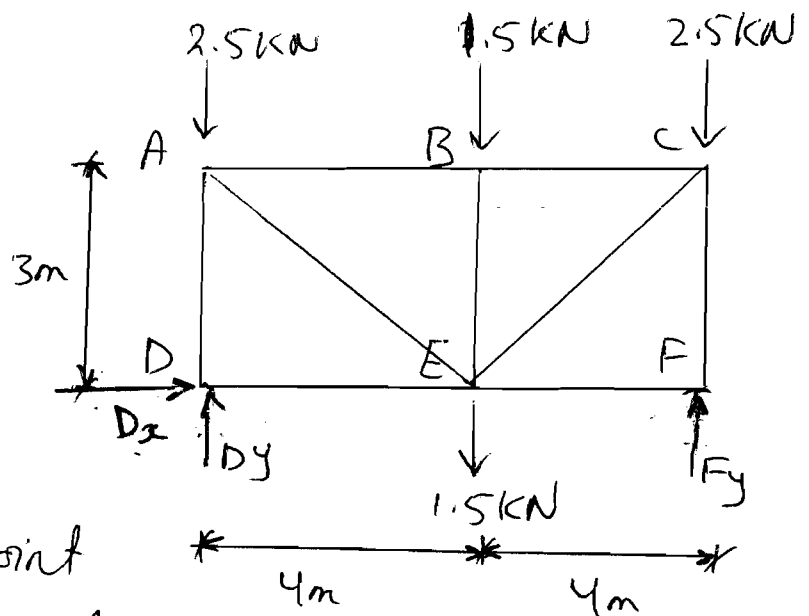


Problem 1:

Given: Fig P₁

Required:

- Use method of joint to find force in each member.
- State whether the force is compressive or Tensile.



Solution:-

$$\rightarrow +\Sigma F_x = 0$$

$$D_x = 0$$

From symmetry:-

$$D_y = F_y = 2.5 + 1.5 = 4 \text{ kN.}$$

By inspection: $F_{DE} = 0$ $F_{FE} = 0$

Joint D

$$\uparrow \sum F_y = 0$$

$$F_{DA} + 4 = 0$$

$$F_{DA} = 4 \text{ kN C}$$



Joint A

$$\uparrow \sum F_y = 0 \quad \text{C Why start with } \underline{y} \text{?!}$$

$$4 - 2.5 - F_{AE} (3/4) = 0$$

$$F_{AE} = 2.5 \text{ kN T}$$



$$\rightarrow \sum F_x = 0$$

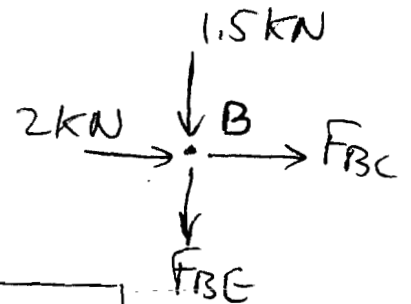
$$F_{AB} + 2.5 (4/5) = 0$$

$$F_{AB} = 2 \text{ kN C}$$

Joint B

$$\uparrow \sum F_y = 0$$

$$-1.5 - F_{BE} = 0, \quad F_{BE} = 1.5 \text{ kN C}$$



3

From symmetry:-

$$F_{BC} = F_{BA}$$

$$F_{BC} = 2 \text{ kN } C$$

$$F_{DA} = F_{FC}$$

$$F_{FC} = 4 \text{ kN } C$$

$$F_{AE} = F_{CE}$$

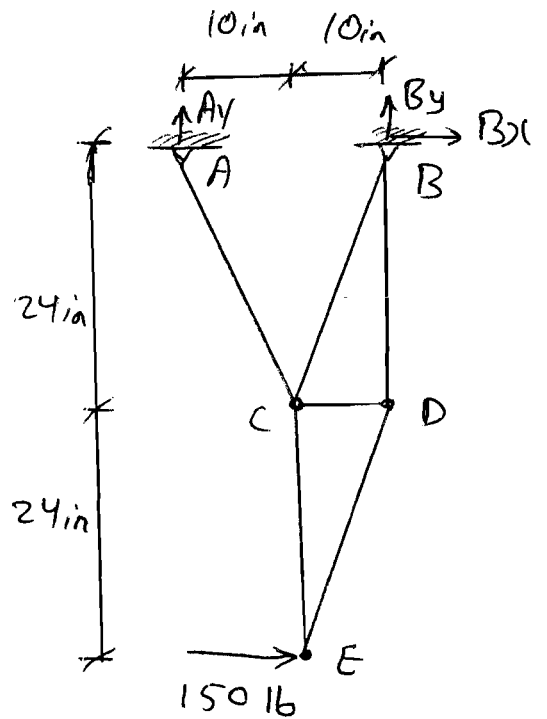
$$F_{CE} = 2.5 \text{ kN } T$$

Problem 2

Given: Fig P2

Required:

- Solve using Method of Joints to find forces at all members
- State whether the force is compression or tension.



Solution:

Note that the reactions are not needed. (why?)

Joint E:

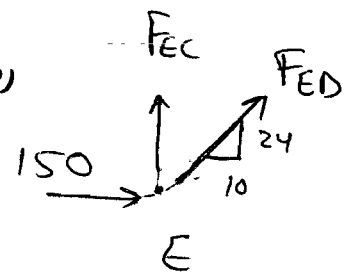
(Why start with joint E?)

$$\sum F_x = 0$$

$$150 + (10/26) F_{ED} = 0$$

$$F_{ED} = -390 \text{ lb}$$

$$F_{ED} = 390 \text{ lb "C"}$$



$$\uparrow \sum F_y = 0$$

$$F_{EC} - (390)(24/26) = 0$$

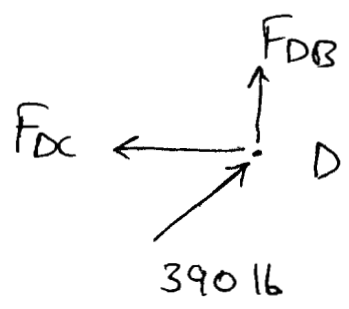
$$F_{EC} = 360 \text{ lb "T"}$$

Joint D

$$\rightarrow \sum F_x = 0$$

$$(390)(10/26) - F_{DC} = 0$$

$$F_{DC} = 150 \text{ lb "T"}$$



$$\uparrow \sum F_y = 0$$

$$(390)(24/26) + F_{DB} = 0$$

$$F_{DB} = -360 \text{ lb}$$

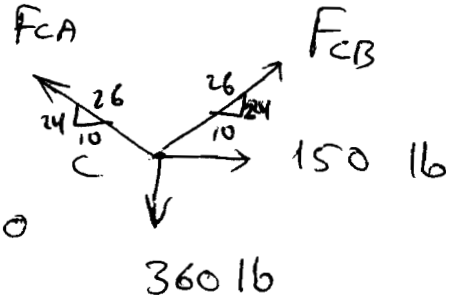
$$F_{DB} = 360 \text{ lb "C"}$$

6

Joint C

$$\uparrow \sum F_y = 0$$

$$(F_{CA}) \left(\frac{24}{26} \right) + F_{CB} \left(\frac{24}{26} \right) - 360 = 0$$



$$\rightarrow \sum F_x = 0$$

$$- F_{CA} \left(\frac{10}{26} \right) + F_{CB} \left(\frac{10}{26} \right) + 150 = 0$$

By solving the previous equations

$F_{CB} = 0$	← Can you get it by inspection?!
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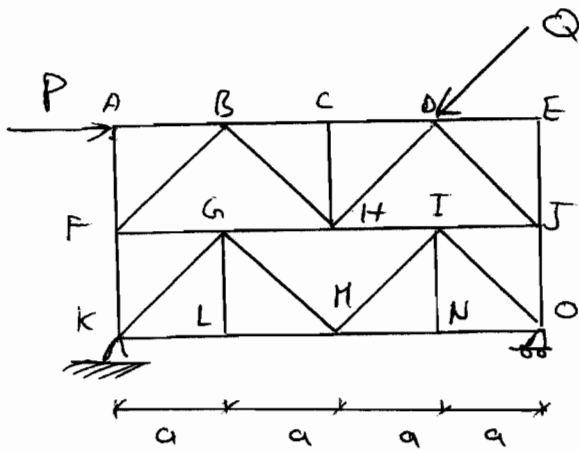
$F_{CA} = 390 \text{ lb "T"}$

Problem 3

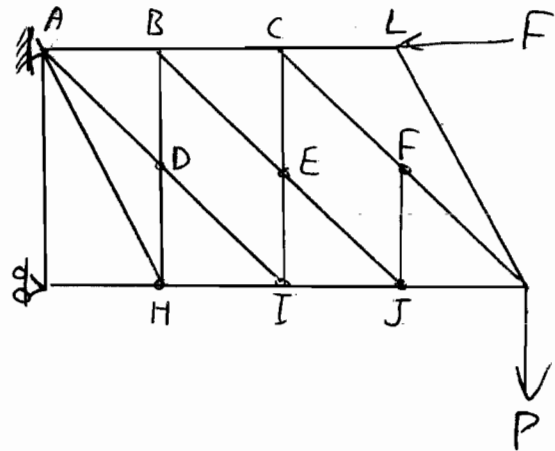
Given: Fig P₃

Required:-

Determine zero-force members By inspection.



(a)



(b)

Solution:-

a) Members AF; CH; ED; EJ; LG; NI

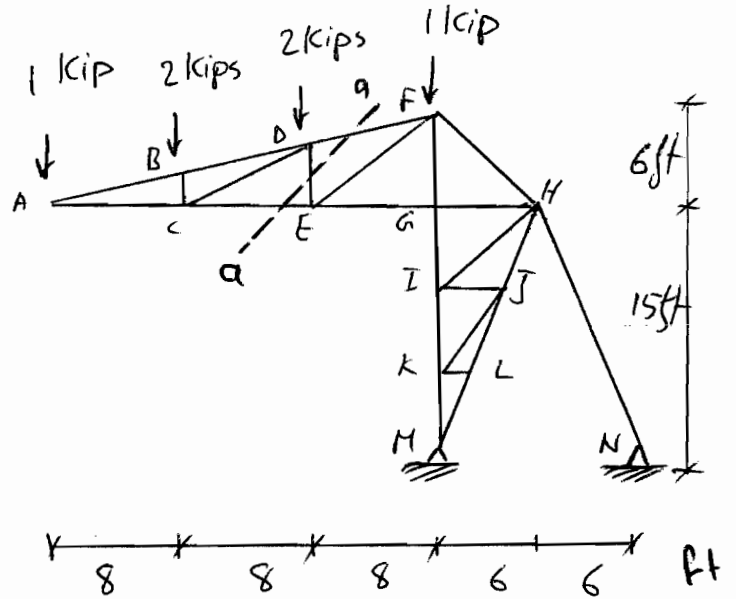
b) Members: FJ; JE; EB; BD; DH; HA; GA; LK

Problem 4:

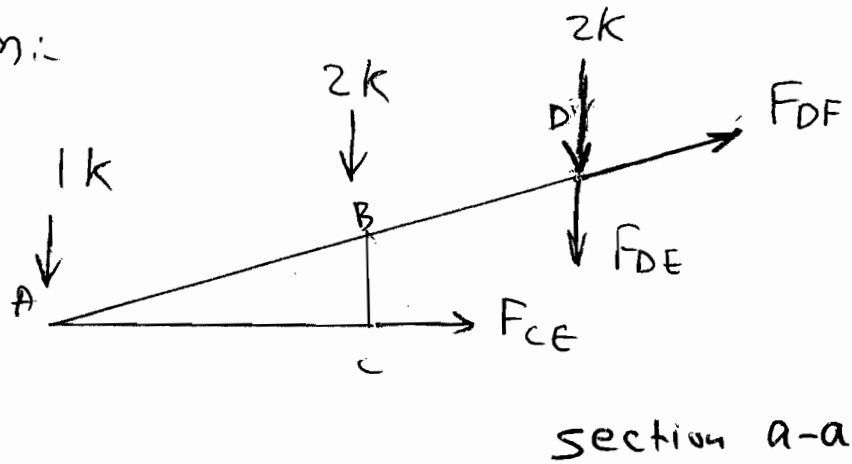
Given: Fig P4

Required:

Determine force in Members DF, DE & CE using M. of Sec.



Solution:



$$+\circlearrowleft \sum M_D = 0$$

$$(1)(16) + (2)(8) - (F_{CE})(4) = 0$$

$$F_{CE} = 8 \text{ kips "C"}$$

$$\rightarrow \sum F_x = 0$$

$$8 + (F_{DF})\left(\frac{8}{\sqrt{68}}\right) = 0, \quad F_{DF} = 8.246 \text{ kip "T"}$$

9

$$\sum F_y = 0 \uparrow^+$$

$$-1 - 2 - 2 - F_{DE} + F_{DF} \left(\frac{2}{\sqrt{68}} \right) = 0$$

$$F_{DE} = -3 \text{ kips}$$

$$\boxed{F_{DE} = 3 \text{ kips "C"}}$$

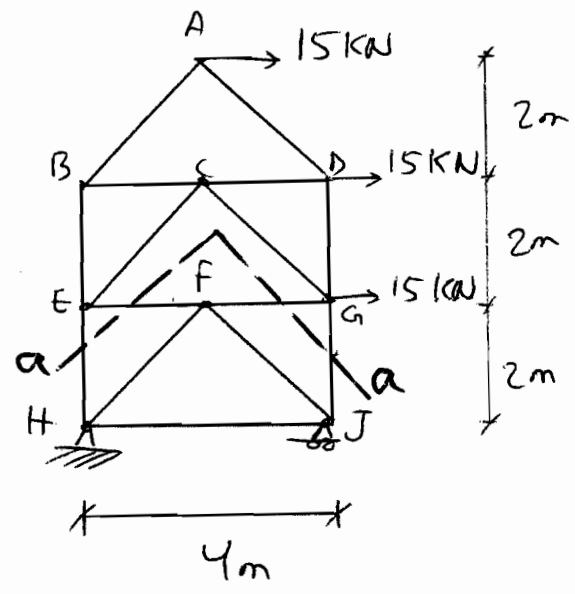
Note that the reactions were not needed. Why?!

Problem 5:-

Given: Fig P5

Required:

Determine force in Member GJ using M of Sec.

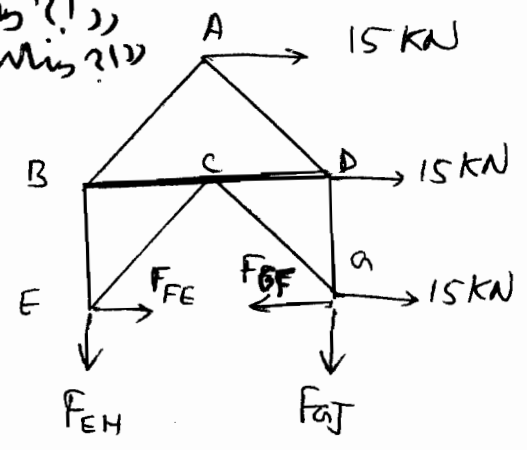


Solution:-

Make section a-a (Why?)
 Take the upper part (Why?)
 $\sum M_E = 0$ (Why?)

$$4 F_{GJ} - 15(2) - 15(4) = 0$$

$$F_{GJ} = -22.5 \text{ kN}$$



$F_{GJ} = 22.5 \text{ kN "C"}$