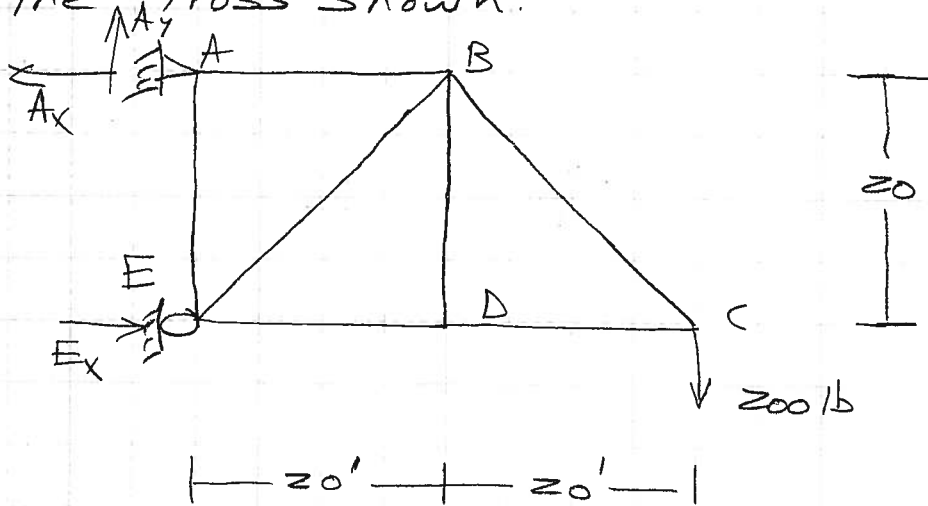


Use the "Brute Force" method of joints to calculate the force in each member of the truss shown.

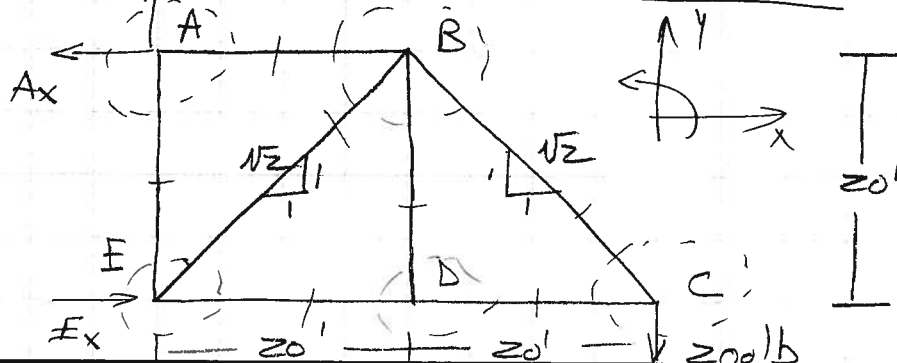


Check to see if truss may be statically determinate.

- (1) $m + r = 2j$
- (2) $7 + 3 = 2(5)$
- (3) $10 = 10$

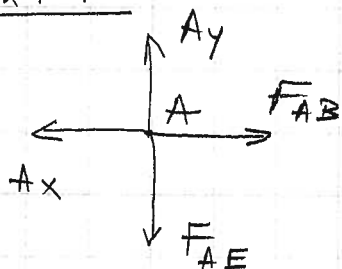
\therefore truss may be determinate

Draw F.B.D. of total truss



Examine each joint.

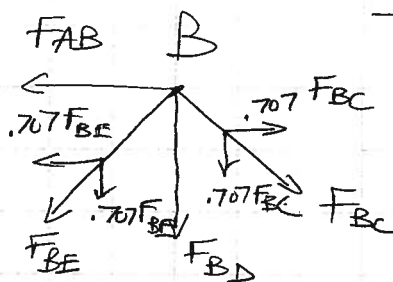
Joint A



$$\begin{aligned} \rightarrow \sum F_x &= 0 \\ F_{AB} - A_x &= 0 \end{aligned} \quad (4)$$

$$\begin{aligned} + \uparrow \sum F_y &= 0 \\ A_y - F_{AE} &= 0 \end{aligned} \quad (5)$$

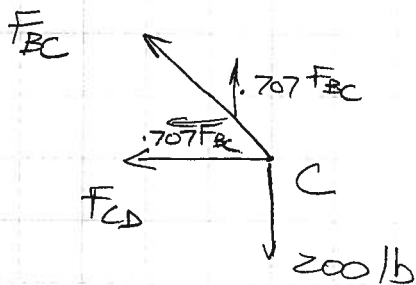
Joint B



$$\begin{aligned} \rightarrow \sum F_x &= 0 \\ -F_{AB} - .707F_{BE} + .707F_{BC} &= 0 \end{aligned} \quad (6)$$

$$\begin{aligned} + \uparrow \sum F_y &= 0 \\ -.707F_{BE} - F_{BD} - .707F_{BC} &= 0 \end{aligned} \quad (7)$$

Joint C



$$\begin{aligned} \rightarrow \sum F_x &= 0 \\ -.707F_{BC} - F_{CD} &= 0 \end{aligned} \quad (8)$$

$$\begin{aligned} + \uparrow \sum F_y &= 0 \\ .707F_{BC} - 200 &= 0 \end{aligned} \quad (9)$$

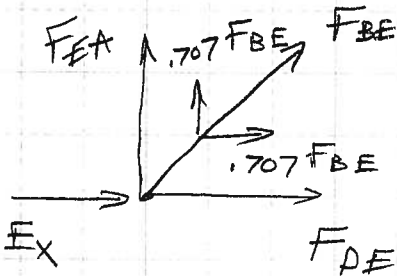
Joint D



$$\begin{aligned} \rightarrow \sum F_x &= 0 \\ -F_{DE} + F_{CD} &= 0 \end{aligned} \quad (10)$$

$$\begin{aligned} \uparrow \sum F_y &= 0 \\ F_{BD} &= 0 \end{aligned} \quad (11)$$

Joint E



$$\begin{aligned} \rightarrow \sum F_x &= 0 \\ F_x + .707 F_{BE} + F_{DE} &= 0 \end{aligned} \quad (12)$$

$$\begin{aligned} \uparrow \sum F_y &= 0 \\ F_{EA} + .707 F_{BE} &= 0 \end{aligned} \quad (13)$$

Solve Equations

Start with equation (9)

$$.707 F_{BC} - 200 = 0 \quad (9)$$

$$F_{BC} = 282.9 \text{ lb T} \quad (14)$$

Then go to equation (8)

$$-.707 \overset{282.9}{F_{BC}} - F_{CD} = 0 \quad (8)$$

$$F_{CD} = -200 \text{ lb or } 200 \text{ lb C} \quad (15)$$

Next go to equation (10)

$$-F_{DE} + \overset{-200}{\nearrow} F_{CD} = 0 \quad (10)$$

$$\underline{F_{DE} = -200 \text{ lb or } 200 \text{ lb C}} \quad (10)$$

Next go to equation (7)

$$-.707 F_{BE} - \overset{70}{\nearrow} F_{BD} - .707 \overset{282.9}{\nearrow} F_{BC} = 0 \quad (7)$$

$$\underline{F_{BE} = -282.9 \text{ lb or } 282.9 \text{ lb C}} \quad (7)$$

Next go to equation (6)

$$-F_{AB} - .707 \overset{-282.9}{\nearrow} F_{BE} + .707 \overset{282.9}{\nearrow} F_{BC} = 0 \quad (6)$$

$$\underline{F_{AB} = 400 \text{ lb T}} \quad (6)$$

Next go to equation (13)

$$F_{EA} + .707 \overset{-282.9}{\nearrow} F_{BE} = 0 \quad (13)$$

$$\underline{F_{EA} = 200 \text{ lb T}} \quad (13)$$

Next go to equation (12)

$$E_x + .707 \overset{-200}{F_{BE}} + \overset{-200}{F_{DE}} = 0 \quad (12)$$

$$\underline{E_x = 400 \text{ lb T}} \quad (20)$$

Next go to equation (4)

$$\overset{400}{F_{AB}} - A_x = 0 \quad (4)$$

$$\underline{A_x = 400 \text{ lb} \leftarrow \text{as shown}} \quad (21)$$

Finally go to equation (5)

$$A_y - \overset{200}{F_{AE}} = 0 \quad (5)$$

$$A_y = 200 \text{ lb} \uparrow \text{ as shown} \quad (22)$$

Summary

