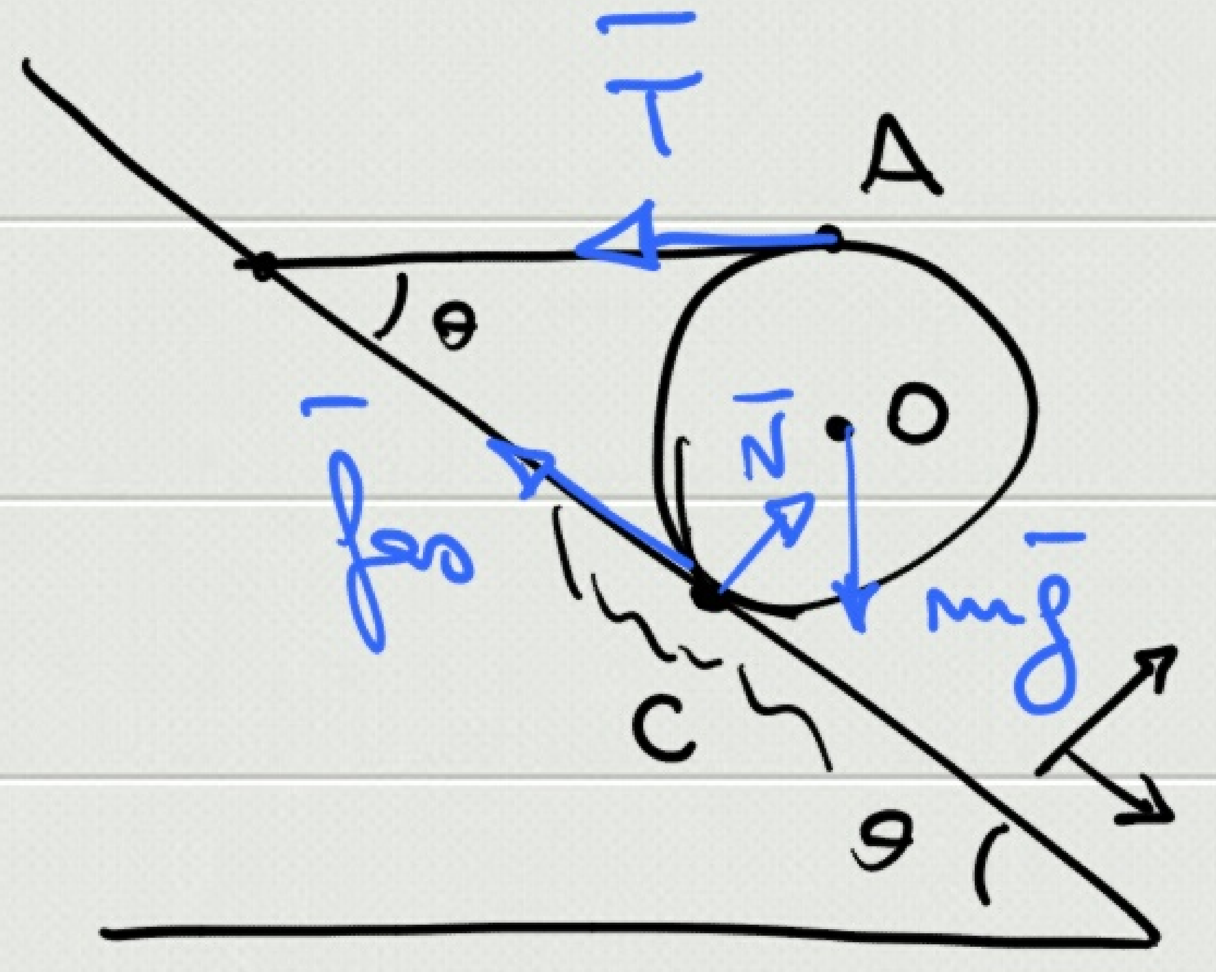


$\theta = 30°$

$R = 0.2\,m$

$m = 100\,kg$

$T,\ N,\ \mu_{s,min}$

$$\bar{T} + \bar{f}_{as} + \bar{N} + m\bar{g} = 0$$

$$O:\ \bar{R}\times\bar{T} + \bar{R}\times\bar{f}_{as} = 0$$

$$C:\ \bar{R}\times m\bar{g} + \bar{R}\times\bar{T} = 0$$

$$A:\ \bar{R}\times m\bar{g} + \bar{R}\times\bar{f}_{as} + \bar{R}\times\bar{N} = 0$$

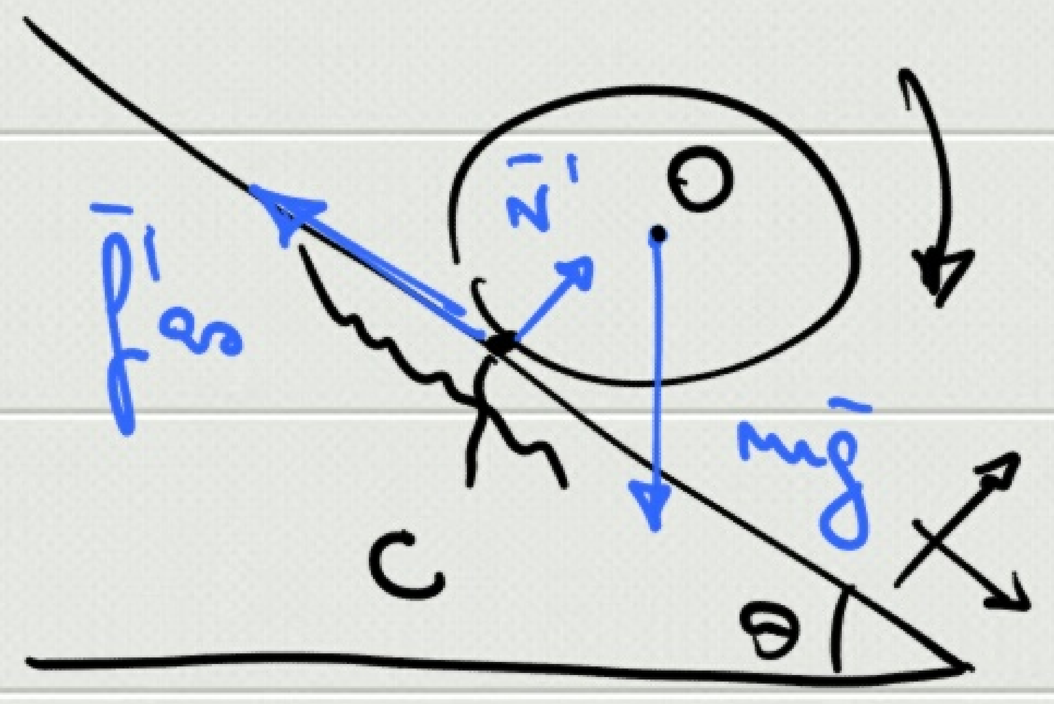
$$\begin{cases} RT - Rf_{as} = 0 \\ -T\cos\theta - f_{as} + mg\sin\theta = 0 \end{cases} \Rightarrow f_{as} = T$$

$$-T\cos\theta - T + mg\sin\theta = 0 \Rightarrow T = \frac{mg\sin\theta}{1+\cos\theta} = 263\ N$$

$$-T\sin\theta + N - mg\cos\theta = 0 \Rightarrow N = mg = 980\ N$$

$$f_{as} = \frac{\cancel{m}g \sin\theta}{1+\cos\theta} \leq f_{as,max} = \mu_s N = \mu_s \cancel{mg}$$

$$\Rightarrow \quad \mu_s \geq \frac{\sin\theta}{1+\cos\theta} = 0.27$$



$f'_{as} = ?$

$$\begin{cases} mg\sin\theta - f'_{as} = m a_{cm} \\ \cancel{R} f'_{as} = \frac{1}{2} m R^{\cancel{2}} \frac{a_{cm}}{\cancel{R}} \quad * \\ R\, mg \sin\theta = \left(\frac{1}{2} m R^2 + m R^2\right) \frac{a_{cm}}{R} \quad * \end{cases}$$

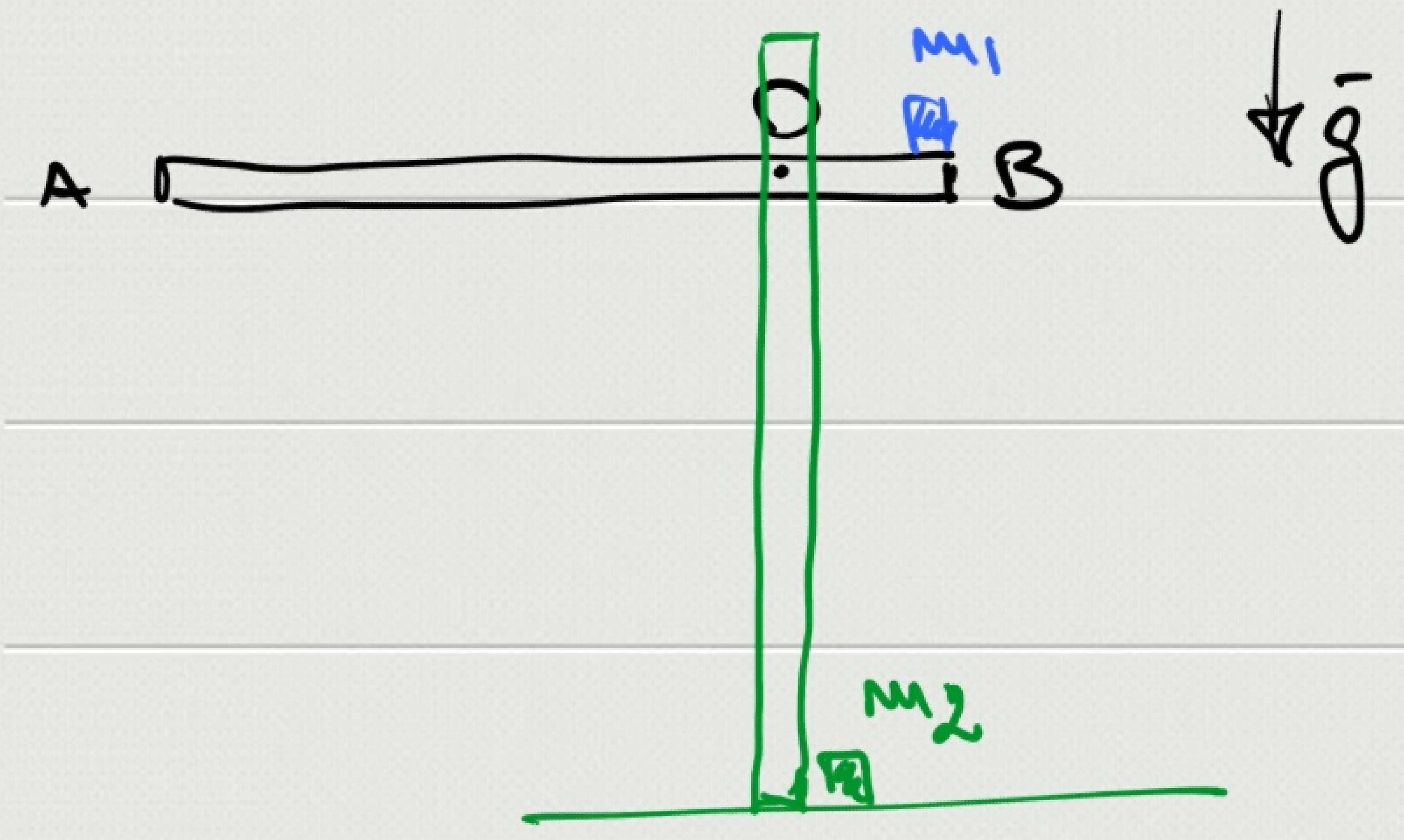
$\bar{M}^E_{polo} = I_z \alpha$

polo O

polo C

$$\rightarrow \cancel{m}g \sin\theta = \frac{3}{2} \cancel{m} a_{cm} \Rightarrow a_{cm} = \frac{2}{3} g \sin\theta$$

$$f'_{as} = \frac{1}{\cancel{2}} m \cdot \frac{\cancel{2}}{3} g \sin\theta = \frac{1}{3} mg \sin\theta = 165\ N$$



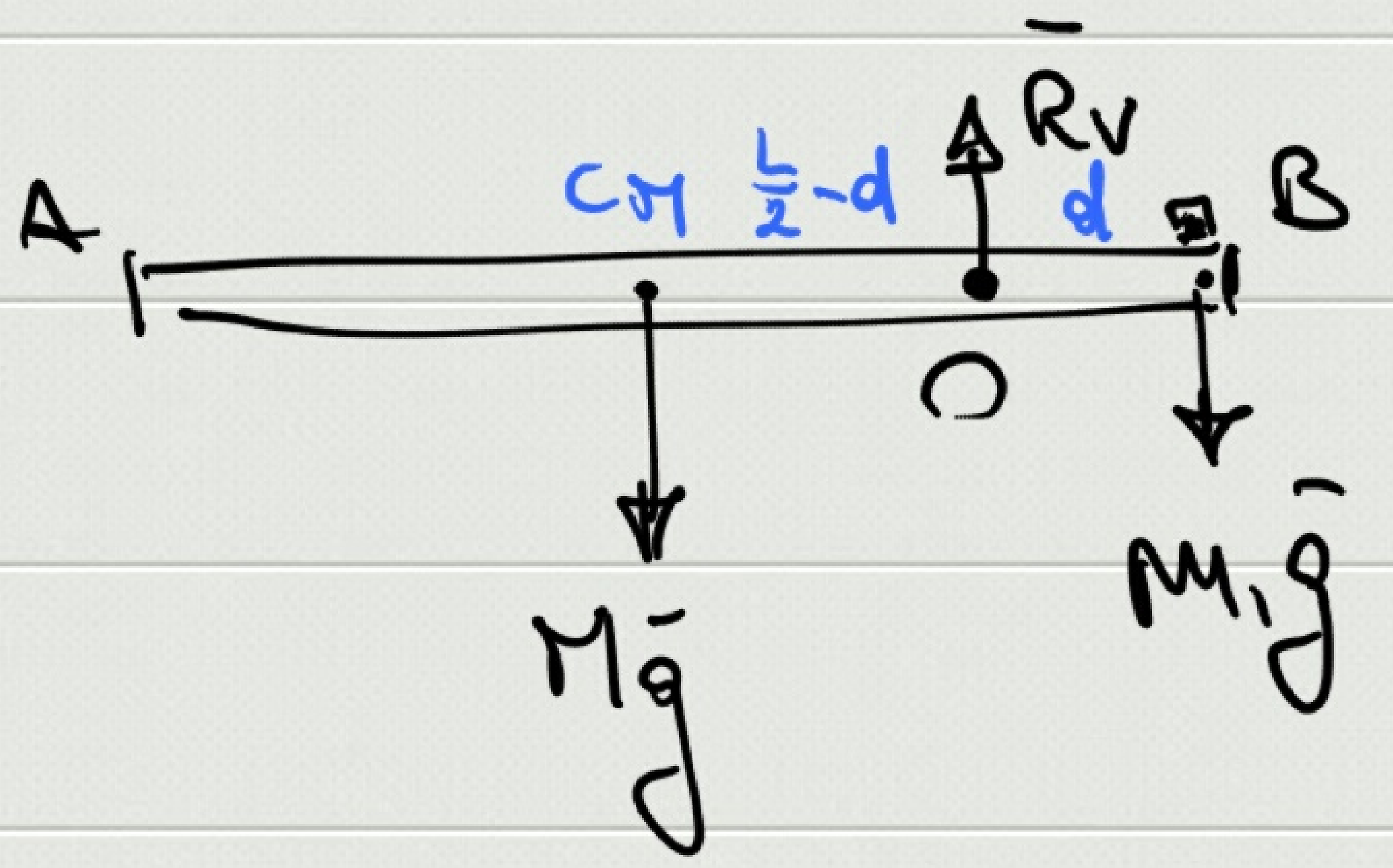
$M = 5$ kg

$L = 0{,}8$ m

$OB = d = 0{,}1$ m

$m_2 = 0.4$ kg

urto elastico



$m_1 = ?$

$$\frac{L}{2} Mg = \left(\frac{L}{2}-d\right) m_1 g$$

$$\frac{L}{2} Mg = d\, m_1 g$$

$$\left(\frac{L}{2}-d\right) Mg = d\, m_1 g \qquad *$$

$$L\, Mg = d\, m_1 g$$

$$\Rightarrow m_1 = \frac{\left(\frac{L}{2}-d\right) M}{d} = 15 \text{ kg}$$

$a_{CM}(t_0^+) = ?$ $\qquad \left(\bar{M}_0^E = I_0 \alpha\right)$

$$\left(\frac{L}{2}-d\right) Mg = \Big[\underbrace{\frac{1}{12} ML^2 + M\left(\frac{L}{2}-d\right)^2}_{I_O}\Big]\alpha \qquad \alpha = \frac{a_{CM}}{\frac{L}{2}-d} \qquad *$$

$$a_{CM} = g$$

$$a_{cm} = \alpha\left(\frac{L}{2}-d\right) = \frac{Mg}{I_0}\left(\frac{L}{2}-d\right)^2 = 6.15\ m/s^2$$

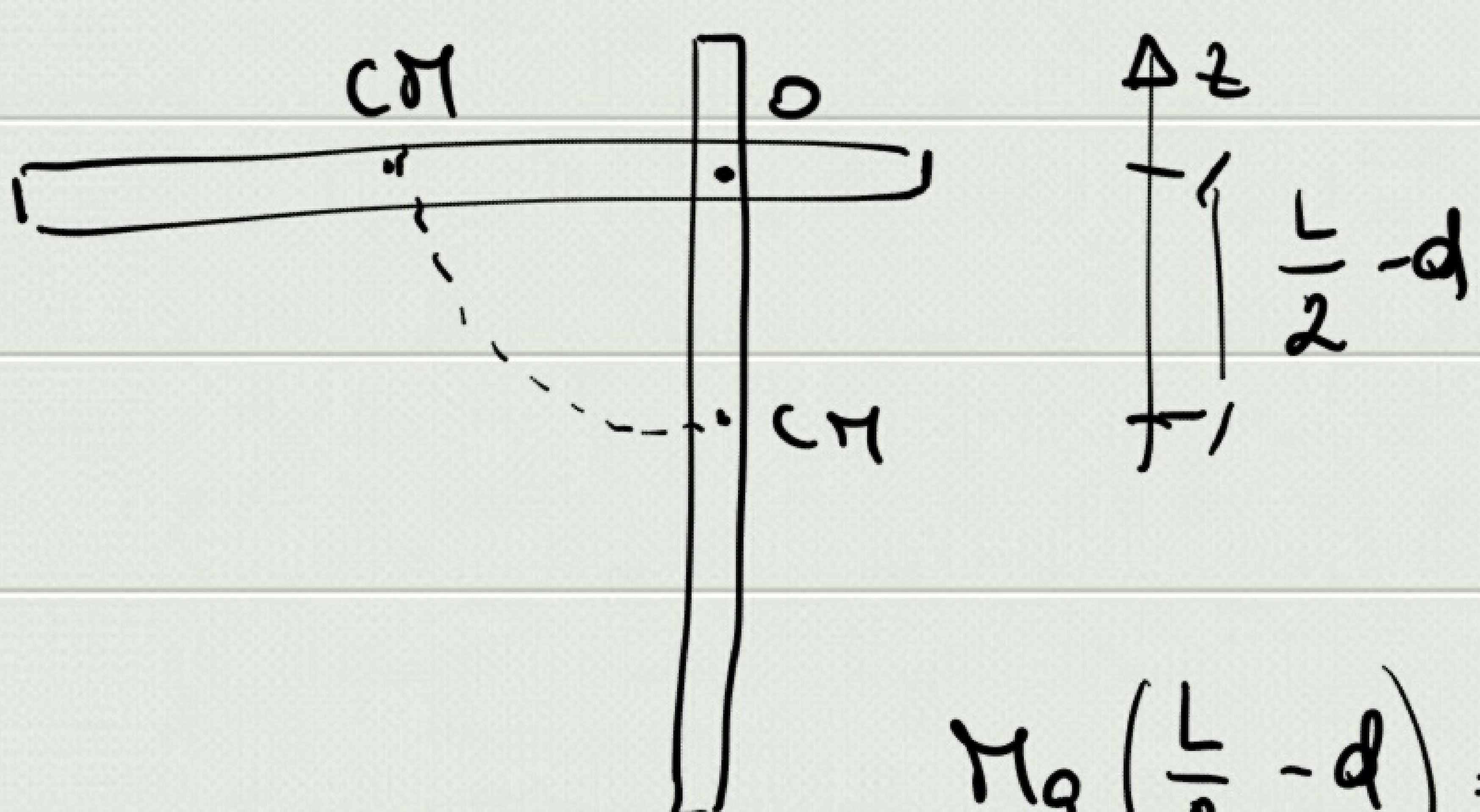
$v_{2,i} = ?$ $\qquad$ $E_k^- = ?$

$$E_k^- = \frac{1}{2} I_0 \omega^2 \quad *$$

$$E_k^- = \frac{1}{2} M v_{cm}^2$$

$$E_k^- = \frac{1}{2} M v_{cm}^2 + \frac{1}{2} I_0 \omega^2$$

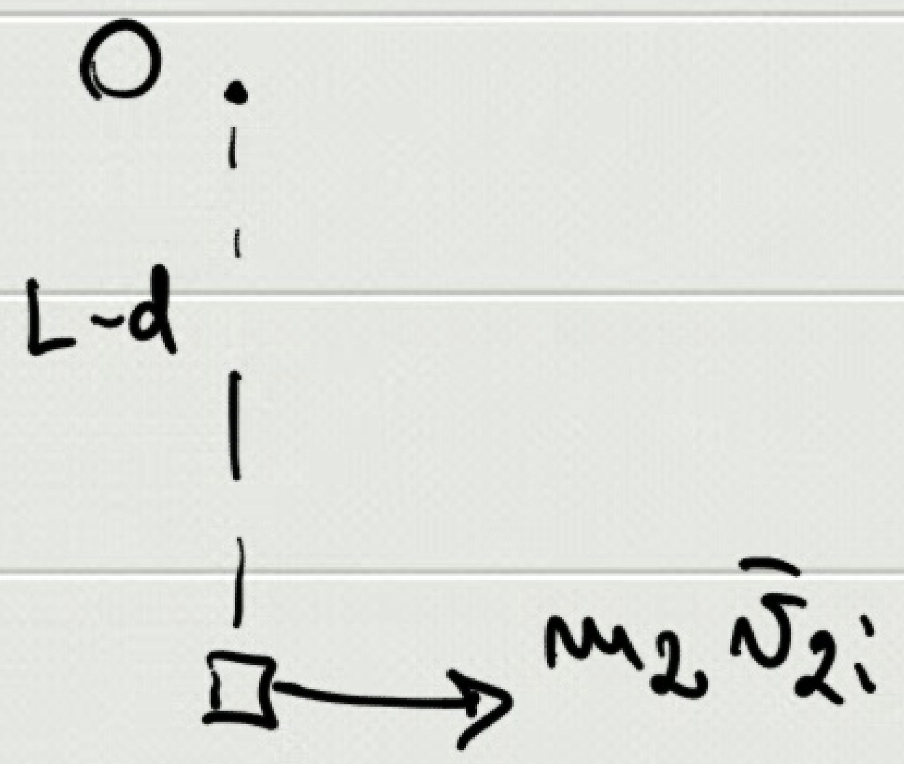
$$E_k^- = \frac{1}{2} M v_{cm}^2 + \frac{1}{2} I_{cm} \omega^2 \quad *$$



$$Mg\left(\frac{L}{2}-d\right) = \frac{1}{2} I_0 \omega^2$$

$$\Rightarrow \omega = \sqrt{\frac{2Mg\left(\frac{L}{2}-d\right)}{I_0}} = 6.4\ rad/s$$

$$\begin{cases} \frac{1}{2} I_0 \omega^2 = \frac{1}{2} I_0 \omega'^2 + \frac{1}{2} m_2 v_{2,i}^2 \\ \bar{L}_0^- = \bar{L}_0^+ \Rightarrow I_0 \omega = I_0 \omega' + (L-d) m_2 v_{2i} \end{cases}$$



$$v_{2,i} = \frac{2 \omega I_0 (L-d)}{I_0 + m_2 (L-d)^2} = 7.04 \ m/s$$