$$F_{ST} = \frac{G \cdot m_S \cdot m_T}{\underbrace{(R_T + H)^2}_{r^2}}$$

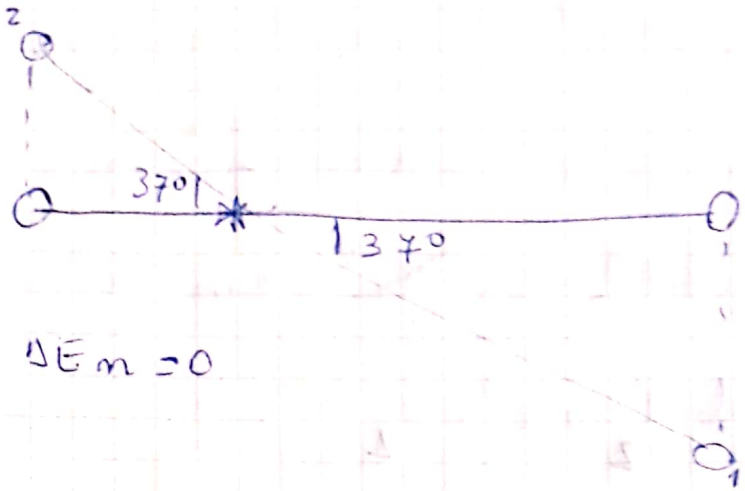
$$m_S \cdot \frac{v_T^2}{r} = G \cdot \frac{m_S \cdot m_T}{r^2}$$

$$v_T^2 = \frac{G\, m_T}{R_T + H}$$

$$v_T^2 = \frac{6,67 \times 10^{-11} \times 6,14 \times 10^{24}}{6,4 \times 10^6 + 2733000}$$

$$v_T^2 = 44841563,56$$

$$\boxed{v_T = 6696,38 \text{ m/s}}$$



$H' = \text{sen}37 \cdot \frac{L}{4}$

$H = \text{sen}37 \cdot \frac{3}{4}L$

$H + H' = \text{sen}37 \cdot L$

$\Delta Em = 0$

$Emi = 2m \cdot g \cdot H$

$Emf = m \cdot g \cdot (H + H') + \frac{1}{2} m V_1^2 + \frac{1}{2} m V_2^2$

$2m \cdot g \cdot H = m \cdot g \cdot (H + H') + \frac{1}{2} m \omega^2 \left(\frac{3}{4}L\right)^2 + \frac{1}{2} m \omega^2 \left(\frac{L}{4}\right)^2$

$2mgH - mg(H + H') = \frac{1}{2} m \omega^2 \frac{9}{16} L^2 + \frac{1}{2} m \omega^2 \frac{L^2}{16}$

$2gH - g(H + H') = \omega^2 L^2 \frac{9}{32} + \omega^2 L^2 \frac{1}{32}$

$2g \cdot \text{sen}37 \frac{3}{4}L - g\,\text{sen}37 \cdot L = \omega^2 L^2 \frac{10}{32}$

$2g\,\text{sen}37 \frac{3}{4} - g\,\text{sen}37 = \omega^2 L \frac{10}{32}$

$3 = \omega^2 L \frac{10}{32}$

$\omega^2 = 14{,}58$

$\boxed{\omega = 3{,}81\ 1/s}$

NOTA

5) $I_{bar} = \frac{M}{12} L^2$ $\quad I_{Disco} = \frac{1}{2} M R^2$

$L_E = (I_{bar\,E} + I_{Disco\,E}) \cdot \omega$

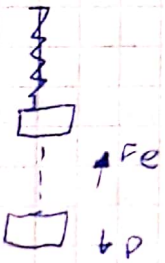
$L_E = \left(\frac{M}{12} L^2 + \left(\frac{L}{4}\right)^2 \cdot M + \frac{M}{2} R^2 + M\left(\frac{L}{4}\right)^2\right) \omega$

$L_E = \left(\frac{7}{48} M L^2 + \frac{M}{2} R^2 + M \frac{L^2}{16}\right) \omega$

$L_E = \left(\frac{5}{24} M L^2 + \frac{M}{2} R^2\right) \omega$ o

$L_E = \left(\frac{M}{12} L^2 + 2M\left(\frac{L}{4}\right)^2 + \frac{M}{2} R^2\right) \omega$

6)



$\Delta L = 16{,}7\ m$

$\omega = \sqrt{\frac{k}{m}}$ $\quad Fe = k \Delta x$

~~$\Sigma F = m a$~~

~~$P = Fe = m \cdot a$~~

$Fe = P$

$m g = k \cdot 0{,}167$

$k = \frac{m g}{0{,}167}$

$\omega = \sqrt{\frac{\frac{m \cdot g}{0{,}167}}{m}} \rightarrow \omega = \sqrt{\frac{m \cdot g}{m \cdot 0{,}167}}$

$\omega = \sqrt{\frac{g}{0{,}167}} \rightarrow \omega = 7.73$ $\quad f = \frac{\omega}{2\pi}$ $\quad \boxed{f = 1{,}23\ /s}$