

M R

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استاتيكا	فيزياء
الكترونياات	دوائر كهربية
هيدروليكا	ميكانيكا الانشانات

مدرس خصوصي

حضورى

اونلاين

يحصل الطالب علي

مقاطع فيديو هات لشرح المقرر بشكل وافي

ملخص للمادة Pdf للمذكرة واطراجة

محاضرات مباشرة علي برنامج زووم

مناقشة الأجزاء الغير مفهومة

تواصل مستمر مع معلم المادة



للواصل

0567630097

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Assignment No (1) Stability and instability

1. Classify each of the structures as statically determinate, statically indeterminate, or unstable. If indeterminate, specify the degree of indeterminacy. The supports or connections are to be assumed as stated.



$$V = C + 3$$

$$4 = 1 + 3 \quad \text{statically determinate}$$



$$3m + 3 \quad 3J + C$$

$$3 \times 3 + 5 = 3 \times 4 + 2$$

$$14 = 14 \quad \Rightarrow \text{statically determinate}$$



$$r \quad c + 3$$

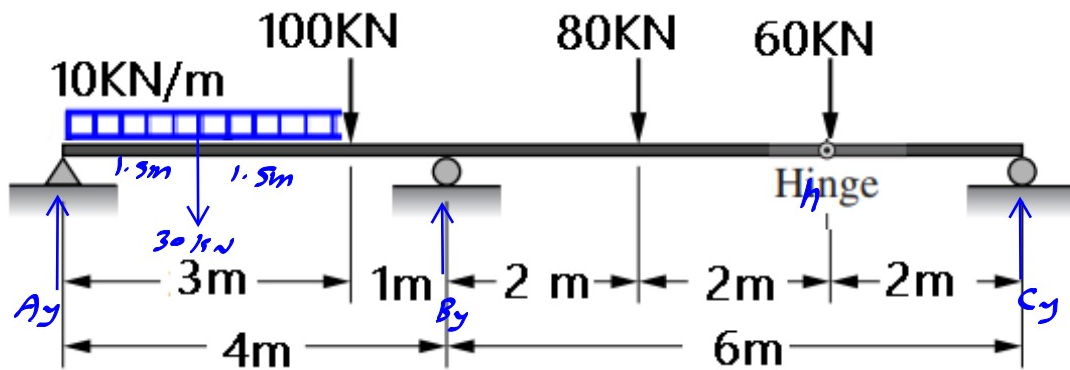
$$6 > 1 + 3$$

$6 > 4$ statically indeterminate to 2nd degree

2. For the statically determinate beam loaded with both distributed and concentrated loads shown below.

i. Calculate the reactions of the beam

ii. Solve and draw the internal force diagrams (AFD, SFD & BMD)



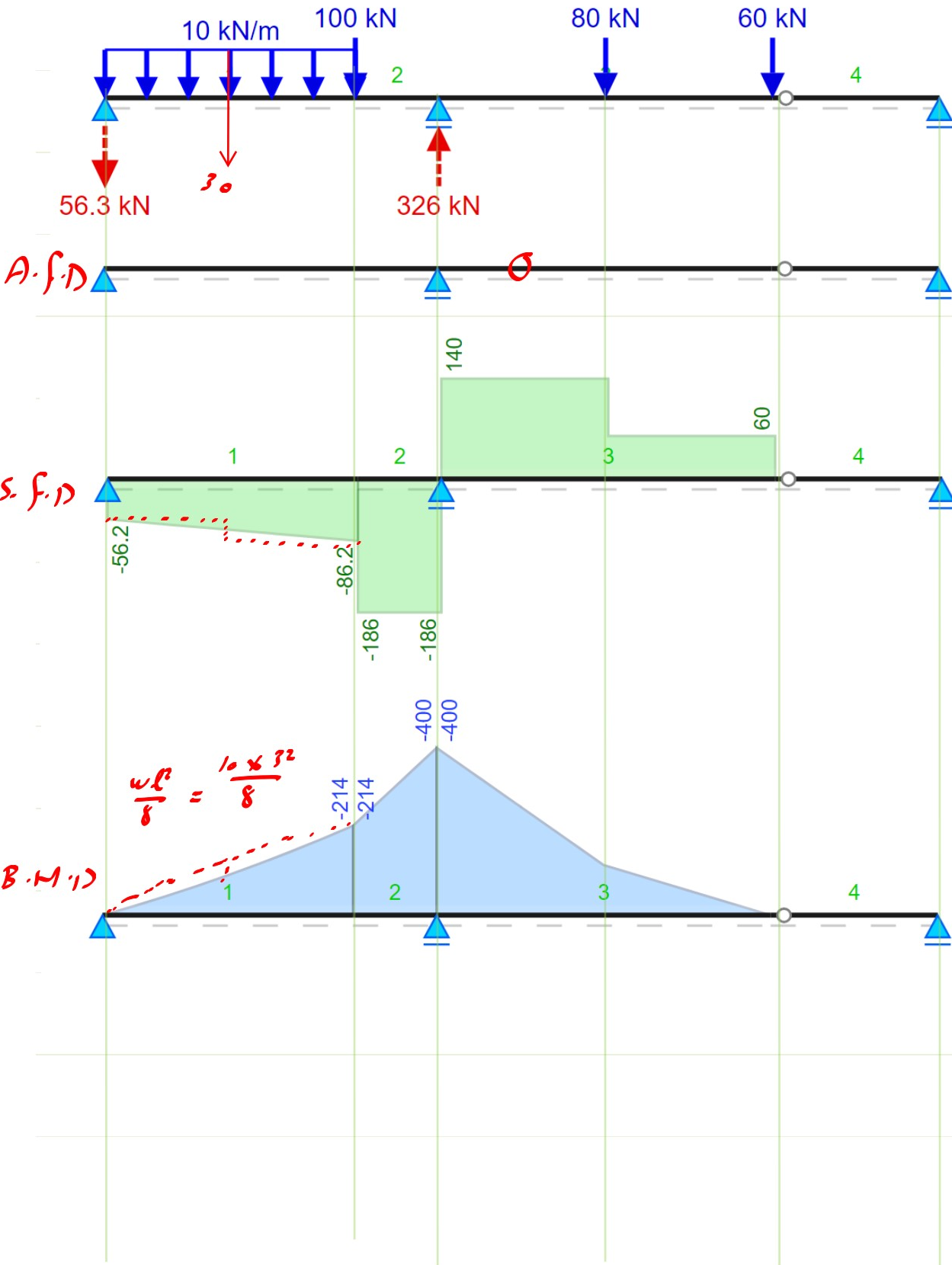
$$\sum M_{\text{Hinge}} = C_y \times 2 = 0 \Rightarrow C_y = 0$$

$$\sum M_A = 30 \times 1.5 + 100 \times 3 - B_y \times 4 + 80 \times 6 + 60 \times 8 = 0$$

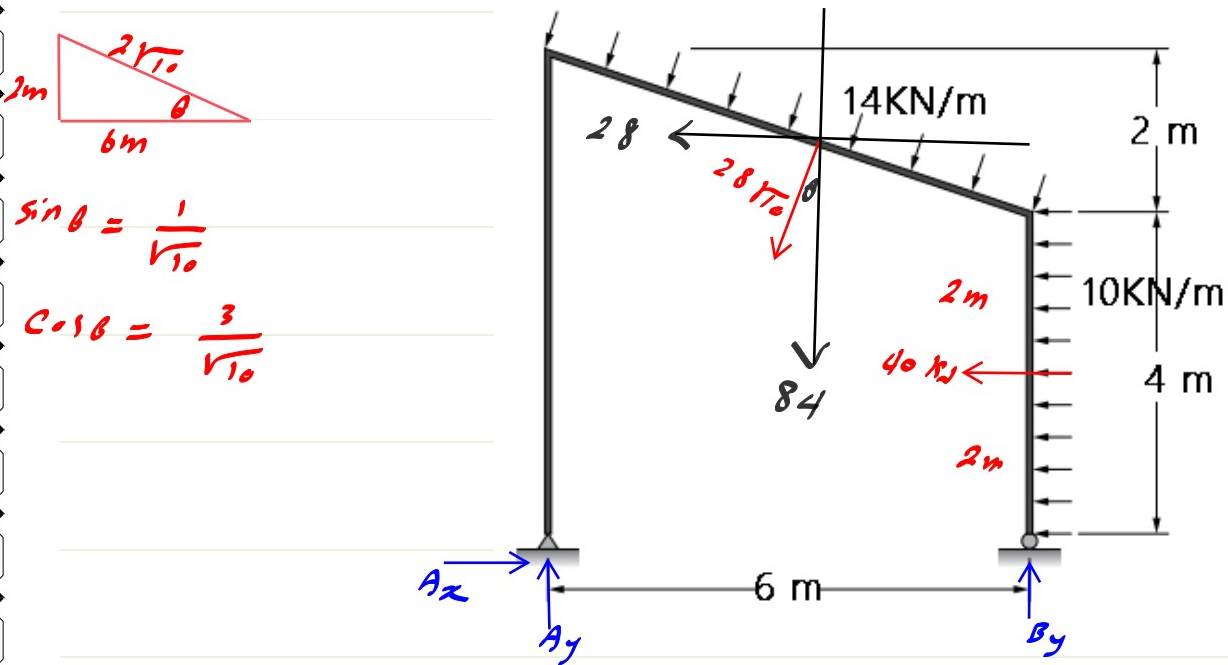
$$B_y = 326.25 \text{ kN} \uparrow$$

$$\sum f_y = A_y - 30 - 100 + 326.25 - 80 - 60 = 0$$

$$A_y = -56.25 \text{ kN} \uparrow = 56.25 \text{ kN} \downarrow$$



3. Draw the Axial force; shear force and bending moment diagrams for each member of the frame shown below. Assume the frame is pin connected at A, and C is a roller.

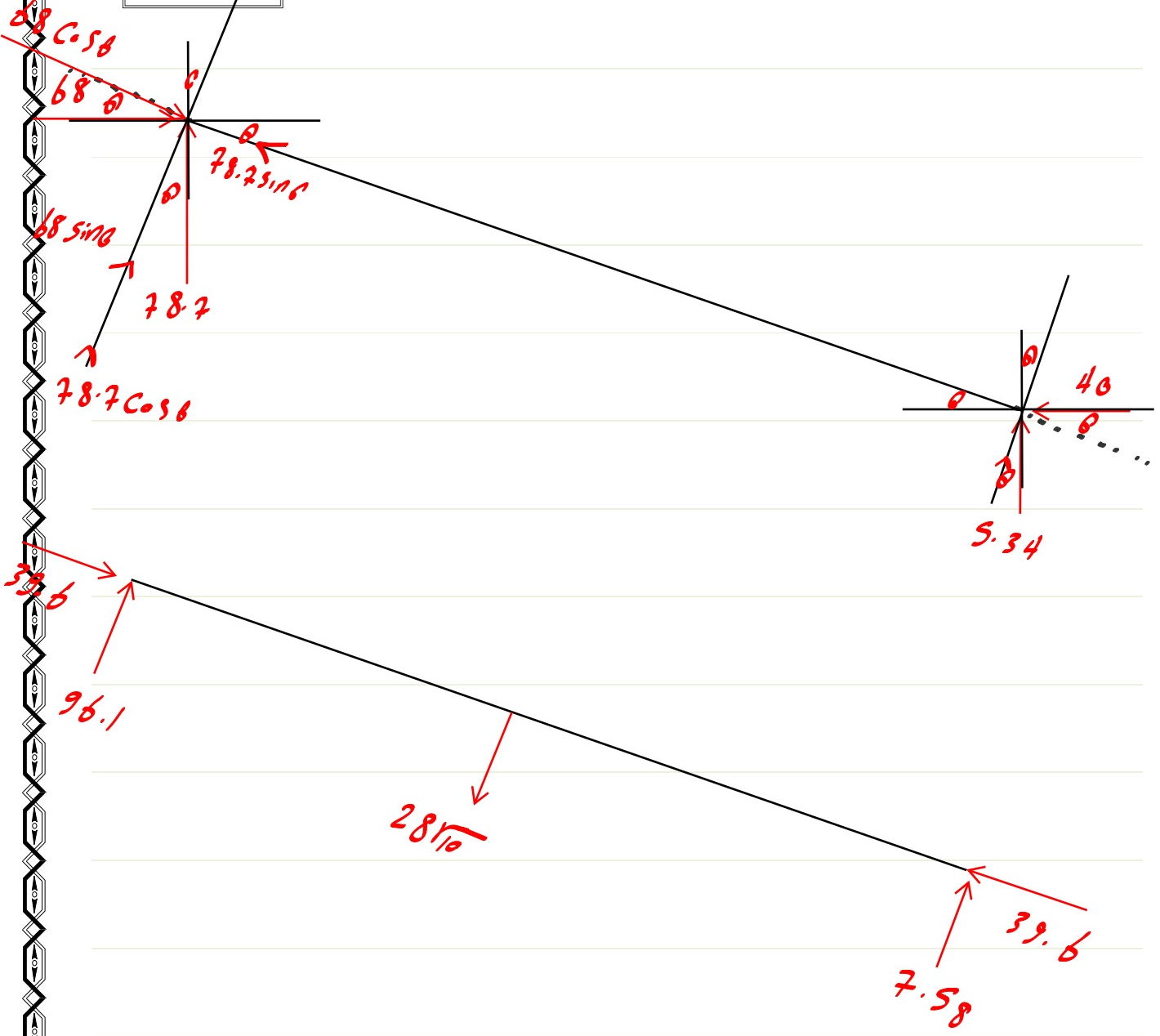


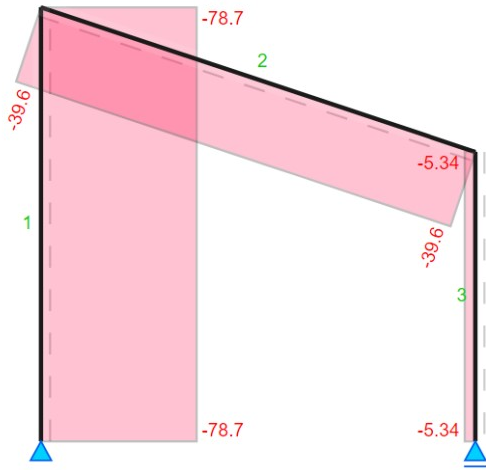
$$\sum F_x = A_x - 28 - 40 = 0 \Rightarrow A_x = 68 \text{ kN}$$

$$\sum M_A = -28 \times 5 + 84 \times 3 - 40 \times 2 - B_y \times 6 = 0$$

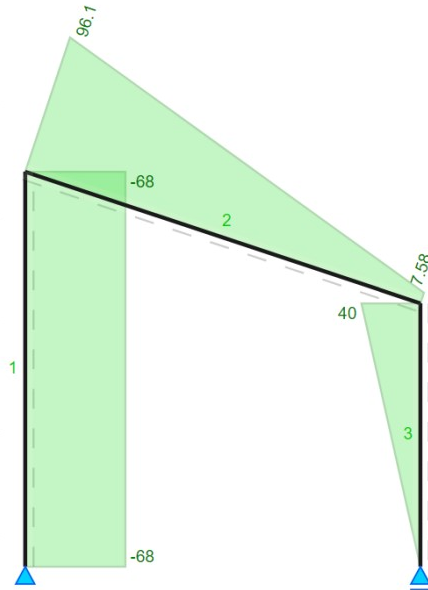
$$B_y = 5.3 \text{ kN}$$

$$\sum F_y = A_y - 84 + 5.33 = 0 \Rightarrow A_y = 78.7 \text{ kN}$$

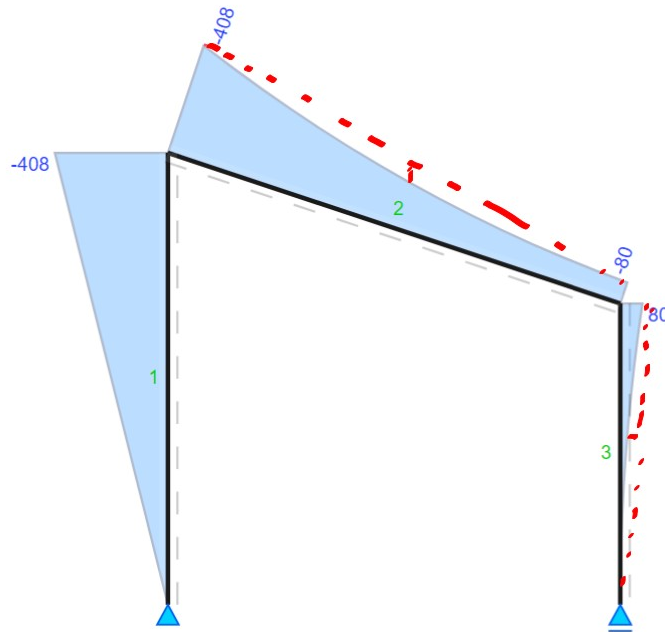




A.S.D



S.S.D



B.M.D

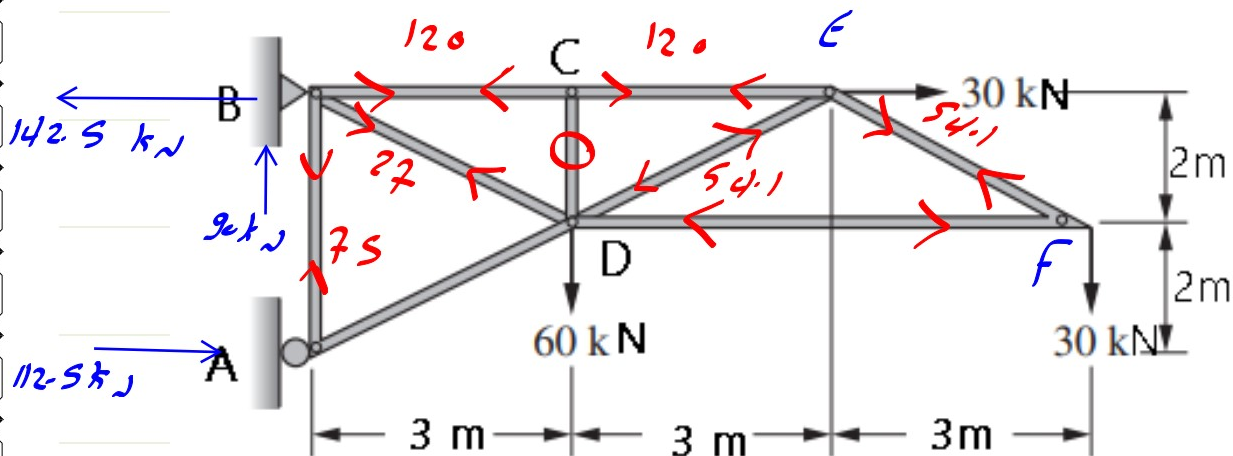
4. The roof truss as shown below

- Determine the force in each member by the method of joints, State whether the members are in tension or compression.
- Check the force in members BC, BE and FC by the method of section.

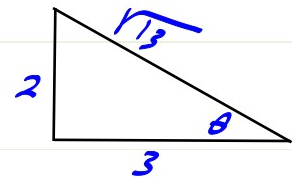
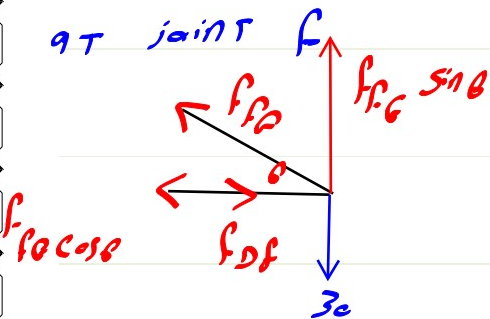
$$\text{Reactions} \Rightarrow \sum f_y = B_y - 60 - 30 = 0 \Rightarrow B_y = 90 \text{ kN}$$

$$\sum M_B = -A_x \times 4 + 60 \times 3 + 30 \times 9 = 0 \Rightarrow A_x = 112.5 \text{ kN}$$

$$\sum f_x = -B_x + 112.5 + 30 = 0 \Rightarrow B_x = 142.5 \text{ kN}$$



at joint F



$$\sin \theta = \frac{2}{\sqrt{13}}$$

$$\cos \theta = \frac{3}{\sqrt{13}}$$

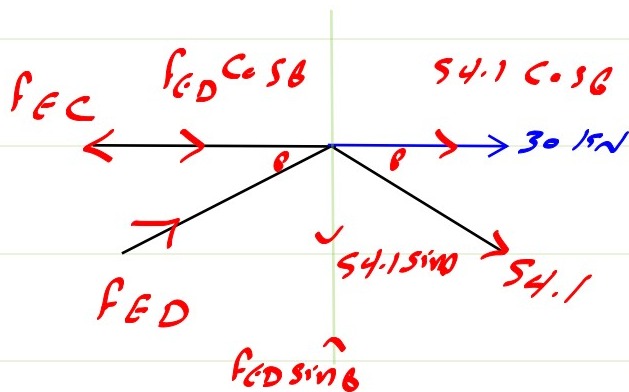
$$\sum f_y = f_{EF} \times \frac{2}{\sqrt{13}} - 30 = 0$$

$$f_{FE} = 54.1 \text{ kN Tension}$$

$$\sum f_x = 54.1 \times \frac{3}{\sqrt{13}} - f_{DF} = 0$$

$$f_{DF} = 45 \text{ kN Comp}$$

at joint F

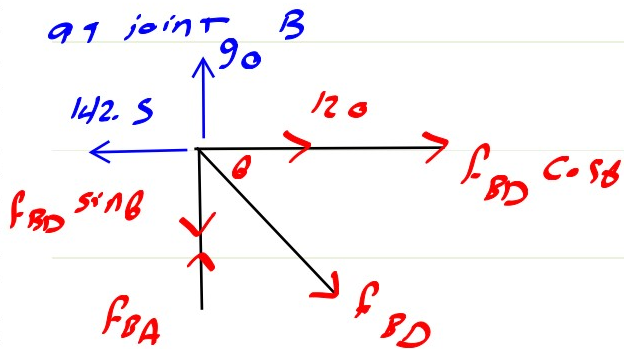


$$\sum f_y = f_{ED} \times \frac{2}{\sqrt{13}} - 54.1 \times \frac{2}{\sqrt{13}} = 0$$

$$f_{ED} = 54.1 \text{ kN Comp}$$

$$\sum f_x = -f_{EC} + 54.1 \times \frac{3}{\sqrt{13}} + 54.1 \times \frac{3}{\sqrt{13}} + 30 = 0$$

$$f_{EC} = 120 \text{ kN Tension}$$



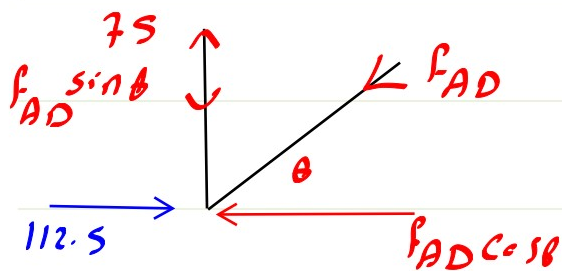
$$\sum F_x = -142.5 + 120 + F_{BD} \times \frac{3}{\sqrt{13}} = 0$$

$$F_{BD} = 27 \text{ kN (T)}$$

$$\sum F_y = 90 + F_{BA} - 27 \times \frac{2}{\sqrt{13}} = 0$$

$$F_{BA} = -75 \text{ kN Comp} = 75 \text{ kN (T)}$$

at joint A

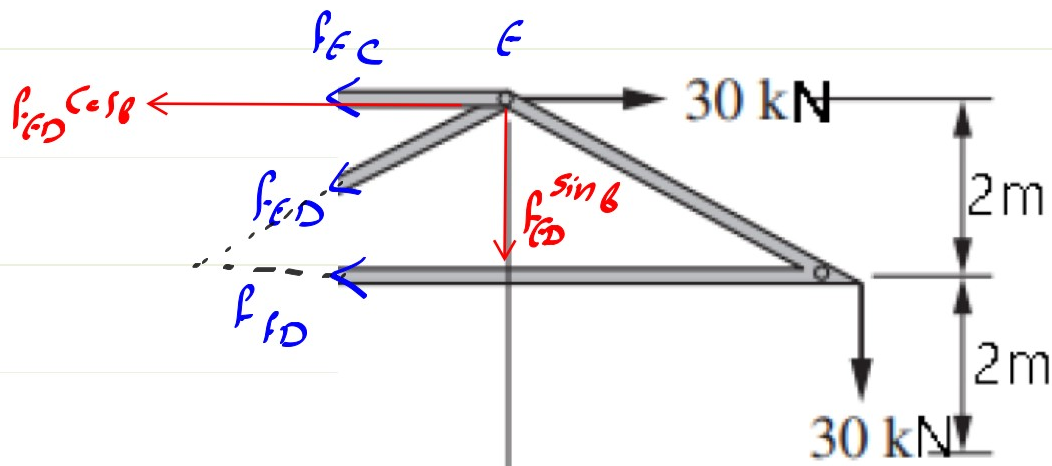


$$\sum F_x = 112.5 - F_{AD} \times \frac{3}{\sqrt{13}} = 0$$

$$F_{AD} = 135.215 \text{ N Comp}$$

$$\sum F_y = 75 - 135.2 \times \frac{2}{\sqrt{13}} \approx 0$$

ii)



$$\sum F_y = -F_{ED} \times \frac{2}{\sqrt{13}} - 30 = 0$$

$$F_{ED} = -54.1 \text{ kN Tension} = 54.1 \text{ kN Comp}$$

$$\sum M_E = F_{FD} \times 2 + 30 \times 3 = 0$$

$$F_{FD} = -45 \text{ kN Tension} = 45 \text{ kN Comp}$$

$$\sum M_D = -F_{EC} \times 2 + 30 \times 2 + 30 \times 6 = 0$$

$$F_{EC} = F_{CE} = 120 \text{ kN Tension}$$