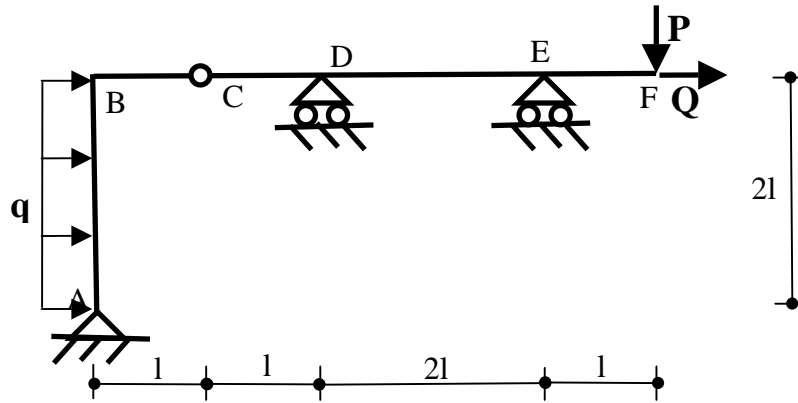
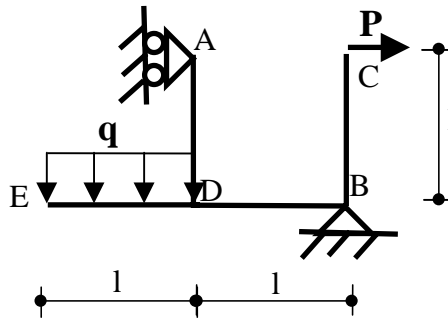


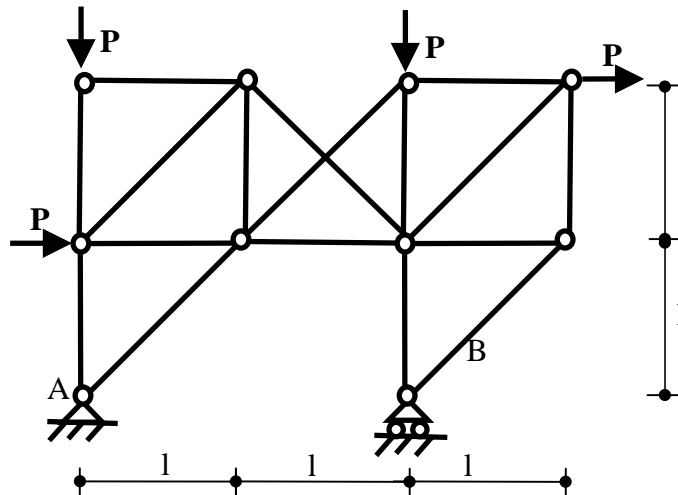
- 1) Disegnare i diagrammi quotati delle azioni interne (N, T, M) per  $l=1\text{m}$ ,  $q=2000\text{ kg/m}$ ,  $P=Q=3/2ql$ .



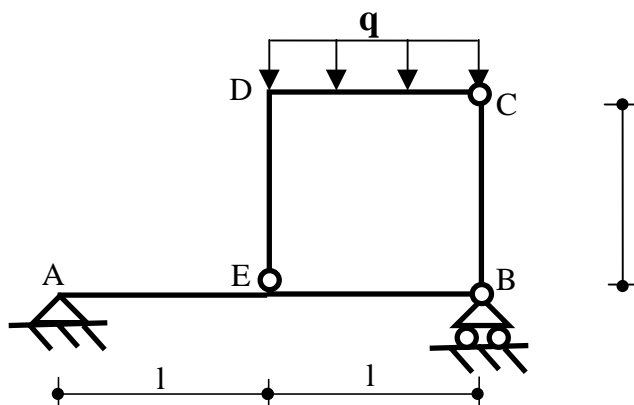
- 2) Disegnare i diagrammi quotati delle azioni interne (N, T, M) per  $l=1\text{ m}$ ,  $q=2000\text{ kg/m}$ ,  $P=3/2ql$ .



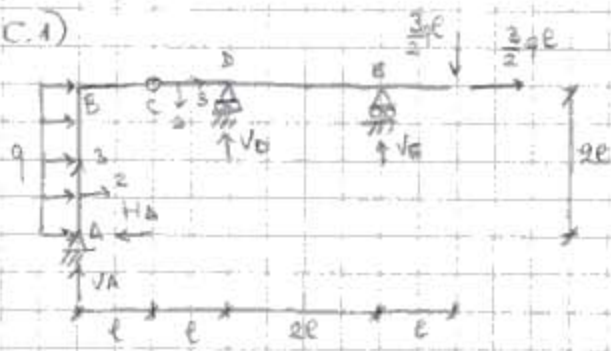
- 3) Calcolare lo stato di sollecitazione per  $l=1\text{m}$ ,  $P=2000\text{ kg}$ .



- 4) Disegnare i diagrammi quotati dell'azione interna (N, T, M) per  $l=1\text{m}$ ,  $q=2000\text{ kg/m}$ .



C.1)



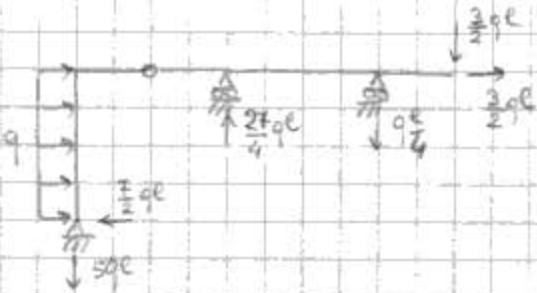
$$\rightarrow H_A = 2qe + \frac{3}{2}qe = \frac{7}{2}qe$$

$$(C)_{ABC} \quad V_A e - 2qe^2 + \frac{7}{2}qe \cdot 2e = 0 \rightarrow V_A = -5qe$$

$$(D) \quad V_E 2e - \frac{3}{2}qe 2e + 2qe^2 - \frac{7}{2}qe 2e + 5qe 2e = 0$$

$$\rightarrow V_E = \frac{qe}{2} \left( \frac{3}{2} - 5 \right) = -\frac{9}{4}qe$$

$$\uparrow V_D = \frac{3}{2}qe + 5qe + \frac{9}{4}qe = \frac{27}{4}qe$$



Equilibrio in A:



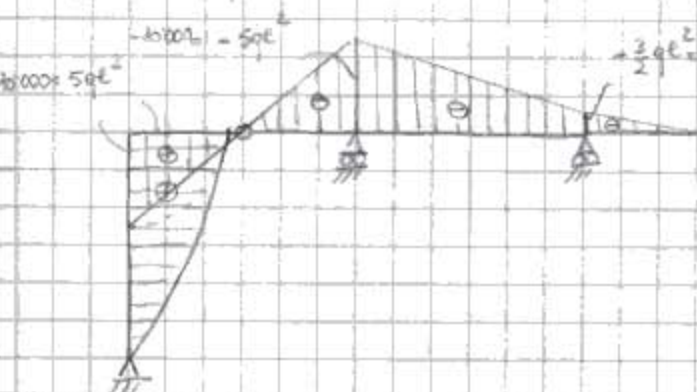
$$\begin{aligned} N_A &= 5qe \\ T_A &= \frac{7}{2}qe \\ M_A &= 0 \end{aligned}$$

Equilibrio di AB:

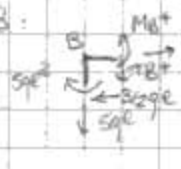


$$\begin{aligned} N_B &= 5qe \\ T_B &= \left( \frac{7}{2} - 2 \right) qe = \frac{3}{2}qe \\ M_B &= \frac{7}{2} qe 2e - 2qe^2 = 5qe^2 \end{aligned}$$

Diagrammi qualitativi di (M, T, N):



Equilibrio di B:



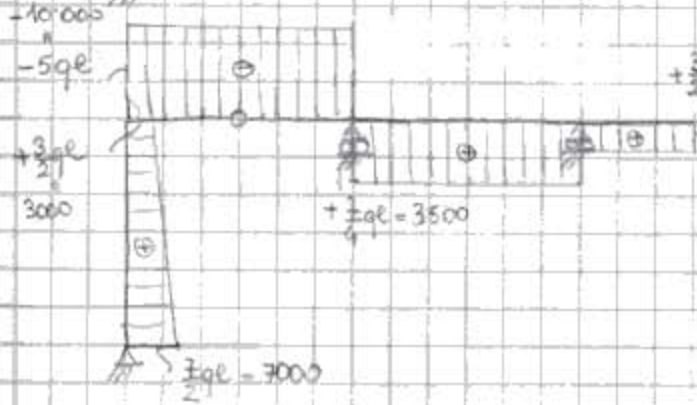
$$\begin{aligned} N_B^+ &= \frac{3}{2} qe \\ T_B^+ &= -\frac{3}{2} qe \\ M_B^+ &= 5qe^2 \end{aligned}$$

(M)

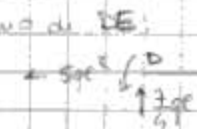
Equilibrio in D:



$$\begin{aligned} T_D^+ &= \frac{7}{2} qe \\ M_D^+ &= -5qe^2 \end{aligned}$$

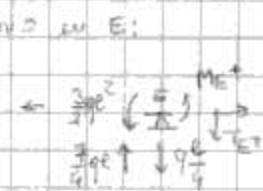


Equilibrio di DE:



$$\begin{aligned} M_E^- &= -5qe^2 + \frac{7}{2} qe^2 \\ &= -\frac{3}{2} qe^2 \end{aligned}$$

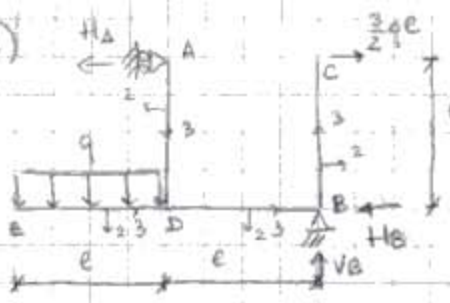
Equilibrio in E:



$$\begin{aligned} T_E^+ &= \frac{5}{4} qe = \frac{3}{4} qe \\ M_E^+ &= -\frac{3}{4} qe^2 \end{aligned}$$

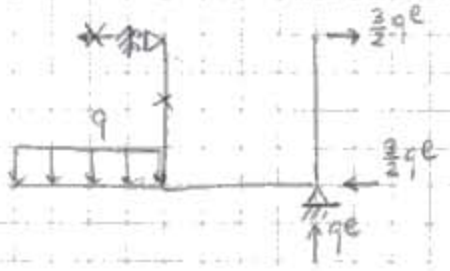


C.2)



Eq. m. cardinali:

(↑)  $V_B = ql$   
 (B↑)  $H_A e + \frac{3}{2} ql e^2 - \frac{3}{2} ql e^2 = 0 \rightarrow H_A = 0$   
 (→)  $H_B = \frac{3}{2} ql$



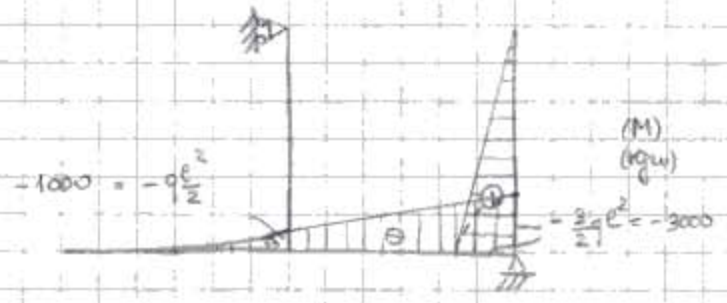
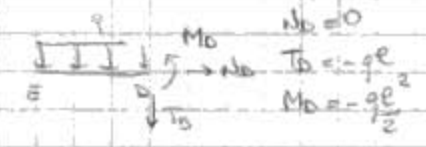
Equilibrio in A:

$M_A = 0$   
 $T_A = 0$   
 $N_A = 0$   
 → tutto AD sciolto

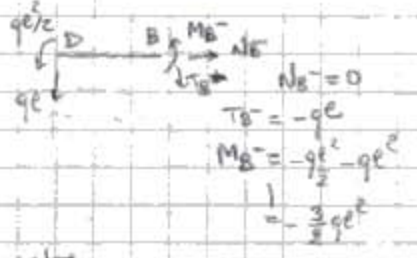
Equilibrio in E: come in A

Diagrammi quotati dell'azione interna:

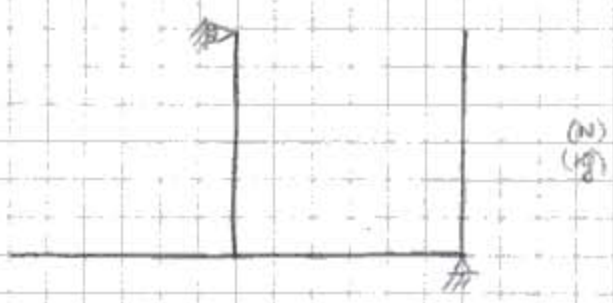
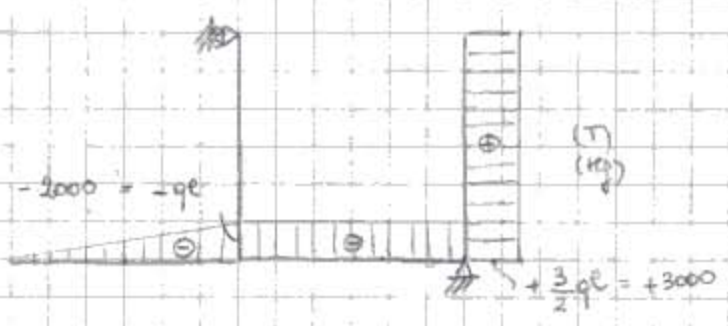
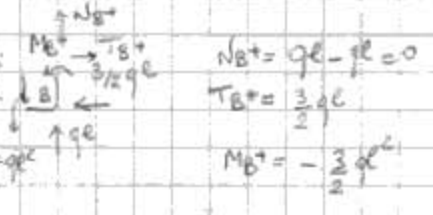
Equilibrio di ED



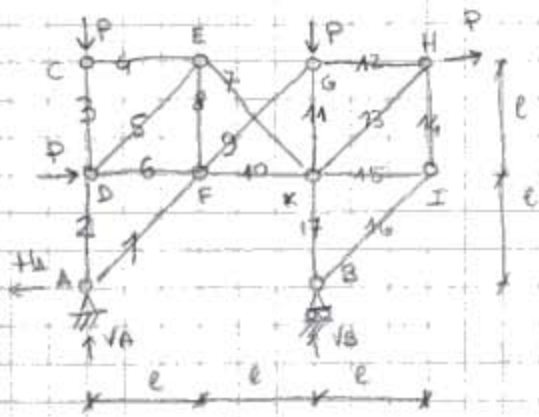
Equilibrio di DB:



Equilibrio in B:



C.3)



$(\leftarrow) H_A = 2P$

$(\uparrow) V_B 2e = P 2e + P e + P 2e \rightarrow V_B = \frac{5P}{2}$

$(\uparrow) V_A = (2 - \frac{5}{2})P = -\frac{P}{2}$

ASTA	N	$K_f$
1	$2P\sqrt{2}$	5656
2	$-\frac{3P}{2}$	-3000
3	$-P$	-2000
4	0	0
5	$-\frac{P\sqrt{2}}{2}$	-1614
6	$-\frac{P}{2}$	-800
7	$-\frac{P\sqrt{2}}{2}$	-1614
8	P	2000
9	$P\sqrt{2}$	2828
10	$P/2$	1000
11	$-2P$	-4000
12	P	2000
13	0	0
14	0	0
15	0	0
16	0	0
17	$-\frac{5P}{2}$	-5000

Metodo dell'equilibrio ai nodi:

$$\begin{cases} N_1 \frac{\sqrt{2}}{2} = 2P \rightarrow N_1 = 2P\sqrt{2} \\ N_2 = \frac{P}{2} - N_1 \frac{\sqrt{2}}{2} = \frac{P}{2} - 2P = -\frac{3P}{2} \end{cases}$$

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

$$\begin{cases} N_5 \frac{\sqrt{2}}{2} + \frac{3P}{2} - P = 0 \rightarrow N_5 \frac{\sqrt{2}}{2} = -\frac{P}{2} \\ N_6 = -P - N_5 \frac{\sqrt{2}}{2} = -P + \frac{P}{2} = -\frac{P}{2} \end{cases}$$

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

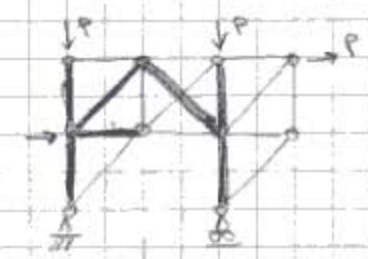
$$\begin{cases} N_9 \frac{\sqrt{2}}{2} = -P + 2P\sqrt{2} \frac{\sqrt{2}}{2} = P \\ N_{10} = -N_9 \frac{\sqrt{2}}{2} - \frac{P}{2} + 2P\sqrt{2} \frac{\sqrt{2}}{2} \\ = -P - \frac{P}{2} + 2P = \frac{P}{2} \end{cases}$$

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

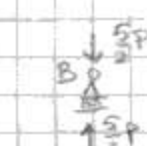
$$\begin{cases} N_{13} = 0 \\ N_{14} = 0 \end{cases}$$

$$\begin{cases} N_{15} = 0 \\ N_{16} = 0 \end{cases}$$

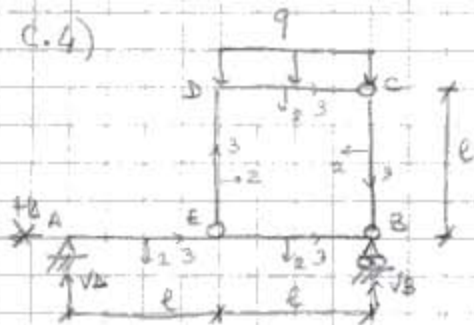
$$\begin{cases} N_{17} = -2P - \frac{P\sqrt{2}}{2} \frac{\sqrt{2}}{2} = -\frac{5P}{2} \end{cases}$$



— TRAVI  
— PUNTI



(C.4)



$(\rightarrow) H_A = 0$

$(\uparrow) V_B 2l = \frac{3}{2} q l^2 \rightarrow V_B = \frac{3}{4} q l$

$(\uparrow) V_A = q l = \frac{3}{4} q l = \frac{9}{4} l$

Equilibrio della scissorina in E.

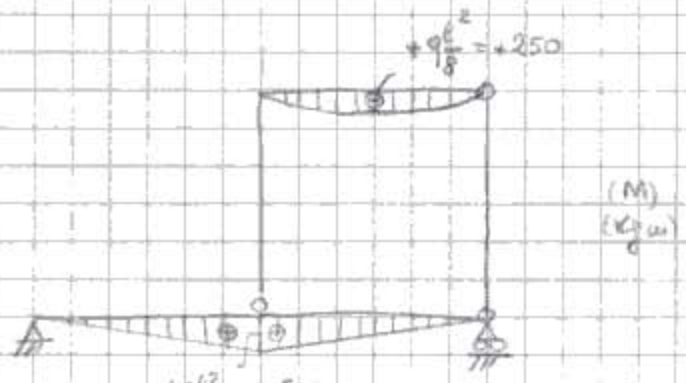
$(\leftarrow) N_{bc} = -\frac{9}{2} q l^2 \rightarrow N_b = -9 q l^2$



Equilibrio in A:  $N_b = 0$   
 $T_A = \frac{9}{4} q l$   
 $M_{A0} = 0$

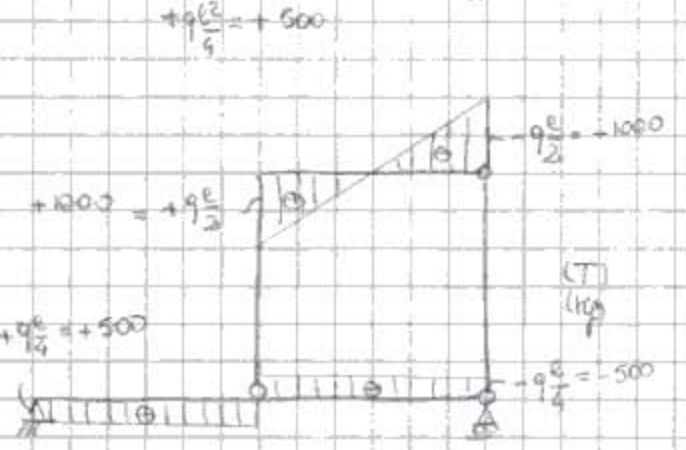
Diagrammi quotazioni (M, T, N):

Equilibrio di AE:  $M_E = \frac{9}{4} q l^2$



Equilibrio in C:  $N_c = 0$   
 $T_c = -9 q l^2$

Equilibrio di CD:  $T_D^+ = q l - \frac{9}{2} q l = -\frac{9}{2} q l$   
 $M_D^+ = \frac{9}{2} q l^2 - \frac{9}{2} q l^2 = 0$



Equilibrio in D:  $M_D = 0$   
 $T_D = 0$   
 $N_D = -\frac{9}{2} q l$

Equilibrio in E:  $N_E^+ = 0$   
 $T_E^+ = \frac{9}{4} q l - \frac{9}{4} q l = -\frac{9}{4} q l$   
 $M_E^+ = \frac{9}{4} q l^2$

