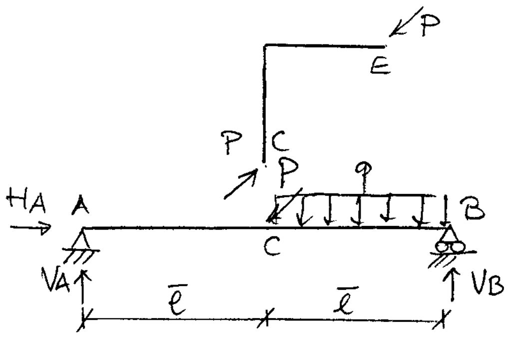
Soluzione Esercizio 1



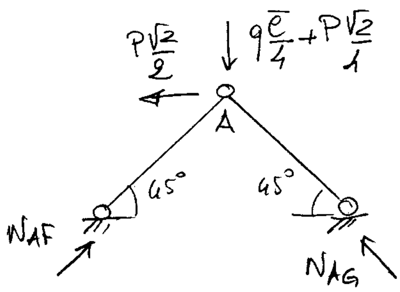
$$\bar{\ell} = \ell_1 + \ell_3 = 3\ m$$

$$H_A = P\frac{\sqrt{2}}{2}$$

$$B \circlearrowleft \quad -V_A\, 2\cancel{\bar{\ell}} + q\frac{\bar{\ell}^{\cancel{2}}}{2} + P\frac{\sqrt{2}}{2}\cancel{\bar{\ell}} = 0$$

$$\boxed{V_A} = q\frac{\bar{\ell}}{4} + \frac{P\sqrt{2}}{4} = \boxed{1103\ kg}$$

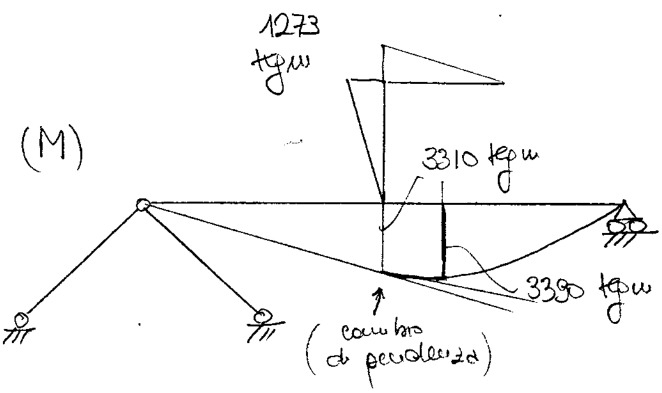
$$\boxed{V_B} = q\bar{\ell} + P\frac{\sqrt{2}}{2} - q\frac{\bar{\ell}}{4} - \frac{P\sqrt{2}}{4} = \frac{3}{4}q\bar{\ell} + \frac{P\sqrt{2}}{4} = \boxed{2604\ kg}$$

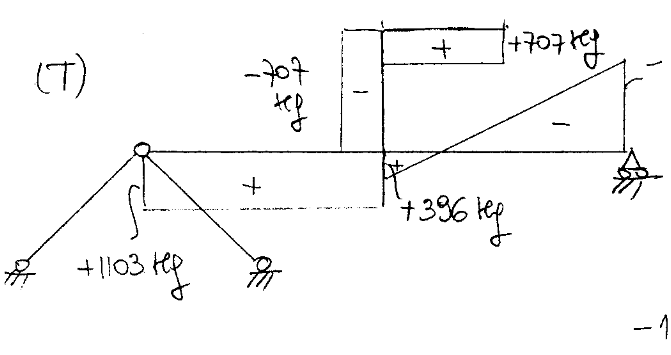


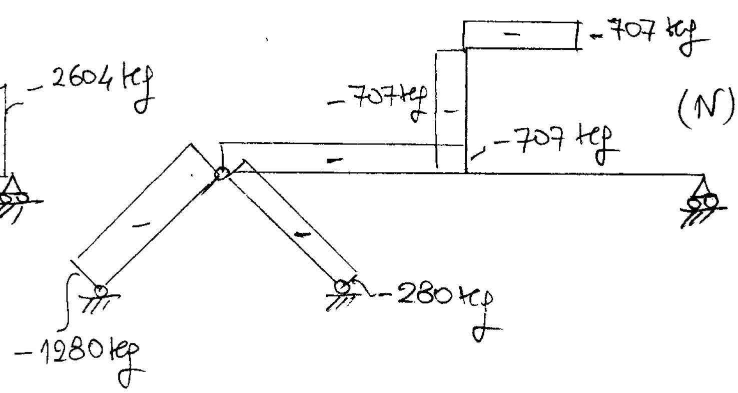
Equilibrio del nodo A:

$$\begin{cases} N_{AF}\frac{\sqrt{2}}{2} - N_{AG}\frac{\sqrt{2}}{2} = \frac{P\sqrt{2}}{2} \\ N_{AF}\frac{\sqrt{2}}{2} + N_{AG}\frac{\sqrt{2}}{2} = q\frac{\ell}{4} + \frac{P\sqrt{2}}{4} \end{cases} \qquad \begin{cases} N_{AF} = \frac{q\ell}{4\sqrt{2}} + \frac{3}{4}P = 1280\ kg \\ N_{AG} = \frac{q\ell}{4\sqrt{2}} - \frac{P}{4} = 280\ kg \end{cases}$$

Diagrammi:

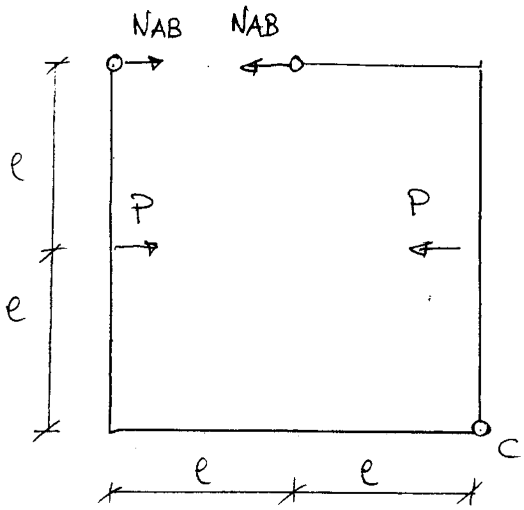






14/6/02

Soluzione Esercizio 2

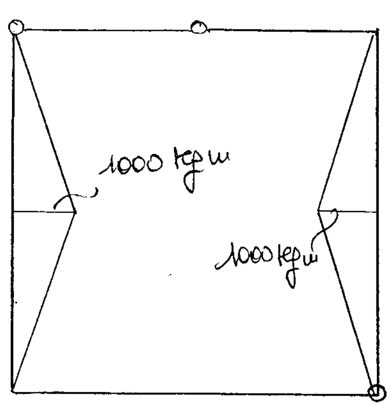


$$C \circlearrowleft \quad N_{AB} \cdot 2l + Pl = 0$$

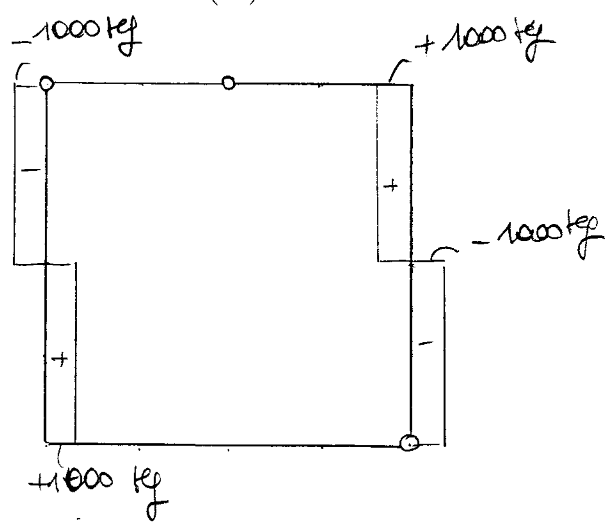
$$\hookrightarrow N_{AB} = -\frac{P}{2} = -1000 \text{ kg}$$

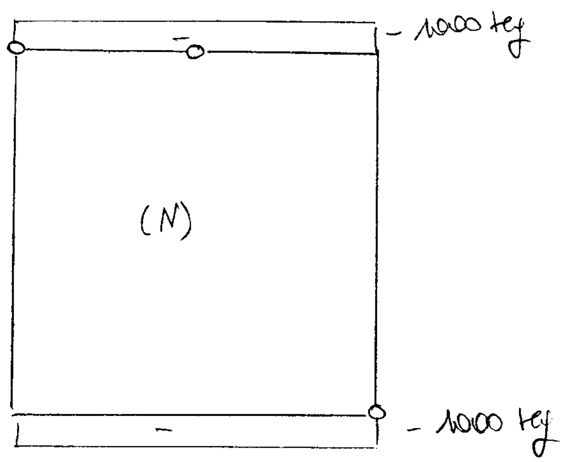
Diagrammi:

(M)



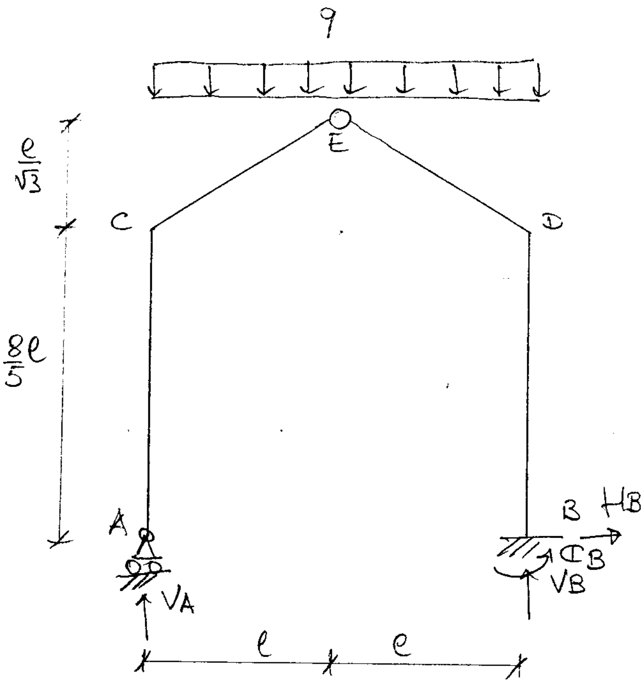
(T)





Soluzione Esercizio 3

14/06/02



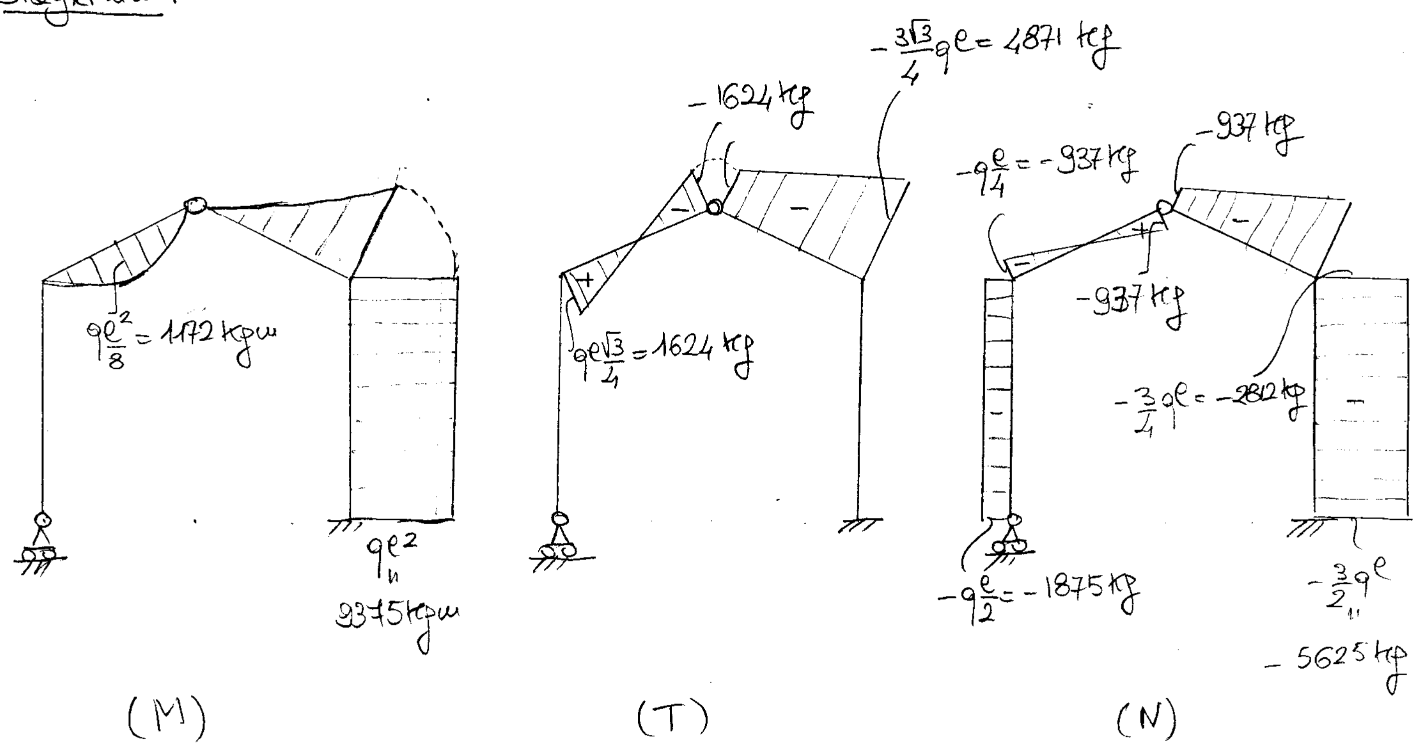
$H_B = 0$

$E \circlearrowleft \; -V_A \cdot \ell + q\frac{\ell^2}{2} = 0 \rightarrow V_A = q\frac{\ell}{2} = 1875 \text{ kg}$

$V_B = 2q\ell - q\frac{\ell}{2} = \frac{3}{2}q\ell = 5625 \text{ kg}$

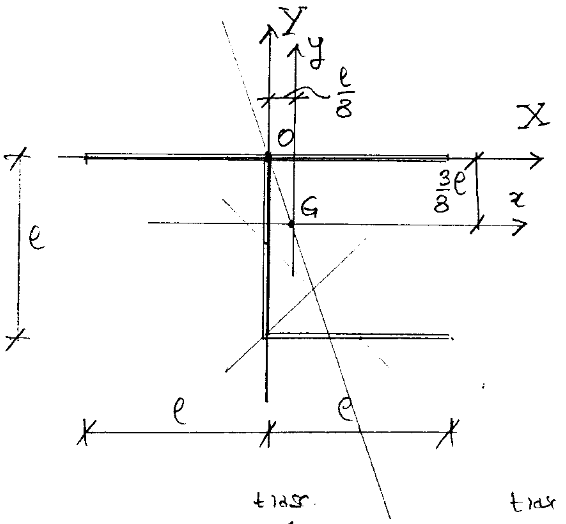
$E \circlearrowleft \; \mathbb{C}_B + \frac{3}{2}q\ell^2 - q\frac{\ell^2}{2} = 0 \rightarrow \mathbb{C}_B = -q\ell^2 = -9375 \text{ kgm}$

Diagrammi:



Soluzione Esercizio 4

14/06/02



$A = 4s\ell$

$S_X = -s\ell^2 - \frac{s\ell^2}{2} = -\frac{3}{2}s\ell^2$

$S_Y = +\frac{s\ell^2}{2}$

$X_G = \frac{s\ell^2}{8s\ell} = +\frac{\ell}{8} = 1{,}25 \text{ cm}$

$Y_G = -\frac{3s\ell^2}{8s\ell} = -\frac{3}{8}\ell = -3{,}75 \text{ cm}$

trasl. trasl.

$I_X = \cancel{\frac{1}{12}2\ell s^3} + \frac{1}{3}s\ell^3 + \cancel{\frac{1}{12}\ell s^3} + s\ell^2 = \frac{4}{3}s\ell^3$

$I_Y = \frac{1}{12}s\,8\ell^3 + \cancel{\frac{1}{12}\ell s^3} + \frac{1}{3}\ell^3 s = s\ell^3$

$I_{XY} = +s\ell\left(-\frac{\ell^2}{2}\right) = -\frac{s\ell^3}{2}$

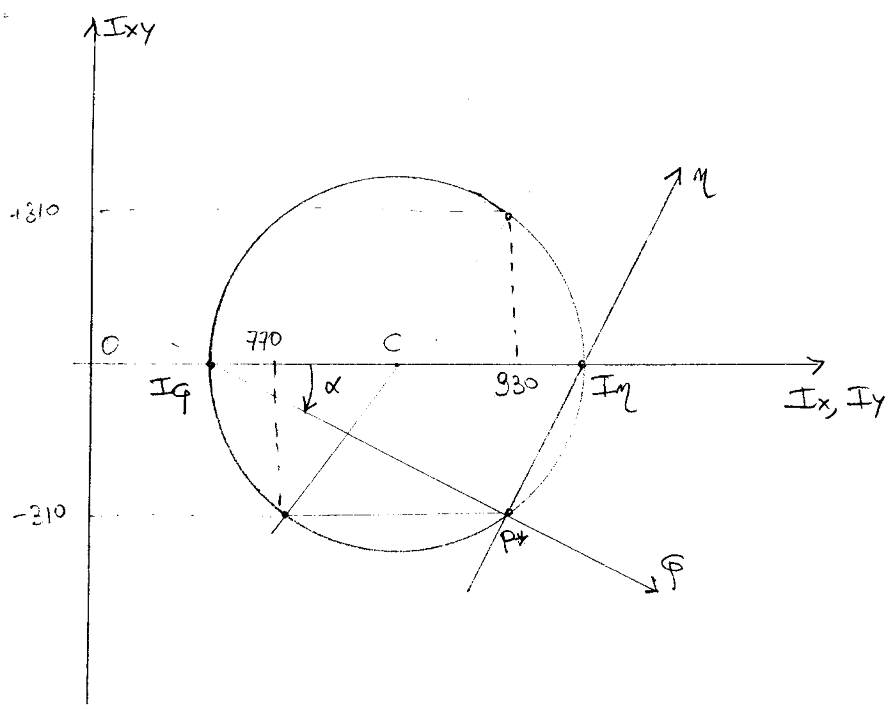
Teorema del trasporto:

$I_x = \frac{4}{3}s\ell^3 - (4s\ell)\left(\frac{3}{8}\ell\right)^2 = \frac{37}{48}s\ell^3 = 770 \text{ cm}^4$

$I_y = s\ell^3 - (4s\ell)\left(\frac{\ell}{8}\right)^2 = \frac{15}{16}s\ell^3 = 930 \text{ cm}^4$

$I_{xy} = -\frac{s\ell^3}{2} - (4s\ell)\left(-\frac{3}{64}\ell^2\right) = -\frac{5}{16}s\ell^3 = -310 \text{ cm}^4$

Cerchio di Mohr:



$\alpha = \frac{1}{2}\operatorname{arctg}\left(+\frac{2\cdot 310}{770-930}\right) = -0{,}655 \cong -37^\circ$

$C = \left(\frac{770+930}{2}; 0\right) = (850; 0)$

$R = \sqrt{\left(\frac{770-930}{2}\right)^2 + 310^2} = 320 \text{ cm}^4$

$\left.\begin{matrix} I_\xi \\ I_\eta \end{matrix}\right\} = 850 \mp 320 = \begin{cases} 530 \text{ cm}^4 \\ 1170 \text{ cm}^4 \end{cases}$