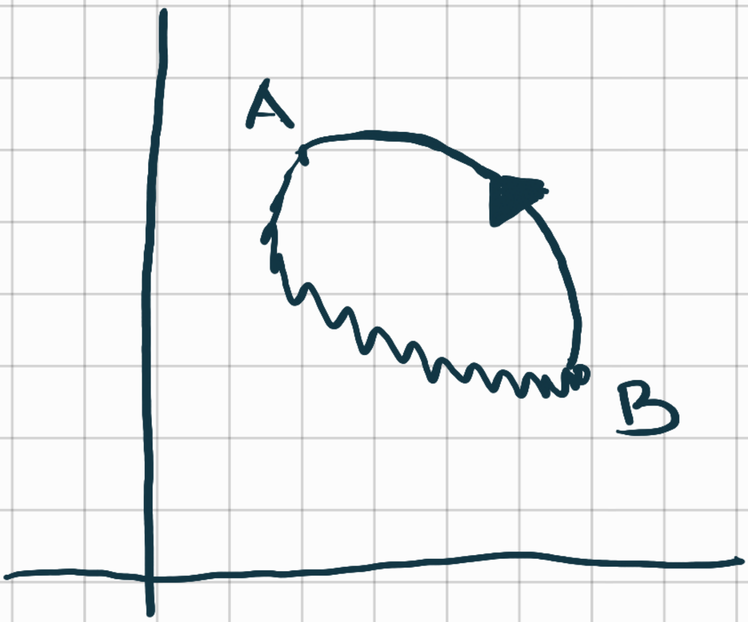
$$\frac{1}{T_0} Q_0 = \sum_{i=1}^{3} \frac{Q_i}{T_i}$$

$$Q_0 = \underset{\uparrow}{T_0} \sum \frac{Q_i}{T_i}$$

$$Q_0 \leq 0$$

$$\sum \frac{Q_i}{T_i} \leq 0$$

$$\oint \frac{dQ}{T} \leq 0$$



$$\oint_{I} \frac{dQ}{T} = \int_{A,\,irr}^{B} \frac{dQ}{T} + \int_{B,\,rev}^{A} \frac{dQ}{T} \leq 0$$

$$\oint_{B,\,rev}^{A} \frac{dQ}{T} + \oint_{A,\,irr}^{B} \frac{dQ}{T} \leq 0$$

$$dQ = 0 \Rightarrow S = 0$$

$$\int^{B} \qquad \qquad \int^{A}$$

$$\int_{A,\,rev} \frac{dQ}{T} \leq -\int_{B,\,irr} \frac{dQ}{T}$$

RIVEDI

$$S(B) - S(A) \geq 0$$

$$S(B) \geq S(A)$$

solo se ho trasformazione isolata

VELOCITÀ FUGA

$$E_p = \frac{GmM}{R+h} \qquad E_c = \frac{1}{2} m v^2$$

2 .

1

1

2

$$-\frac{GmM}{(r+h)}+\frac{1}{2}mv^2=-\cancel{\frac{GmM}{(r+h)}}+\cancel{\frac{1}{2}mv^2}$$

$$0 \qquad 0$$

$$\frac{GmM}{r_T}=\frac{1}{2}mv^2$$

$$r_T\,\frac{G\cancel{m}M}{r_T^2}=\frac{1}{2}\cancel{m}v^2$$

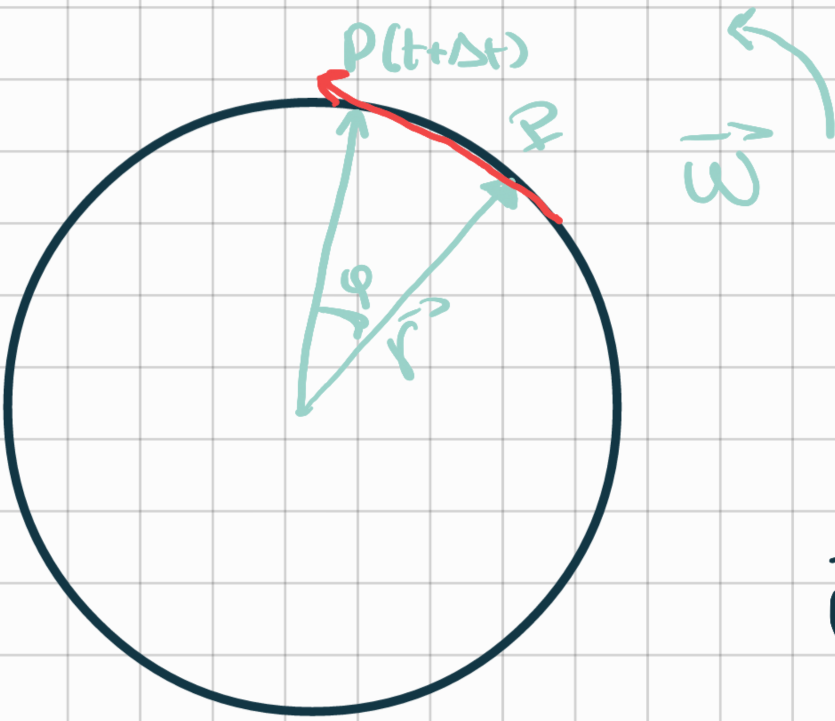
$$\frac{GM}{R_T^2}=g$$

$$gR_T=\frac{1}{2}v^2$$

$$v^2 = 2 g R_T$$

$$v = \sqrt{2 g R_T}$$

$$\frac{GmM}{r} \neq mgh$$



$$\vec{\omega} = \dot{\varphi}$$

$$\vec{s} = \vec{r} \cdot \varphi$$

$$\vec{a}_r = \frac{v^2}{R} = \omega^2 R$$

$$\vec{v} = \omega R$$

$$\vec{a}_t = \ddot{\varphi} = \alpha R$$

$$\varphi(t) = \varphi \cos(\omega t)$$

$$s(t) = v \cdot t + \frac{1}{2} a t^2$$

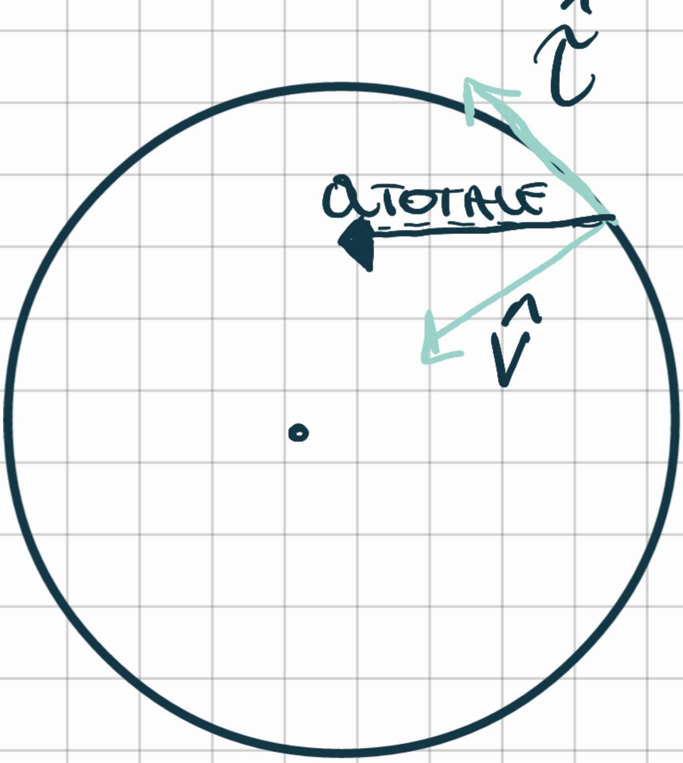
$$\downarrow$$

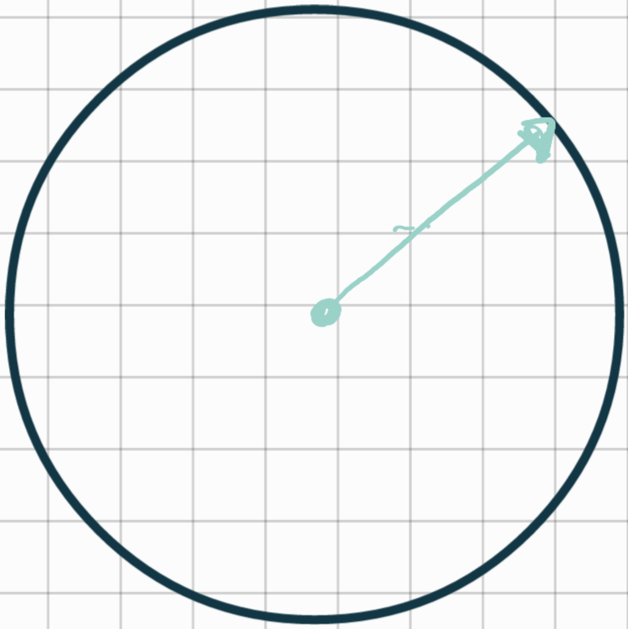
$$\varphi(t) = \omega \cdot t + \frac{1}{2} \alpha t^2$$

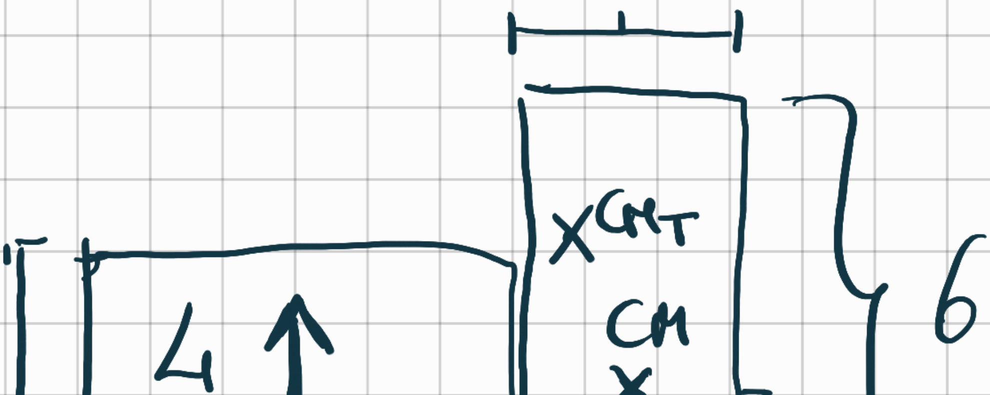
fino a $2\pi R$

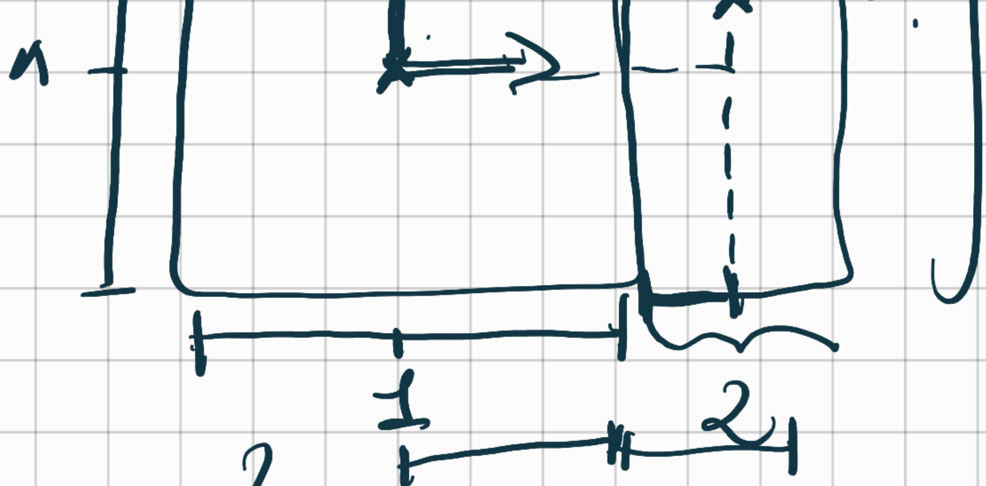
$$\omega(t) = \omega_0 + \alpha t$$

$$t = \frac{\omega - \omega_0}{\alpha}$$


$\hat{\tau}$
a TOTALE
$\hat{v}$




x^{CM_T}
CM
4
6



$Peso = \ell^2 = 2^2$

$$X_{cm} = \frac{2 \cdot 12}{4+12} = \frac{24}{16} = 3/2$$

$$Y_{cm} = \frac{2 \cdot 12}{4+12} = 3/2$$

$1 + 3/2 = 5/2$

$x = y = 5/2$

$$\Delta U = Q - L$$

$$dU = \text{đ}Q - \text{đ}L$$

$n c_v dT$ $\qquad\qquad$ $P dV$

$$\text{đ}Q = n c_v dT + P dV$$