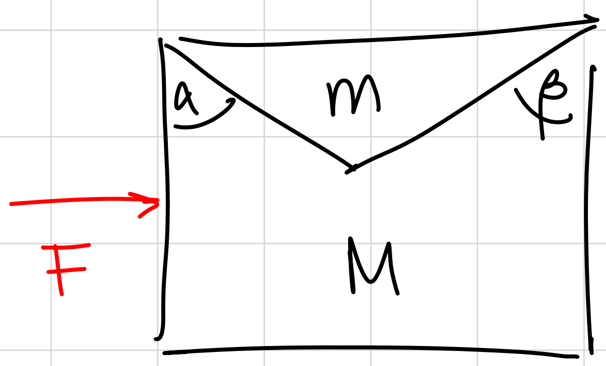
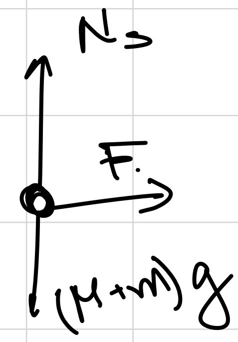


M+m

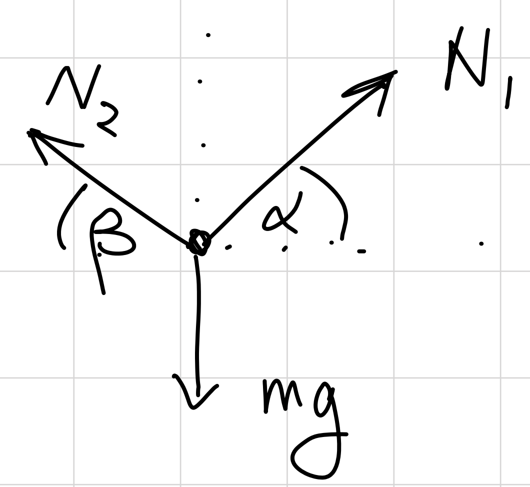
DCL



$$\sum F_x = F = (m+M)\,\bar{a}$$

$$\vec{a} = \frac{F}{m+M}$$

DCL :



① $N_1 \cos\alpha - N_2 \cos\beta = m\,\vec{a} = m \cdot \dfrac{F}{m+M}$

② $N_1 \,\mathrm{sen}\,\alpha + N_2 \,\mathrm{sen}\,\beta - mg = 0$

$$N_1 = \left(\frac{mF}{m+M} + N_2 \cos\beta \right) \frac{1}{\cos\alpha}$$ ③

$$\frac{mF}{m+M} \tan\alpha + N_2 \cos\beta \tan\alpha + N_2 \,\mathrm{sen}\,\beta = mg$$

$$N_2\left(\cos\beta\tan\alpha+\operatorname{sen}\beta\right)=mg-\frac{mF}{m+M}\tan\alpha$$

$$N_2=\frac{mg-\frac{mF}{m+M}\tan\alpha}{\cos\beta\tan\alpha+\operatorname{sen}\beta} \longleftarrow =0$$

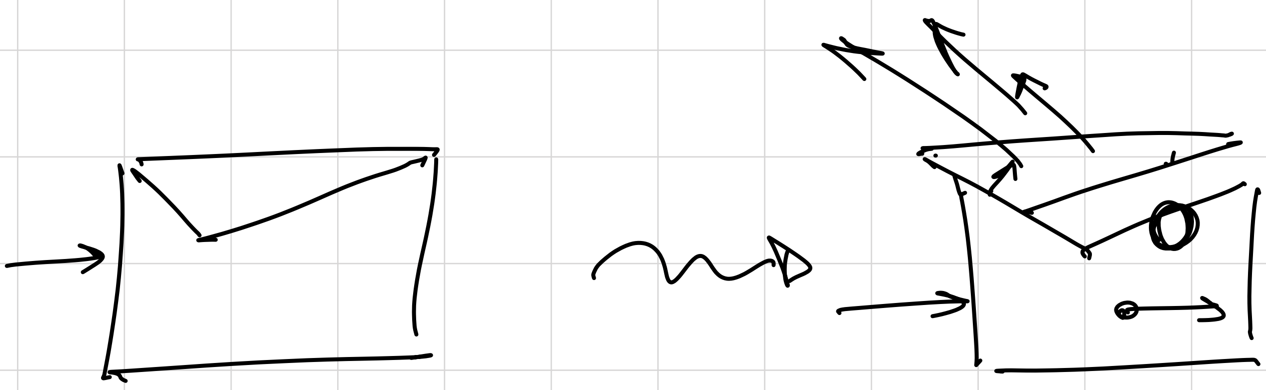
$$N_1=\left(\frac{mF}{m+M}+N_2\cos\beta\right)\frac{1}{\cos\alpha}$$

$$N_1=\left(\frac{mF}{m+M}+\left(\frac{mg-\frac{mF}{m+M}\tan\alpha}{\cos\beta\tan\alpha+\operatorname{sen}\beta}\right)\cos\beta\right)\frac{1}{\cos\alpha}$$

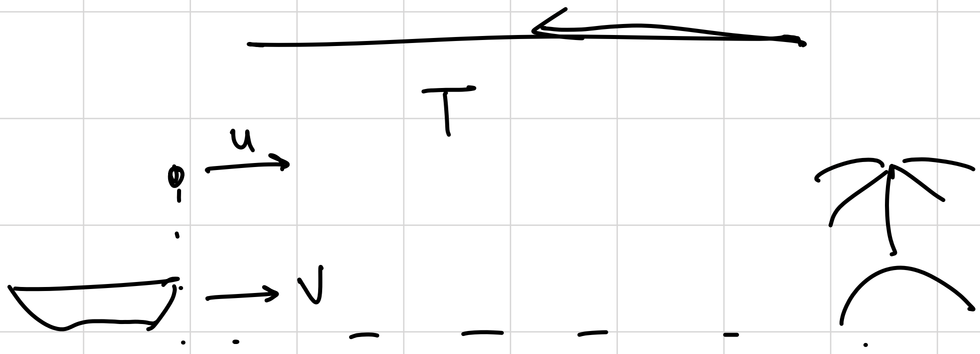
$$=\frac{1}{\cos\alpha}\left(\frac{\cancel{\frac{mF}{m+M}\cos\beta\tan\alpha}+\frac{mF}{m+M}\operatorname{sen}\beta+mg\cos\beta-\cancel{\frac{mF}{m+M}\tan\alpha\cos\beta}}{\cos\beta\tan\alpha+\operatorname{sen}\beta}\right)$$

$$N_1 = \frac{\frac{mF}{m+M}\,\text{sen}\beta + mg\cos\beta}{(\cos\beta\tan\alpha + \text{sen}\beta)\cos\alpha}$$

$$N_1 = \frac{\frac{mF}{m+M}\,\text{sen}\beta + mg\cos\beta}{\cos\beta\,\text{sen}\alpha + \text{sen}\beta\cos\alpha}$$

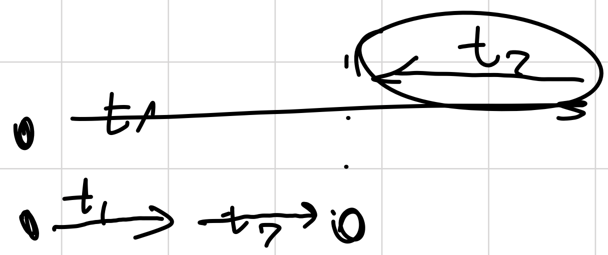


$N_2 = 0$



t_1 : L en llegar a la isla

$\rightarrow T = t_1 + t_2$ $\quad t_2$: L en I $\rightarrow$ B



$\rightarrow D_L^1 = u t_1$

$D_L^2 = u t_2$

$$X_{fL} = ut_1 - ut_2 \qquad X_B = V \cdot T$$

$$= ut_1 - u(T - t_1)$$

$$u(2t_1 - T)$$

$$X_{fL} \overset{!}{=} X_{fB}$$

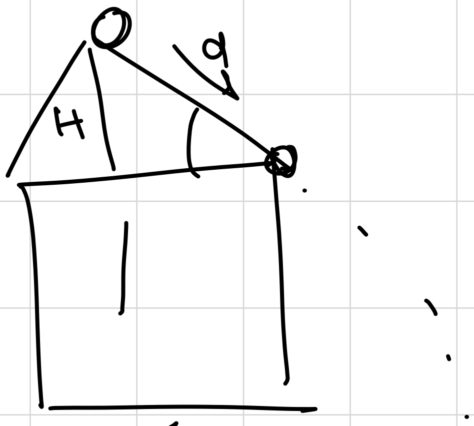
$$u(2t_1 - T) = VT$$

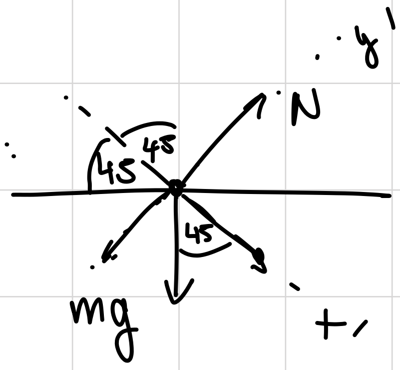
$$t_1 = \frac{VT}{2u} + \frac{T}{2}$$

$$+\ D_0 = \frac{VT}{2} + \frac{uT}{2}$$

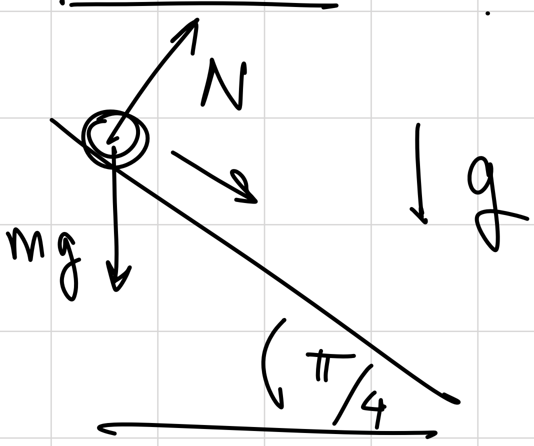
$$-\ X_{fB} = VT$$

$$D_{BI} = \frac{VT}{2} + \frac{uT}{2} - VT = \frac{uT}{2} - \frac{VT}{2}$$



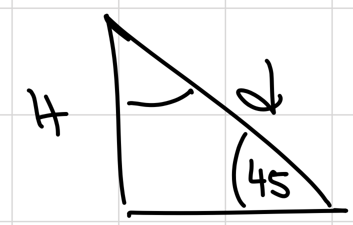
DCL: 

$$\cancel{m}g\cos 45 = \cancel{m}\cdot\vec{a}$$
$$g\cos 45 = \vec{a}$$



$$F_{x'}: \cancel{m}g\cos 45 \neq m\vec{a}$$
$$\vec{a} = g\cos 45$$

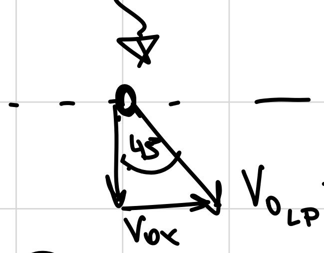
$$\vec{V}_f^{\,2} - \cancel{\vec{V}_0^{\,2}} = 2d\vec{a} \quad / \; d = \frac{H}{sen 45}$$



$$sen 45 = \frac{H}{d}$$
$$d =$$

$$V_f^2 = 2\underbrace{\frac{H}{\frac{\sqrt{2}}{2}}}_{= sen 45} g\overbrace{\cos 45}^{\frac{\sqrt{2}}{2}} = 2Hg$$

$$V_f = \sqrt{2gH}$$



$V_{0_{LP}} = V_f$ MRUA

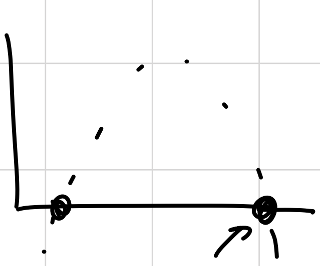
L.P. $V_{0x} = \sqrt{2Hg}\; sen 45 = \sqrt{Hg}$

$V_{0y} = \sqrt{2Hg}\cos 45 = \sqrt{Hg}$

$$y(t) = y_0 + V_{0y}t + \frac{1}{2}\vec{a}t^2$$

$$y(t) = H - \sqrt{Hg}\, t - \frac{1}{2}gt^2$$

$$0 = H - \sqrt{Hg}\, t - \frac{1}{2}gt^2$$

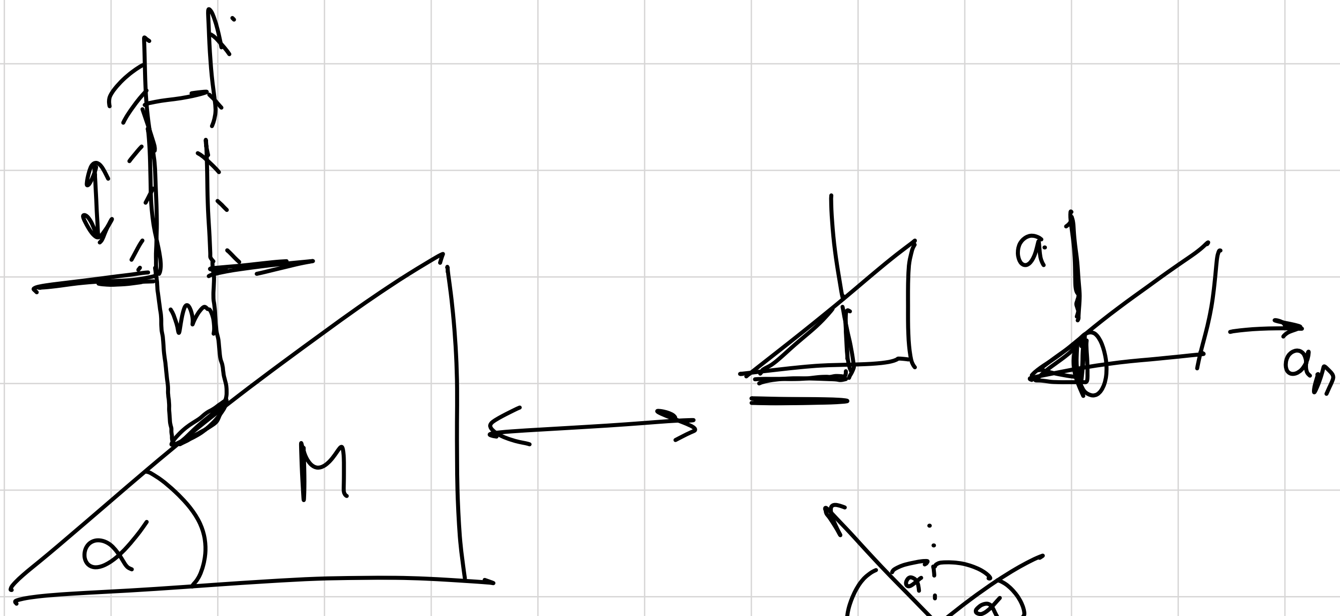


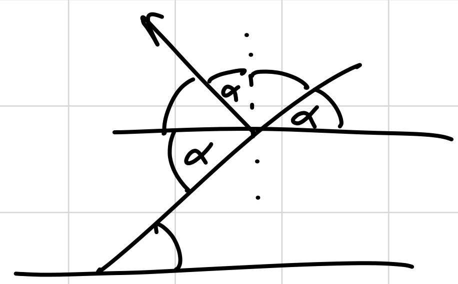
$$\frac{\sqrt{Hg} - \sqrt{Hg + 4\frac{g}{\cancel{2}}H}}{-g} = t = \frac{\sqrt{Hg} - \sqrt{3Hg}}{-g} = \frac{\sqrt{Hg}\left(\sqrt{3} - 1\right)}{g}$$

$$t = \sqrt{\frac{H}{g}}\left(\sqrt{3} - 1\right)$$

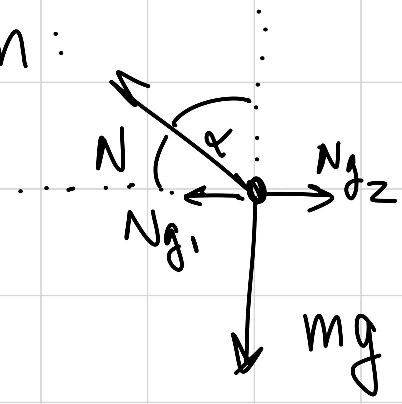
$$t = \sqrt{\frac{H}{g}}\left(\sqrt{3}-1\right)$$

$$X(t) = \sqrt{H\cancel{g}}\ \frac{\sqrt{H}}{\cancel{\sqrt{g}}}\left(\sqrt{3}-1\right) = H\left(\sqrt{3}-1\right)$$

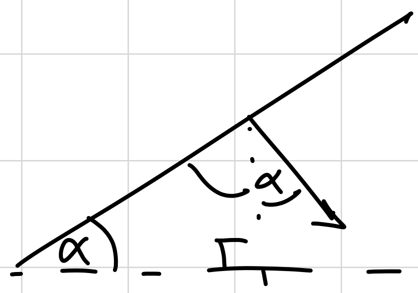




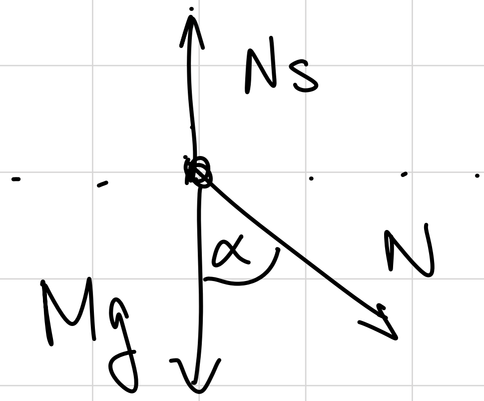
DCL m:



ΣF_y: $N\cos\alpha - mg = -m\vec{a}_m$



DCL M:



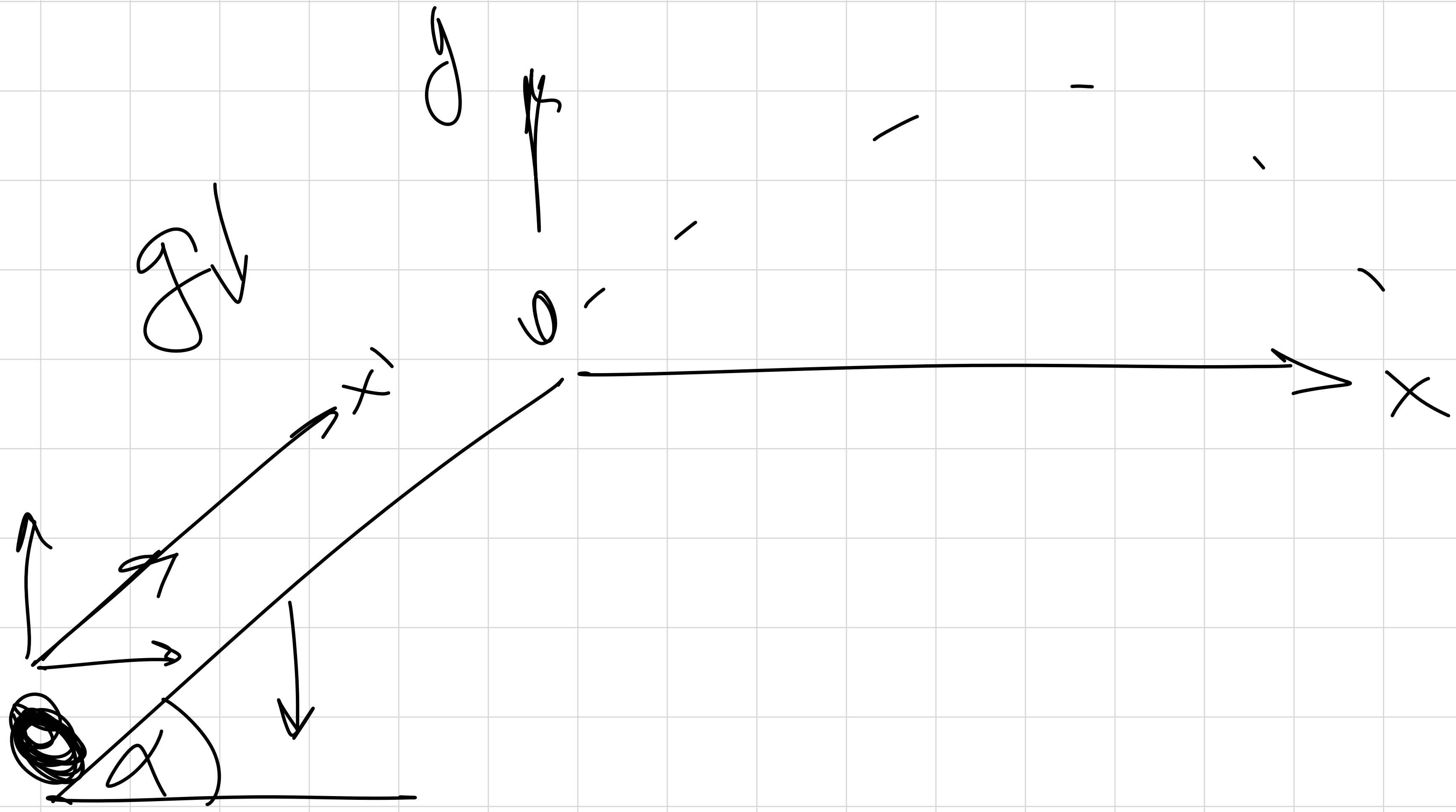
ΣF_x: $N \operatorname{sen}\alpha = M a_M$

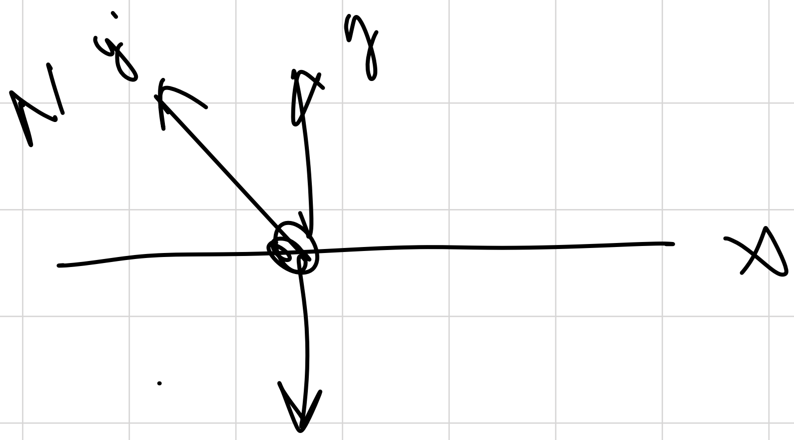
$$a_M = \frac{N \operatorname{sen}\alpha}{M}$$

$$N = \frac{M a_M}{\operatorname{sen}\alpha}$$

$$\frac{M a_M}{\operatorname{sen}\alpha}\cos\alpha - mg = -m a_m$$

$$a_m = g - \frac{M}{m}\cot\alpha \, a_M$$





$$F_{x'} : -Mg \operatorname{sen} \alpha = M\vec{a}$$
$$\vec{a} = -g \operatorname{sen} \alpha$$