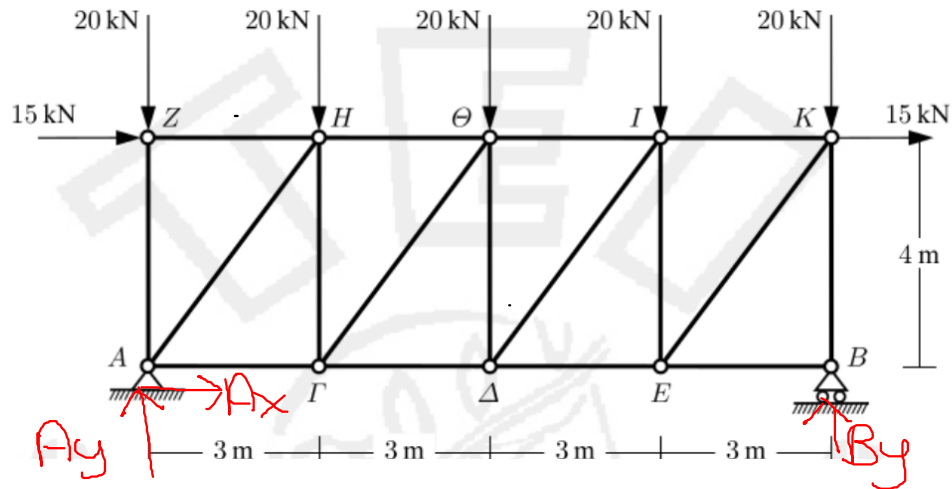


(β) Να υπολογισθούν με τη μέθοδο των κόμβων οι δυνάμεις των ράβδων που συντρέχουν στους κόμβους B, K, E και I (δηλ. BE, BK, KI, KE, IΘ, ΙΔ, ΙΕ και ΔΕ).

Για όλα τα μέλη να διευκρινισθεί εάν υπόκεινται σε θλίψη ή εφελκυσμό.



Βήμα 1^ο Βρίσκω τις εξωτερικές αντιδράσεις

$$(\rightarrow) \sum F_x = 0$$

$$A_x + 15 + 15 = 0 \Rightarrow A_x = -30 \text{ kN (αριστερά φέρει)}$$

$$(\uparrow) \sum F_y = 0$$

$$A_y + B_y - 20 - 20 - 20 - 20 - 20 = 0$$

$$A_y + B_y = 100 \quad (1)$$

$$(\curvearrowright) \sum M_A = 0$$

$$12B_y - 15 \cdot 4 - 15 \cdot 4 - 20 \cdot 3 - 20 \cdot 6 - 20 \cdot 9 - 20 \cdot 12 = 0$$

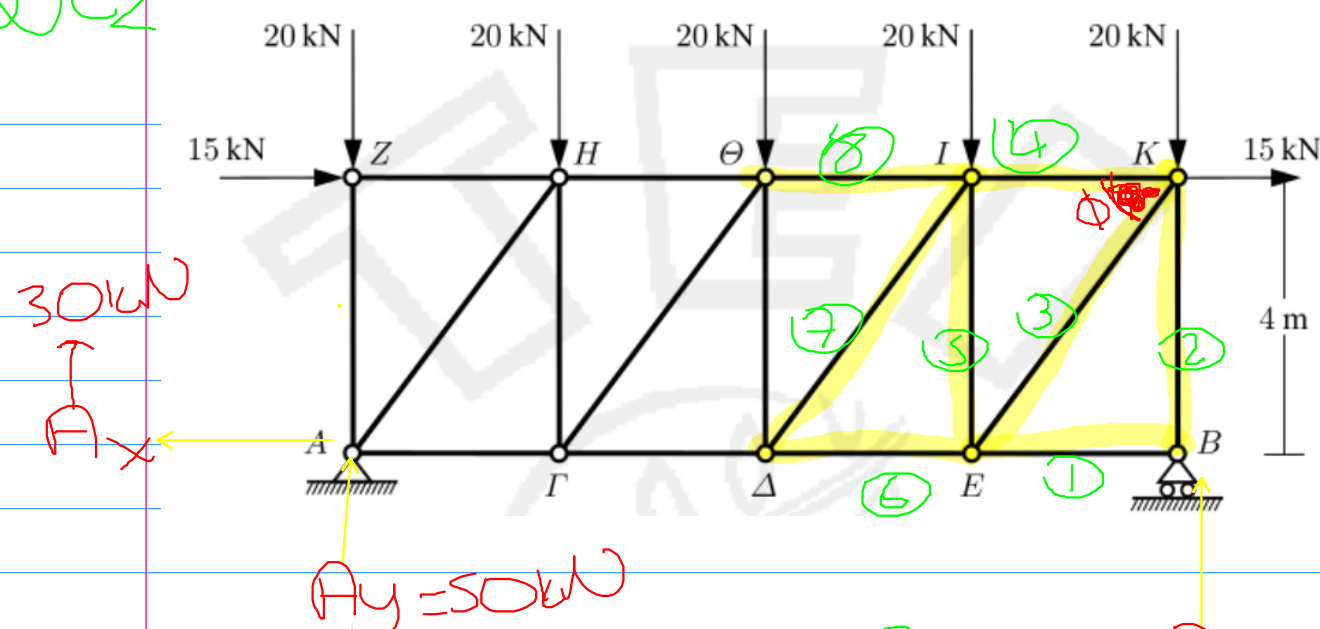
$$12B_y = 600$$

$$B_y = 50 \text{ kN}$$

$$\text{Άρα } A_y = 50 \text{ kN}$$

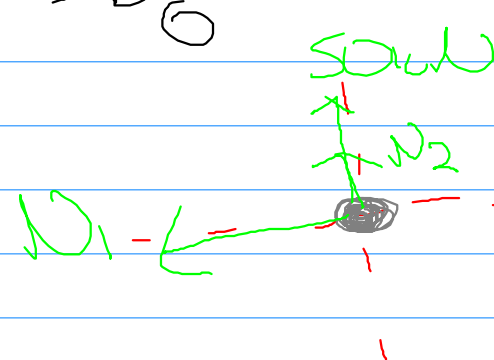
Βήμα 2^ο Κάνω το ΔΚΕΣ και βάζω τις δυνάμεις να βρῶ με τη σωστή φορά (δηλαδή να είναι θετικές)

20E2



Braka 3^o Kuvu yordam uymur

Kuvu B^o



$$\sum F_x = 0$$

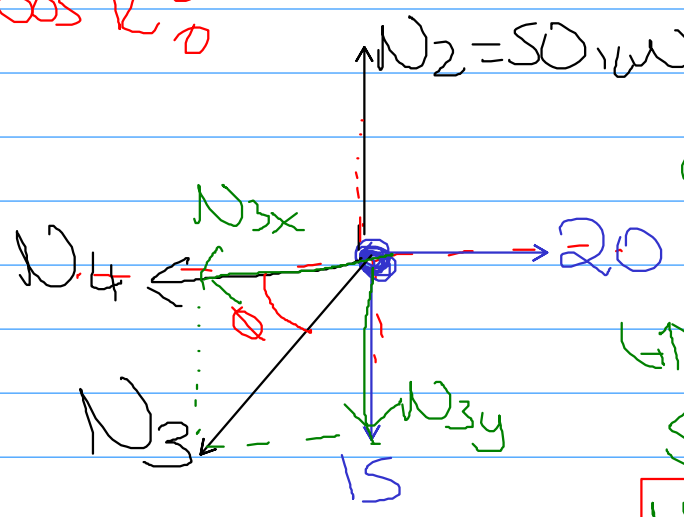
$$N_1 = 0 \text{ kN}$$

$$\sum F_y = 0$$

$$50 + N_2 = 0$$

$$N_2 = -50 \text{ kN}$$

Kuvu K^o



$$\tan \phi = \frac{4}{3} \rightarrow \phi = 53.13^\circ$$

$$\sum F_x = 0$$

$$20 - N_{3x} - N_4 = 0$$

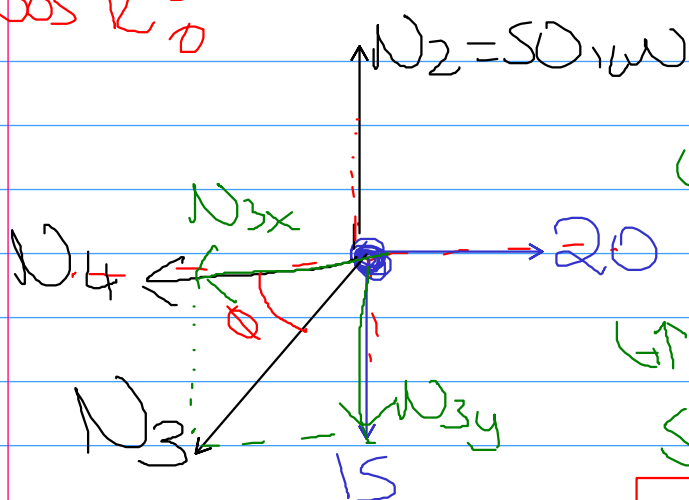
$$\sum F_y = 0$$

$$50 - N_{3y} - 15 = 0$$

$$N_{3y} = 35 \text{ kN}$$

Συνέχεια

Καταβάς K_D



$$\tan \phi = \frac{4}{3} \Rightarrow \phi = 53.13^\circ$$

$$\sum F_x = 0$$

$$20 - N_{3x} - N_4 = 0 \quad (1)$$

$$\sum F_y = 0$$

$$50 - N_{3y} - 15 = 0$$

$$N_{3y} = 35 \text{ kN}$$

Οπότε εφόσον γνωρίζουμε την N_{3y} οπότε την N_{3y} και την N_{3x}

$$\begin{aligned} \text{Εφόσον οτι } F_x &= F \cdot \cos \phi \\ F_y &= F \cdot \sin \phi \end{aligned}$$

$$\text{Αρα } N_{3y} = N_3 \cdot \sin 53.13 \Rightarrow N_3 = \frac{35}{\sin 53.13} = 43.75 \text{ kN}$$

$$(1) \Rightarrow 20 - N_{3x} - N_4 = 0$$

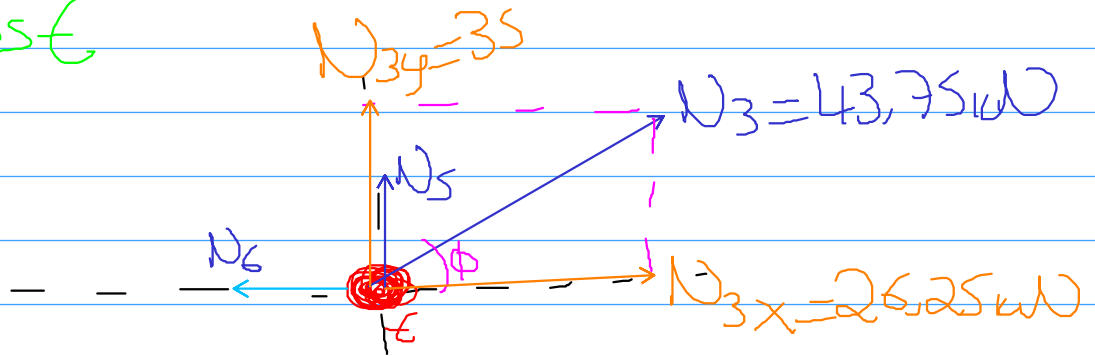
$$20 - 43.75 \cos 53.13 - N_4 = 0$$

$$20 - 26.25 - N_4 = 0$$

$$N_4 = 6.25 \text{ kN}$$

$$\Phi = 53,13^\circ$$

Körper E



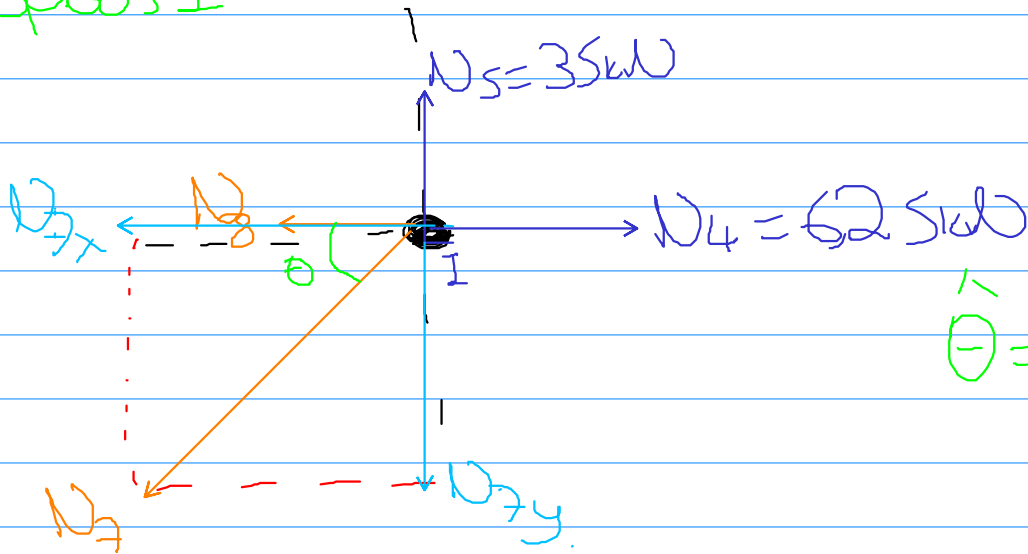
$$\begin{aligned} \rightarrow) \sum F_x &= 0 \\ 26,25 - N_6 &= 0 \end{aligned}$$

$$N_6 = 26,25 \text{ kN}$$

$$\begin{aligned} \leftarrow) \sum F_y &= 0 \\ N_5 + N_{3y} &= 0 \end{aligned}$$

$$N_5 = -35 \text{ kN}$$

Körper I



$$\hat{\theta} = \hat{\Phi} = 53,13^\circ$$

$$\rightarrow) \sum F_x = 0$$

$$6,25 - N_8 - N_{7x} = 0$$

$$\leftarrow) \sum F_y = 0$$

$$35 - N_{7y} = 0$$

$$N_{7y} = 35 \text{ kN}$$

$$N_7 = 43,75 \text{ kN}$$

$$6,25 - N_8 - 43,75 = 0$$

$$N_8 = -37,5 \text{ kN}$$