P4.13. Determine the forces in all bars of the trusses. Indicate tension or compression.

Complete by Method of Joints.

Compute $R_E$: $\Sigma M$ about $G$

$\Sigma M_G = 0; \ 10 \times 8' - 4 \times 6' - R_E \cdot 16' = 0$

$R_E = 3.5$ kips

$\Sigma F = 0; \ F_{HG} - 4 = 0$

$F_{HG} = 4$ kips

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P4.37. Using the method of sections, determine the forces in the bars listed below each figure.

Freebody Left of Section (1) to Compute Force in Bar “EF”:

\[ \Sigma M_D = 0; \quad F_{DF}(9^\prime) - 30^\prime \times (12^\prime) = 0 \]

\[ F_{DF} = 40^\prime \text{ tension} \]

Freebody Joint “F”:

\[ \uparrow \Sigma F_y = 0; \quad F_{FH} = 0 \]

Freebody Left of Section (2) to Compute Bar Forces in Bars EI & ED:

\[ \Sigma M_{D} = 0; \quad -30^\prime (36^\prime) - 18^\prime (24^\prime) - 12^\prime (9^\prime) + F_{ED}(12^\prime) = 0 \]

\[ F_{ED} = 135^\prime \text{ compression} \]

\[ \Sigma M_I = 0; \quad -30^\prime (24^\prime) - 18^\prime (12^\prime) - 12^\prime (9^\prime) + F_{ED}(12^\prime) = 0 \]

\[ F_{ED} = 87^\prime \]

\[ \frac{F_{EDX}}{4^\prime} = \frac{87^\prime}{3^\prime} \quad F_{EDX} = 116^\prime \]

Thus \[ F_{ED} = 145^\prime \text{ tension} \]

Freebody Joint I:

\[ \uparrow \Sigma F_I = 0; \quad -F_{DI} + F_{DJ} = 0 \]

\[ F_{DI} = 135^\prime \text{ compression} \]
P4.40. Determine the forces in all bars of the truss. Indicate tension or compression. 

*Hint:* Start with the method of sections.

\[ \Sigma F_y = 0 \therefore A_y = 0 \]

Cut Section (2)–(5)

\[ \uparrow \Sigma F_j = 0; \quad A_j - 30 = 0 \]
\[ A_j = 30 \text{ kN} \uparrow \]

\[ \Sigma M_j = 0; \quad A_j F_{BC} 2 = 0 \]
\[ F_{BC} = \frac{3}{2} A_j = 45 \text{ kN} \]

\[ \Sigma F_z = 0; \quad -F_{BC} + F_{FE} = 0 \]
\[ F_{FE} = F_{BC} = 45 \text{ kN} \]

**Entire Structure**

\[ \Sigma M_E = 0; \quad 30 \times 9 - 30 \times 6 - E, 3 = 0 \]
\[ E = 30 \text{ kN} \downarrow \]

\[ \uparrow \Sigma F_j = 0; \quad 30 - 30 + R_D = 0 \]
\[ R_D = 30 \text{ kN} \uparrow \]

**Final Results Shown Above**