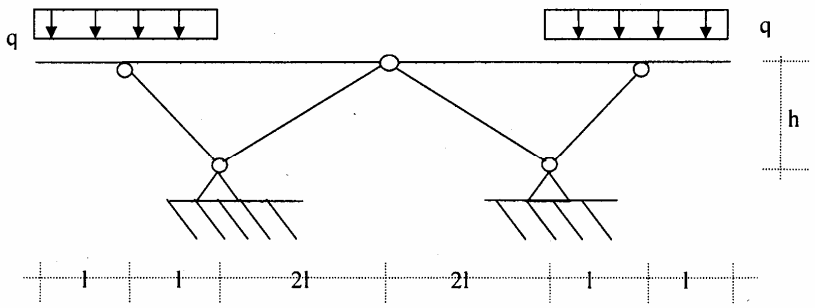
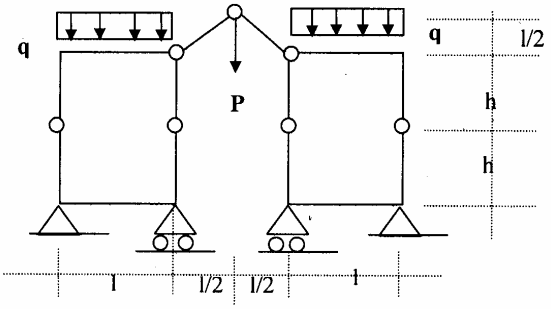
II compito scritto in itinere di Scienza delle costruzioni I AA 2009/2010 10/03/2010 **A**

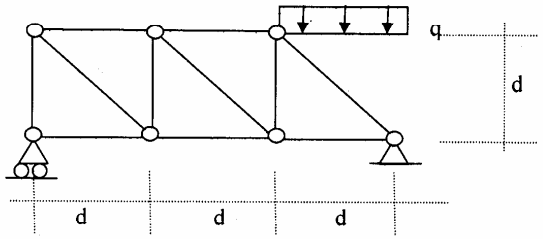
1) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M della struttura simmetrica in figura dove l=3m, h=4m, q=1000Kg/m



2) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M per la struttura simmetrica in figura dove l=3m; h=2m, **P**=2ql, q=800 Kg/m

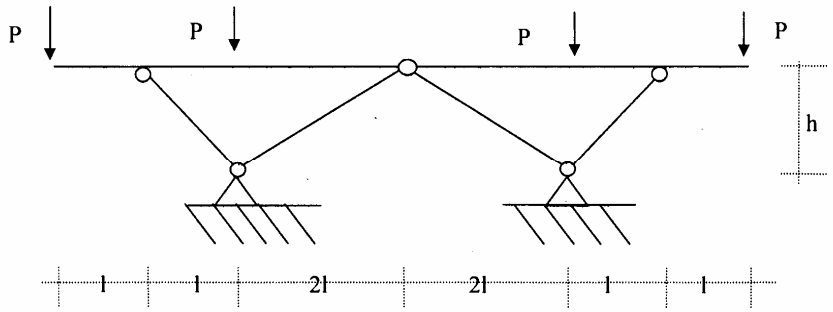


3) Determinare lo stato di sollecitazione primario e secondario della reticolare in figura dove q=100Kg/m, d=1,5 m

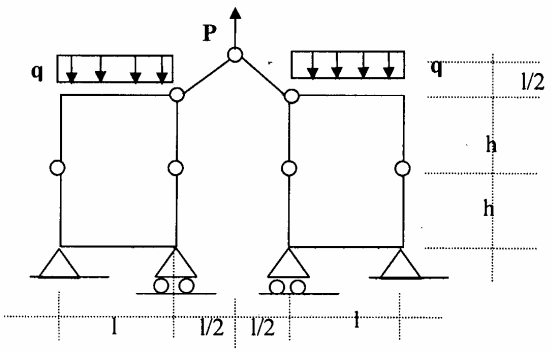


II compito scritto in itinere di Scienza delle costruzioni I AA 2009/2010 10/03/2010 **B**

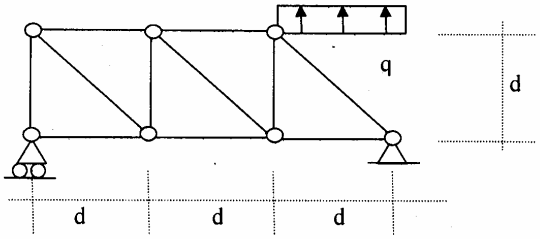
1) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M della struttura simmetrica in figura dove l=3m, h=4m, P=1000Kg.



2) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M per la struttura simmetrica in figura dove l=3m; h=2m, **P**=2ql, q=800 Kg/m

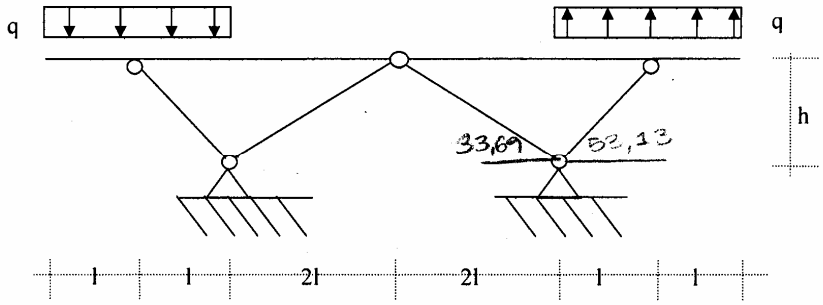


2) Determinare lo stato di sollecitazione primario e secondario della reticolare in figura dove q=100Kg/m, d=1,5 m

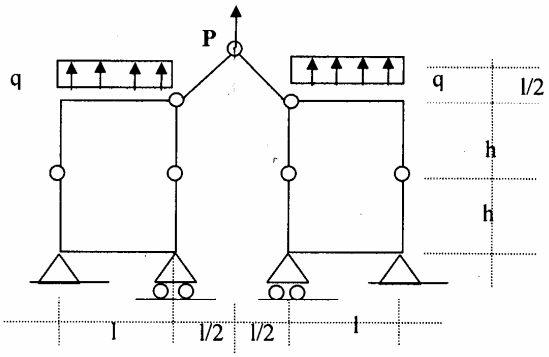


II compito scritto in itinere di Scienza delle costruzioni I AA 2009/2010 10/03/2010 **C**

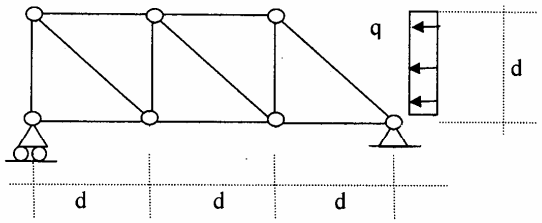
1) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M della struttura antisimmetrica in figura dove l=3m, h=4m, q=1000Kg/m



2) Risolvere e determinare i diagrammi quotati delle azioni interne N,T,M per la struttura simmetrica in figura dove l=3m; h=2m, **P**=2ql, q=800 Kg/m



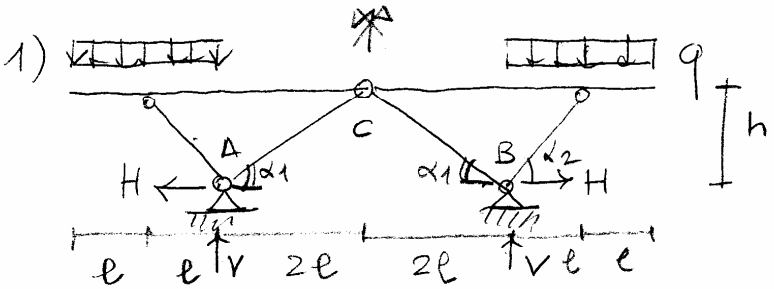
3) Determinare lo stato di sollecitazione primario e secondario della reticolare in figura dove q=100Kg/m, d=1,5 m

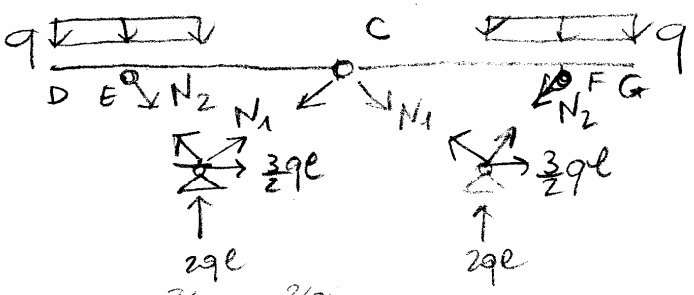


II COMPITO IN ITINERE 10/03/10

(A)

1)





$h = 4m;\ \ell = 3m$

$tg\alpha_2 = \frac{h}{\ell} = \frac{4}{3}$

$tg\alpha_1 = \frac{h}{2\ell} = \frac{2}{3}$

$q = 1000\ kg/m$

$2V = 4q\ell \Rightarrow V = 2q\ell$

↺ pt. dx

$+H\frac{4}{3}\ell - 2q\ell \cdot 3\ell + V2\ell = 0$

$H = \frac{3}{4}(6q\ell - 4q\ell) = \frac{3}{2}q\ell$

↺ tratto DEC

$N_2 \sin\alpha_2 3\ell + 2q\ell\ 3\ell = 0$

$N_2 = -2q\ell / \sin\alpha_2 =$

$= \underline{7500\ kg}$

↑ globale

$+4q\ell - 2N_1 \sin\alpha_1 = 4q\ell$

$N_1 = 0$

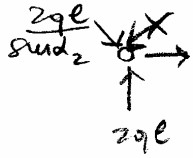
$\sin\alpha_1 = \frac{2/3}{\sqrt{1+4/9}} = \frac{2/3}{\sqrt{13}/3} = 2/\sqrt{13}$

$\cos\alpha_1 = 3/\sqrt{13}$

$\sin\alpha_2 = \frac{4/3}{\sqrt{1+16/9}} = 4/5$

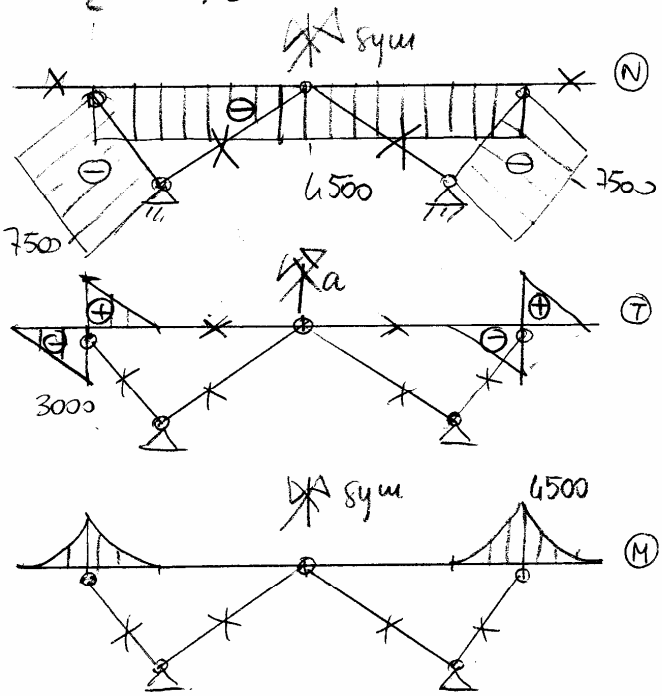
$\cos\alpha_2 = 3/5$

check eq. nodo (A)

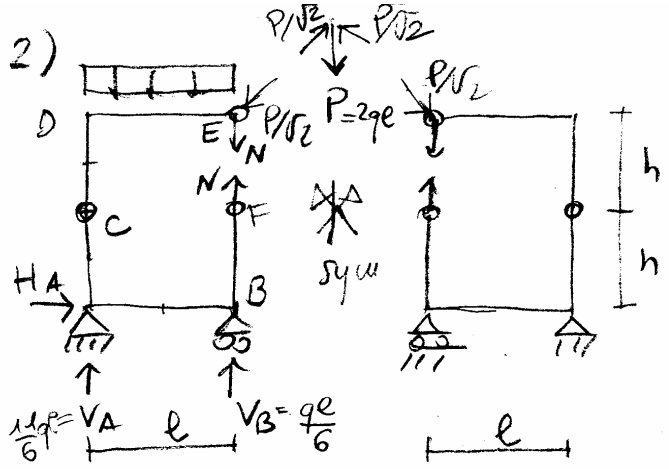


↑ ok

→ ok



2)



$h = 2m$; $\ell = 3m$, $q = 800\ kg/m$

$V_A + V_B = q\ell + \frac{P}{2} = 2q\ell$

B↺ olobale telaio sx

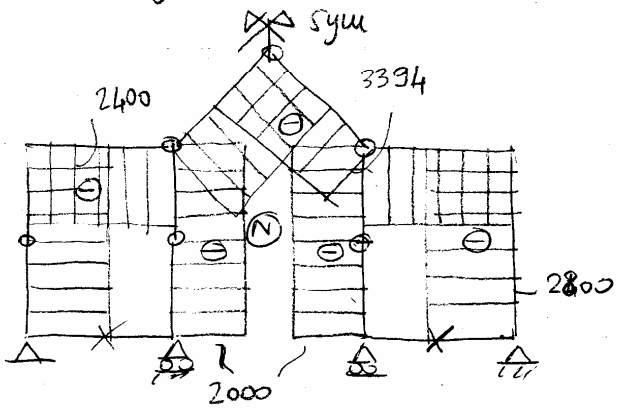
$-V_A \ell + q\frac{\ell^2}{2} + \frac{P}{2}\cdot\frac{2}{3}\ell$

$V_A = \frac{q\ell}{2} + \frac{4}{3}q\ell = \frac{11}{6}q\ell$

$V_B = 2q\ell - \frac{11}{6}q\ell = +\frac{1}{6}q\ell$

$H_A = \frac{P}{2} = 2400\ kg$

Studio il telaio di sx



↺ tratto EDC

$-N\ell - \frac{P}{2}\ell + \frac{P}{2}\cdot\frac{2}{3}\ell - q\frac{\ell^2}{2} = 0$

$N = -q\ell + \frac{2q\ell}{3} - \frac{q\ell}{2} =$

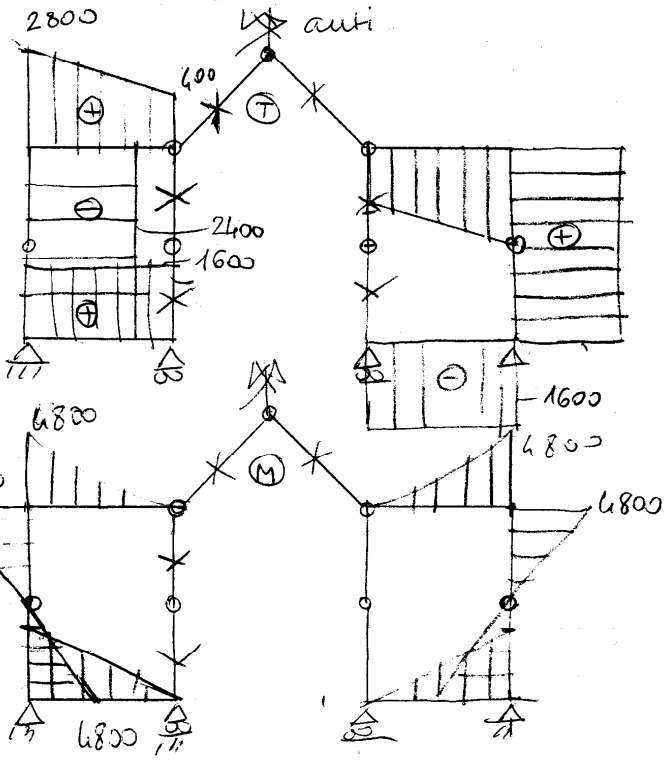
$= -\frac{q\ell}{6}(6 - 4 + 3)$

$= -\frac{5}{6}q\ell = \boxed{-2000\ kg}$

check ↺ F BAC

$+N\ell + q\frac{\ell^2}{6} + q\ell\cdot\frac{2}{3}\ell = 0$

$-\frac{5}{6}q\ell + \frac{q\ell}{6} + \frac{2}{3}q\ell = 0$

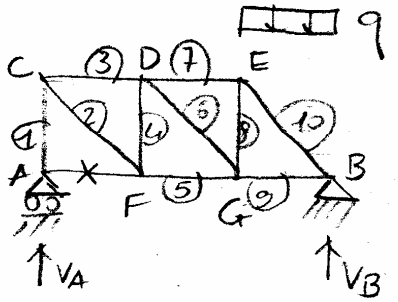


$N = -2000\ kg$

$V_A = 4400\ kg$

$V_B = 400\ kg$

3)



$q = 100\,kg/m$; $d = 1{,}5\,m$

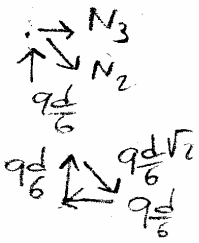
$-V_A 3d + q\frac{d}{2}^2 = 0$

$V_A = q\frac{d}{6}$

$V_B = qd - q\frac{d}{6} = \frac{5}{6}qd$

1	$-q\frac{d}{6}$	-25 kg
2	$q\frac{d}{6}\sqrt{2}$	$35{,}35$ kg
3	$-q\frac{d}{6}$	-25
4	$-qd/6$	-25
5	$qd/6$	25
6	$q\frac{d}{6}\sqrt{2}$	$35{,}35$
7	$-qd/3$	-50
8	$-qd/6$	-25
9	$+qd/3$	50
10	$-\frac{qd\sqrt{2}}{3}$	$-70{,}71$

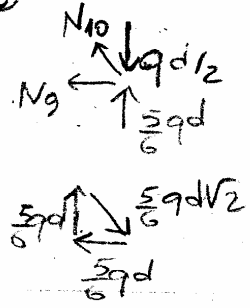
(C)



$N_2 = q\frac{d}{6}\sqrt{2}$

$N_3 = -q\frac{d}{6}$

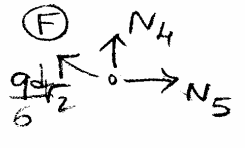
(B)



$N_{10} = -q\frac{d}{3}\sqrt{2}$

$N_9 = q\frac{d}{3}$

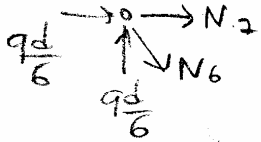
(F)



$N_4 = -q\frac{d}{6}$

$N_5 = q\frac{d}{6}$

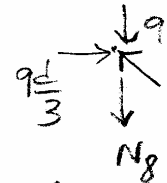
(D)



$N_6 = q\frac{d}{6}\sqrt{2}$

$N_7 = -q\frac{d}{6}\sqrt{2}\cdot\frac{\sqrt{2}}{2} - q\frac{d}{6} = -q\frac{d}{3}$

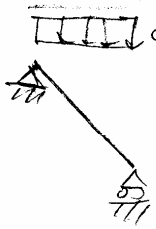
(E)

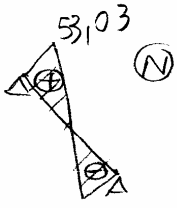


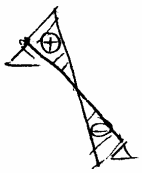
→) ok

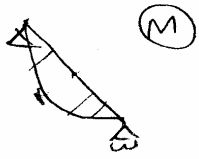
↑) $N_8 = -q\frac{d}{2} + q\frac{d}{3} = -\frac{qd}{6}$

SECONDARIO

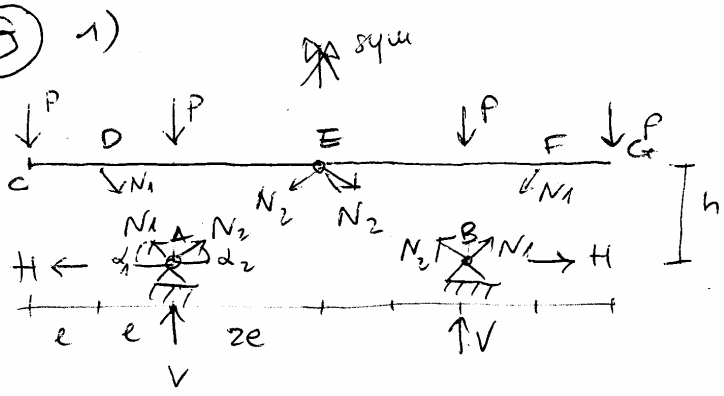


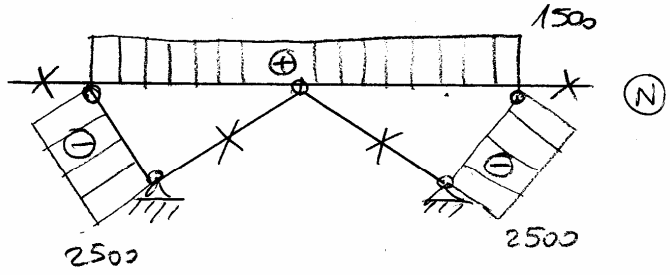


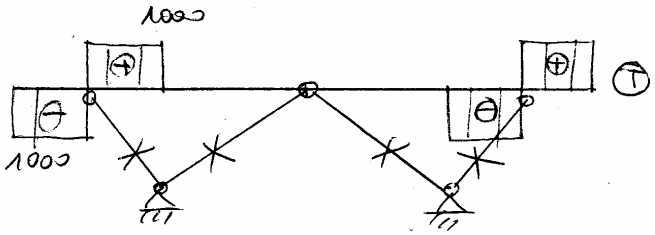


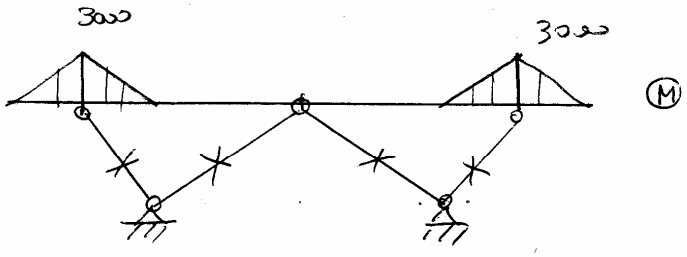


B 1)









$h = h_M = \frac{4}{3}\ell$

$\ell = 3u$

$P = 1000\ kg$

$tg\,\alpha_1 = \frac{4}{3}$

$\sin\alpha_1 = \frac{4/3}{\sqrt{1+\frac{16}{9}}} = 4/5$

$\cos\alpha_1 = 3/5$

$tg\,\alpha_2 = \frac{4}{6} = 2/3$

$\sin\alpha_2 = \frac{2/3}{\sqrt{1+4/9}} = 2/\sqrt{13}$

$\cos\alpha_2 = 3/\sqrt{13}$

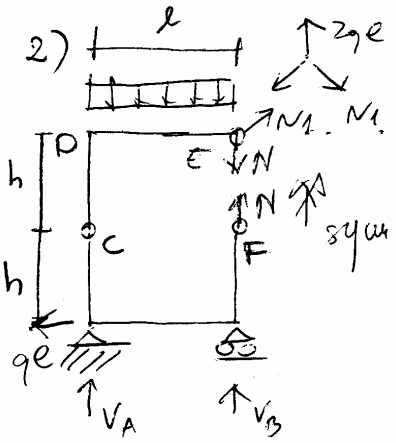
$N_1 = \frac{-2P}{\sin\alpha_1} = -2500\ kg$

↑) globale CDEFG

$-2N_2\sin\alpha_2 - 2N_1\sin\alpha_1 = 2P$

$N_2 = \frac{1}{\sin\alpha_2}(+2P - 2P) = 0$

2)



$h = 2m = \frac{2}{3}\ell \qquad \ell = 3m \qquad q = 800 kg/m$

$\Sigma N_1 = 2q\ell \cdot \sqrt{2}$

$N_1 = q\ell\sqrt{2} =$

A) $V_B \ell + q\ell^{\frac{\ell}{2}} - q\ell^{\frac{\ell}{2}} - q\ell \cdot \frac{4}{3}\ell = 0$

$V_B = -\frac{\ell}{2} + \frac{4}{3}q\ell = +\frac{5}{6}q\ell = 2000 kg$

$V_A = -\frac{5}{6}q\ell = -2000 kg$

C) tratto FBAC

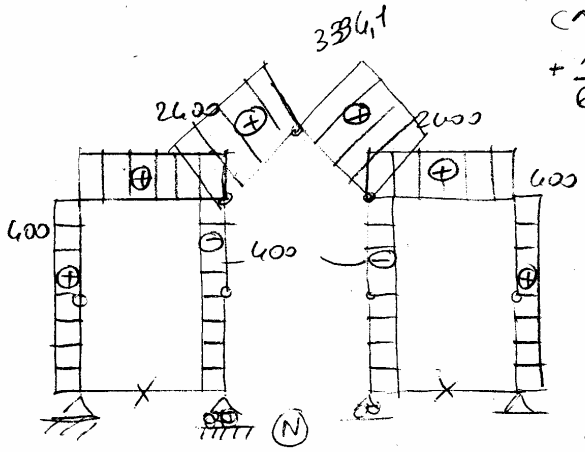
$N\ell + V_B\ell = q\ell \cdot \frac{2}{3}\ell$

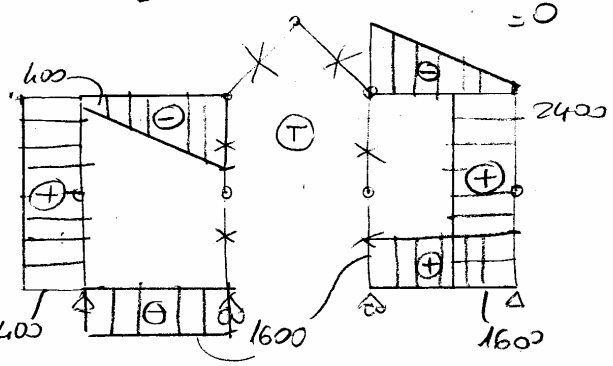
$N = \frac{2}{3}q\ell - \frac{5}{6}q\ell = -\frac{q\ell}{6} = -400$

check

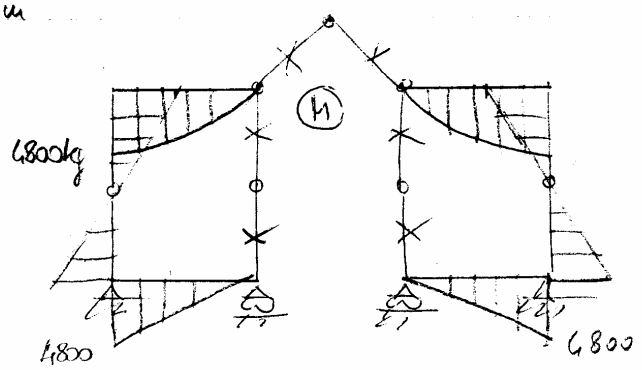
C tratto EDC

$+\frac{1}{6}q\ell^2 - q\frac{\ell^2}{2} + q\ell^2 - q\ell \cdot \frac{2}{3}\ell = \frac{q\ell}{6}(1-3+6-4) = 0$

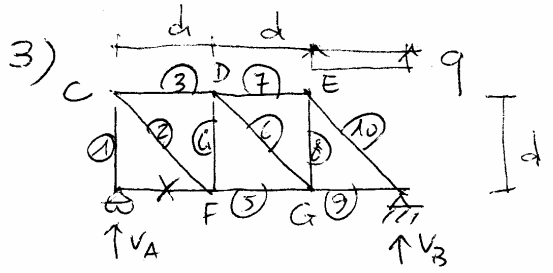




$M_{DE} = -\frac{q\ell^2}{2} + q\ell^2 + \frac{q\ell^2}{6} = \frac{2}{3}q\ell^2 = 6800 kg\,m$



3)



$q = 100 kg/m$

$d = 1,5 m$

A) $V_B 3d + qd\frac{5}{2}d = 0$

$V_B = -\frac{5}{6}qd = -125 kg$

$V_A = \frac{5}{6}qd - qd = -q\frac{d}{6}$

$= -25 kg$

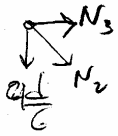
B) $+\frac{5}{6}qd \cdot 3d = qd^2$ ok

1	25	7	50
2	-35,35	8	25
3	25	9	-50
4	25	10	70,71
5	-25		
6	-35,35		

A

$N_1 = q\frac{d}{6} = 25$

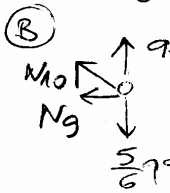
C



$N_2 = -q\frac{d}{6}\sqrt{2}$

$N_3 = q\frac{d}{6}$

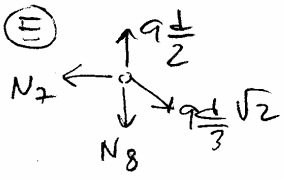
B



$N_{10} = q\frac{d}{3}\sqrt{2}$

$N_9 = -q\frac{d}{3}$

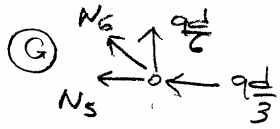
E



$N_7 = q\frac{d}{3}$

$N_8 = q\frac{d}{2} - q\frac{d}{3} = q\frac{d}{6}$

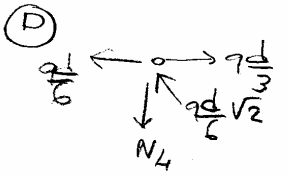
G



$N_6 = -q\frac{d}{6}\sqrt{2}$

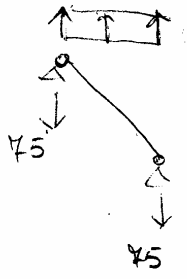
$N_5 = q\frac{d}{6} - q\frac{d}{3} = -q\frac{d}{6}$

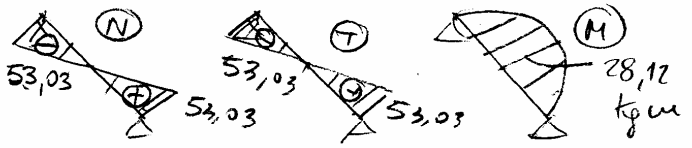
D

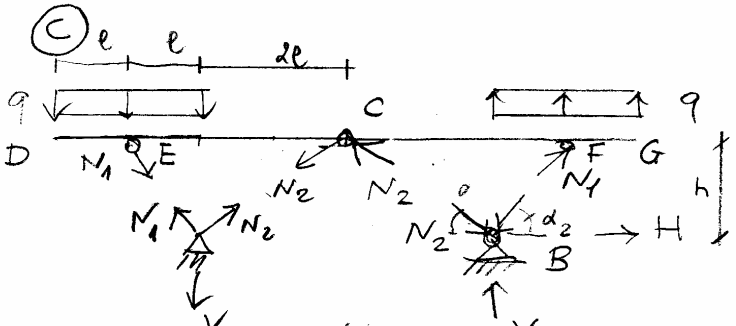


$N_4 = q\frac{d}{6}$

SECONDARIO







$l = 3m$, $h = 4/3\,l$

$q = 1000\ kg/m$

$H = 0$

C) ausiliario

$N_1 \sin\alpha_2 \cdot 3l + 2q \cdot 3l = 0$

$N_1 = -\frac{2ql}{\sin\alpha_2} = -7500\ kg$

→) globale DECFG

$2N_1 \cos\alpha_2 = 2N_2 \cos\alpha_1$

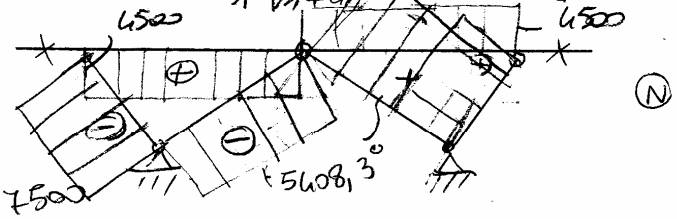
$N_2 = N_1 \frac{\cos\alpha_2}{\cos\alpha_1} = -5608{,}3\ kg$

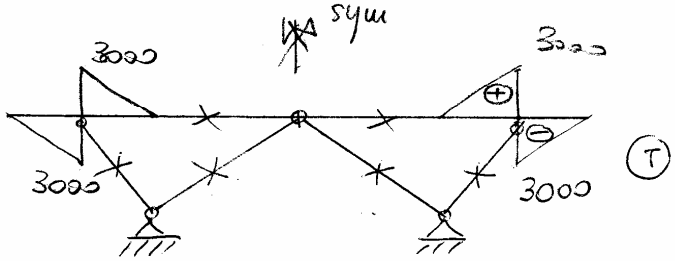
$V \cdot 4l + 2q \cdot 6l = 0$

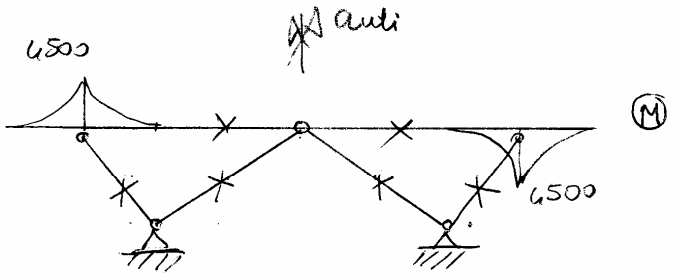
$V = -3ql = -9000\ kg$

$\operatorname{tg}\alpha_2 = 4/3$; $\sin\alpha_2 = \frac{4/3}{\sqrt{1+4/9}} = 4/5$; $\cos\alpha_2 = 3/5$

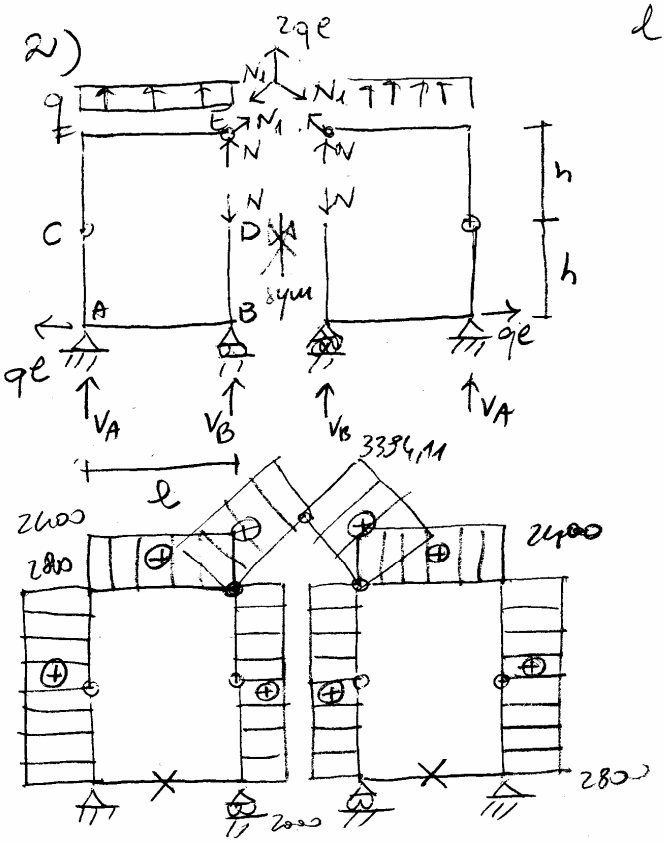
$\operatorname{tg}\alpha_1 = 2/3$; $\sin\alpha_1 = \frac{2/3}{\sqrt{1+4/9}} = 2/\sqrt{13}$; $\cos\alpha_1 = 3/\sqrt{13}$

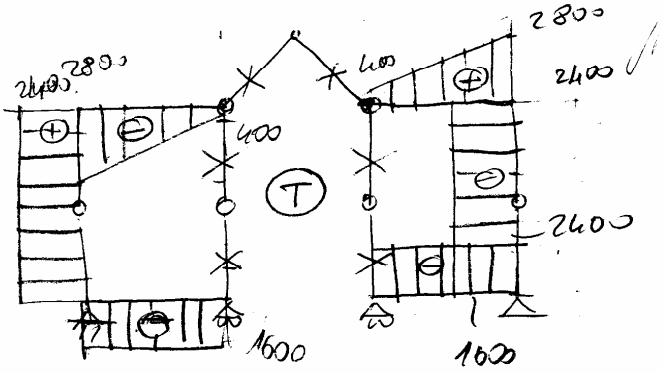


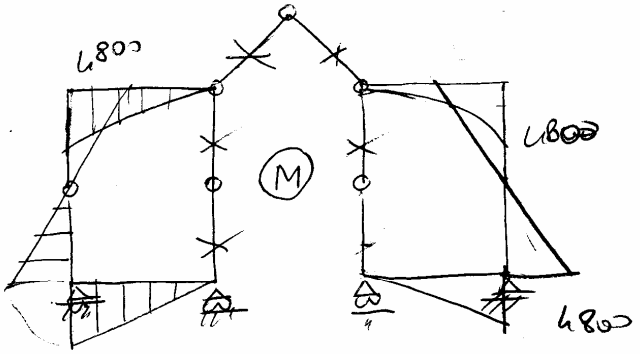




2)







$\ell = 3m, h = 2, q = 800 kg/m$

$2q\ell$

$\frac{2q\ell}{\sqrt{2}} = N_1 = 3394,11 kg$

$q = 800 kg/m$

$\ell = 3m$

$h = 2m = \frac{2}{3}\ell$

↺ globale tutto Sx

$V_B \ell + q\frac{\ell^2}{2} + \frac{2q\ell}{\sqrt{2}} \cdot \frac{\sqrt{2}}{2} \ell - q\ell \cdot \frac{4}{3}\ell = 0$

$V_B = -\frac{3}{2}q\ell + \frac{4}{3}q\ell - \frac{q\ell}{6} = -1400 kg$

$V_A = -q\ell - q\ell + q\frac{\ell}{6} = -\frac{11}{6}q\ell$

$= -4400 kg$

↺ tratto DBAC

$-N\ell + V_B\ell - q\ell \cdot \frac{2}{3}\ell = 0$

$N = -q\frac{\ell}{6} - \frac{2}{3}q\ell = -\frac{5}{6}q\ell$

$= -2000 kg$

check

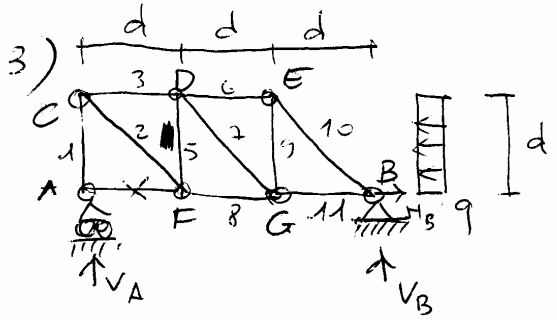
↺ tratto EFC

$-\frac{5}{6}q\ell^2 + q\ell^2 - q\ell \cdot \frac{2}{3}\ell + q\frac{\ell^2}{2} = 0$

$M_{FE} = +q\frac{\ell^2}{2} + q\ell^2 - \frac{5}{6}q\ell^2 = \frac{2}{3}q\ell^2$

$= 4800 kgm$

3)



$d = 1,5\,m$

$q = 100\,kg/m$

$H_B = qd$

$A\circlearrowleft \quad V_B\,3d + q\frac{d^2}{2} = 0$

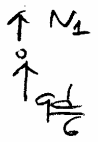
$V_B = -q\frac{d}{6} = -25\,kg$

$V_A = q\frac{d}{6} = 25\,kg$

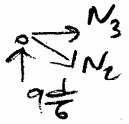
1 −25 kg	8 25
2 +35,35	9 −25
3 −25	10 35,35
4 /	11 50
5 −25	
6 −50	
7 35,35	

(A)

$N_1 = -q\frac{d}{6}$



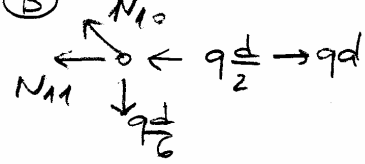
(C)



$N_2 = q\frac{d}{6}\sqrt{2} = 35,35\,kg$

$N_3 = -q\frac{d}{6} = -25\,kg$

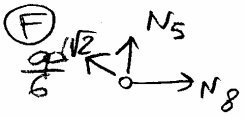
(B)



$N_{10} = q\frac{d}{6}\sqrt{2}$

$N_{11} = -q\frac{d}{6} + \frac{1}{2}qd = +\frac{1}{3}qd$

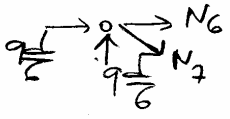
(F)



$N_5 = -q\frac{d}{6}$

$N_8 = q\frac{d}{6}$

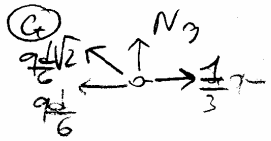
(D)



$N_7 = +q\frac{d}{6}\sqrt{2}$

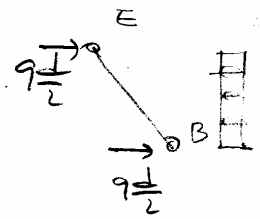
$N_6 = -q\frac{d}{6} - q\frac{d}{6} = -q\frac{d}{3}$

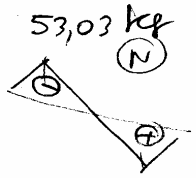
(G)

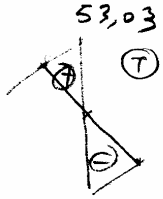


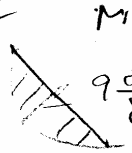
$N_9 = -q\frac{d}{6}$

SECONDARIO









$q\frac{d^2}{8} = 28,12\,kgm$