# Insetto su piastra circ.

Sist. rif. PIASTRA

B

$v = 1.0\ cm/s$

$\mu_s = 0.080$

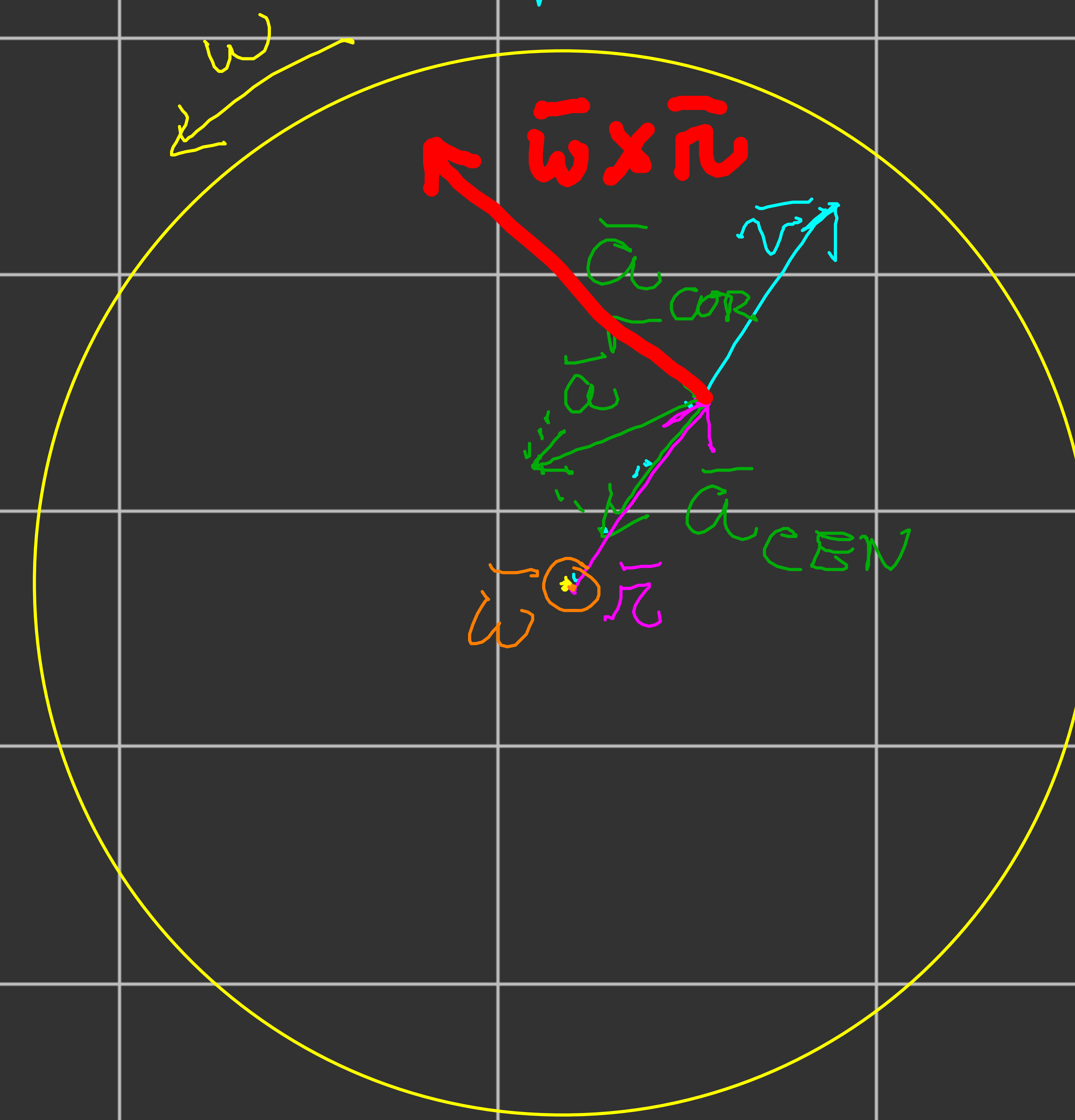
$\omega = 4.7\ rad/s$

$$\bar{a}_{PA} = \bar{a}_{PB} + \frac{d\bar{\omega}}{dt}\times\bar{r} + \underbrace{\bar{\omega}\times(\bar{\omega}\times\bar{r})}_{\bar{a}_{CEN}} + \underbrace{2\bar{\omega}\times\bar{v}}_{\bar{a}_{COR}}$$

$\bar{a}_{PB} = 0$ moto rett. unif. in B

$\frac{d\bar{\omega}}{dt} = 0$ $\omega$ cost

$$|\bar{a}| = \sqrt{(\omega^2 r)^2 + (2\omega v)^2} >$$



# Insetto su piastra circ.

Sist. rif. PIASTRA

13

$v = 1.0\ cm/s$

$\mu_s = 0.080$

$\omega = 4.7\ rad/s$

$$\bar F_{att} < \bar F_{CEN} + \bar F_{COR}$$

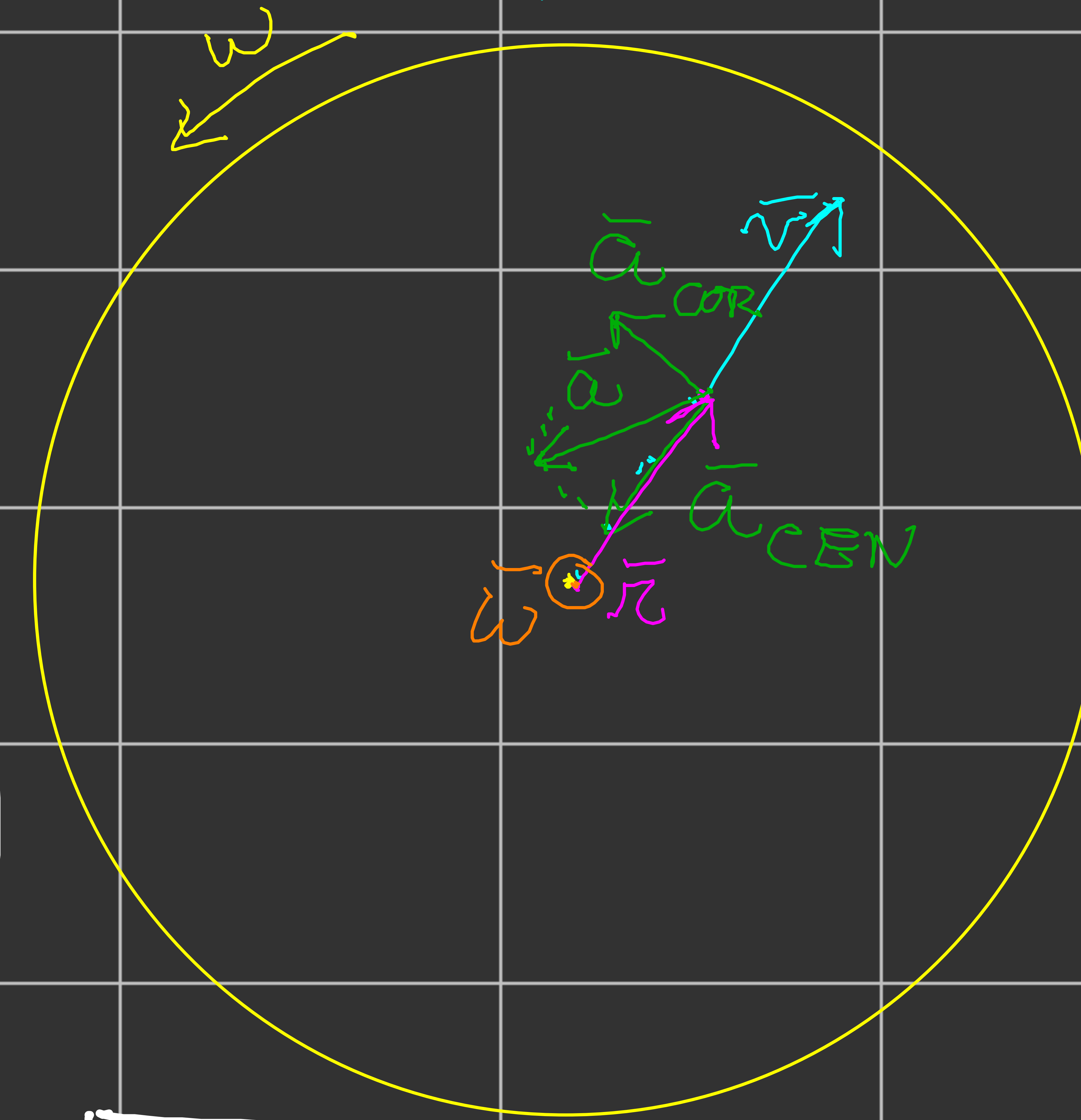
$$|\bar F_{att}| = \mu m g < |m(\bar a_{CEN} + \bar a_{COR})|$$

$$|\bar a| = \sqrt{(\omega^2 r)^2 + (2\omega v)^2}$$

$$\mu g < \sqrt{(\omega^2 r)^2 + (2\omega v)^2}$$

$$\mu^2 g^2 < \omega^4 r^2 + 4\omega^2 v^2$$

$$r > \frac{1}{\omega}\sqrt{\left(\frac{\mu g}{\omega}\right)^2 - 4\omega^2} = \boxed{3.5\ cm}$$



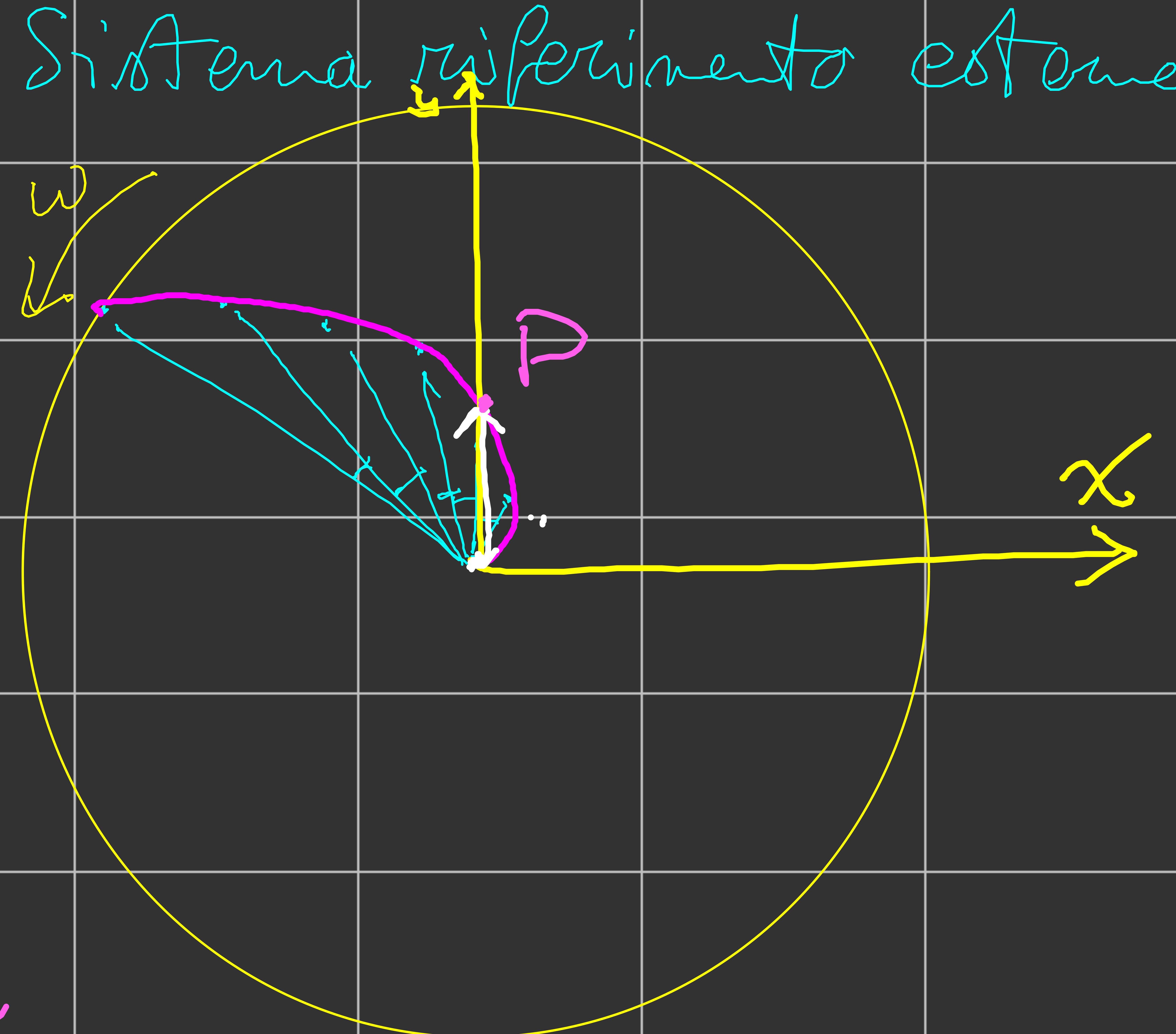
$$\begin{cases} x = vt\cos\omega t \\ y = vt\sin\omega t \end{cases}$$

$t = 0$ CENTRO

a P $t$ tale per cui

$\omega t = \frac{\pi}{2}$

$y = vt\sin\left(\frac{\pi}{2}\right) = vt$



Sistema riferimento esterno


$$\begin{cases} x = vt\cos\omega t \\ y = vt\sin\omega t \end{cases}$$

$$v_x = \frac{dx}{dt} = v\cos\omega t - vt\omega\sin\omega t$$

$$v_y = \frac{dy}{dt} = v\sin\omega t + vt\omega\cos\omega t$$

$$a_x = \frac{dv_x}{dt} = -v\omega\sin\omega t - v\omega\sin\omega t - vt\omega^2\cos\omega t$$

$$a_y = \frac{dv_y}{dt} = v\omega\cos\omega t + v\omega\cos\omega t - vt\omega^2\sin\omega t$$

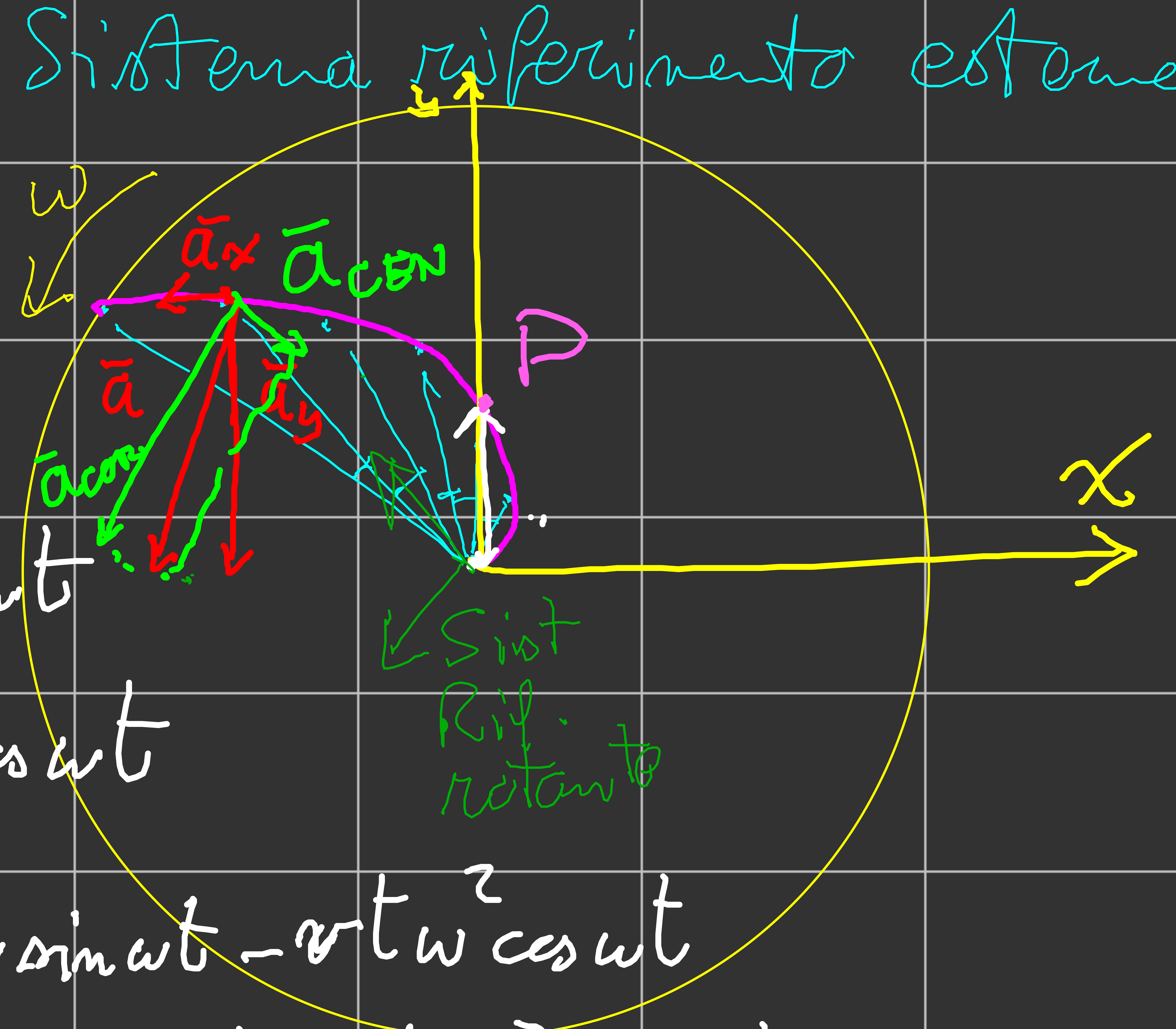
$$\begin{cases} x = vt\cos\omega t \\ y = vt\sin\omega t \end{cases}$$

$$v_x = \frac{dx}{dt} = v\cos\omega t - vt\omega\sin\omega t$$

$$v_y = \frac{dy}{dt} = v\sin\omega t + vt\omega\cos\omega t$$

$$a_x = \frac{dv_x}{dt} = -v\omega\sin\omega t - v\omega\sin\omega t - vt\omega^2\cos\omega t$$

$$a_y = \frac{dv_y}{dt} = v\omega\cos\omega t + v\omega\cos\omega t - vt\omega^2\sin\omega t$$



# Due Cubi

$M = 50\ Kg$

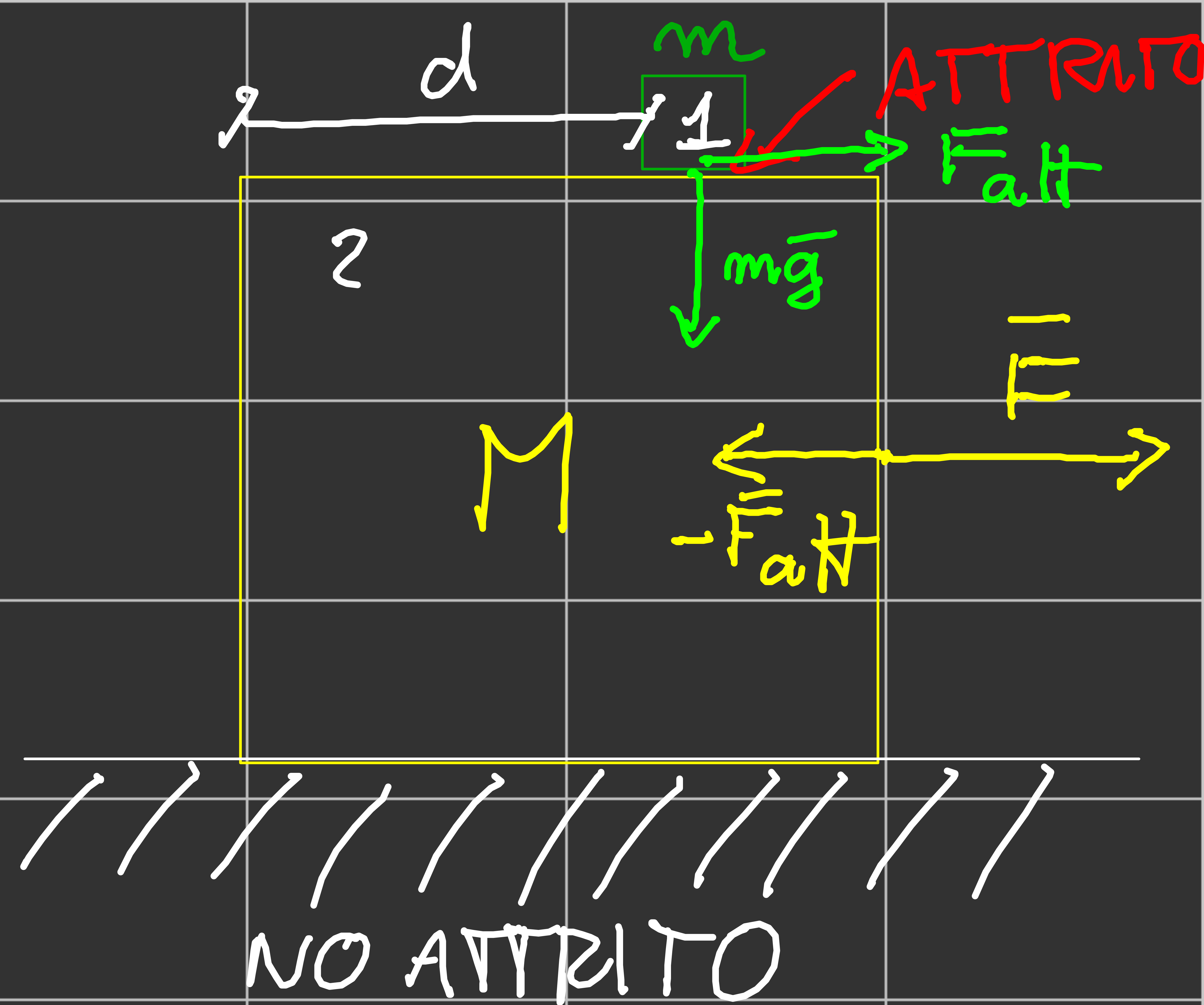
$m = 10\ Kg$

$F = 100\ N$

$d = 50\ cm$

$t = 2.0\ s$ cubetto cade

$\mu_d = ?$




per m $\rightarrow$ $\mu m g = m a_1$

per M $\rightarrow$ $F - \mu m g = M a_2$

# Due Cubi

$M = 50\ Kg$

$m = 10\ Kg$

$F = 100\ N$

$d = 50\ cm$

$t = 2.0\ s$ cubetto cade

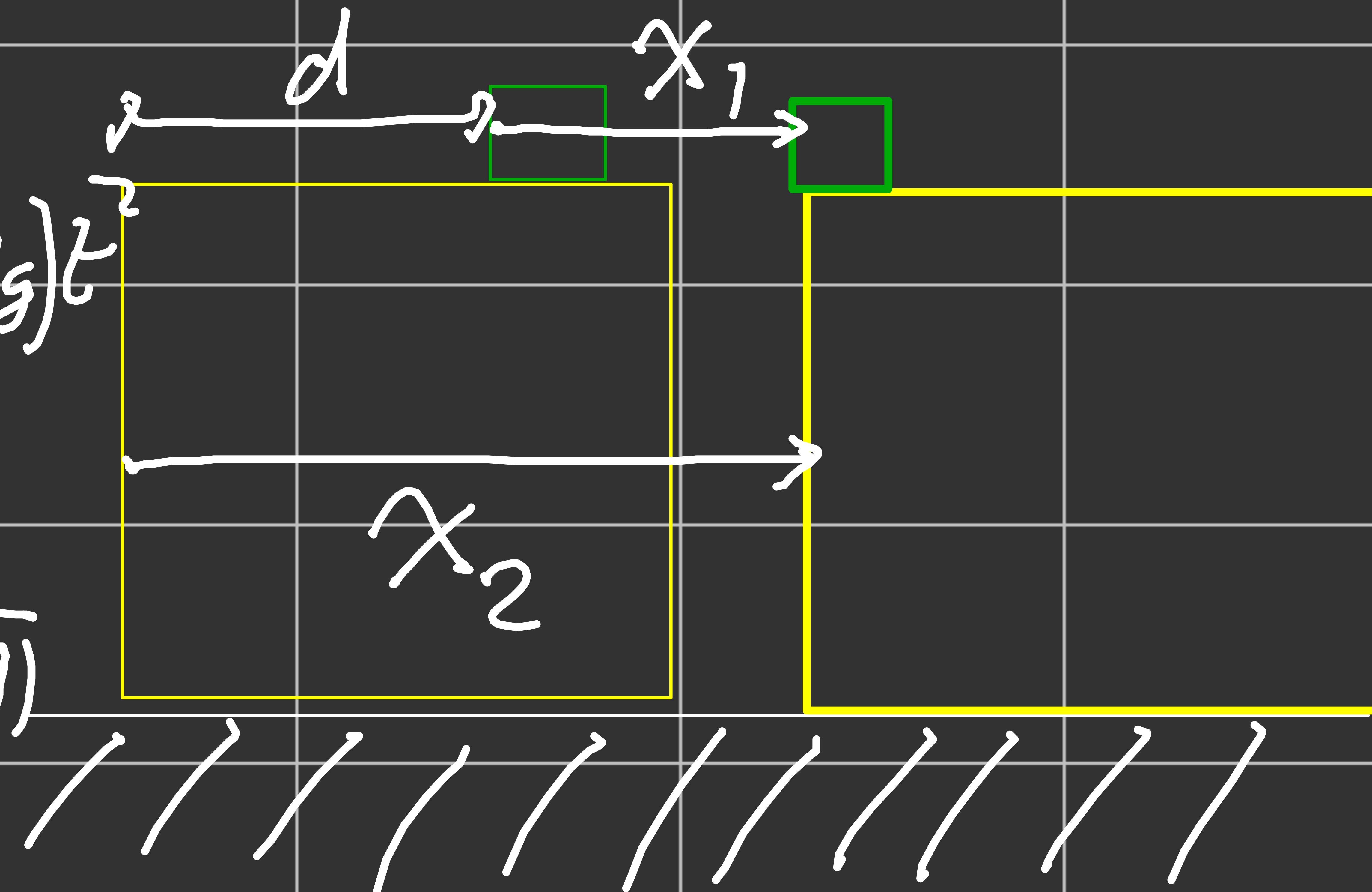
$\mu_d = ?$

$$d = x_2 - x_1$$

$$d = \frac{1}{2M}\left(F - \mu m g - \mu M g\right)t^2$$

$$\mu = \left[\frac{F}{M} - \frac{2d}{t^2}\right]\frac{M}{g(m+M)} = \boxed{0.15}$$

$t = 0$ $\qquad$ $t = 2\,s$




NO ATTRITO

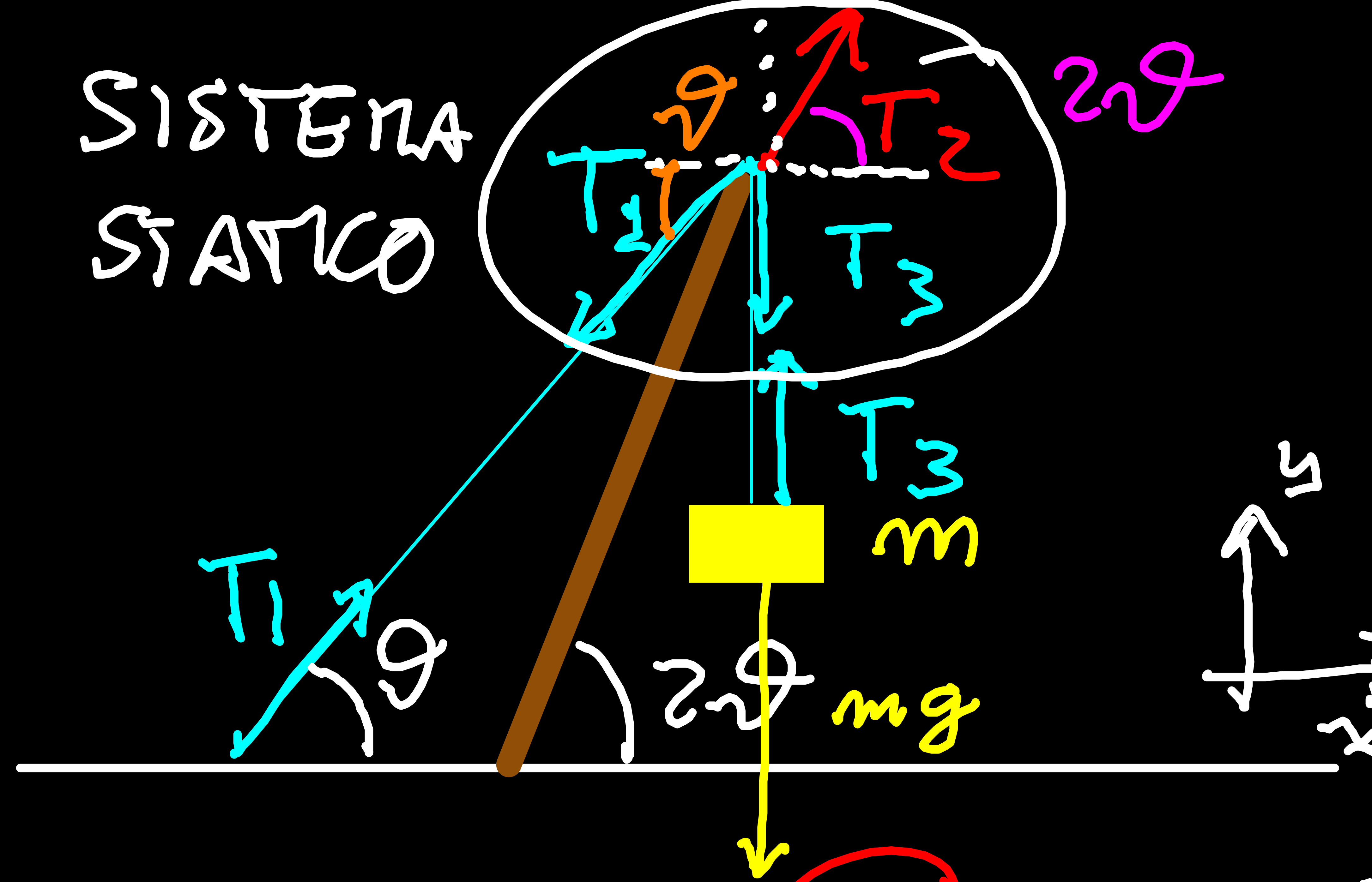
per m $\rightarrow$ $\mu m g = m a_1$ $\qquad$ $x_1 = \frac{1}{2}(\mu g)t^2$

per M $\rightarrow$ $F - \mu m g = M a_2$ $\qquad$ $x_2 = \frac{1}{2}\left(\frac{F - \mu m g}{M}\right)t^2$

# Trave inclinata con fune

Trovare tensioni fune e reazione vincolare trave

$m = 1000\ Kg,\ \vartheta = 20°$




ORIZZ. $T_2 \cos 2\vartheta - T_1 \cos\vartheta = 0$

$$T_2 = T_1 \frac{\cos\vartheta}{\cos 2\vartheta} = (1.23)\,T_1$$

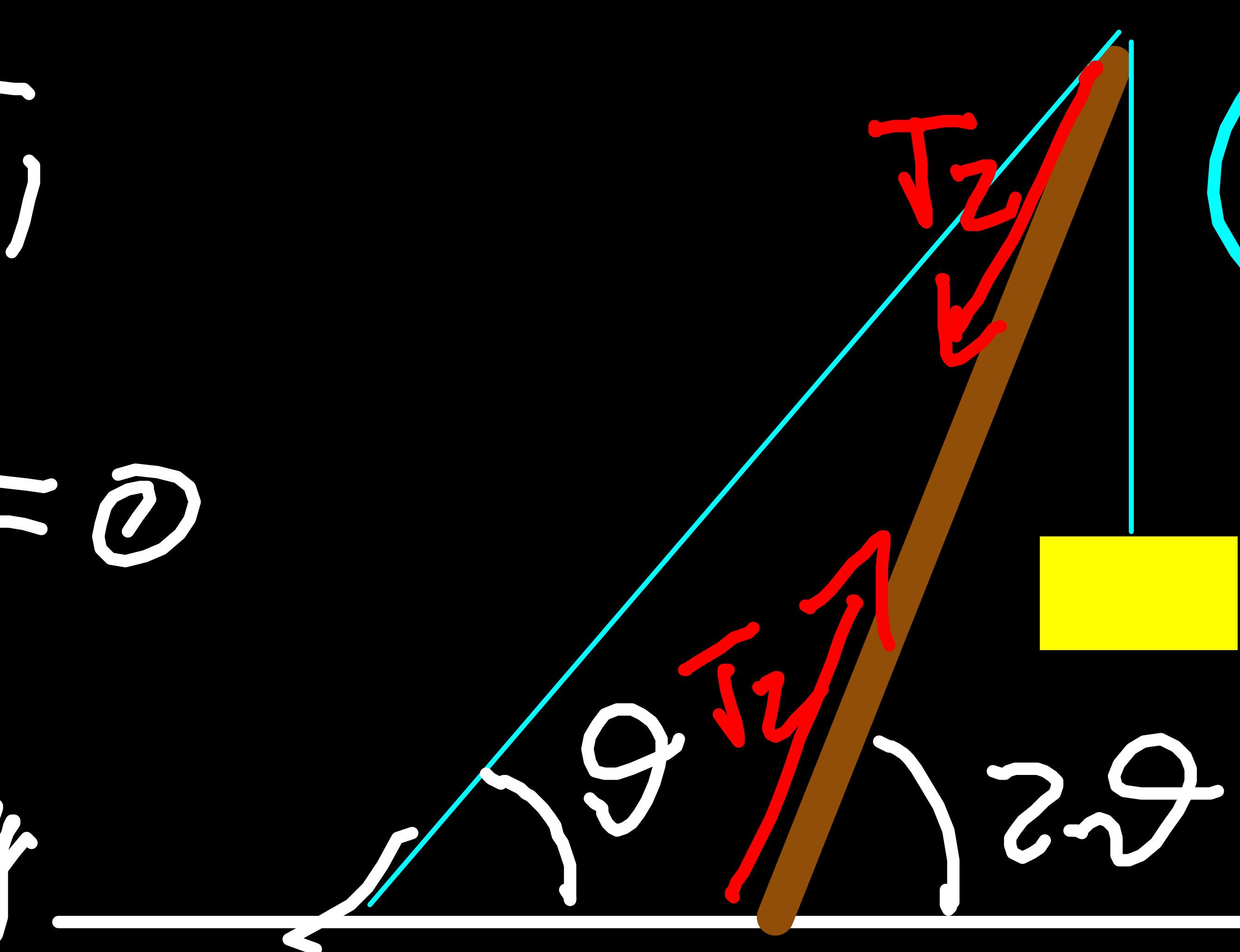
VERT $T_2 \,\text{sen}\, 2\vartheta - T_1 \sin\vartheta - T_3 = 0$

$$T_1 \left(1.23 \sin 2\vartheta - \sin\vartheta\right) = mg$$

$$T_1 = \frac{mg}{1.23 \sin 2\vartheta - \sin\vartheta} = 2.2 \times 10^4\ N$$

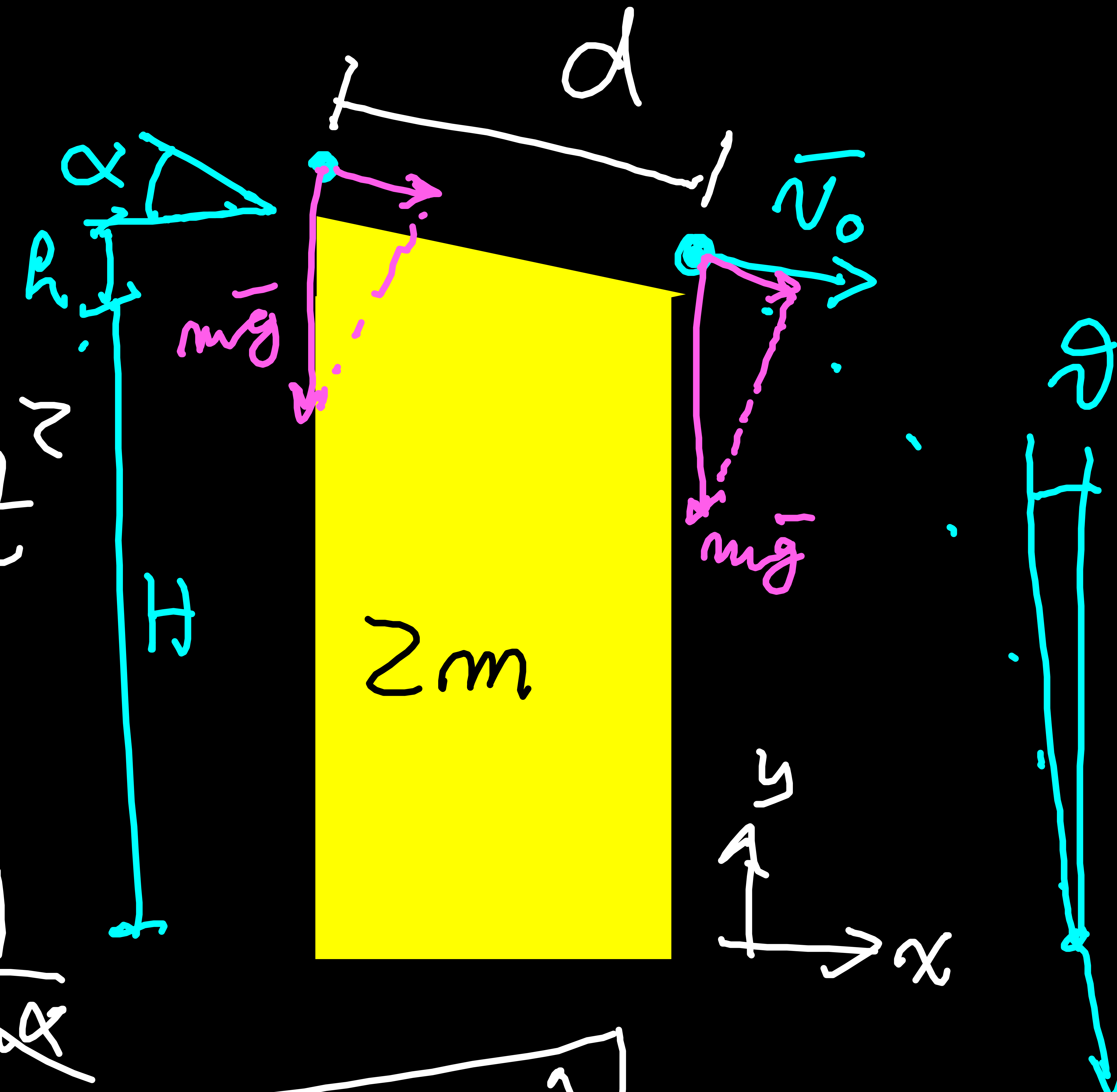
$T_2 = 2.7 \times 10^4\ N$

$T_3 = 9.8 \times 10^3\ N$



# Problema I 12/07/18

$h = 70\ cm$
$H = 1{,}500\ m$
$\alpha = 30°$




$$d = \frac{h}{\sin\alpha} = \frac{1}{2} a t^2 = \frac{1}{2}(g \sin\alpha) t^2$$

$$t = \sqrt{\frac{2h}{g} \frac{1}{\sin\alpha}}$$

$$v_0 = at = g \sin\alpha \sqrt{\frac{2h}{g} \frac{1}{\sin\alpha}} = \sqrt{2hg} =$$

$$\bar{v}_0 = v_0 \cos\alpha\ \hat{i} + (-1) v_0 \sin\alpha\ \hat{j}$$

$$= 3.21\ \hat{i} - 1.85\ \hat{j}$$

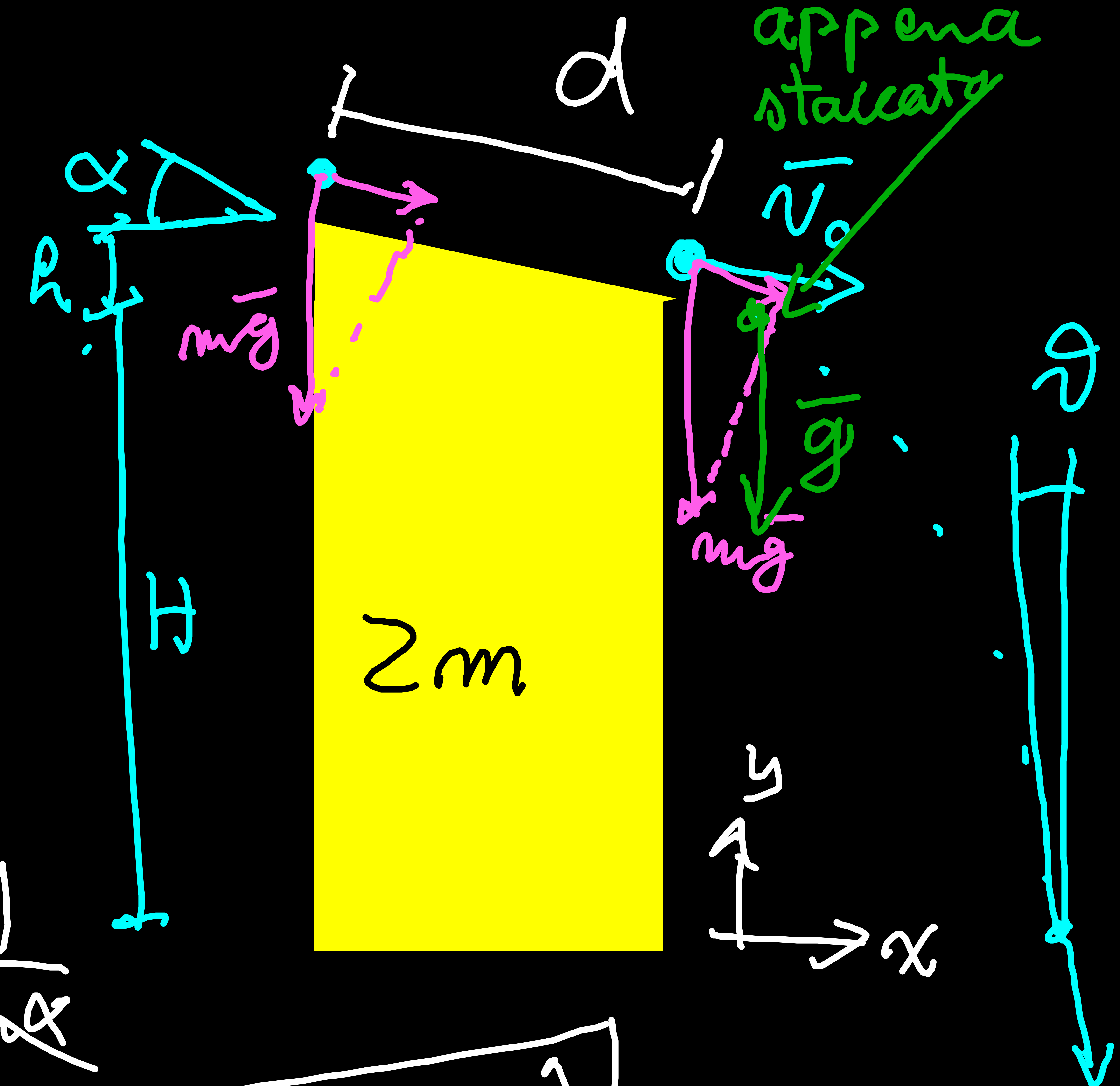
# Problema I 12/07/18

$h = 70\ cm$

$H = 1{,}500\ m$

$\alpha = 30°$

$\bar{a} = (0\,\hat{i} - 9.81\,\hat{j})\ m/s^2$




$$v_0 = at = g \sin\alpha \sqrt{\frac{2h}{g}}\,\frac{1}{\sin\alpha} = \sqrt{2hg} =$$

$$\bar{v}_0 = v_0 \cos\alpha\,\hat{i} + (-) v_0 \sin\alpha\,\hat{j} = 3.21\,\hat{i} - 1.85\,\hat{j}\ m/s^2$$

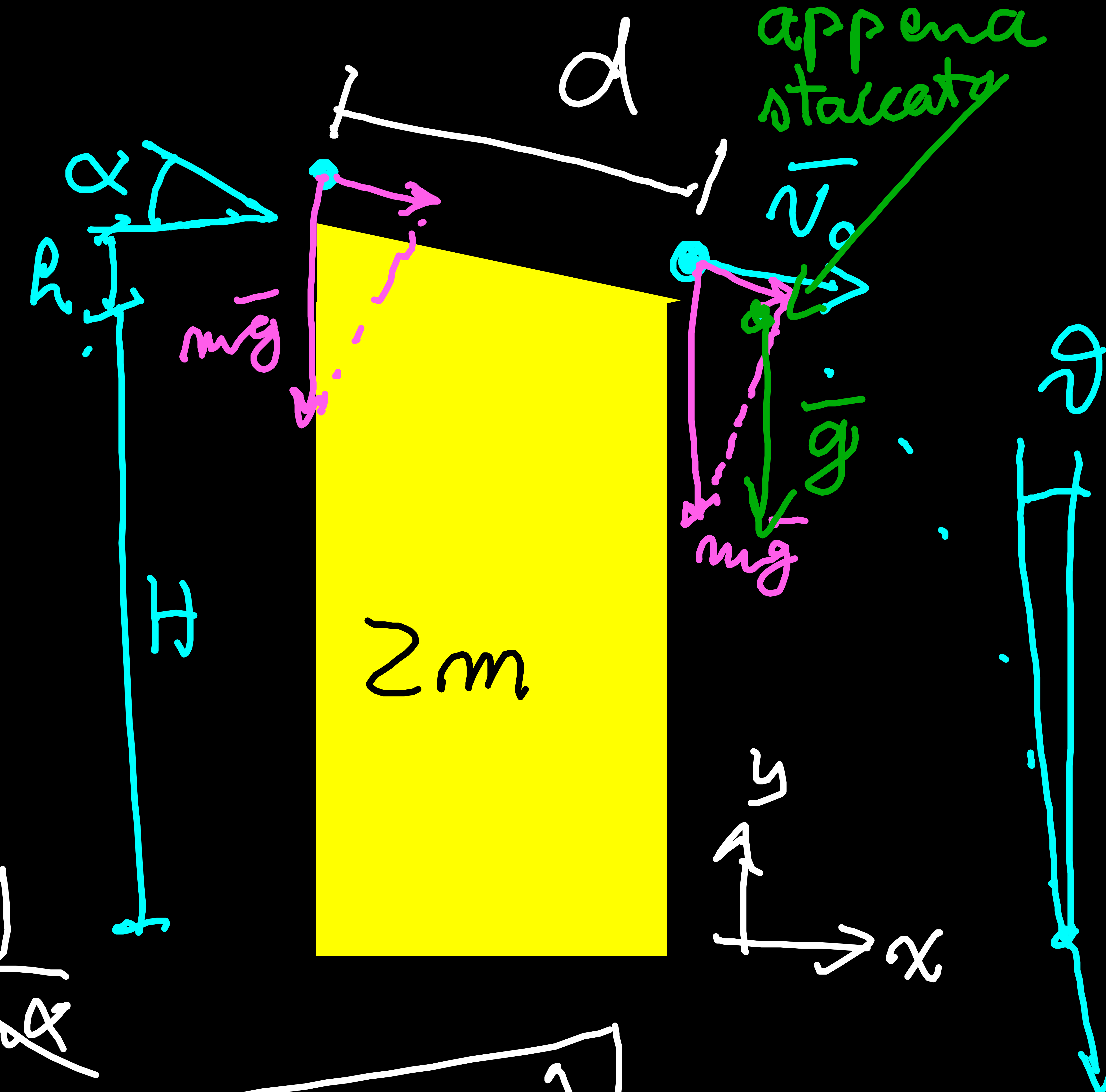
# Problema I 12/07/18

$h = 70\ cm$

$H = 1{,}500\ m$

$\alpha = 30°$

$\bar{a} = (0\,\hat{i} - 9.81\,\hat{j})\ m/s^2$



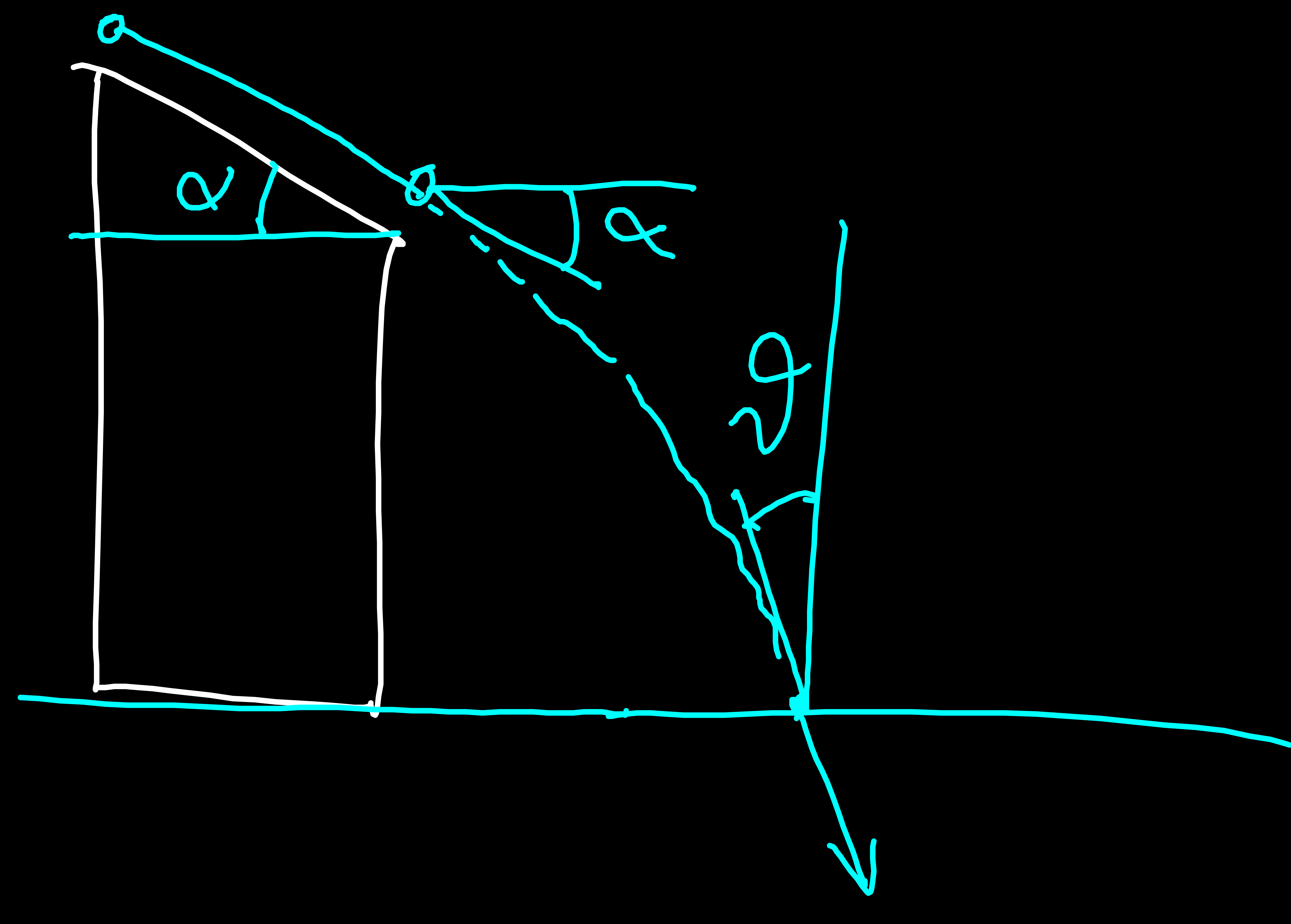

$v_0 = at = g \sin\alpha \sqrt{\frac{2h}{g}\frac{1}{\sin\alpha}}$

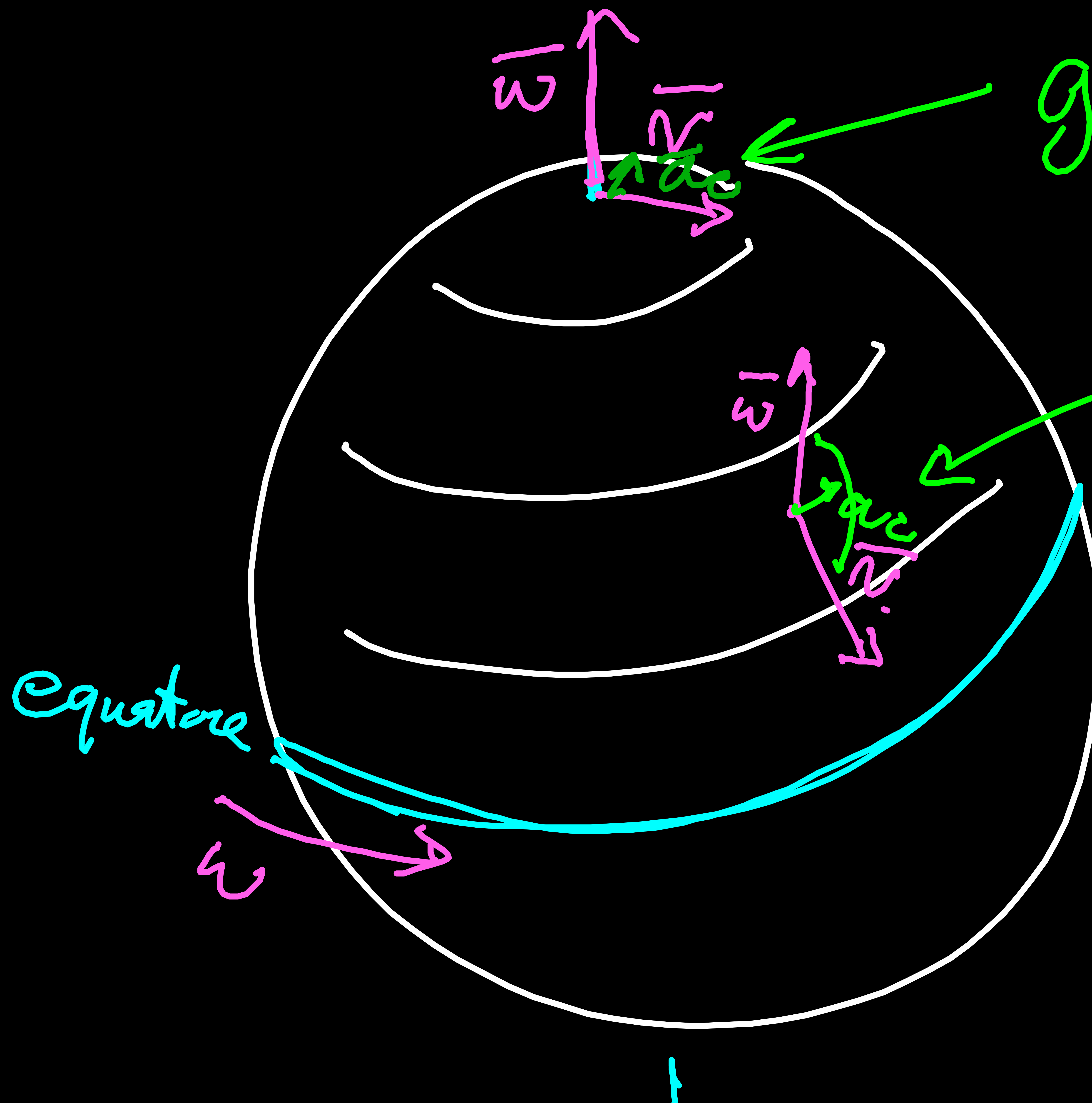
$= \sqrt{2hg}$

$=$

$\bar{v}_0 = v_0 \cos\alpha\,\hat{i} + (-)v_0 \sin\alpha\,\hat{j}$

$= 3.21\,\hat{i} - 1.85\,\hat{j}\ m/s^2$


α
α
ϑ




grande $\left(\sin\vartheta \simeq 1 \quad \vartheta = \frac{\pi}{2}\right)$

piccola $\left(\sin\vartheta \simeq 0.0 \quad \vartheta \to \pi\right.$

$$|\vec{\omega} \times \vec{v}| = \omega v \sin\vartheta$$