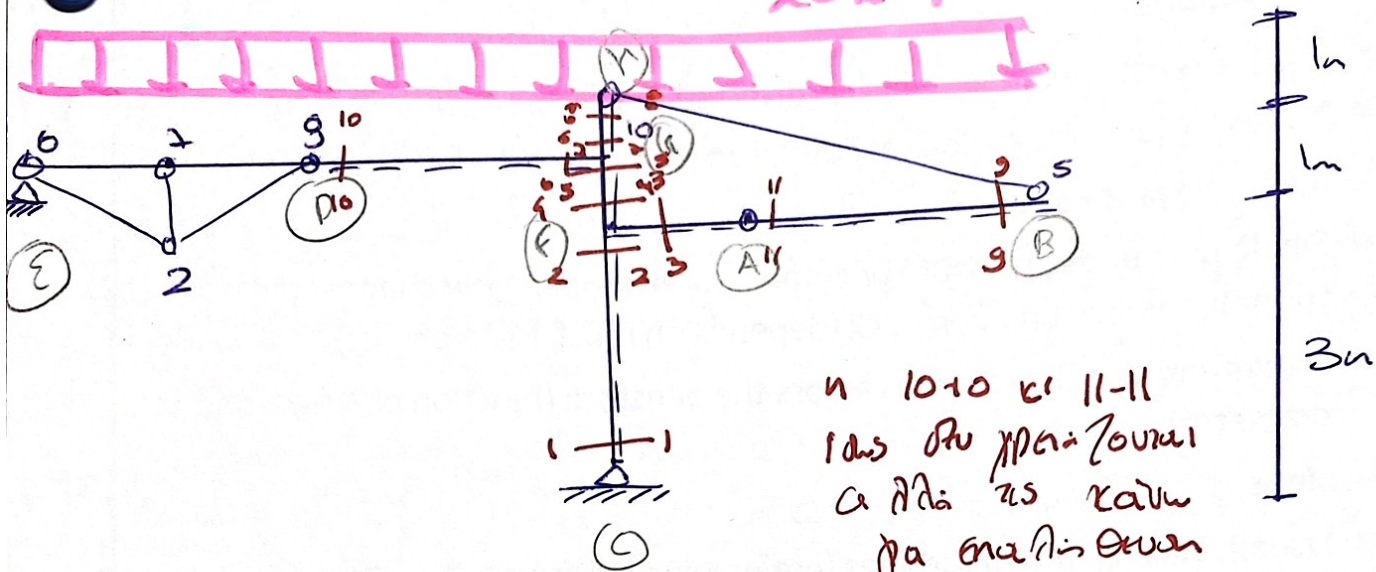
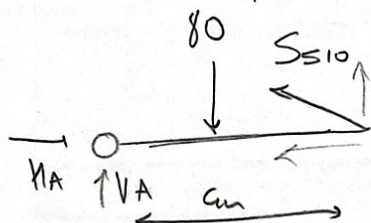
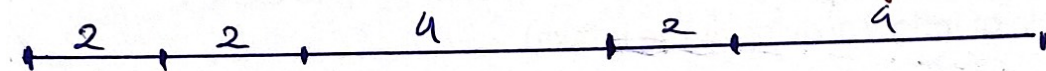


24/25 Επανάληψη

20 kN/m



η 10-10 κι 11-11
 1ος στρ χρειάζονται
 α βλδ κς καθω
 πα αναλιν θεωρα



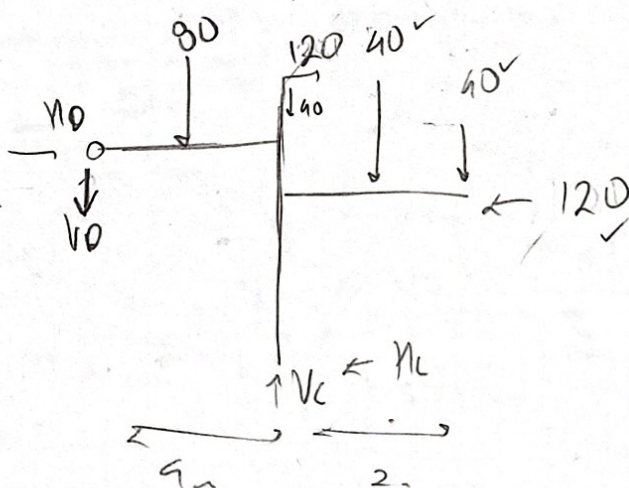
$$\sum F_x = 0 \Rightarrow H_A = 0.949 SS_{10}$$

$$\sum F_y = 0 \Rightarrow V_A + 0.316 SS_{10} = 80$$

$$\sum M_B = 0 \Rightarrow 4V_A = 2 \times 80 \Rightarrow V_A = 40 \text{ kN}$$

$$\text{Απο } SS_{10} = \frac{40}{0.316} = 126.58 \text{ kN}$$

$$H_A = 120 \text{ kN}$$



$$\sum F_x = 0 \Rightarrow H_C = H_0$$

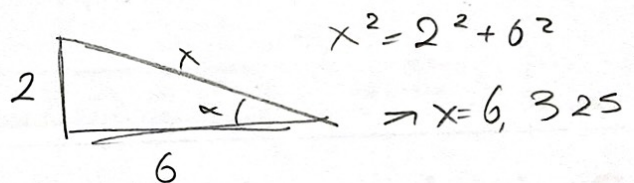
$$\sum F_y = 0 \Rightarrow V_C = 1200 + V_0$$

$$\sum M_C = 0 \Rightarrow -(40 \times 2) - (140 \times 1) + (120 \times 3) - (120 \times 5) + (80 \times 2) + 4V_D - 4H_D = 0$$

$$\Rightarrow -120 - 240 + 160 + 4V_D - 4H_D = 0$$

$$\Rightarrow -4V_D + 4H_D = -200$$

$$\Rightarrow V_D + H_D = -50$$

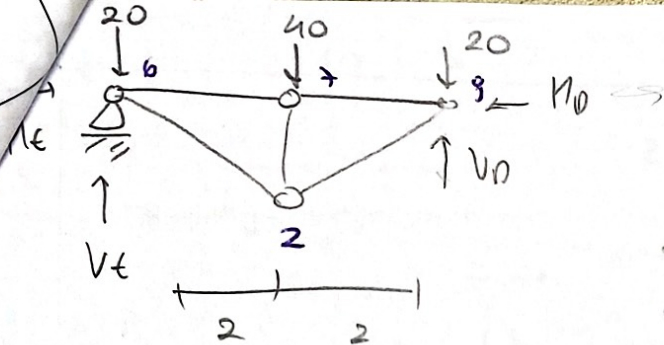


$$x^2 = 2^2 + 6^2$$

$$\Rightarrow x = 6.325$$

$$\cos \alpha = \frac{6}{6.325} = 0.949$$

$$\sin \alpha = \frac{2}{6.325} = 0.316$$



$$\frac{qL}{2} = \frac{20 \times 2}{2} = 20 \text{ kN}$$

$$\sum F_x = 0 \Rightarrow H_D = H_A$$

$$\sum F_y = 0 \Rightarrow 80 = V_A + V_D$$

$$\sum M_D = 0 \Rightarrow 4V_A = (4 \times 20) + (2 \times 40)$$

$$\Rightarrow 4V_A = 80 + 80$$

$$\Rightarrow V_A = 40 \text{ kN} = V_D$$

Apó $H_D = -50 + 40 = -10 \text{ kN} = H_C = H_A$

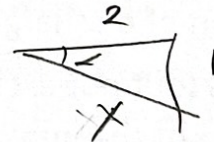
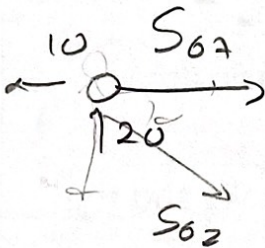
$$V_C = 200 + 40 = 240 \text{ kN}$$

$$L_{\text{aire}} = 2 + 2 + 4 + 2 + 4 = 14$$

$$P = 14 \times 20 = 280 \text{ kN}$$

$$V_C + V_A = 40 + 240 = 280 \text{ kN} \quad \underline{\underline{\text{OK}}}$$

#6



$$X^2 = 2^2 + 1^2 = 5 \Rightarrow X = 2,236$$

$$\sin \theta = \frac{1}{2,236} = 0,447$$

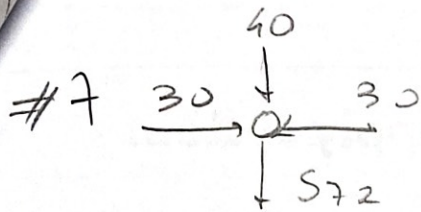
$$\cos \theta = \frac{2}{2,236} = 0,894$$

$$\sum F_y = 0 \Rightarrow S_{62} = \frac{20}{0,447} = 44,74 \text{ kN}$$

$$\begin{aligned} \sum F_x = 0 \Rightarrow S_{67} + S_{62} \times 0,894 &= 10 \\ &= S_{67} - 10 - 40 = -30 \text{ kN} \end{aligned}$$

#8 Appropies

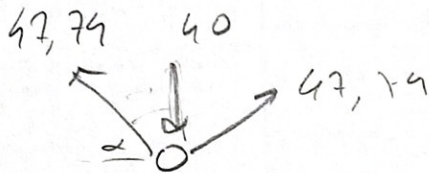
$$S_{87} = -30 \text{ kN} \text{ et } S_{82} = 44,74 \text{ kN}$$



$$\sum F_x = 0 \quad \underline{\underline{OK}}$$

$$\sum F_y = 0 \Rightarrow S72 = -40 \text{ kN}$$

#2 ya trapezoidal



$$\sum F_x = 0 \Rightarrow 47.74 \times 0.809$$

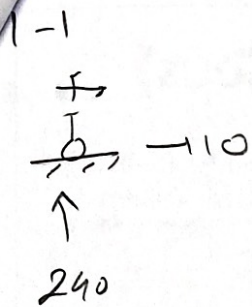
$$= 47.74 \times 0.399$$

$$\Rightarrow 0 = 0 \quad \underline{\underline{OK}}$$

$$\sum F_y = 0 \Rightarrow 40 = (47.74 \times 0.447) \times 2 =$$

$$40 = 40 \quad \underline{\underline{OK}}$$

Medios	Eje en nudos	Barra
6-7		30
7-8		30
6-2	47.74	
8-2	47.74	
7-2		40
5-10	126.58	

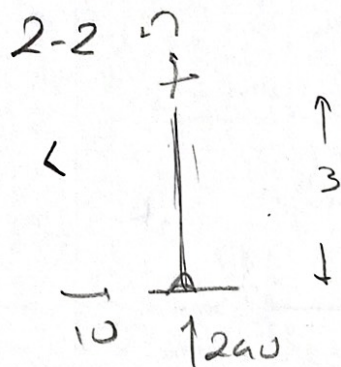


$$Q_C = -10 \text{ kN}$$

$$N_C = -240 \text{ kN}$$

$$M_C = 0$$

✓

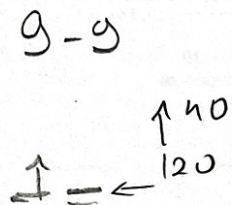


$$N_F^I = -240 \text{ kN}$$

$$Q_F^I = -10 \text{ kN}$$

$$M_F^I = -3 \times 10 = -30 \text{ kNm}$$

✓

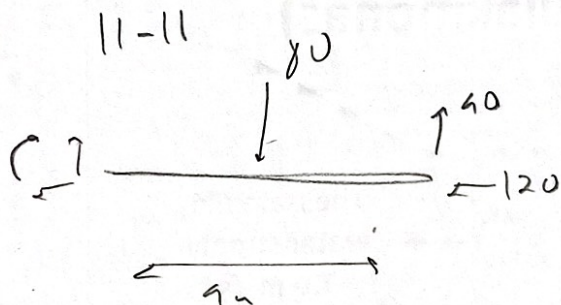


$$N_B = -120 \text{ kN}$$

$$Q_B = -40 \text{ kN}$$

$$M_B = 0$$

✓

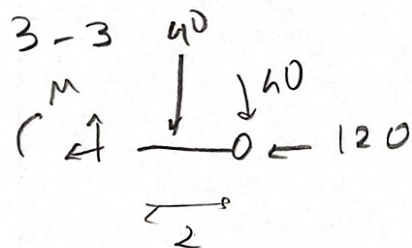


$$N_A = -120 \text{ kN}$$

$$Q_A = +40 \text{ kN}$$

$$M_A = (40 \times 4) - (80 \times 2) = 160 - 160 = 0 \text{ kNm}$$

✓

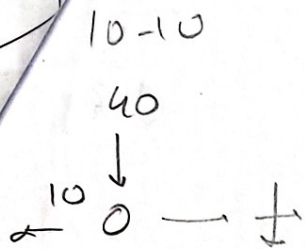


$$Q_F^S = +90 \text{ kN}$$

$$N_F^S = -120 \text{ kN}$$

$$M_F^S = -(40 \times 1) - (40 \times 2) = -120 \text{ kNm}$$

✓

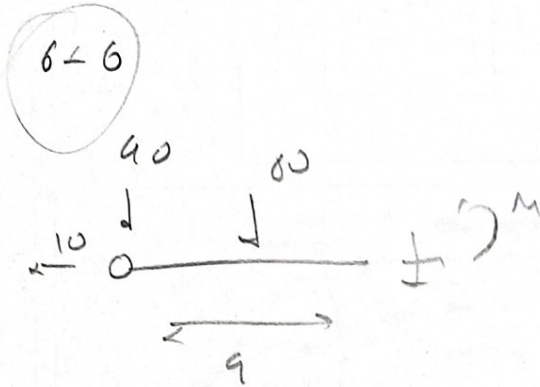


$$Q_D = -40 \text{ kN}$$

$$N_D = +10 \text{ kN}$$

$$M_D = 0$$

✓



$$N_{6-6} = +10 \text{ kN}$$

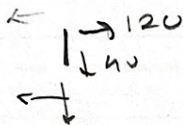
$$Q_{6-6} = -120 \text{ kN}$$

$$M_{6-6} = -(40 \times 9) - (10 \times 2)$$

$$= -320 \text{ kNm}$$

✓

8-8

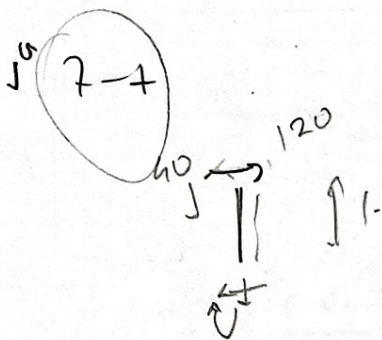


$$N_8 = -40 \text{ kN}$$

$$Q_8 = +120 \text{ kN}$$

$$M_8 = 0$$

✓

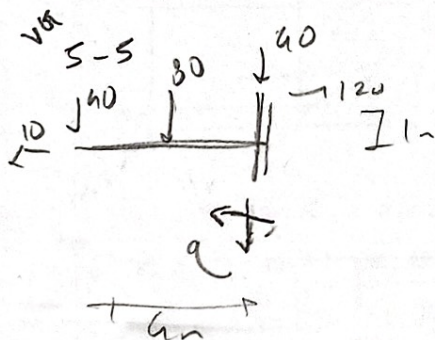


$$N_{7-7} = -40 \text{ kN}$$

$$Q_{7-7} = +120 \text{ kN}$$

$$M_{7-7} = -120 \text{ kNm}$$

✓



$$N_{5-5} = -160 \text{ kN}$$

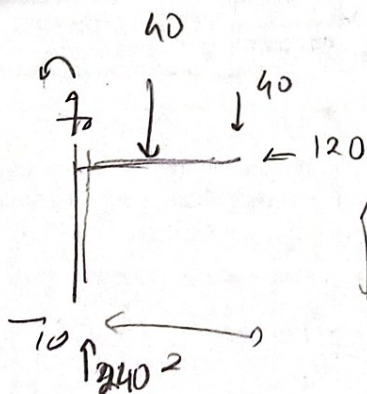
$$Q_{5-5} = +110 \text{ kN}$$

$$M_{5-5} = (120 \times 1) - (30 \times 2) - (40 \times 4)$$

$$\Rightarrow M_{5-5} = +200 \text{ kNm}$$

+

4-4

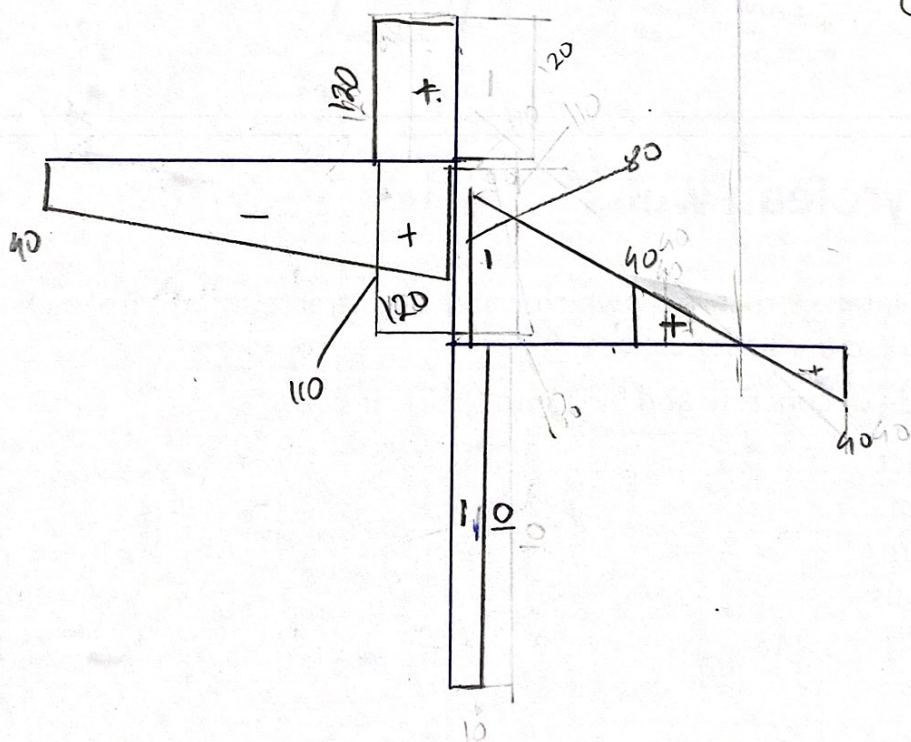
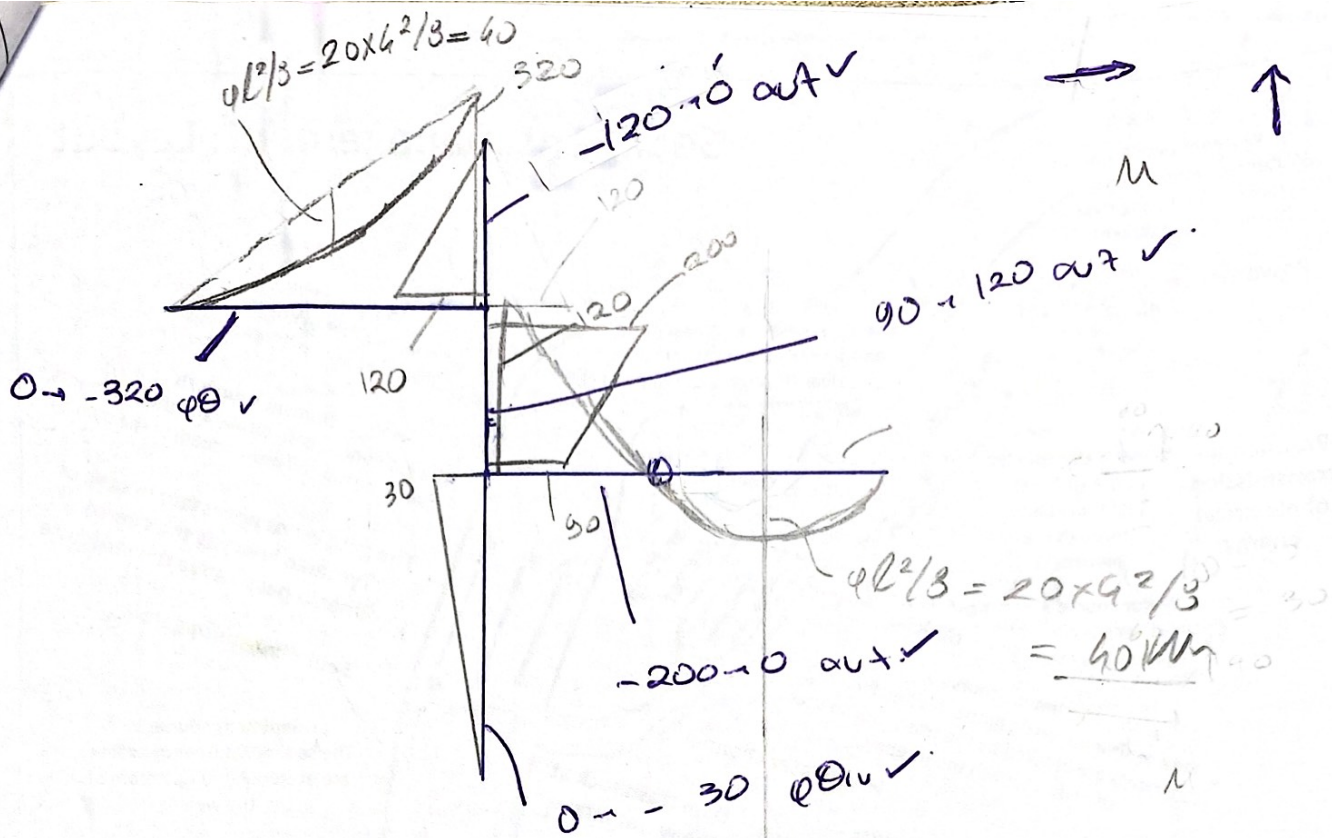


$$N_{4-4} = -160 \text{ kN}$$

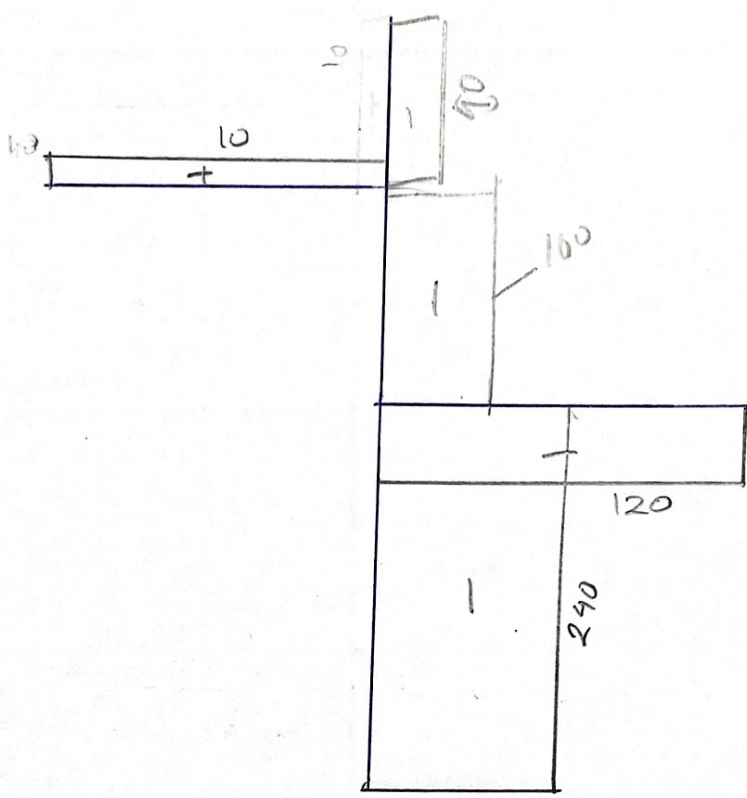
$$Q_{4-4} = +110 \text{ kN}$$

$$M_{4-4} = (40 \times 1) - (40 \times 2) + (10 \times 3)$$

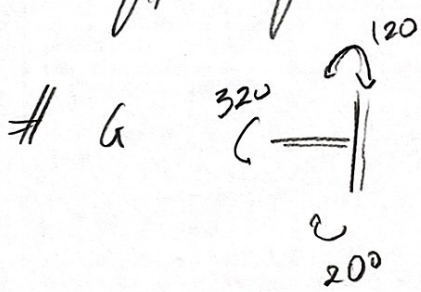
$$\Rightarrow M_{4-4} = 90 \text{ kNm}$$



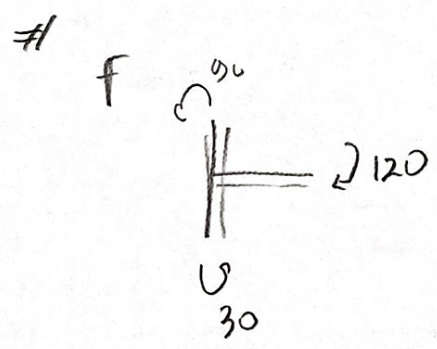
N



Ελέγξω για ισορροπία ροπών (moment).

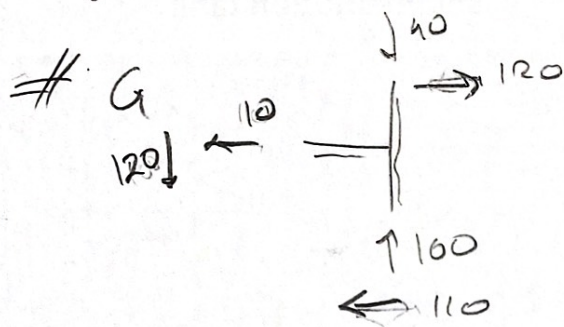


$$120 + 200 = 320 \text{ OK}$$



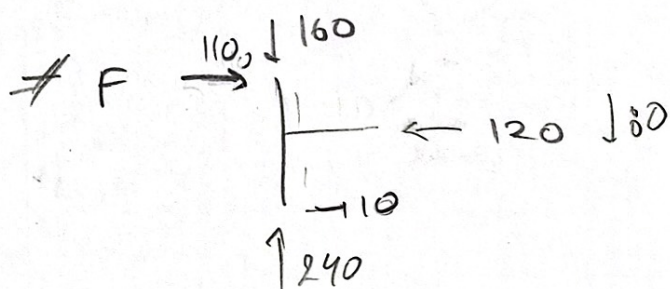
$$90 + 30 = 120 \text{ OK}$$

Ελέγξω για ισορροπία κόμβου (οριζόντια + κάθετη)



$$120 + 40 = 160 \text{ OK}$$

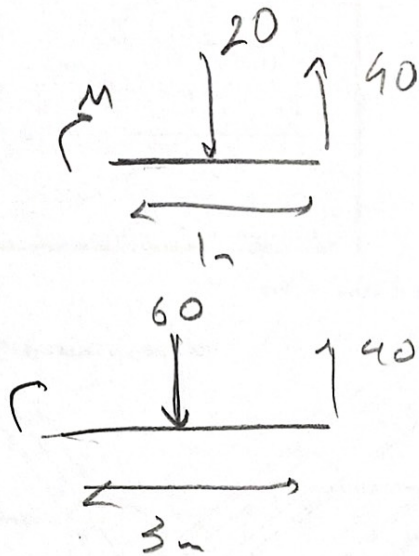
$$110 + 10 = 120 \text{ OK}$$



$$110 + 10 = 120 \text{ OK}$$

$$160 + 80 = 240 \text{ OK}$$

για ζυγα 4 5



$$M + (0,5 \times 20) - (40 \times 1) = 0$$

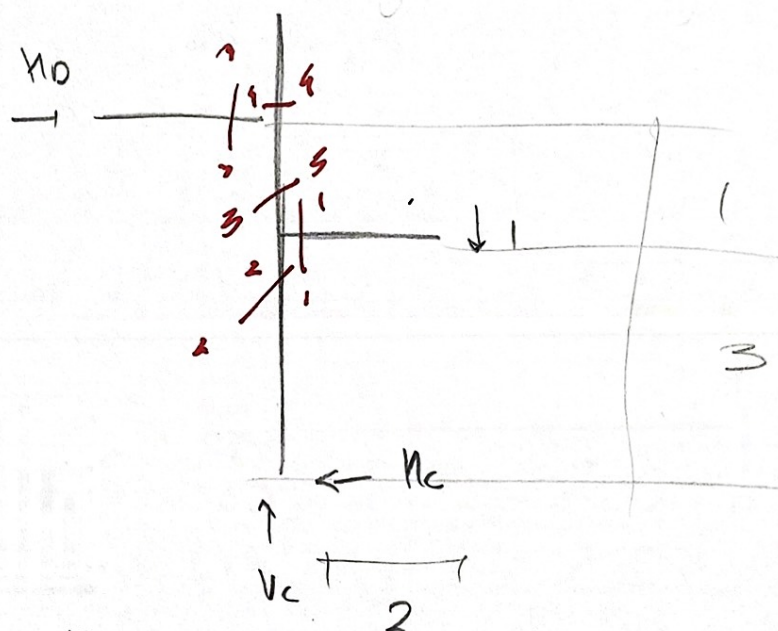
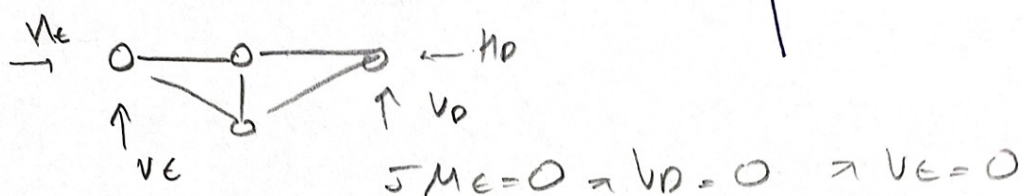
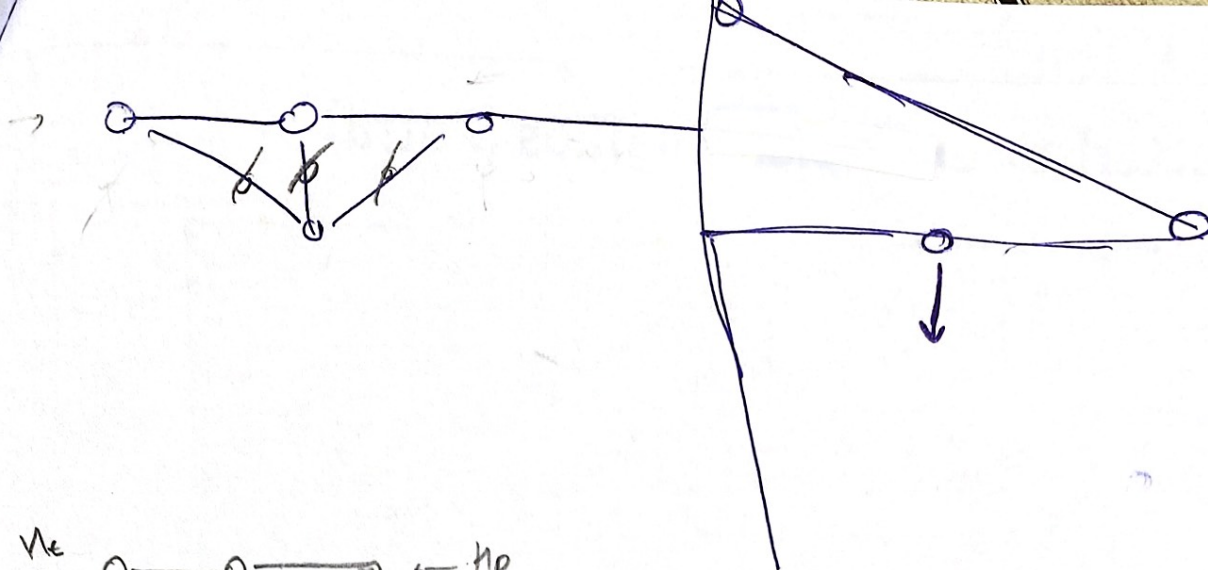
$$\Rightarrow M \neq 40 - 10 = +30$$

$$M + (1,5 \times 60) - (40 \times 3) = 0$$

$$\Rightarrow M + 90 - 120 = 0$$

$$\Rightarrow M = +30$$

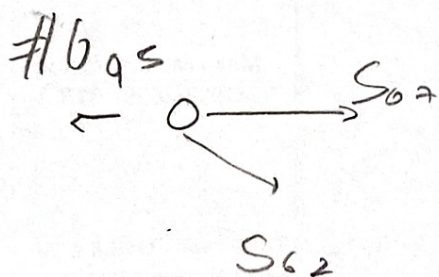
$\Rightarrow$ ναυτά. Ούτως πονεί.



$$\sum F_x = 0 \Rightarrow H_D = H_C$$

$$\sum F_y = 0 \Rightarrow V_C = 1$$

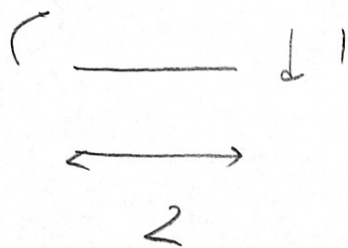
$$\sum M_C = 0 \Rightarrow 4H_D - 2 \Rightarrow H_D = -0,5$$



$$\sum F_y = 0 \Rightarrow S_{62} = 0$$

$$S_{67} = 0,5 = S_{78} \text{ type supports.}$$

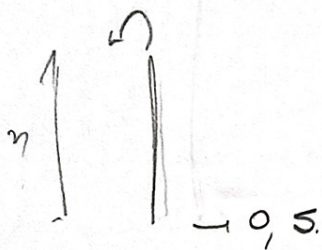
1-1



$$M = -2 \text{ km}$$

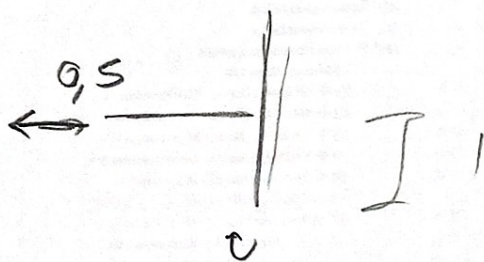
3-3 k' 4-4 $M = 0$

2-2

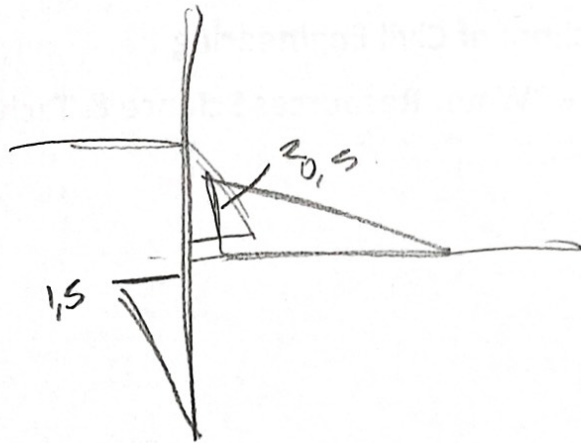


$$M = -0,5 \times 3 = -1,5 \text{ km}$$

5-5



$$M = 0,5 \times 1 = 0,5 \text{ km}$$



$$\begin{array}{c} 95 \\ \div 22 \\ \hline 15 \end{array}$$

$$2 \times \left(\begin{array}{c} 1,5 \\ \nabla \end{array} + \begin{array}{c} 30 \\ \nabla \end{array} \right) =$$

$$3 \times 1,5 \times 30 \times \frac{1}{3} = 45$$

$$2 \times \left(\begin{array}{c} \triangle \\ 95 \end{array} + \begin{array}{c} 120 \\ \square \\ 90 \end{array} \right) = 1 \times \frac{1}{6} \times \frac{1}{2} (2 \times 90 + 120) = 25$$

$$2 \times \left(\begin{array}{c} \triangle \\ 120 \end{array} + \begin{array}{c} \triangle \\ 120 \end{array} \right) = \frac{1}{9} \times 120 \times 2 \times 2 = 120$$

$$45 + 25 + 120 = \frac{190}{650.000} = 0,0003 \text{ m} = 3 \text{ mm}$$

$$+ \int \sigma \epsilon = \dots$$