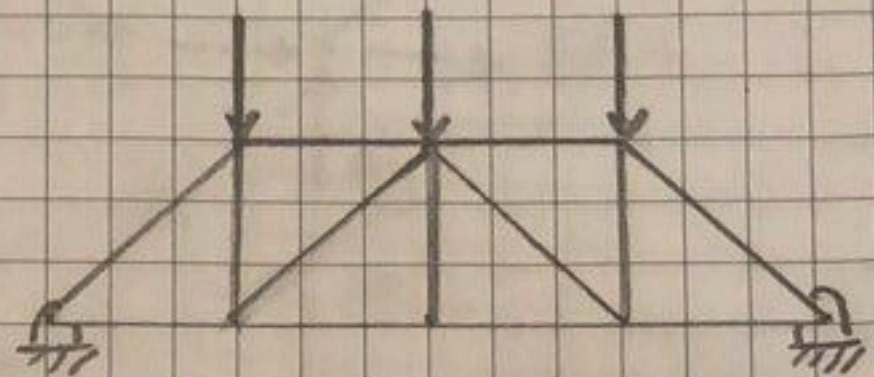
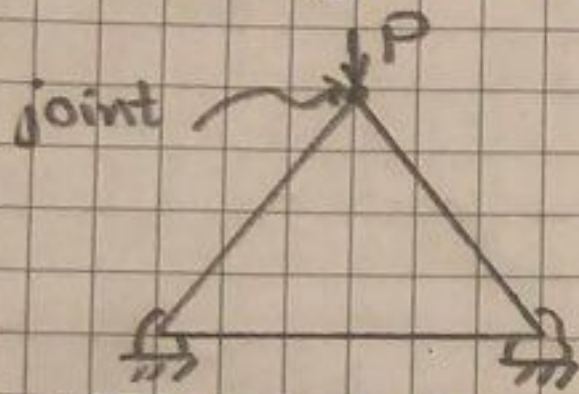


Trusses

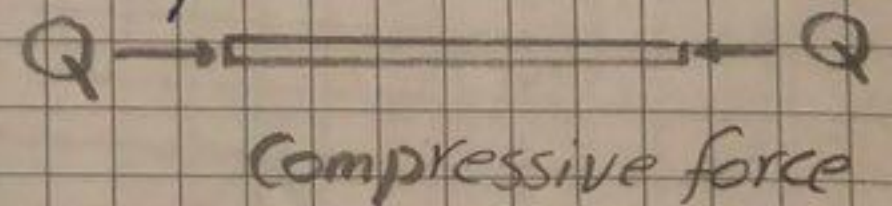
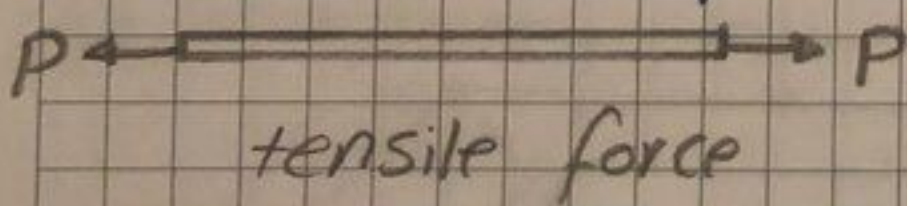
A truss is a structure made up of a number of members fast end together at their ends in such a manner as to form a rigid body.



The calculation for the internal forces in the members of a truss are based on the following assumption:-

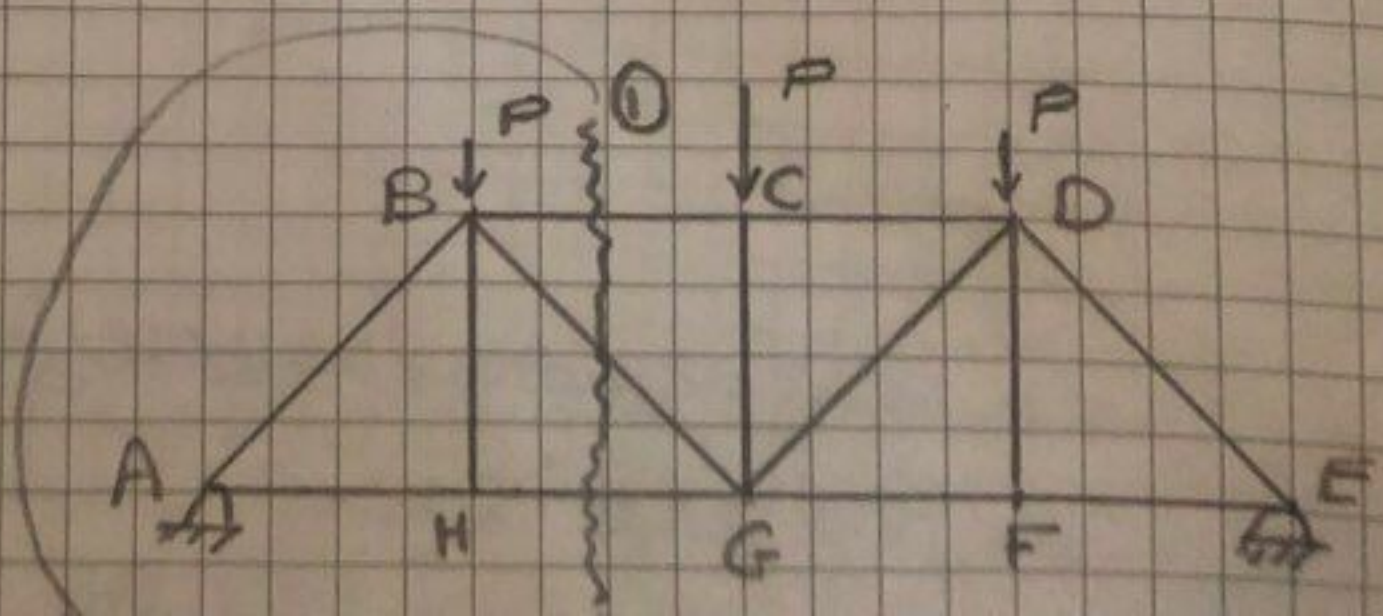
1. The members of the truss are jointed together by means of smooth pins at their ends.
2. The loads and reactions act only at the joints.
3. The weights of the individual members can be neglected.

Each member of the truss is a two-force member



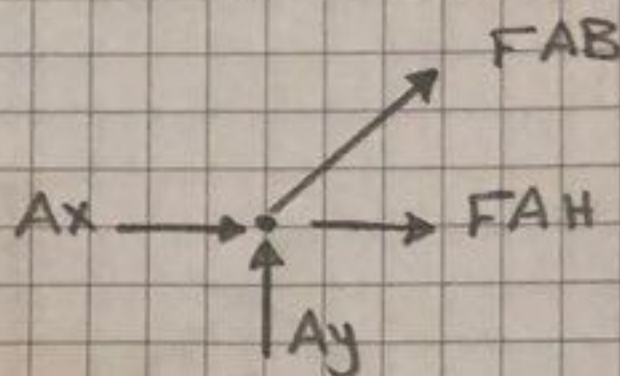
Analysis of Trusses

The forces in the members of a truss can be determined by two methods.

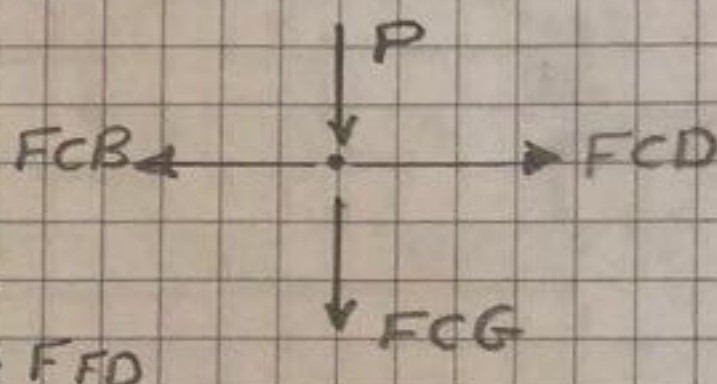


1. Method of Joints: a single joint in the truss is isolated as a free body and then applying equations of equilibrium.

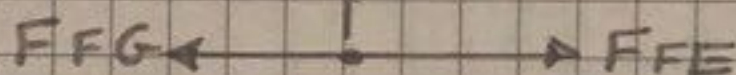
joint A:



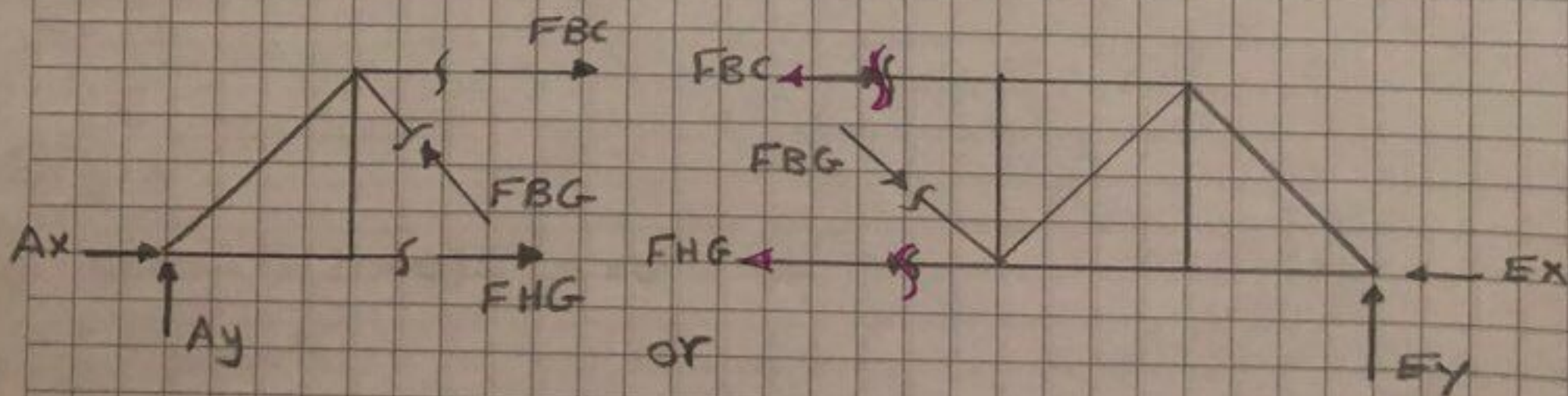
joint C:



joint F:



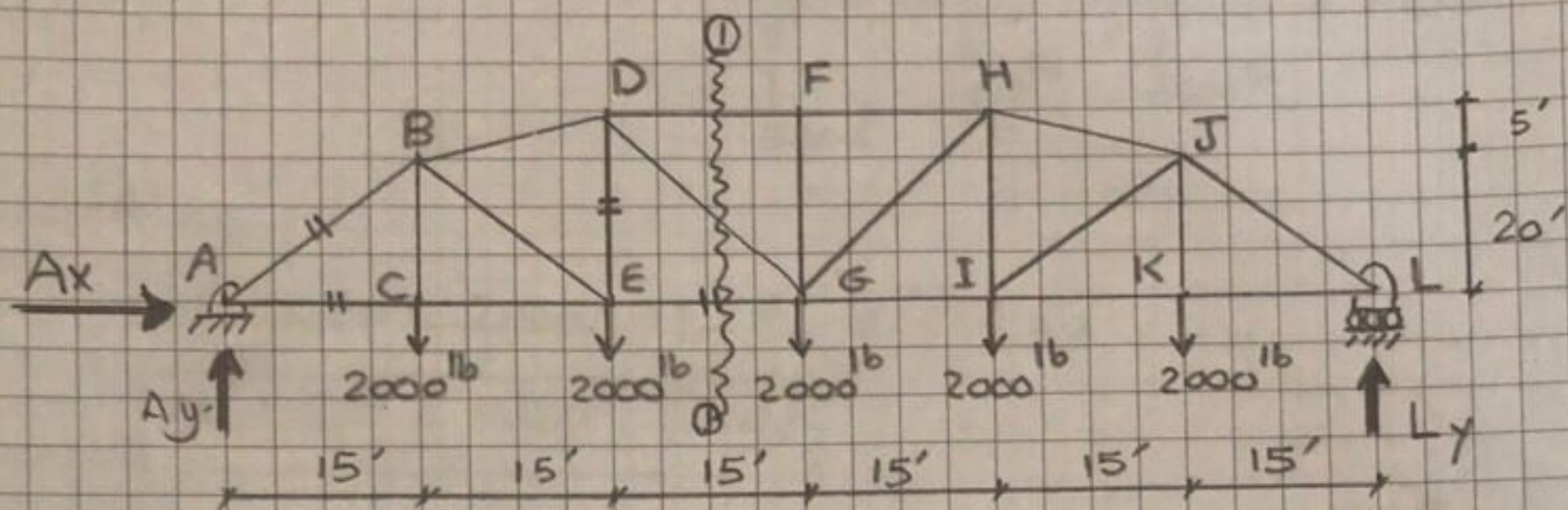
2. Method of Sections: two or more non-concurrent members are cut to obtain a free body and then applying equations of equilibrium.



Note:

- 1- ان لا يمس المقطع باي مفصل وانما يقطع اعضاء فقط.
- 2- ان لا يمس المقطع بالاعضاء التي لها احمال.
- 3- ان يترك المقطع عن علاقة والتمرة لا تقطع اي اعضاء اخرى.

Ex: Determine the forces in member AB, AC, DE and EG of the pin-connected truss in figure below:



Sol:-

$$\sum M_L = 0$$

$$A_y(90) - 2000(75) - 2000(60) - 2000(45) - 2000(30) - 2000(15) = 0$$

$$A_y = 5000 \text{ lb } \uparrow$$

$$\sum F_x = 0$$

$$A_x = 0$$

$$\sum F_y = 0$$

$$5000 - 5(2000) + L_y = 0$$

$$L_y = 5000 \text{ lb}$$

joint A

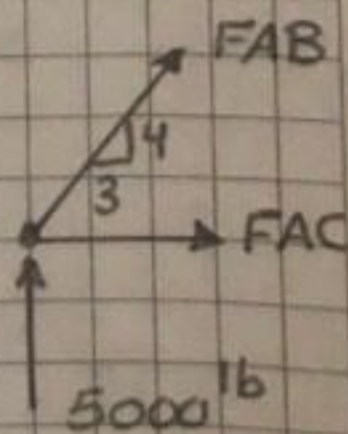
$$\sum F_y = 0$$

$$5000 + F_{AB} \left(\frac{4}{5} \right) = 0 \Rightarrow F_{AB} = -6250 \text{ lb}$$

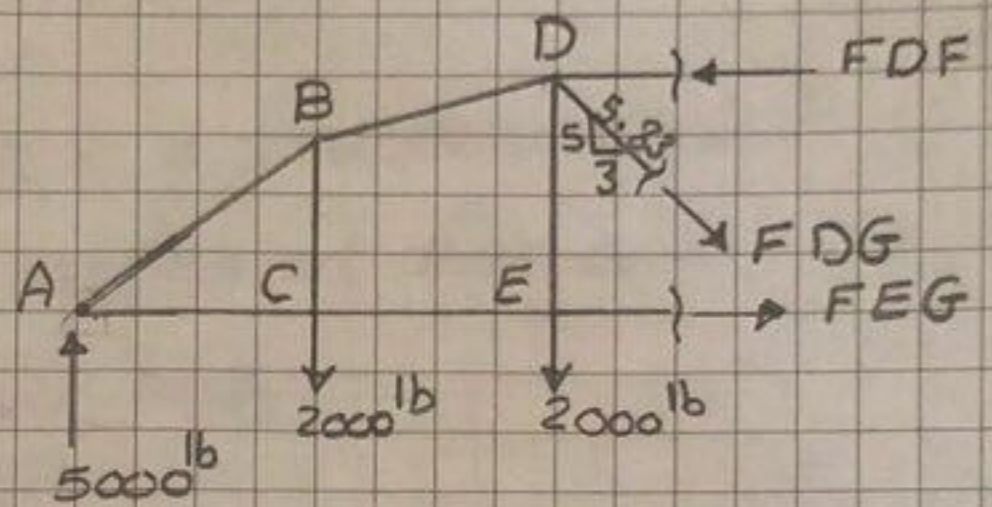
$$\therefore F_{AB} = 6250 \text{ (Comp)}$$

$$\sum F_x = 0 \Rightarrow F_{AC} - 6250 \left(\frac{3}{5} \right) = 0$$

$$F_{AC} = 3750 \text{ lb (Ten)}$$



Sec 1-1 :-



$$\sum M_D = 0$$

$$5000(30) - 2000(15) - FEG(25) = 0$$

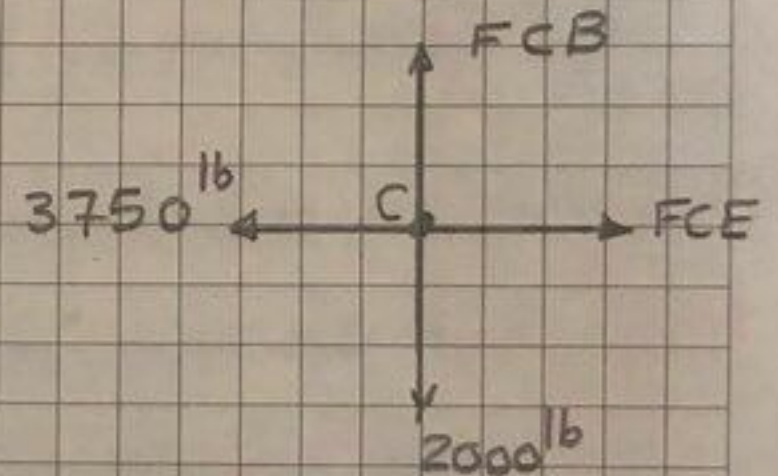
$$\therefore FEG = 4800 \text{ lb (Ten)}$$

joint C

$$\rightarrow \sum F_x = 0 \Rightarrow$$

$$FCE - 3750 = 0$$

$$FCE = 3750 \text{ lb (Ten)}$$



$$\uparrow \sum F_y = 0$$

$$FCB - 2000 = 0$$

$$FCB = 2000 \text{ lb (Ten)}$$

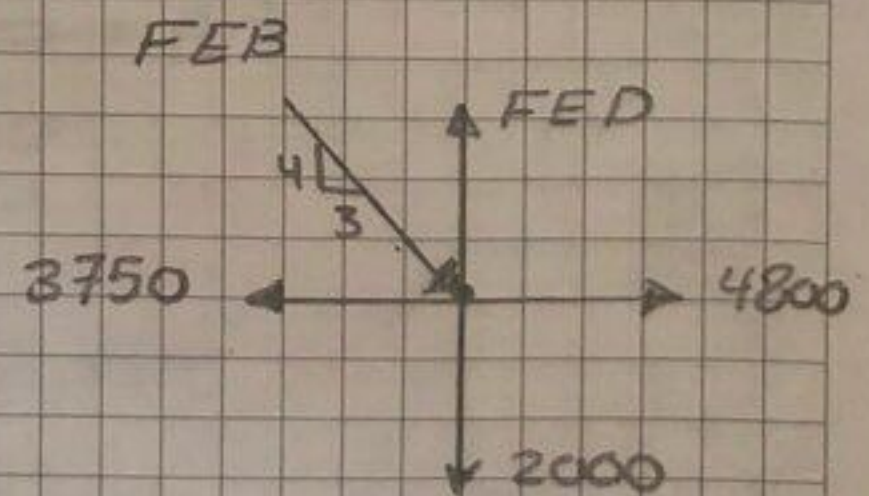
joint E

$$\rightarrow \sum F_x = 0$$

$$4800 - 3750 + FEB\left(\frac{3}{5}\right) = 0$$

$$FEB = -1750 \text{ lb}$$

$$FEB = 1750 \text{ lb (Ten)}$$



$$\uparrow \sum F_y = 0$$

$$FED - 2000 + 1750\left(\frac{4}{5}\right) = 0 \Rightarrow FED = 600 \text{ lb (Ten)}$$