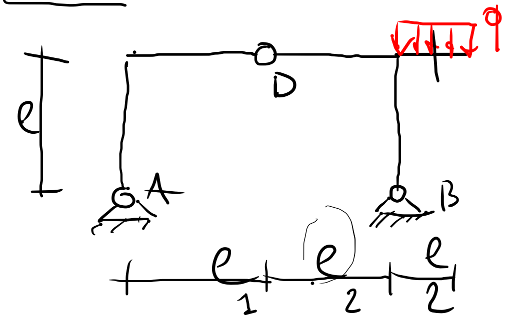
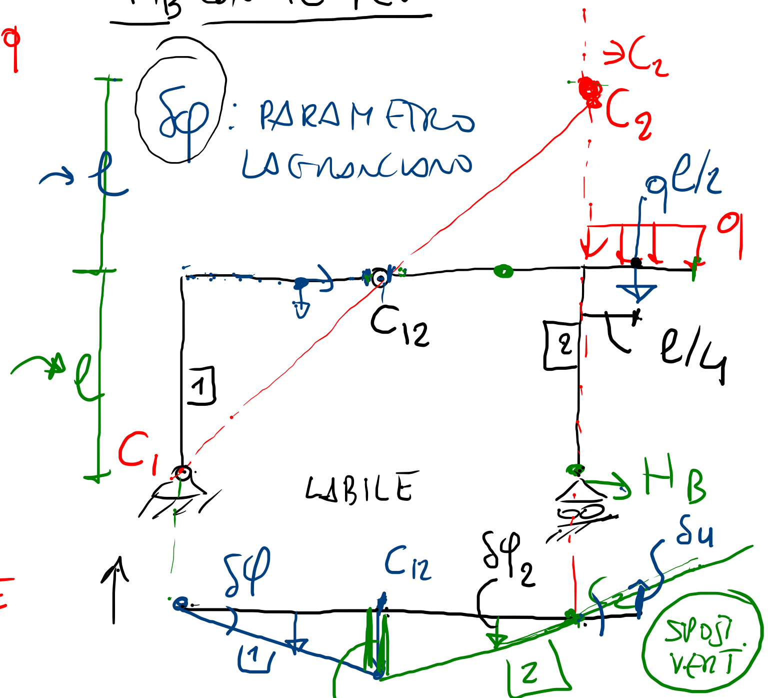
ES PLV

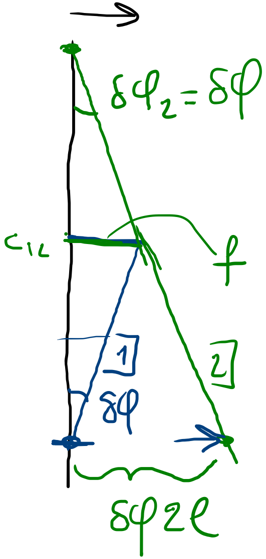
H_B CON IL PLV

19/5/22



$\delta\varphi$: PARAMETRO LAGRANGIANO





SPOST ORIZZ

$f = \delta\varphi\, l$

$\delta\varphi_2\, l$

$\parallel$

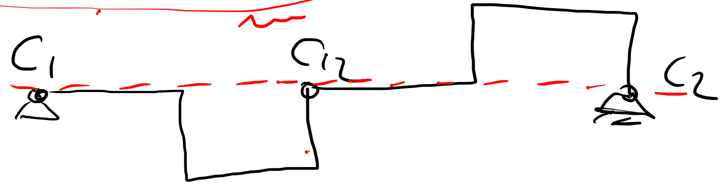
$\delta\varphi$

C. RELATIVO

$C_1\ ,\ C_2\ ,\ C_{12}$

I TEOREMA DELLE CATENE CINEMATICHE

$C_1 \leftrightarrow C_{12} \leftrightarrow C_2$



$d = \delta\varphi\, l_1 = \delta\varphi_2\, l_2$

$\delta\varphi_2\ ? = f(\delta\varphi)$

$\delta\varphi_2 = \delta\varphi$

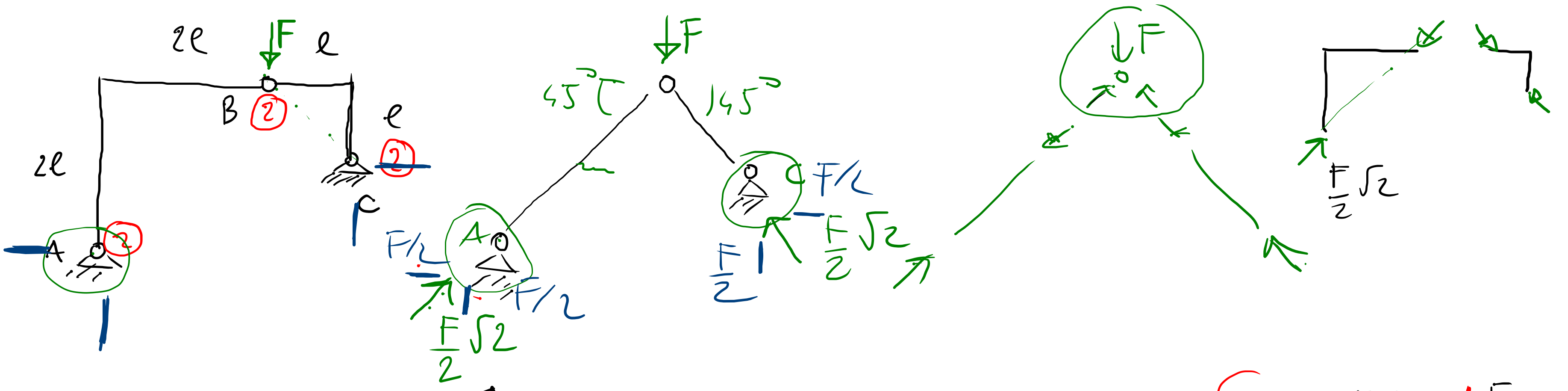
$\delta L = 0 \Rightarrow H_B$

$\forall \delta\varphi$

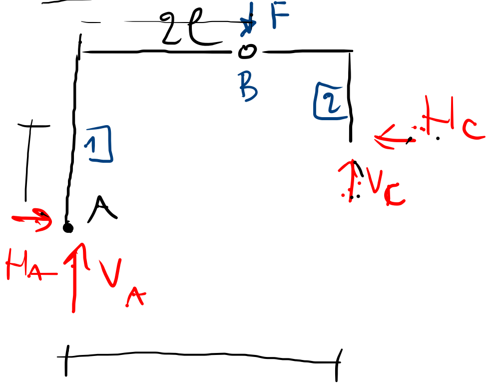
$$-\frac{ql}{2}\left(\cancel{\delta\varphi}\,\frac{\cancel{l}}{4}\right) + H_B\, \cancel{\delta\varphi}\, 2\cancel{l} = 0$$

$$-\frac{ql}{8} = -2H_B \Rightarrow \boxed{H_B = \frac{ql}{16}}$$

ARCO A TRE CERNIERE CON CERNIERA INTERNA CARICATA



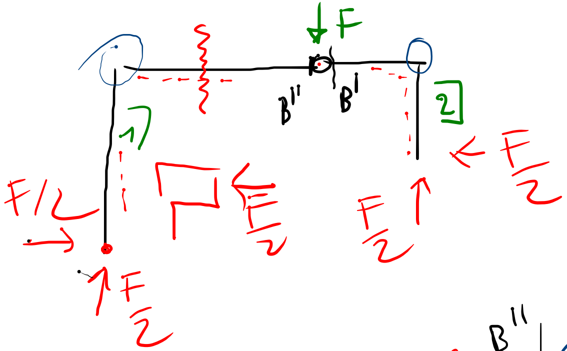
STUDIO CON EQ' AUSILIARIA



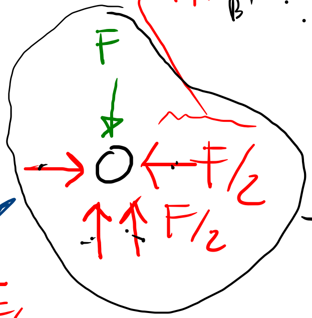
$$\left\{\begin{array}{ll} \xrightarrow{+}: & +H_A - H_C = 0 \\ +\uparrow: & +V_A - F + V_C = 0 \\ \overset{+}{\circlearrowleft} A: & -F2l + H_C l + V_C 3l = 0 \\ \overset{+}{\circlearrowleft} B\ \boxed{2}: & V_C l - H_C l = 0 \quad \} \text{ EQ AUSIL.} \end{array}\right.$$

$\boxed{1} + \boxed{2}$

$$\left\{\begin{array}{l} V_C = \dfrac{2Fl}{4l} = +\dfrac{F}{2} = H_C \\ H_A = H_C = +\dfrac{F}{2} \\ V_A = F - V_C = +\dfrac{F}{2} \end{array}\right.$$



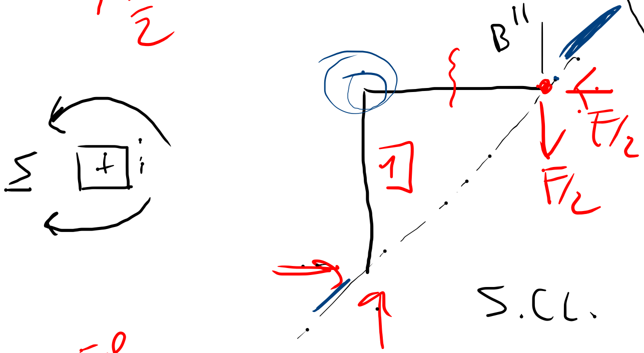
S.C.L.



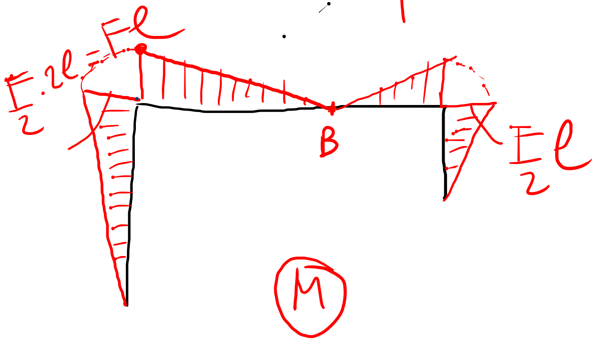
VERIFICARE EQUIL CERNIERA

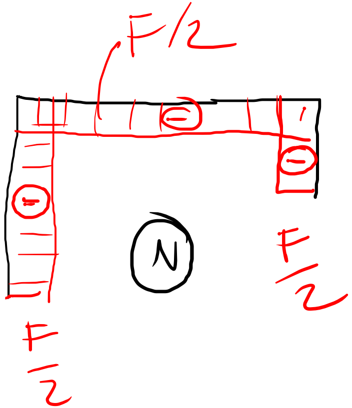
S.C.L.

OK!

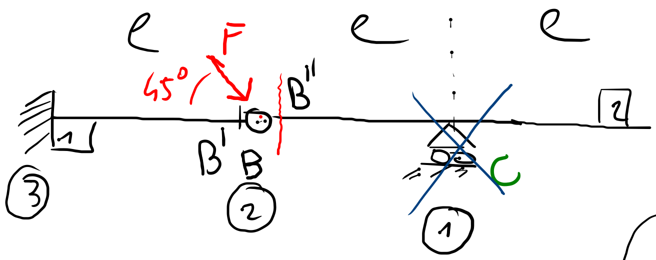


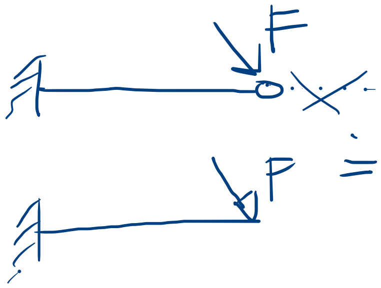
S.C.L.

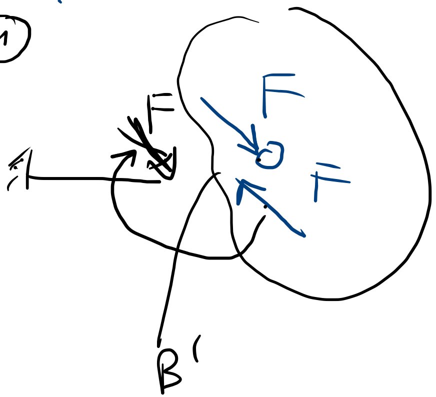


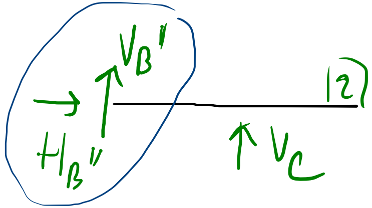


ES



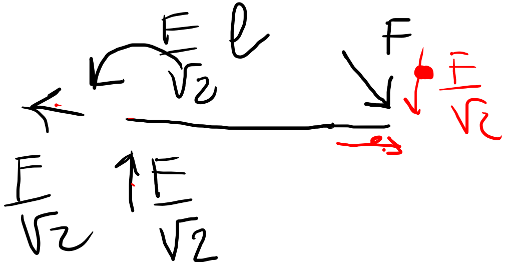


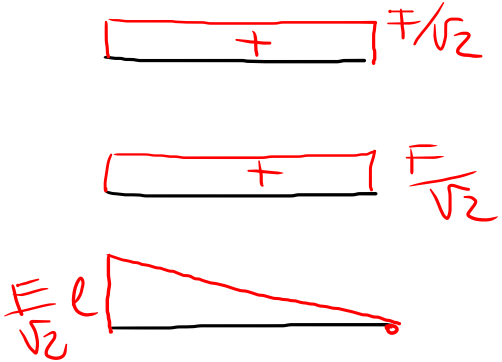




NO CARICHI
NO REAZIONI

$$\begin{cases} H_{B''}=0 \\ V_C+V_{B''}=0 \\ V_C=0 \end{cases}$$



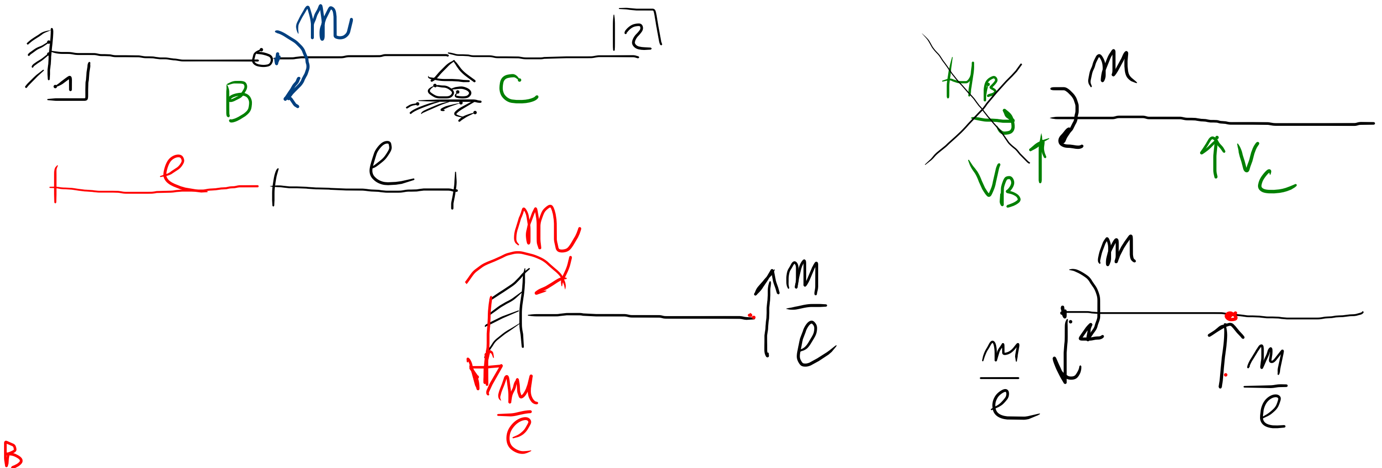


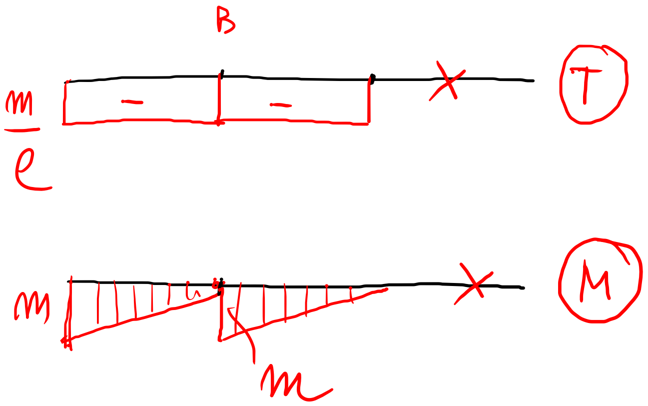
N

T

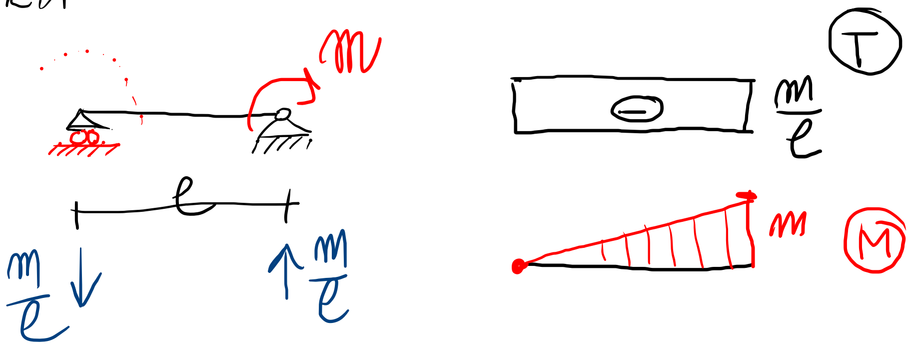
M

ES

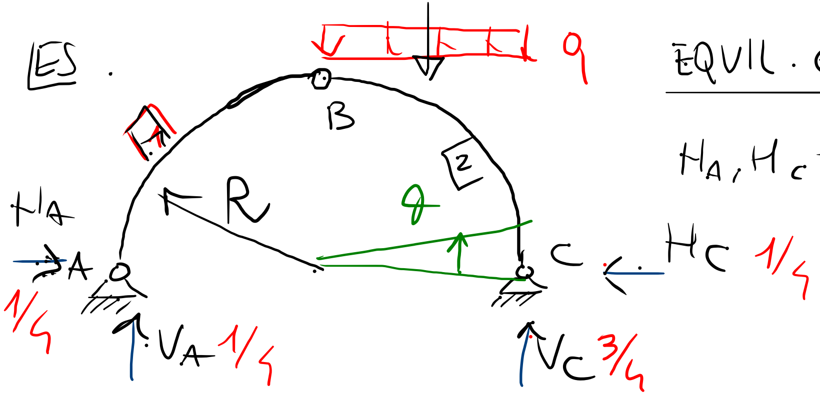




UN ULTERIORE SCHEMA DA SAPERE A MEMORIA

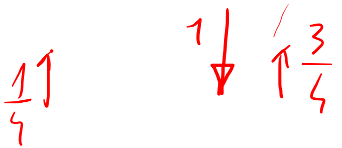


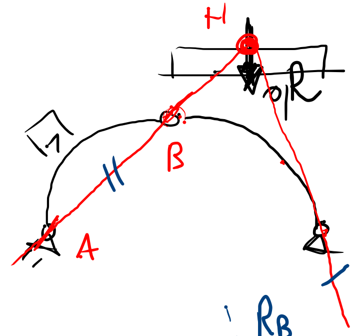
ES.

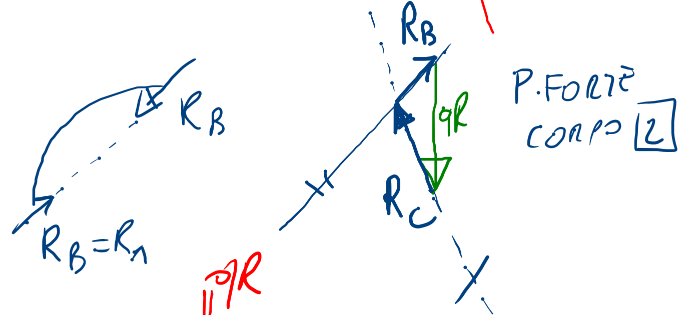


EQUIL. e DIAGR CDS

$H_A, H_C \Rightarrow$ SPINTA







$\xrightarrow{+}$ $+H_A - H_C = 0$

$\uparrow +$: $V_A - qR + V_C = 0$

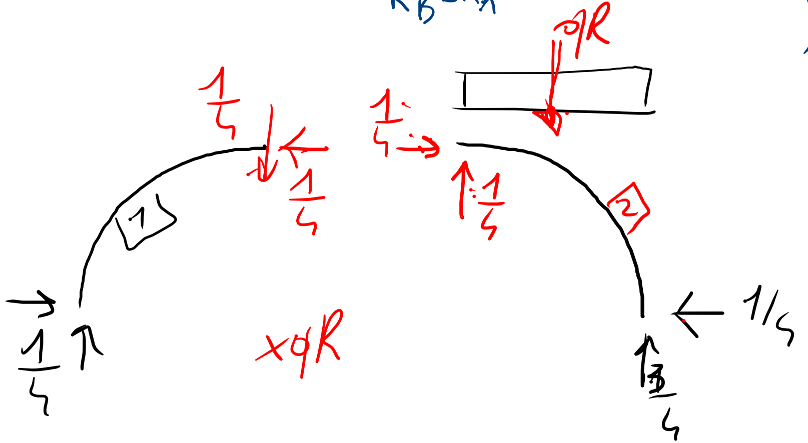
$A \curvearrowleft +$ $-qR \cdot \frac{3}{2}R + V_C 2R = 0$

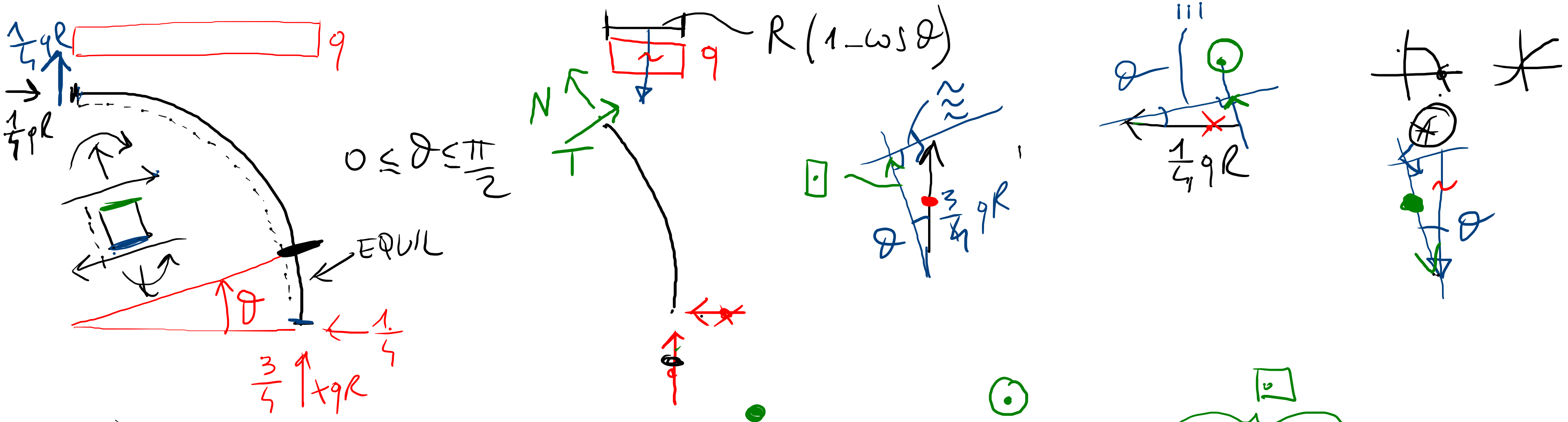
[1]+[2]

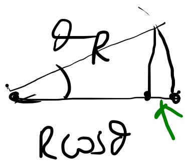
$\curvearrowleft B$ [1] : $-V_A R + H_A R = 0$ eq AUSIL.

$V_C = qR\frac{3}{4}$ $H_A = \frac{1}{4}qR$

$V_A = \frac{1}{4}qR$ $H_C = \frac{1}{4}qR$







$$\boxed{+\uparrow (N)} : \; +N - \underbrace{qR(1-\cos\theta)\cos\theta}_{\bullet} + \underbrace{\tfrac14 qR\sin\theta}_{\odot} + \underbrace{\tfrac34 qR\cos\theta}_{\boxdot} = 0$$

$N(\theta) = qR(1-\cos\theta)\cos\theta - \frac14 qR\sin\theta - \frac34 qR\cos\theta$; $N(0) = -\frac34 qR$ $\boxed{\text{OK!}}$

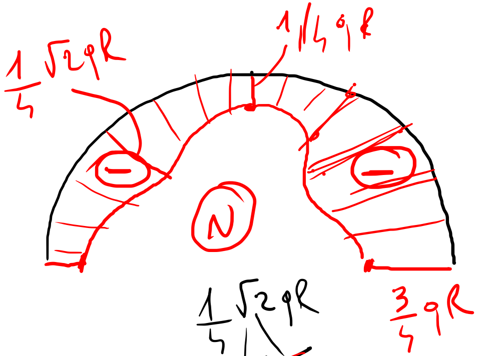
$N(\pi/2) = -\frac14 qR$ $\boxed{\text{OK!}}$

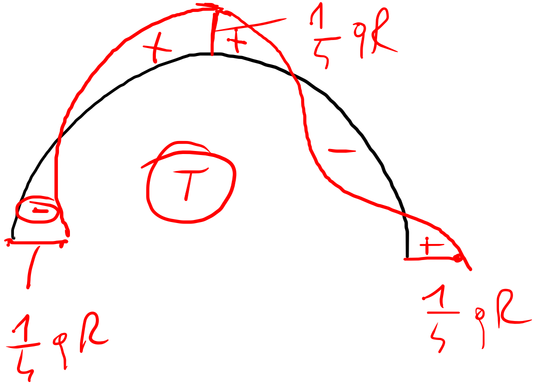
$$\boxed{+\nearrow T} : \; +T - \underbrace{qR(1-\cos\theta)\sin\theta}_{\circledast} - \underbrace{\tfrac14 qR\cos\theta}_{|||} + \underbrace{\tfrac34 qR\sin\theta}_{\approx} = 0$$

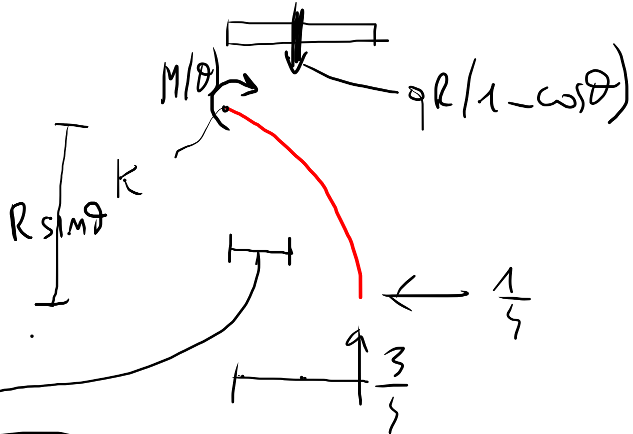
$T(\theta) = qR(1-\cos\theta)\sin\theta + \frac14 qR\cos\theta - \frac34 qR\sin\theta$

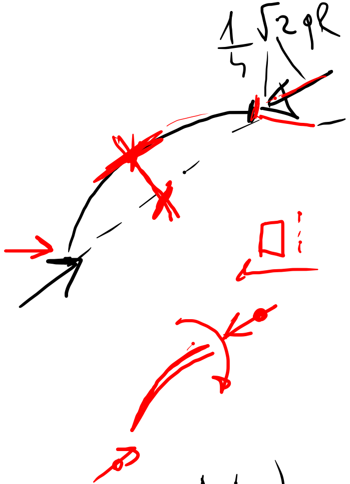
$\rightarrow T(0) = +\frac14 qR$ $\boxed{\text{OK}}$

$\rightarrow T(\pi/2) = qR - \frac34 qR = +\frac14 qR$ $\boxed{\text{OK}}$









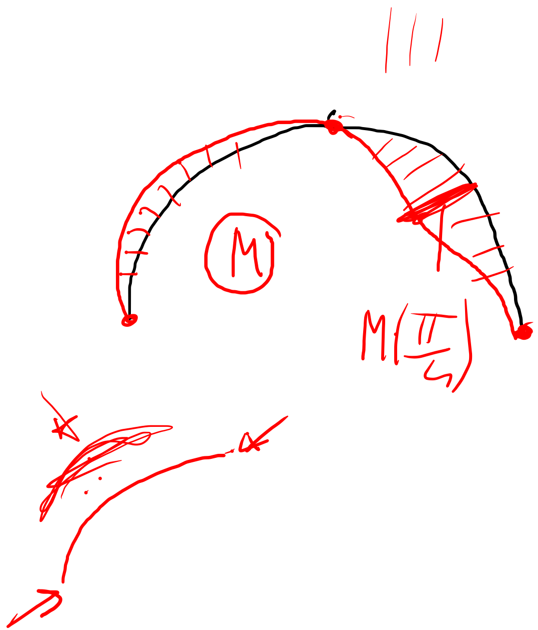
$\overset{+}{\circlearrowleft}K$: $-M(\theta) - qR(1-\cos\theta)\cdot\frac{R}{2}(1-\cos\theta) - \frac{1}{4}qR\cdot R\sin\theta$

$+\frac{3}{4}qR\cdot R(1-\cos\theta) = 0$

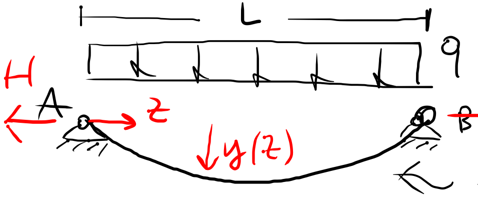
$$M(\theta) = -q\frac{R^2}{2}(1-\cos\theta)^2 - \frac{1}{4}qR^2\sin\theta + \frac{3}{4}qR^2(1-\cos\theta)$$

$M(0)=0 \overset{?}{\longrightarrow} 0$ OK

$M(\frac{\pi}{2})=0 \, ? \longrightarrow -\frac{2qR^2}{4} - \frac{1}{4}qR^2 + \frac{3}{4}qR^2 = 0$


M
M(π/4)

STRUTTURE FUNICOLARI DEL CARICO (CENNI)

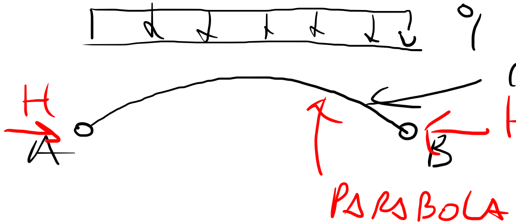


← filo teso inestensibile (SOGGETTO SOLO A TRAZIONE)

$$y''(z) = \frac{q}{H} \quad \text{cost.}$$

$y(0)=0;\ y(L)=0$

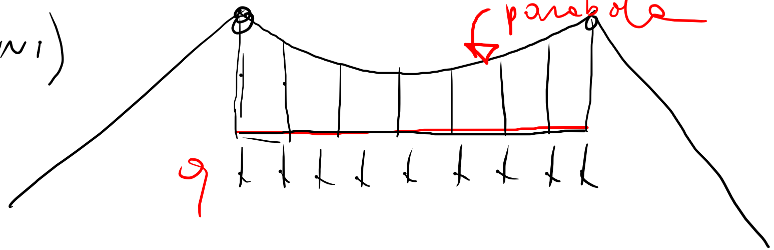
$y(z) \Rightarrow$ PARABOLA

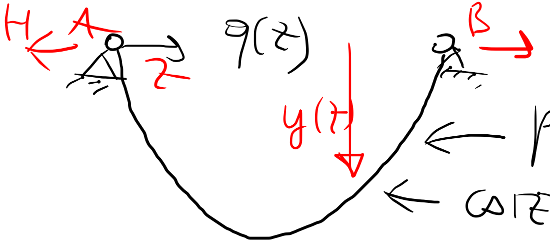


ARCO COMPRESSO $(N \neq 0)$

$(M=0)$

$(T=0)$



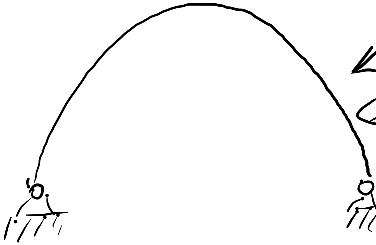


← peso proprio

← CATENARIA

γ: PESO PER UNITA' DI LUNGHEZZA

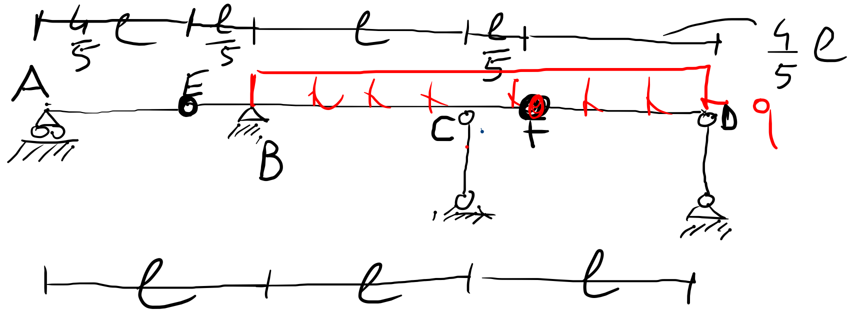
$$y(z) = \frac{H}{\gamma} \cosh\left(\frac{\gamma}{H} z - c_1\right) + c_2$$

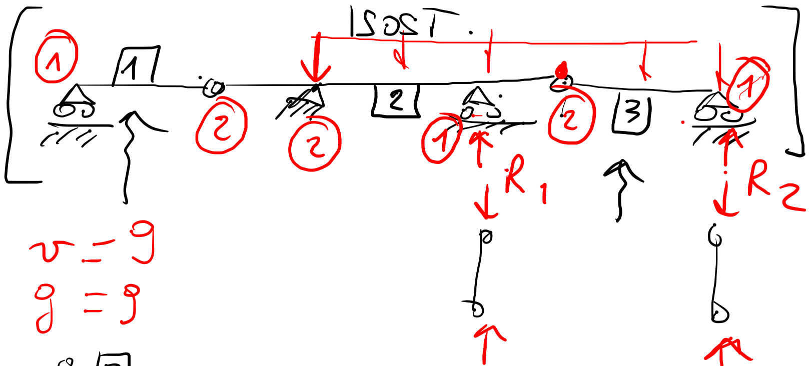


← CATENARIA

← COMPRESSIONE

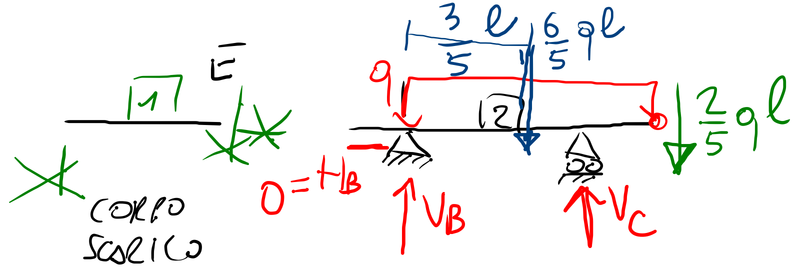
ES

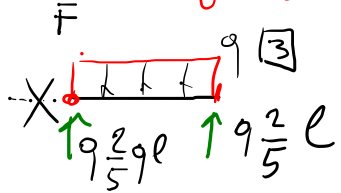


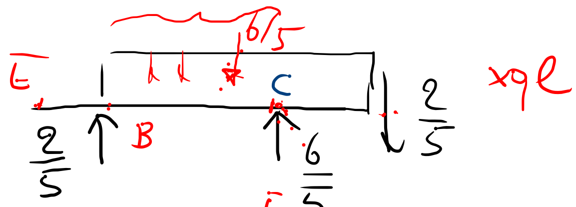


$v = 9$

$g = 9$





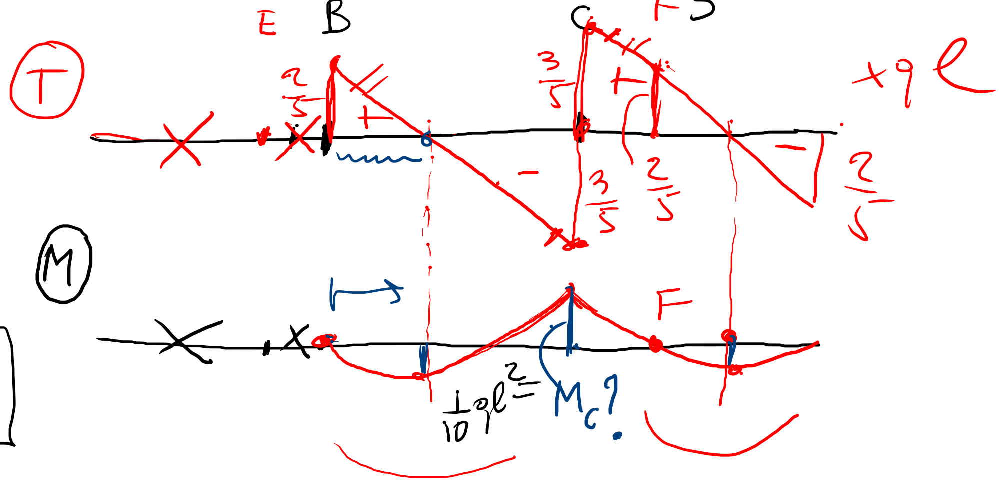


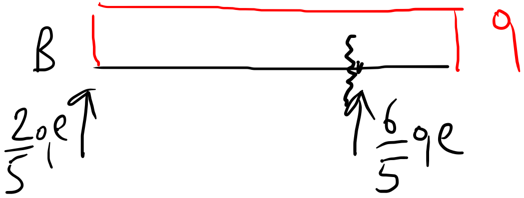
EQUIL. CORPO $\boxed{2}$

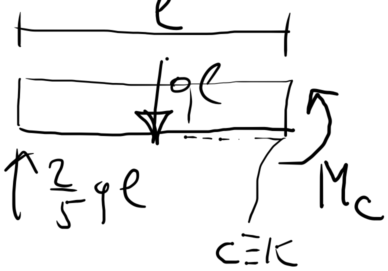
$$\uparrow + : \quad V_B - \frac{6}{5}q\ell + V_C - \frac{2}{5}q\ell = 0$$

$$\overset{+}{\curvearrowleft} B) : \quad -\frac{6}{5}q\ell \cdot \frac{3}{5}\ell + V_C\,\ell - \frac{2}{5}q\ell \cdot \frac{6}{5}\ell = 0$$

$$\boxed{V_C = \frac{6}{5}q\ell} \qquad \boxed{V_B = \frac{8}{5}q\ell - V_C = \frac{2}{5}q\ell}$$







$$C \circlearrowleft^{+}: -\frac{2}{5}q\ell\cdot\ell + q\ell\frac{\ell}{2} + M_c = 0$$

$$M_c = \left(\frac{2}{5} - \frac{1}{2}\right) q\ell^2 = \frac{4-5}{10} = -\frac{1}{10} \times q\ell^2$$