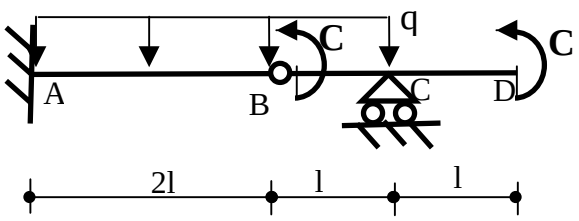
CORSO DI LAUREA IN INGEGNERIA MECCANICA
UNIVERSITÀ DEGLI STUDI DI FERRARA
PRIMA PROVA SCRITTA IN ITINERE DI STATICA

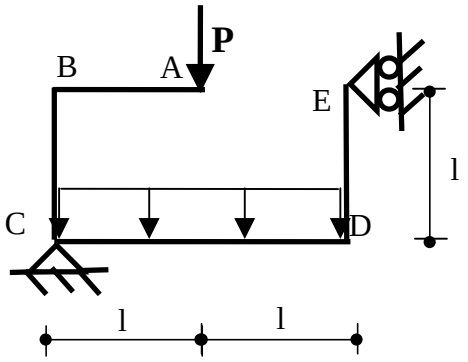
FERRARA, 3/11/2008

B

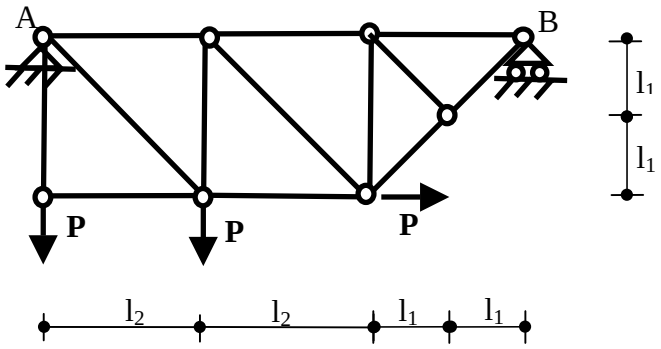
1) **Disegnare i diagrammi quotati delle azioni interne (N, T, M) per l=1.5 m, q= 1500 kg/m, C=2 tm.**



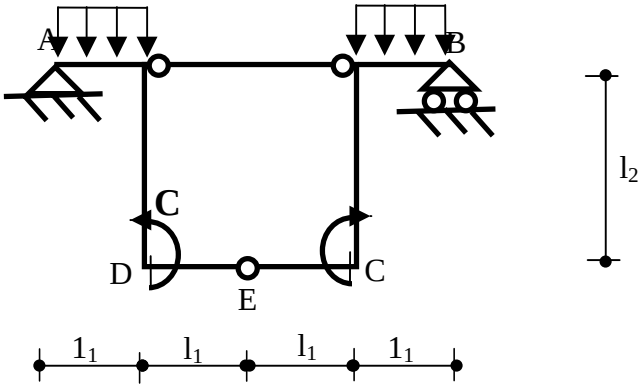
2) **Disegnare i diagrammi quotati delle azioni interne (N, T, M) per l= 1.5 m, q= 1500 kg/m, P=2 t.**



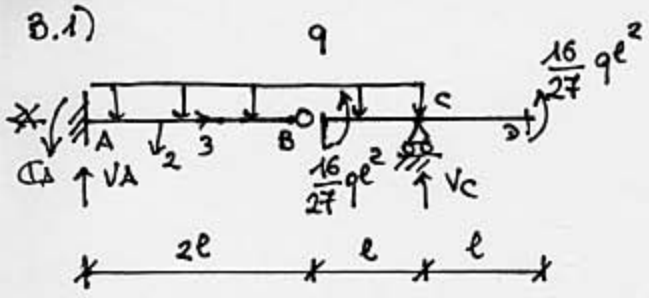
3) **Calcolare lo stato di sollecitazione per l_1=0.75 m, l_2=1.5 m, P= 2 t.**



4) **Disegnare i diagrammi quotati di (N,T,M) per l_1=0.75 m,l_2=1.5 m, C=2 tm, q=1500 kg/m.**



B.1)



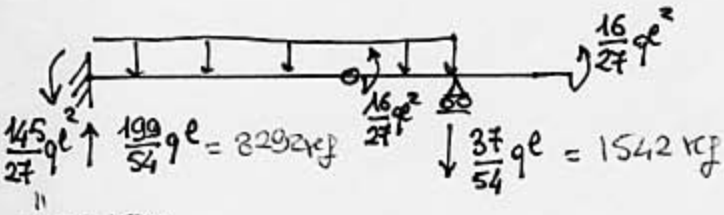
$(B\curvearrowright)_{BCD}$ $\quad V_C\,\ell = -\frac{32}{27}ql^2 + q\frac{\ell^2}{2} = -\frac{37}{54}ql^2 = 1542\ kg$

$(\uparrow)$ $\quad V_A = 3q\ell - V_C = \left(3+\frac{37}{54}\right)q\ell = \frac{199}{54}q\ell$

$= 8292\ kg$

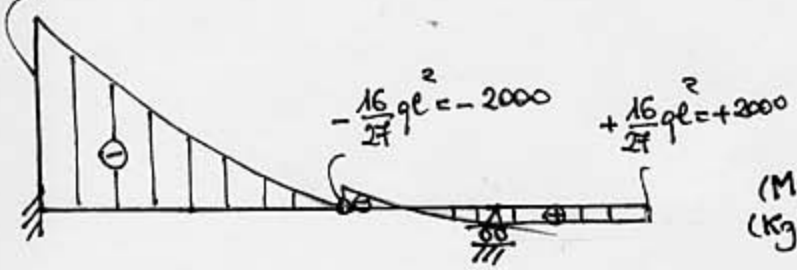
$(B\curvearrowright)_{AB}$ $\quad C_A = V_A\cdot 2\ell - 2q\ell^2$

$= \left(\frac{199}{27}-2\right)q\ell^2 = \frac{145}{27}ql^2 = 18125\ kgm$



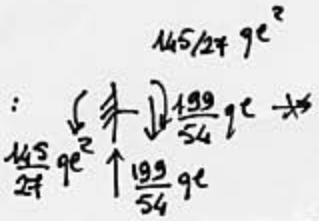
$= 18125\ kgm$

$-\frac{145}{27}ql^2 = -18125$

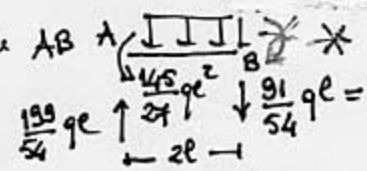


(M) (Kgm)

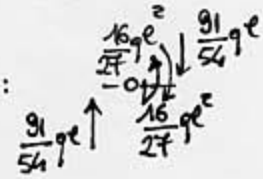
Equilibre de A:

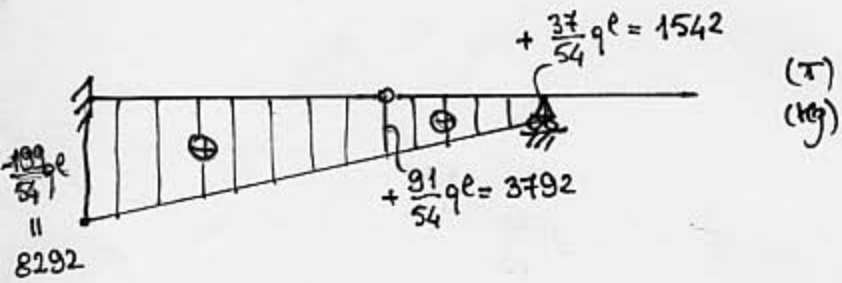


Equilibre de AB



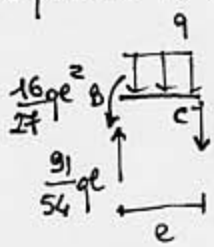
Equilibre en B:





(T) (kg)

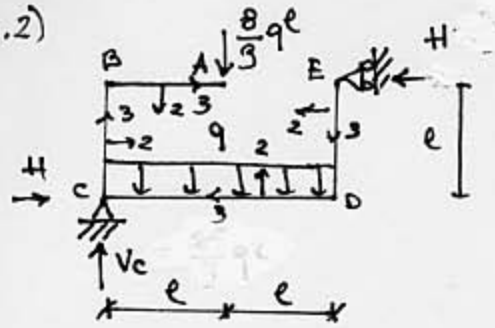
Equilibre de BC:



$\frac{16}{27}ql^2 + \frac{q\ell^2}{2} - \frac{91}{54}ql^2 = -\frac{16}{27}ql^2$

$N = 0$

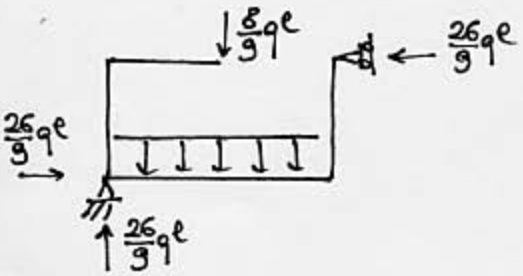
B.2)



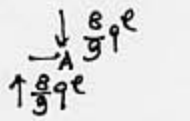
$(\uparrow)\quad V_c = \frac{8}{9}ql + 2ql = \frac{26}{9}ql = 6500\ kg$

$(C\curvearrowright)\quad Hl = \frac{8}{9}ql^2 + 2ql^2 = \frac{26}{9}ql^2$

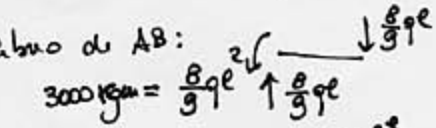
$\hookrightarrow\quad H = \frac{26}{9}ql = 6500\ kg$



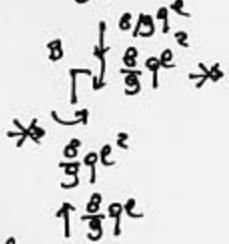
Equilibrio in A:



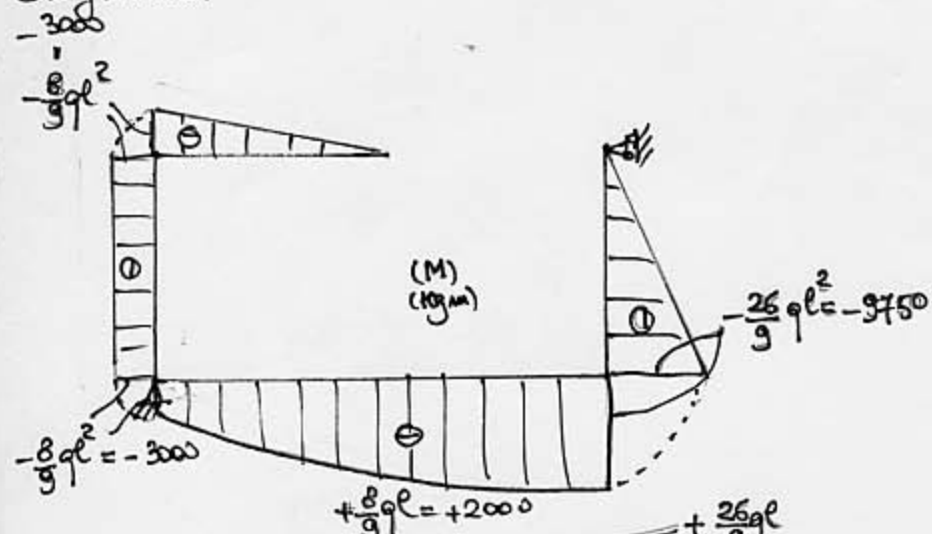
Equilibrio di AB:



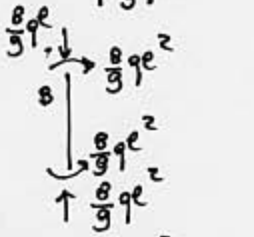
Equilibrio in B:



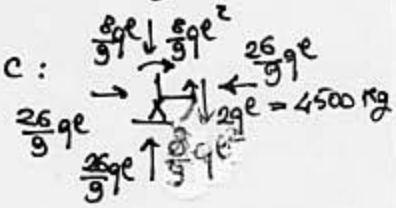
Diagrammi:

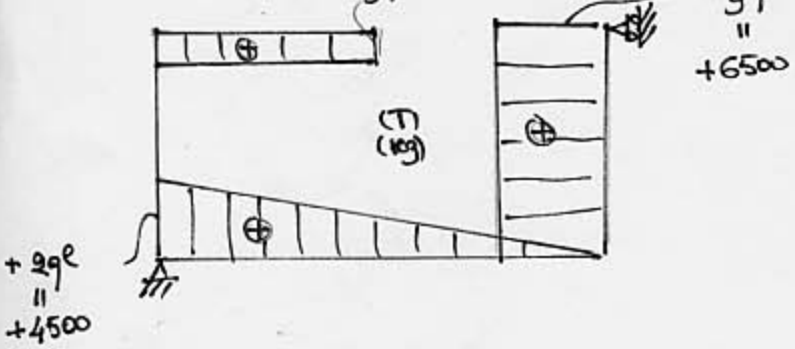


Equilibrio di BC:



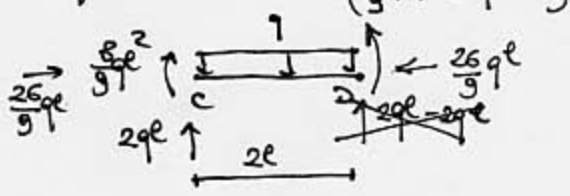
Equilibrio in C:

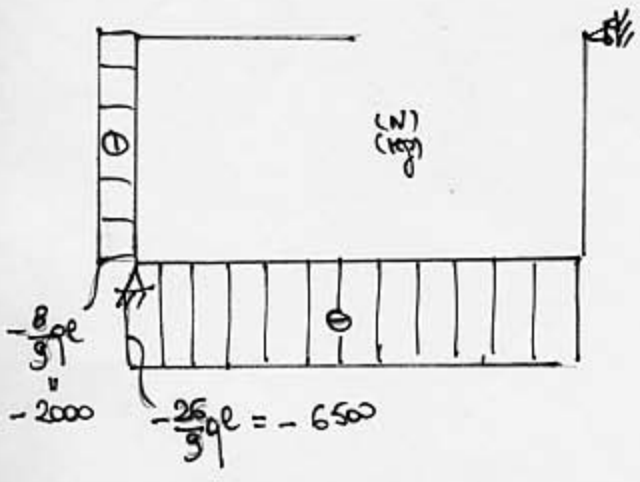




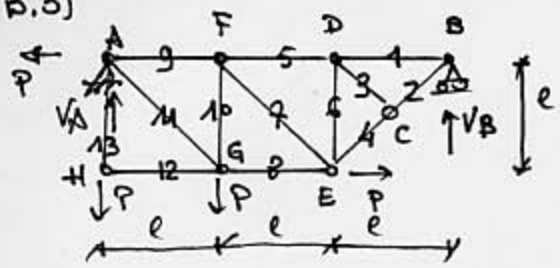
Equilibrio di CD:

$(\frac{8}{9}+4-2)ql^2 = \frac{26}{9}ql^2$





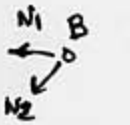
B.3)



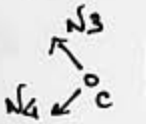
$(\curvearrowleft A)$ $\quad V_B \cdot 3\ell = -P\ell + P\ell = 0$

$V_A = 2P$

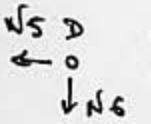
Equilibrio ai nodi:



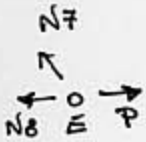
$\begin{cases} N_1 = 0 \\ N_2 = 0 \end{cases}$



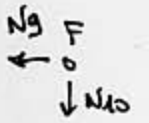
$\begin{cases} N_3 = 0 \\ N_4 = 0 \end{cases}$



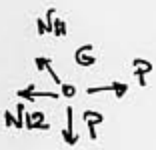
$\begin{cases} N_5 = 0 \\ N_6 = 0 \end{cases}$



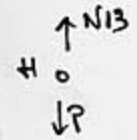
$\begin{cases} N_7 \frac{\sqrt{2}}{2} = 0 \\ N_8 = P \end{cases}$



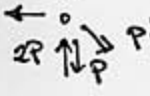
$\begin{cases} N_9 = 0 \\ N_{10} = 0 \end{cases}$



$\begin{cases} N_{11} \frac{\sqrt{2}}{2} = P \rightarrow N_{11} = P\sqrt{2} \\ N_{12} = P - N_{11} \frac{\sqrt{2}}{2} = P - P = 0 \end{cases}$

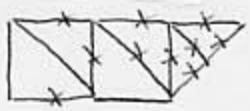


$N_{13} = P$



$\begin{cases} P = P\sqrt{2}\frac{\sqrt{2}}{2} \\ 2P = P + P\sqrt{2}\frac{\sqrt{2}}{2} \end{cases}$

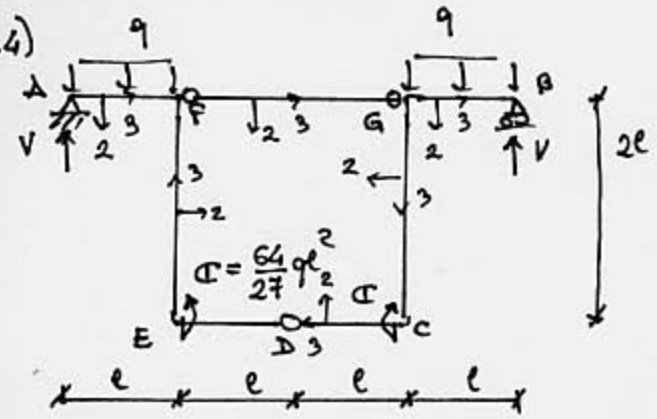
ASTA	N	kg
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	P	2000
9	0	0
10	0	0
11	$P\sqrt{2}$	2828
12	0	0
13	P	2000



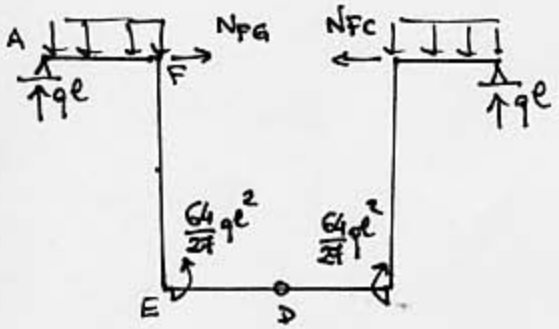
— TIRANTE

✶ SCARICA

B.4)



$\Sigma V = \Sigma q\ell \rightarrow V = q\ell = 1125\ kg$

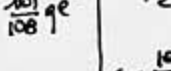


$(D^\circ)_{AFED}$ $N_{FG}\,2\ell = \frac{64}{27}q\ell^2 + q\ell\frac{3}{2}\ell - q\ell\,2\ell$

$= \frac{101}{54}q\ell^2$

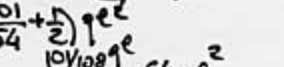
$\hookrightarrow N_{FG} = \frac{101}{108}q\ell = 1052\ kg$

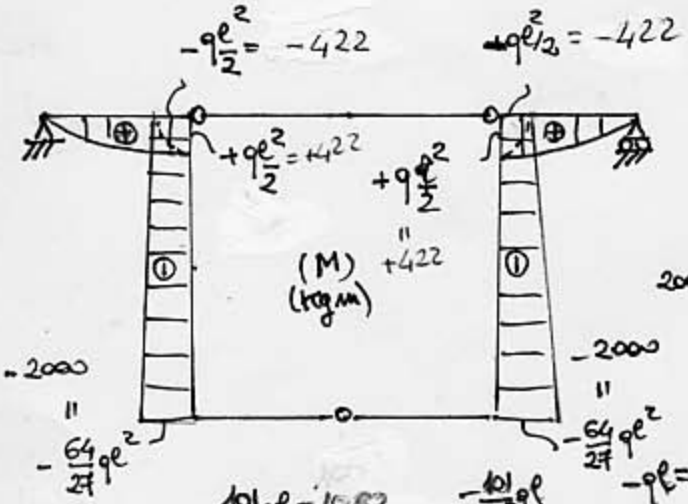
Equilibrio in A: 

Equilibrio di AF: 

$q\ell^2 - q\frac{\ell^2}{2} = q\frac{\ell^2}{2} = 1687\ kgm$

Diagrammi:

Equilibrio di F: 



Equilibrio di FE:

$2000\ kgm = \frac{64}{27}q\ell^2 = \left(\frac{101}{54} + \frac{1}{2}\right)q\ell^2$

Equilibrio in E: