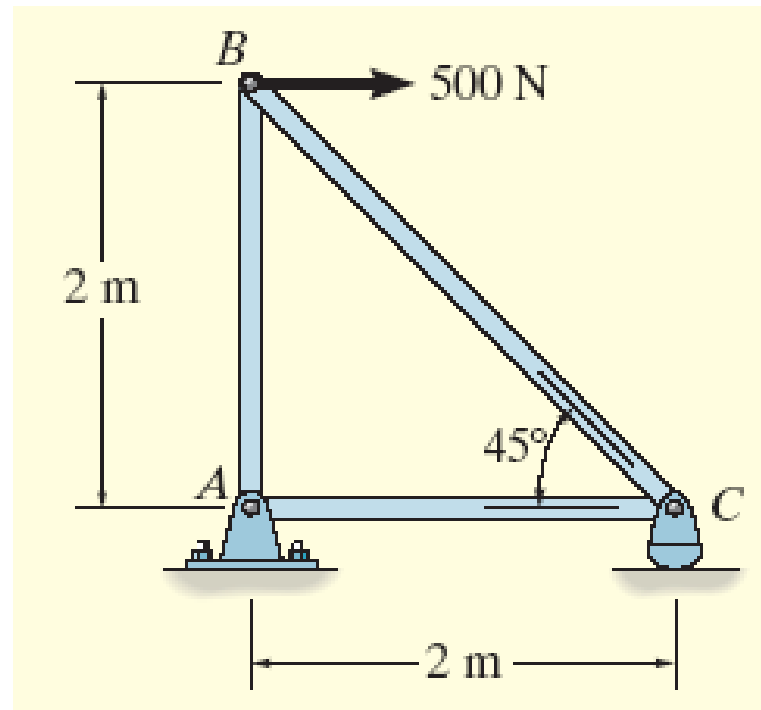


**NUMERICAL PROBLEM
ON
ANALYSIS
OF
PIN JOINTED FRAME**

Example 6.1

Determine the force in each member of the truss and indicate whether the members are in tension or compression.



Solution

- 2 unknown member forces at joint B
- 1 unknown reaction force at joint C
- 2 unknown member forces and 2 unknown reaction forces at point A

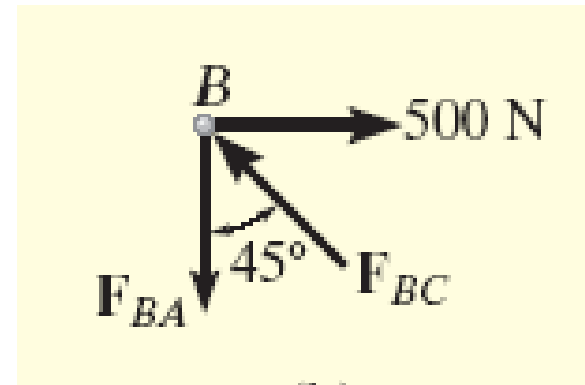
For Joint B,

$$+ \rightarrow \sum F_x = 0;$$

$$500 \text{ N} - F_{BC} \sin 45^\circ = 0 \Rightarrow F_{BC} = 707.1 \text{ N (C)}$$

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

$$F_{BC} \cos 45^\circ - F_{BA} = 0 \Rightarrow F_{BA} = 500 \text{ N (T)}$$



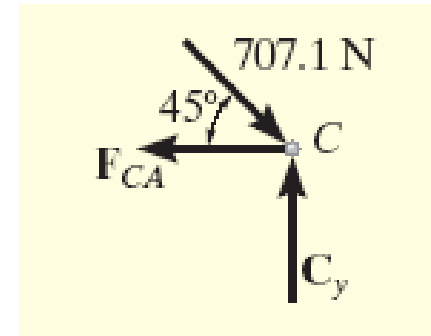
For Joint C,

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

$$- F_{CA} + 707.1 \cos 45^\circ N = 0 \Rightarrow F_{CA} = 500 N (T)$$

$$+ \uparrow \Sigma F_y = 0;$$

$$C_y - 707.1 \sin 45^\circ N = 0 \Rightarrow C_y = 500 N$$



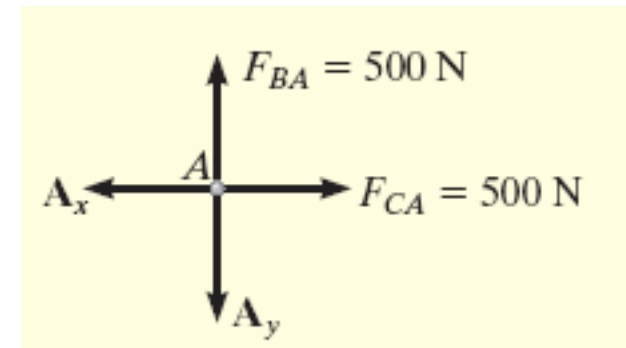
For Joint A,

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

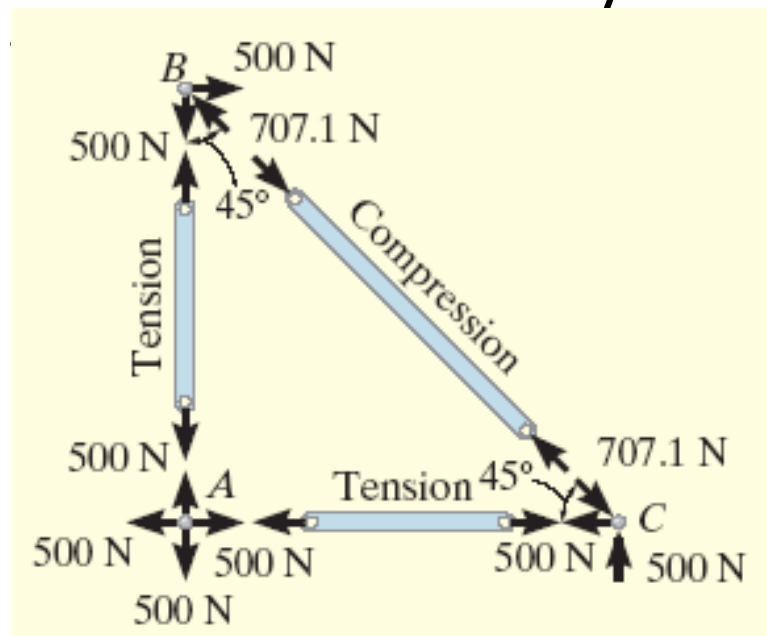
$$500 N - A_x = 0 \Rightarrow A_x = 500 N$$

$$+ \uparrow \Sigma F_y = 0;$$

$$500 N - A_y = 0 \Rightarrow A_y = 500 N$$

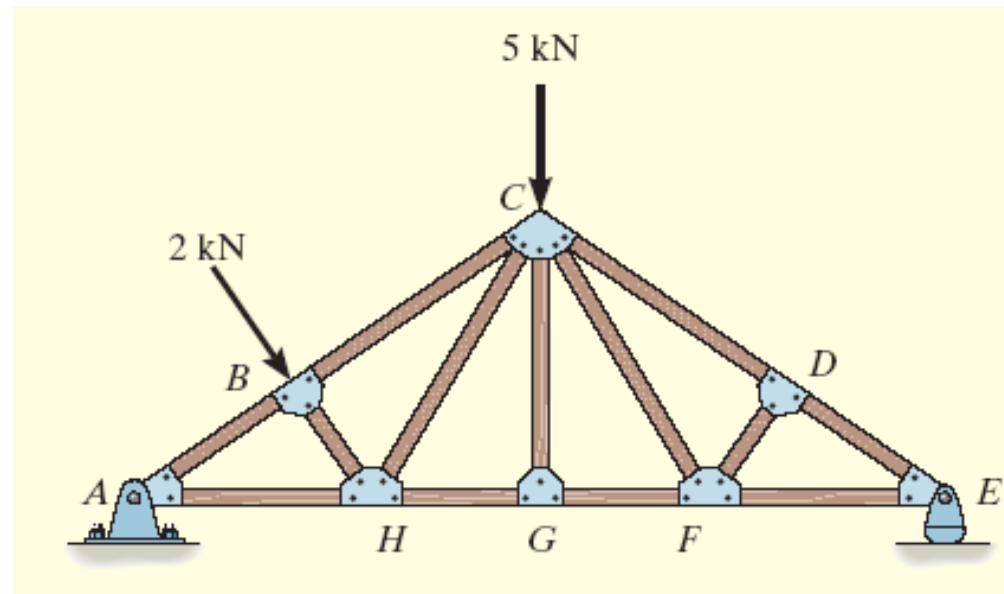


- FBD of each pin shows the effect of all the connected members and external forces applied to the pin
- FBD of each member shows only the effect of the end pins on



Example 6.4

Using the method of joints, determine all the zero-force members of the Fink roof truss. Assume all joints are pin connected.



Solution

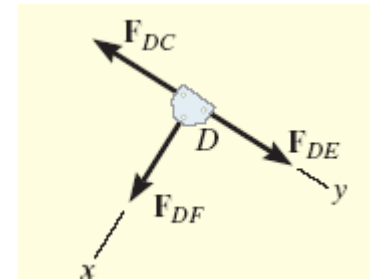
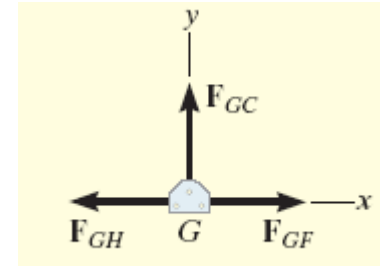
For Joint G,

$$+ \uparrow \sum F_y = 0 \Rightarrow F_{GC} = 0$$

GC is a zero-force member.

For Joint D,

$$\sum F_x = 0 \Rightarrow F_{DF} = 0$$

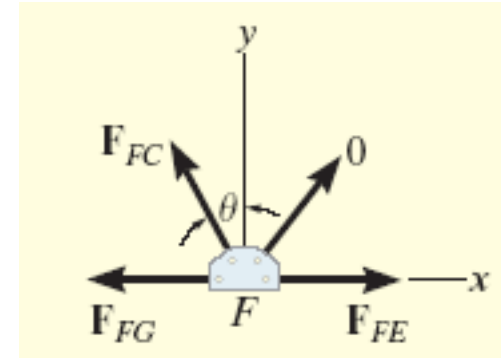


Solution

For Joint F,

$$+ \uparrow \sum F_y = 0 \Rightarrow F_{FC} \cos \theta = 0$$

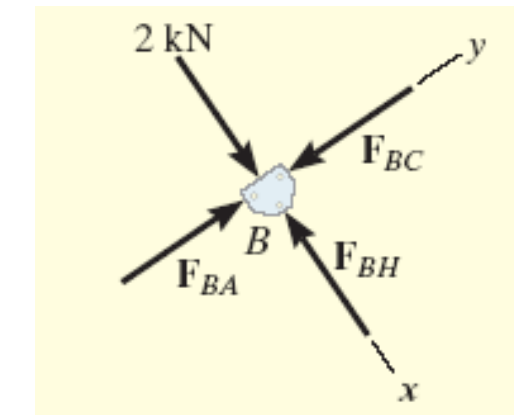
$$\theta \neq 90^\circ, F_{FC} = 0$$



For Joint B,

$$+ \uparrow \sum F_y = 0 \Rightarrow F_{FC} \cos \theta = 0$$

$$\theta \neq 90^\circ, F_{FC} = 0$$



Solution

F_{HC} satisfy $\sum F_y = 0$ and therefore HC is not a zero-force member.

