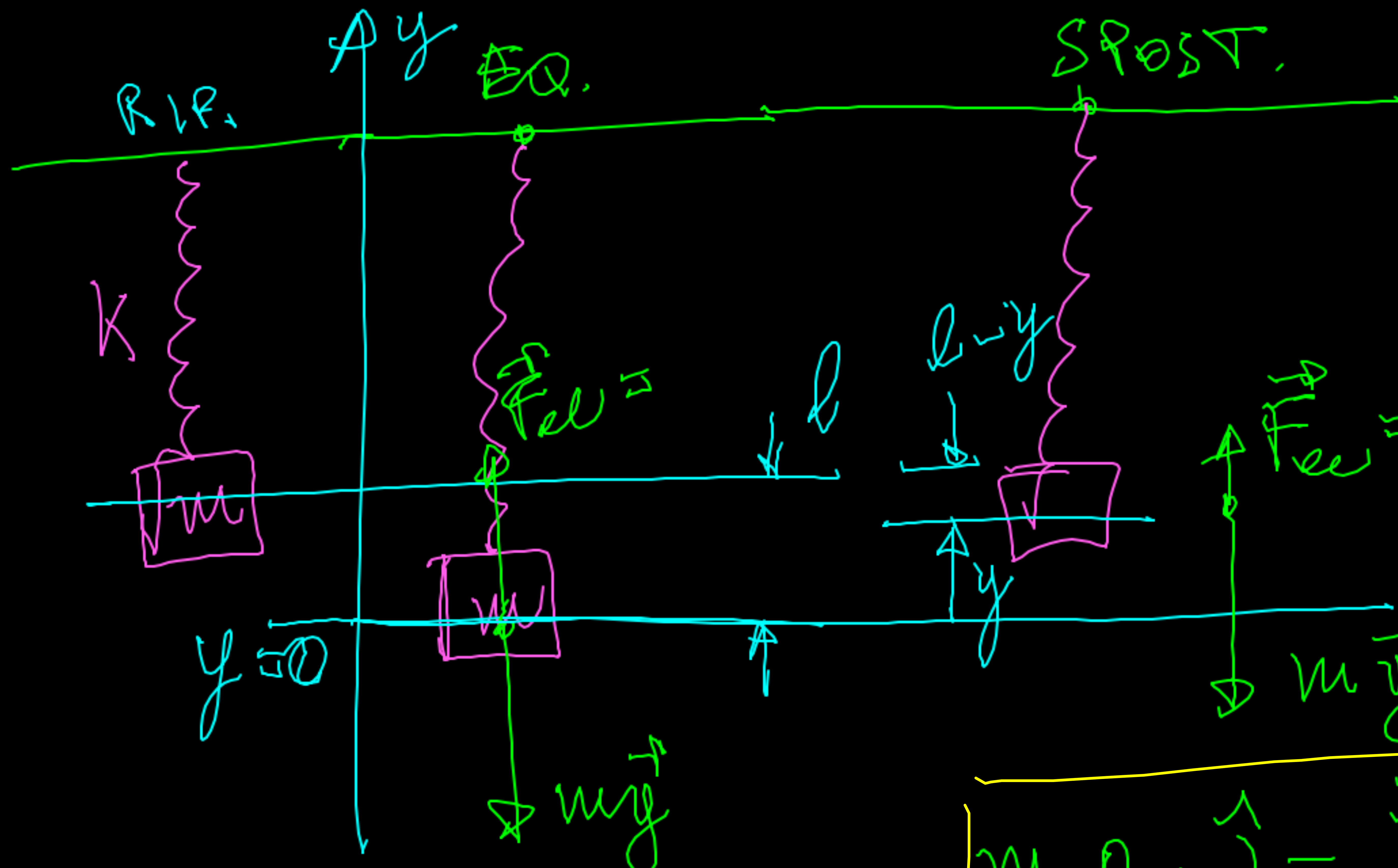


$$\vec{F}_{el} = K(l-y)\hat{j}$$

$$m\vec{g} = -mg\hat{j}$$

$$m a_y \hat{j} = \vec{F}_{el} + m\vec{g} \neq 0$$

$$\vec{F}_{el} + m\vec{g} = 0$$

(Y) $a_y = \frac{K}{m}(l - y(t)) - g$

$$Kl - mg = 0 \qquad Kl\hat{j} - mg\hat{j} = 0$$

$$\frac{K}{m}l - g = 0$$

$$\frac{d^2y}{dt^2} = -\frac{K}{m}y + \left(\frac{K}{m}l - g\right), \qquad \frac{K}{m}l - g = 0$$

$$\dot{y}(t) = -\omega A \sin(\omega t + \phi)$$

$$\frac{d^2y}{dt^2} = -\frac{K}{m}y \Rightarrow y(t) = A\cos(\omega t + \phi)$$

$$\omega = \sqrt{\frac{K}{m}} \qquad T = \frac{2\pi}{\omega}$$

COND. INIZ.

$$\boxed{\frac{d^2x}{dt^2} = -\omega^2 x}$$

$$y(0) = y_0 > 0 \qquad y_0 = A\cos\phi \qquad y_0 = A$$

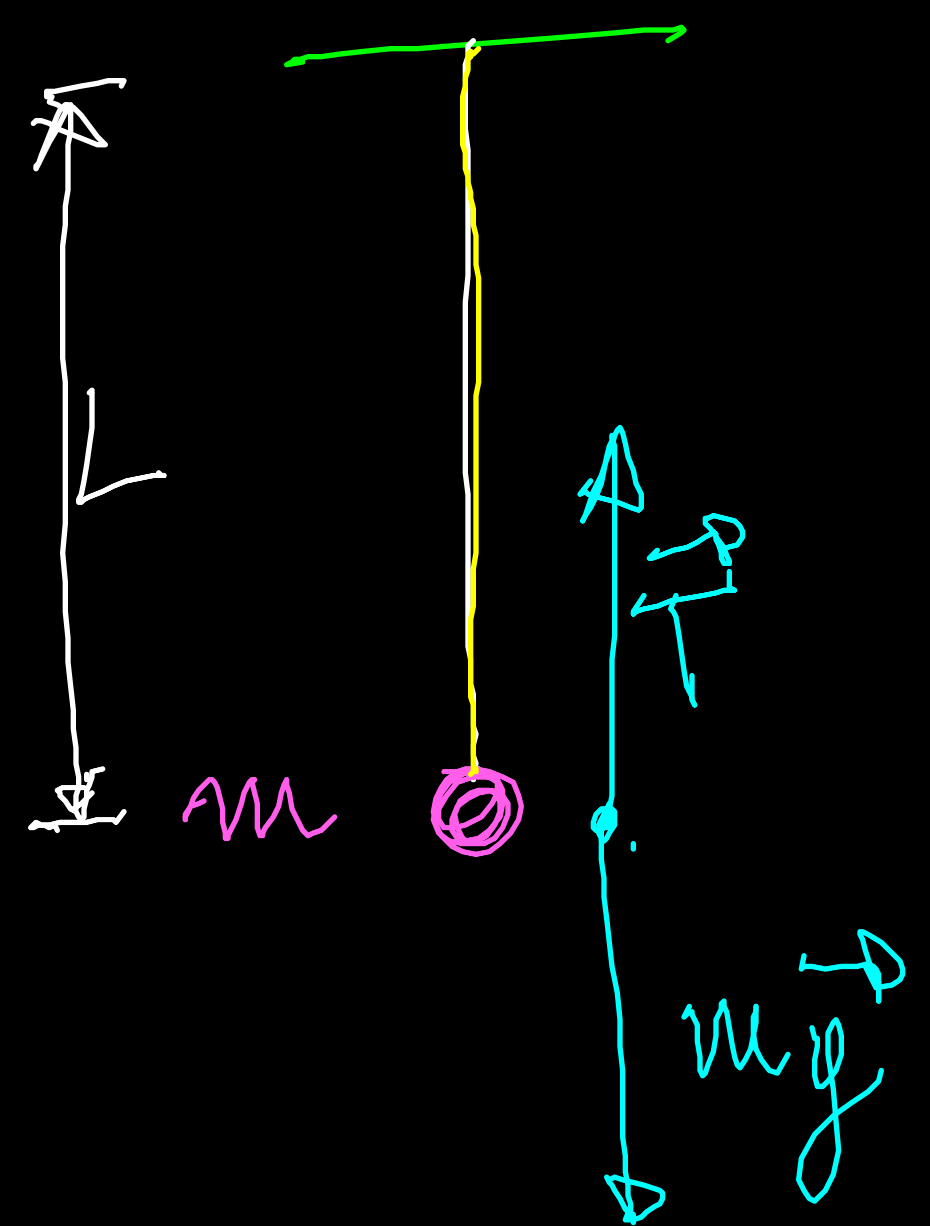
$$\dot{y} = \frac{dy}{dt} = 0 \qquad 0 = -\omega A \sin\phi \Rightarrow \phi = 0$$

$$\ddot{x} = -\omega^2 x$$

$$y(t) = y_0 \cos \omega t$$

PENDOLO SEMPLICE

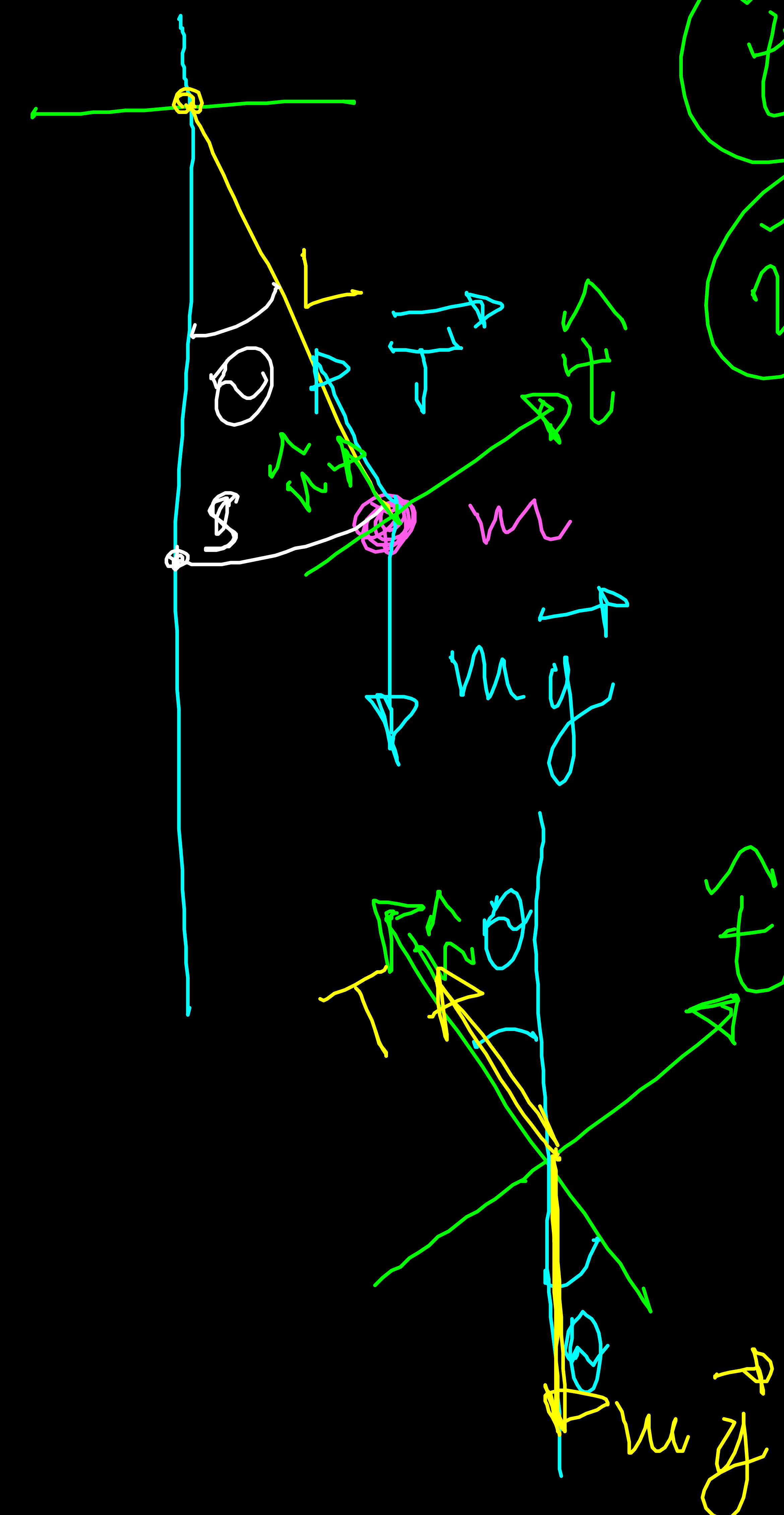
POS. DI EQ.



$mg = T$

$a = 0$

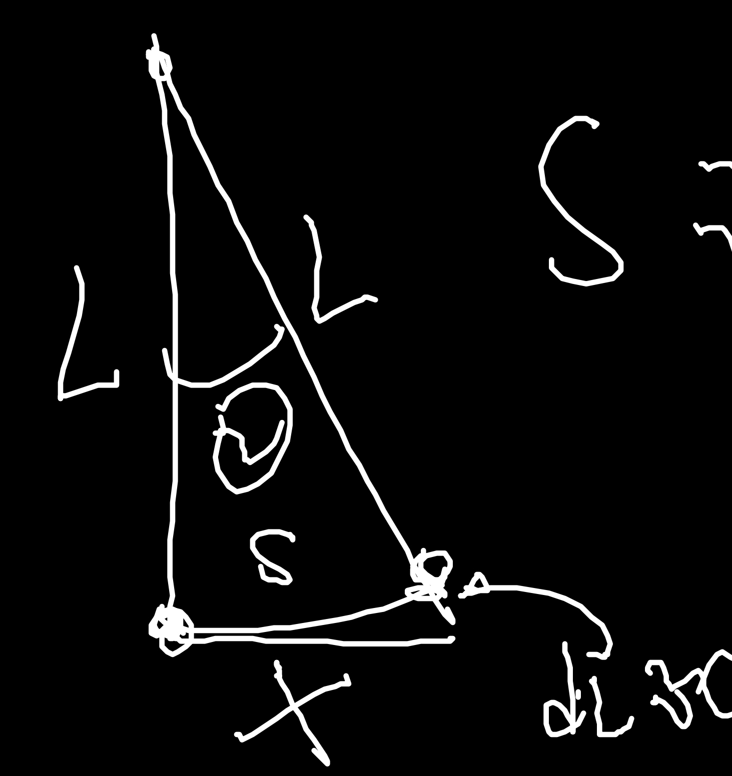
FUORI EQ.



$(\hat{t})\quad -mg\sin\theta = m a_t$

$(\hat{n})\quad T - mg\cos\theta = 0$

θ "piccolo", $\theta \ll 1\ \text{rad}$



$s \simeq x$

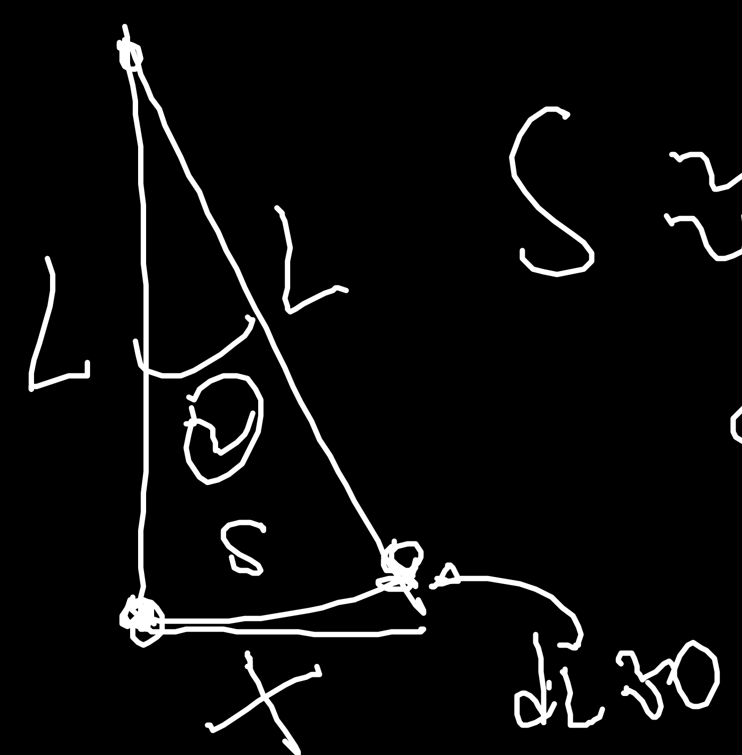
$\sin\theta = \dfrac{x}{L}$

$a_t \simeq a_x$

$$-mg\sin\theta = m a_t$$

$$T - mg\cos\theta = 0$$

θ "piccolo", $\theta \ll 1$ rad



$$s \simeq x$$

$$\sin\theta = \frac{x}{L}$$

$$a_t \simeq a_x$$

$$m a_x = m\frac{d^2x}{dt^2} = -mg\frac{x}{L}$$

$$\omega = \sqrt{\frac{g}{L}} \qquad T_{ps} = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{L}{g}}$$

$$a_t = \alpha L \qquad g = \frac{4\pi^2}{T_{ps}^2} L$$

$$-mg\sin\theta = m\alpha L = m\ddot{\theta} L$$

$$\theta \ll 1 \Rightarrow \ddot{\theta} = -\frac{g}{L}\theta(t)$$

$$\theta(t) = A\cos(\omega t + \phi)$$

$$\omega = \sqrt{\frac{g}{L}}$$

PENDOLO FISICO