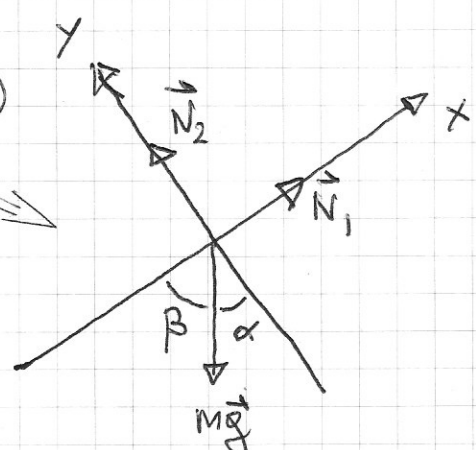


$$\beta = \frac{\pi}{2} - \alpha$$

$$\gamma = \frac{\pi}{2} - (\alpha + \phi)$$

STATICA :

$$\sum \vec{F} = 0$$

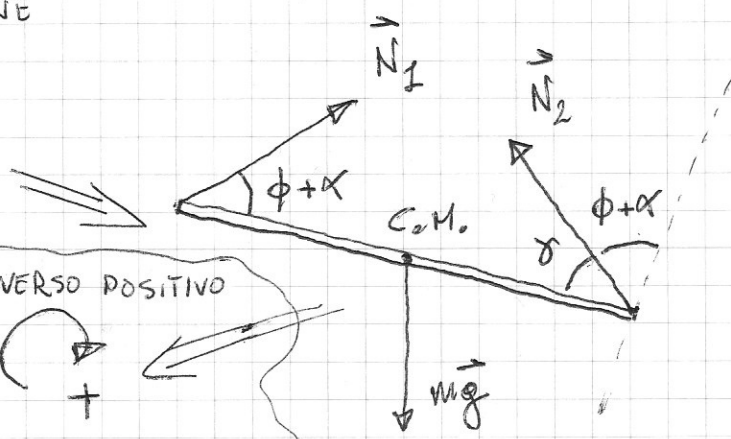


$$N_1 \equiv |\vec{N}_1| = mg \sin \alpha$$

$$N_2 \equiv |\vec{N}_2| = mg \cos \alpha$$

FORZE DI REAZIONE

$$\sum \vec{M} = 0$$



1) VERSO POSITIVO

2) POLO NEL C.M.

$$\frac{l}{2} N_1 \sin(\phi + \alpha) = \frac{l}{2} N_2 \cos(\phi + \alpha)$$

$$mg \sin \alpha \sin(\phi + \alpha) = mg \cos \alpha \cos(\phi + \alpha)$$

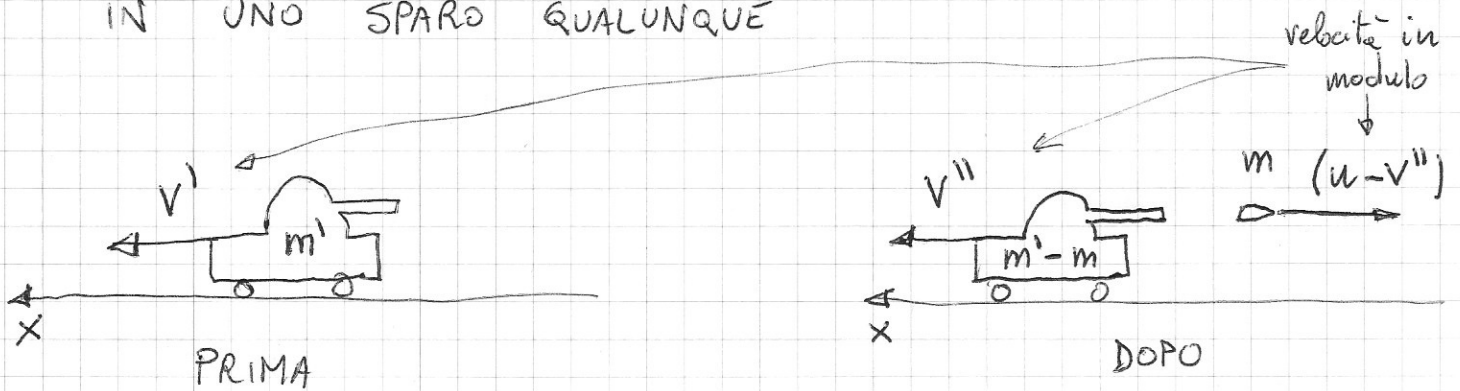
$$\text{tg}(\phi + \alpha) = \text{cotg}(\alpha)$$

$$(\phi + \alpha) + \alpha = \frac{\pi}{2}$$

$$\phi = \frac{\pi}{2} - 2\alpha$$

POSIZIONE DI EQUILIBRIO

IN UNO SPARO QUALUNQUE



ESSENDO NULLE LE F ESTERNE SU X SI CONSERVA P_x

$$m'v' = (m'-m)v'' - m(u - v'') = m'v'' - \cancel{mv''} - mu + \cancel{mv''}$$

$$v'' = v' + \frac{m}{m'}u$$

1° SPARO) $v' = 0, m' = M \rightarrow V_1 = \frac{m}{M}u$

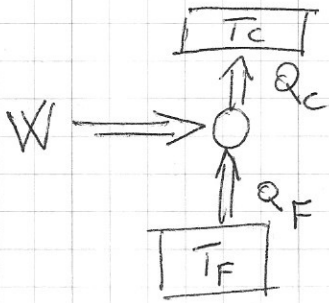
2° SPARO) $v' = \frac{m}{M}u, m' = M - m \rightarrow V_2 = \frac{m}{M}u + \frac{m}{(M-m)}u$

3° SPARO) $v' = \frac{m}{M}u + \frac{m}{(M-m)}u, m' = M - 2m \rightarrow V_3 = \frac{mu}{M} + \frac{m}{(M-m)}u + \frac{m}{(M-2m)}u$

3 TERMINI

QUINDI $V_n = mu \sum_{k=1}^n \frac{1}{[M - (k-1)m]}$

PER RAFFREDDARE L'ACQUA SERVE UN FRIGORIFERO



CON $T_C = 30^\circ\text{C} = 303.15\text{ K}$

$T_0 = 5^\circ\text{C} = 278.15\text{ K}$

T_F TEMPERATURA DI 1lt H_2O $T_0 < T_F < T_C$

C CAPACITÀ TERMICA 1lt $\text{H}_2\text{O} = 4186 \frac{\text{J}}{\text{K}}$

$$\frac{W}{Q_F} = \frac{Q_C - Q_F}{Q_F} = \frac{Q_C}{Q_F} - 1 = \frac{T_C}{T_F} - 1$$

IL FRIGO PIÙ EFFICIENTE È QUELLO DI CARNOT

CONSIDERANDO UNO SCAMBIO DI CALORE INFINITESIMO

$$\frac{dW}{dQ_F} = \frac{T_C}{T_F} - 1$$

INOLTRE - $dQ_F = C dT_F$

$$dW = \left(\frac{T_C}{T_F} - 1 \right) dQ_F = -C \left(\frac{T_C}{T_F} - 1 \right) dT_F$$

$$W = -C \int_{T_C}^{T_0} \left(\frac{T_C}{T_F} - 1 \right) dT_F = C \int_{T_0}^{T_C} \left(\frac{T_C}{T_F} - 1 \right) dT_F =$$

$$= C \left(T_C \ln \left(\frac{T_C}{T_0} \right) - (T_C - T_0) \right) \approx 4570\text{ J}$$