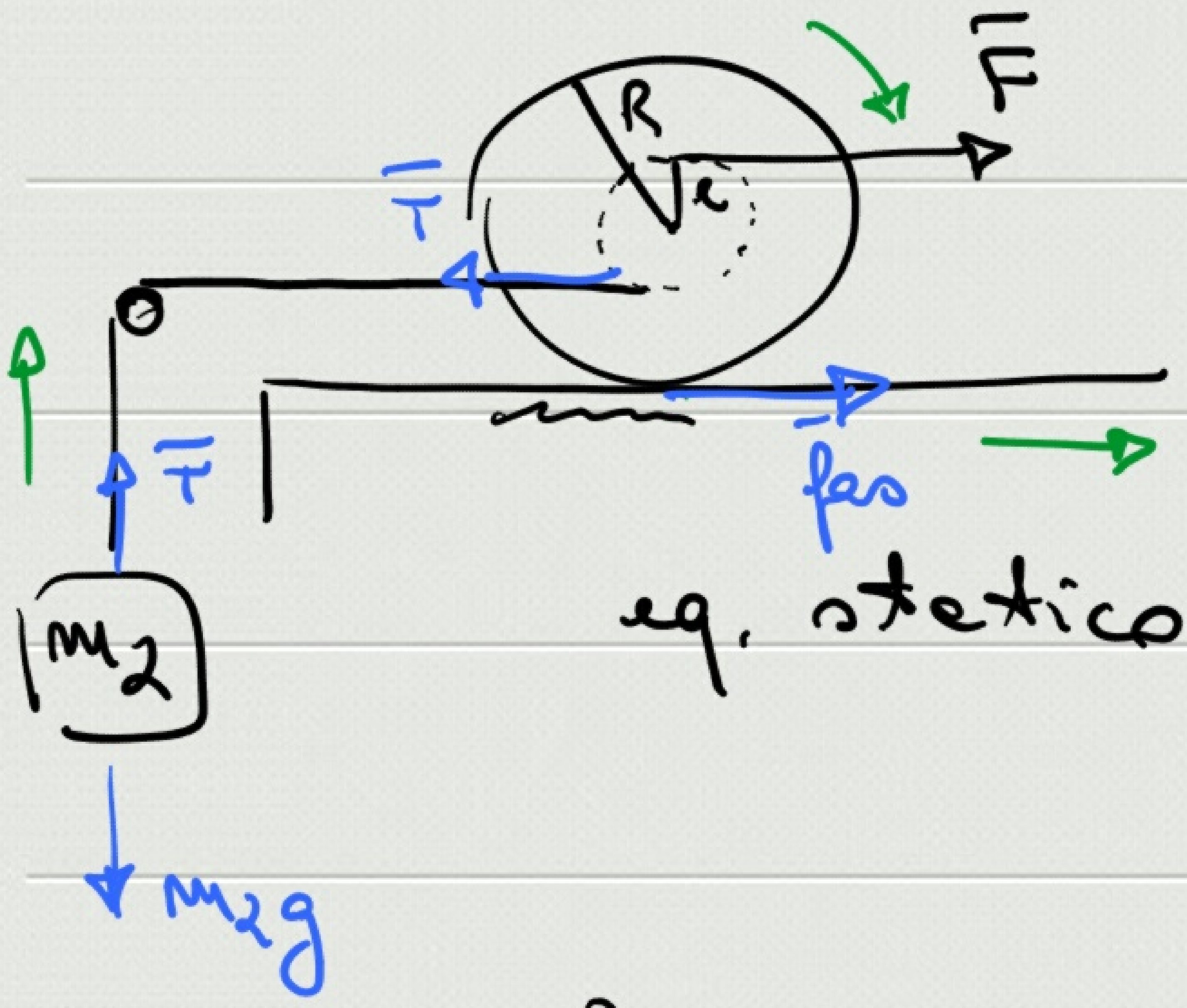
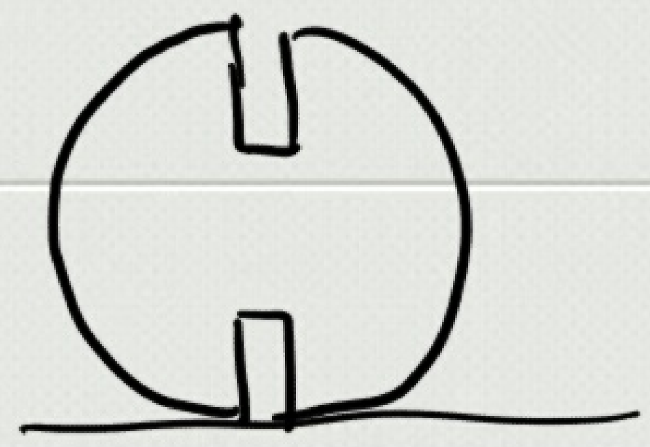


eq. statico



Sfera

$R = 0.15\ m$

$m_1 = 24\ kg$

$\mu_s = 0.2$

$r = 0.06\ m$

$m_{2,max} = ?$

$$\begin{cases} T - m_2 g = 0 & \Rightarrow T = m_2 g \\ F + f_{as} - T = 0 & \Rightarrow F = m_2 g - f_{as} \\ rF + rT - R f_{as} = 0 \end{cases}$$

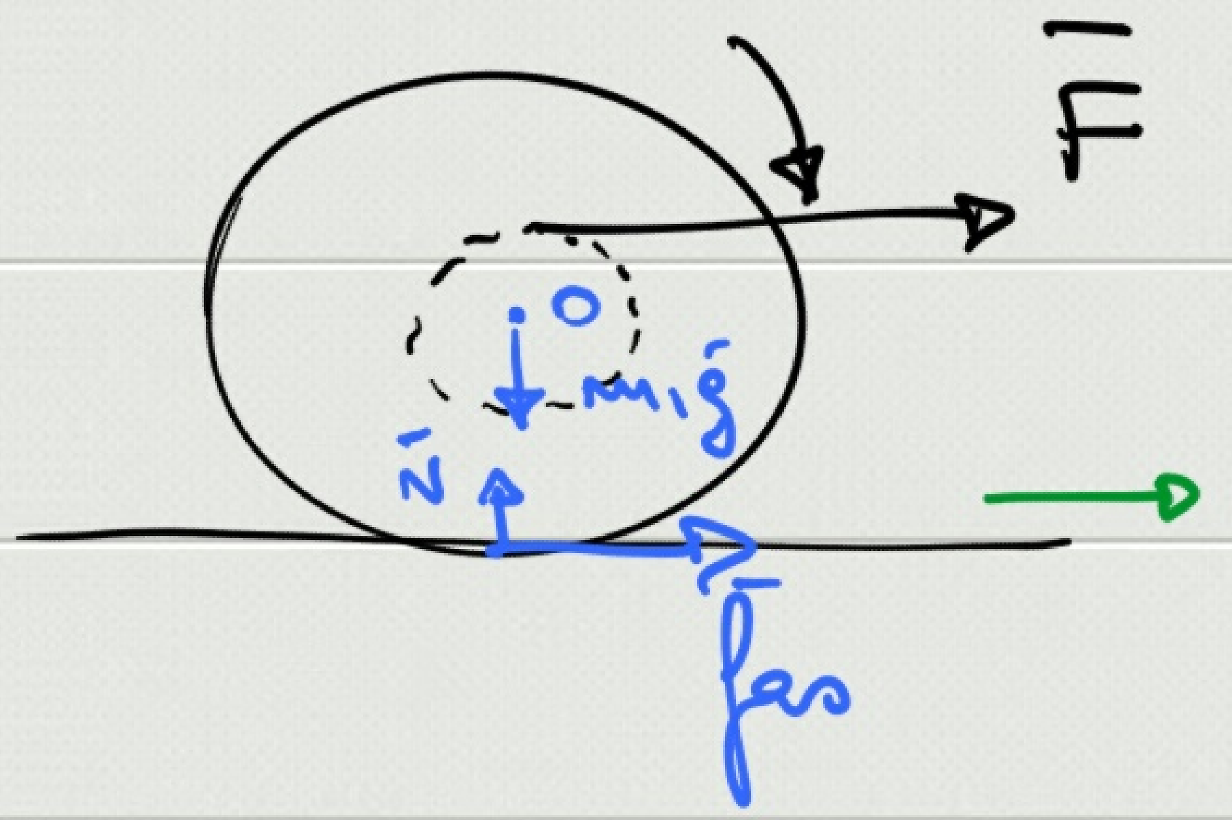
$$\Rightarrow r m_2 g - r f_{as} + r m_2 g - R f_{as} = 0$$

$$f_{as} = \frac{2 r m_2 g}{r + R} \leq \mu_s N = \mu_s m_1 g$$

$$m_2 \leq \frac{\mu_s m_1 (r+R)}{2r} = 8.4\ kg$$

$$F^* = m_2^* g - f_{as} = m_2^* g - \frac{2r}{r+R} m_2^* g =$$

$$= m_2^* g \left(\frac{R-r}{R+r} \right) = 35.3 \text{ N}$$



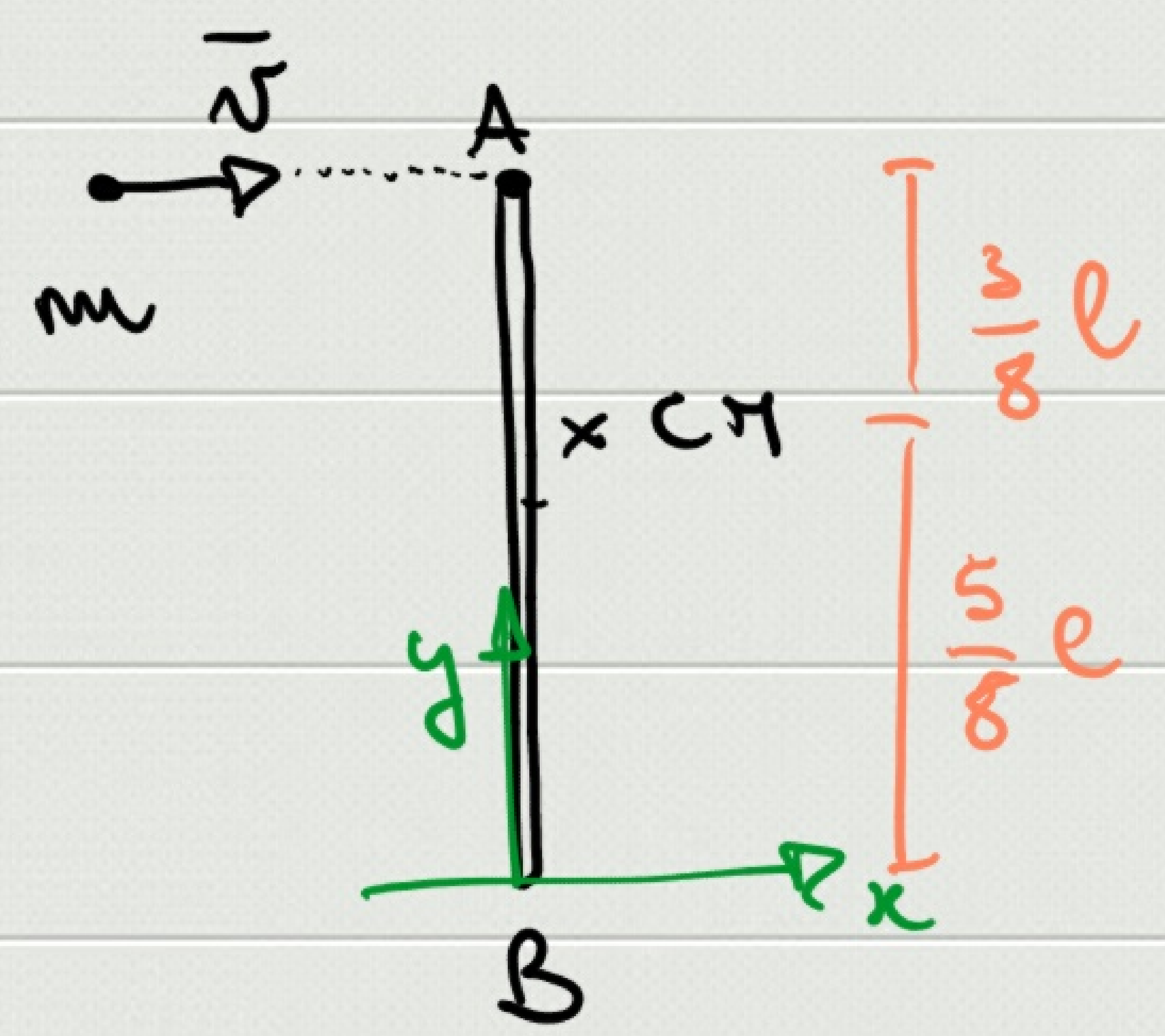
Puro rotolamento ?

$$\begin{cases} F + f_{as} = m_1 a_{CM} & \Rightarrow \quad f_{as} = m_1 a_{CM} - F \\ rF - R f_{as} = \frac{2}{5} m_1 R^2 \alpha \underset{\substack{\text{puro rot} \\ \alpha = a_{CM}/R}}{=} \frac{2}{5} m_1 R a_{CM} \end{cases}$$

$$rF - R m_1 a_{CM} + RF = \frac{2}{5} m_1 R a_{CM}$$

$$(r+R)F = \frac{7}{5} m_1 R a_{CM} \Rightarrow a_{CM} = \frac{5}{7} \frac{(r+R)F}{m_1 R}$$

$$f_{as} = \frac{5(r+R)F - 7RF}{7R} = \frac{F}{7R} \underset{\substack{\shortparallel \\ 0}}{(5r - 2R)} \leq \mu_s m_1 g$$



$|\overline{AB}| = \ell = 0.3$ m

$M = 0.06$ kg

$m = \frac{M}{3}$

$v = 0.7$ m/s

$\omega, \bar v_A, \bar v_B, E_K$

$$\boxed{\bar L_{CM}(t_0^-) = \bar L_{CM}(t_0^+)}$$

$$y_{CM} = \frac{M\frac{\ell}{2} + m\ell}{m+M} = \frac{\frac{M}{2} + \frac{M}{3}}{\frac{4}{3}M}\ell = \frac{5}{\cancel{6}_2}\cdot\frac{3}{4}\ell = \frac{5}{8}\ell$$

$$\frac{3}{8}\ell m v = \frac{1}{12}M\ell^2\omega$$

$$\frac{5}{8}\ell m \cancel{v = \frac{1}{12}}M\ell^2\omega$$

$$\frac{3}{8}\ell m v = \left(\frac{1}{12}M\ell^2 + \frac{1}{64}M\ell^2\right)\omega$$

$$\frac{3}{8}\ell m v = \left(\frac{1}{12}M\ell^2 + \frac{1}{64}M\ell^2 + \frac{25}{64}m\ell^2\right)\omega$$

$$\frac{3}{8}\ell m v = \left[\left(\frac{1}{12}M\ell^2 + M\frac{\ell^2}{64}\right) + m\frac{9}{64}\ell^2\right]\omega$$

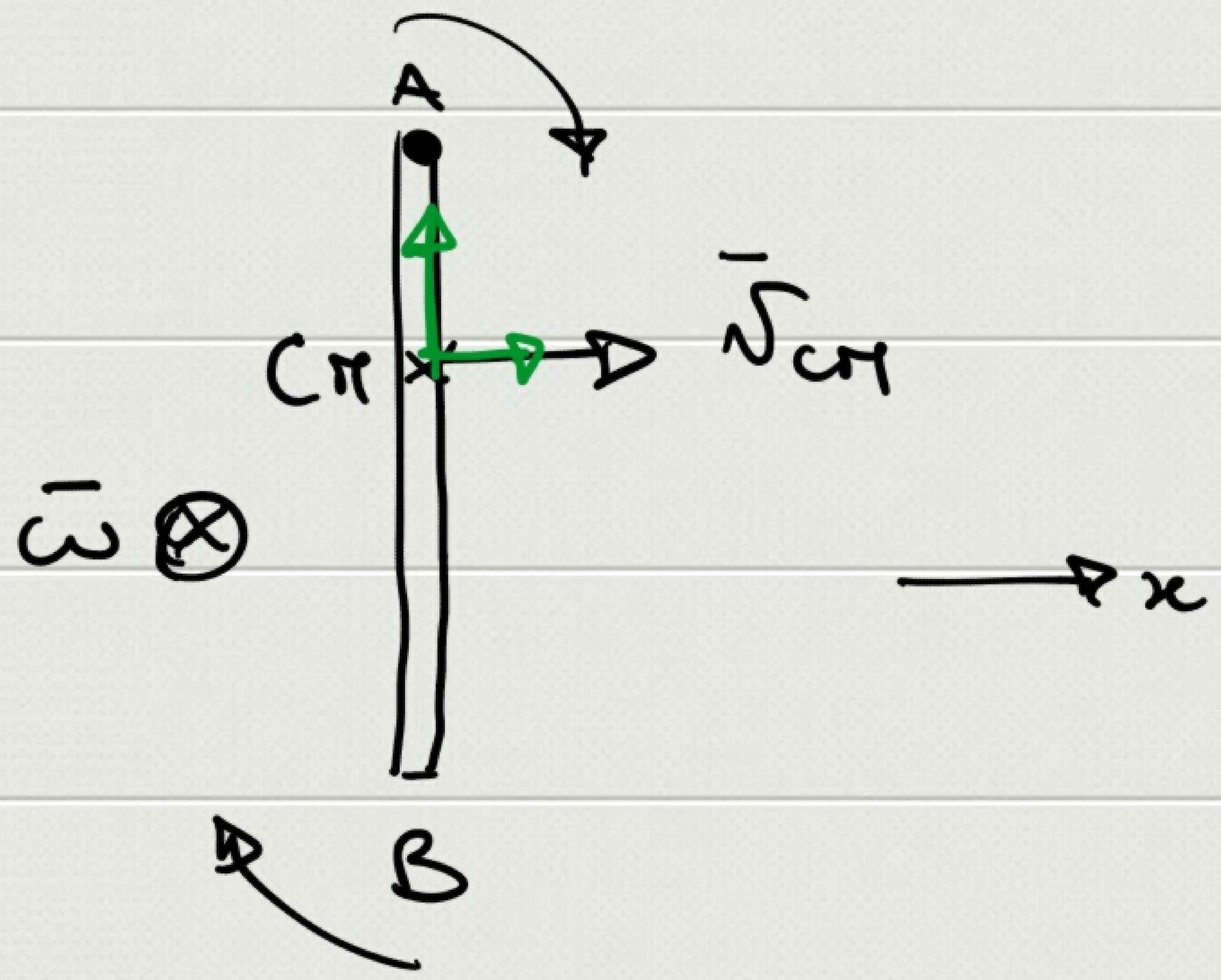
$$\Rightarrow \omega = \frac{6}{7}\frac{v}{\ell} = 2 \text{ rad/s}$$

$v_A = v$

$v_A = v + \frac{3}{8} l \omega$

$v_A = v_{CM} \qquad v_{CM} = \frac{m}{m+M} v$

$v_A = v_{CM} + \frac{3}{8} l \omega$



$\bar{P} = cost = m\bar{v}$

$\stackrel{!}{=} (m+M)\bar{v}_{CM}$

$\Rightarrow \bar{v}_{CM} = \frac{m}{m+M} \bar{v}$

$\bar{v} = \cancel{\bar{v}'} + \bar{v}_{O'} + \bar{\omega} \times \bar{r}'$

$\bar{v}_{A/B} = \bar{v}_{CM} + \bar{\omega} \times \bar{r}'_{A/B}$

$\bar{v}_A = v_{CM}\,\bar{u}_x + \omega \frac{3}{8} l\, \bar{u}_x$

$\Rightarrow v_A = \frac{v}{4} + \frac{\cancel{6}^{3}}{7} \frac{v}{\cancel{l}} \cdot \frac{3}{\cancel{8}_{4}} \cancel{l} = \frac{7+9}{28} v = \frac{4}{7} v =$

$= 0.4 \text{ m/s}$

$v_B = -\frac{2}{7} v = -0.2 \text{ m/s}$

$$E_k = \frac{1}{2} m v^2$$

$$E_k = \frac{1}{2} I_{cm} \omega^2$$

$$E_k = \frac{1}{2}(m+M) v_{cm}^2 + \frac{1}{2} I_{cm} \omega^2 \quad *$$

$$E_k = \frac{1}{2}(m+M) v_{cm}^2$$

$$E_k = \frac{2}{21} M v^2 = 2.8 \text{ mJ}$$