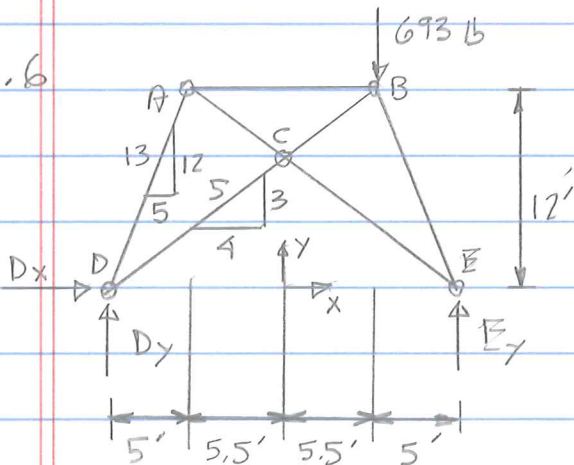


Homework # 5 Solution

3-1

6.6



$$\sum M_D = 0: -693 \text{ lb} \cdot 16' + E_y \cdot 21' = 0$$

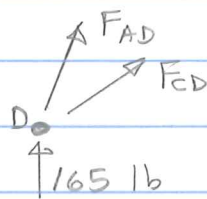
$$\Rightarrow E_y = 528 \text{ lb}$$

$$\sum F_y = 0: -693 \text{ lb} + D_y + E_y = 0$$

$$\Rightarrow D_y = 165 \text{ lb}$$

$$\sum F_x = 0 \Rightarrow D_x = 0$$

Joint D

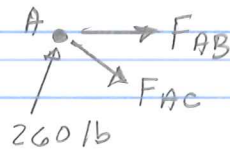


$$\sum F_x = 0: F_{AD} \frac{5}{13} + F_{CD} \frac{4}{5} = 0$$

$$\sum F_y = 0: 165 \text{ lb} + F_{AD} \frac{12}{13} + F_{CD} \frac{3}{5} = 0$$

$$F_{AD} = -260 \text{ lb (C)}, F_{CD} = 125 \text{ lb (T)}$$

Joint A

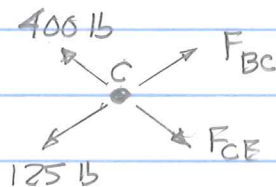


$$\sum F_x = 0: 260 \text{ lb} \cdot \frac{5}{13} + F_{AB} + F_{AC} \frac{4}{5} = 0$$

$$\sum F_y = 0: 260 \text{ lb} \cdot \frac{12}{13} - F_{AC} \frac{3}{5} = 0$$

$$F_{AC} = 400 \text{ lb (T)}, F_{AB} = -420 \text{ lb (C)}$$

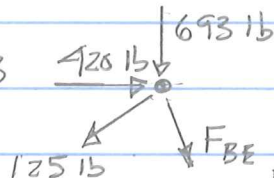
Joint C



By inspection

$$F_{BC} = 125 \text{ lb (T)}, F_{CE} = 400 \text{ lb (T)}$$

Joint B

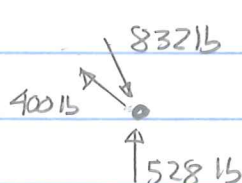


$$\sum F_x = 0: 420 \text{ lb} - 125 \text{ lb} \frac{4}{5} + F_{BE} \frac{5}{13} = 0$$

$$\sum F_y = 0: -693 \text{ lb} - 125 \text{ lb} \frac{3}{5} - F_{BE} \frac{12}{13} = 0$$

$$F_{BE} = -832 \text{ lb (C)}, \text{ by both (so checks)}$$

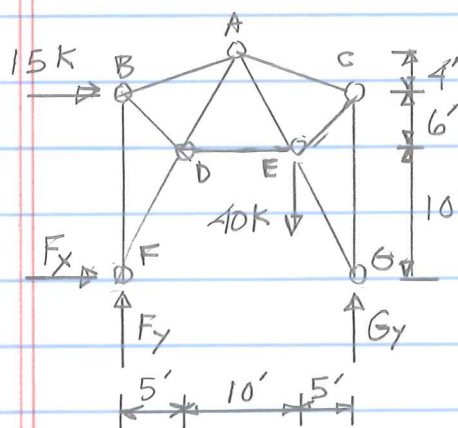
Joint E



$$\sum F_x = 0: 832 \text{ lb} \cdot \frac{5}{13} - 400 \text{ lb} \frac{4}{5} = 0 \text{ check}$$

$$\sum F_y = 0: 528 \text{ lb} - 832 \text{ lb} \frac{12}{13} + 400 \text{ lb} \frac{3}{5} = 0 \text{ check}$$

6.27



$$\sum M_F = 0: -15k \cdot 16.5' - 40k \cdot 15.5' + G_y \cdot 20.5' = 0$$

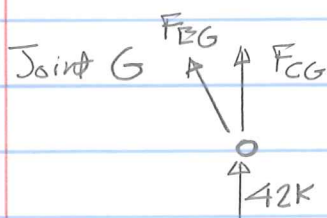
$$\Rightarrow G_y = 42k$$

$$\sum F_y = 0: -40k + F_y + G_y = 0$$

$$\Rightarrow F_y = -2k$$

$$\sum F_x = 0: 15k + F_x = 0$$

$$\Rightarrow F_x = -15k$$

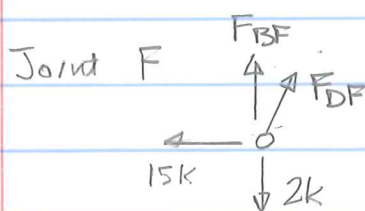


$$\sum F_x = 0 \Rightarrow$$

$$F_{EG} = 0$$

$$\sum F_y = 0 \Rightarrow$$

$$F_{CG} = -42k \quad (C)$$

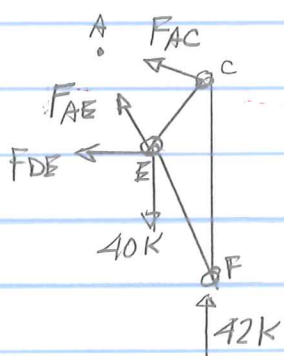


$$\sum F_x = 0: -15k + F_{DF} \frac{5}{\sqrt{125}} = 0$$

$$\sum F_y = 0: F_{BF} - 2k + F_{DF} \frac{10}{\sqrt{125}} = 0$$

$$F_{DF} = 33.541k \quad (T), \quad F_{BF} = -28k \quad (C)$$

Could continue with method of joints, but try a section for illustration.



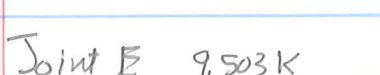
$$\sum M_A = 0: -F_{DE} \cdot 10.5' - 40k \cdot 5.5' + 42k \cdot 10.5' = 0$$

$$\Rightarrow F_{DE} = 22k \quad (T)$$

$$\sum F_x = 0: -F_{DE} - F_{AE} \frac{5}{\sqrt{125}} - F_{AC} \frac{10}{\sqrt{116}} = 0$$

$$\sum F_y = 0: 42k - 40k + F_{AE} \frac{10}{\sqrt{125}} + F_{AC} \frac{4}{\sqrt{116}} = 0$$

$$F_{AC} = -28.272k \quad (C), \quad F_{AE} = 9.503k \quad (T)$$



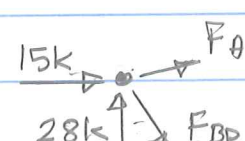
$$\sum F_x = 0: -22k - 9.503k \frac{5}{\sqrt{125}} + F_{CE} \frac{5}{\sqrt{161}} = 0$$

$$F_{CE} = 41.004k \quad (T)$$

$$\sum F_y = 0 \text{ used as a check. OK (not shown)}$$

Joint C used as a check. OK (not shown)

Joint B

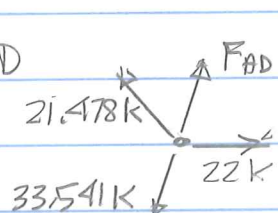


$$\sum F_x = 0: 15k + F_{AB} \cdot \frac{10}{\sqrt{116}} + F_{BD} \cdot \frac{5}{\sqrt{61}} = 0$$

$$\sum F_y = 0: 28k + F_{AB} \cdot \frac{4}{\sqrt{116}} - F_{BD} \cdot \frac{6}{\sqrt{61}} = 0$$

$$F_{BD} = 21.478 \text{ k (T)} \quad F_{AB} = -30.965 \text{ k (C)}$$

Joint D



$$\sum F_x = 0: 22k - 21.478k \cdot \frac{5}{\sqrt{61}} + (F_{AD} - 33.541k) \cdot \frac{5}{\sqrt{125}} = 0$$

$$F_{AD} = 15.093 \text{ k (T)}$$

$$\sum F_y = 0 \text{ used as a check. OK (not shown)}$$

Joint A used as a check. OK (not shown)

6.33 a. DG, thus BD

IS, thus HI

FG, thus GH

b. AC, thus CE, thus EF, thus FG, thus GH