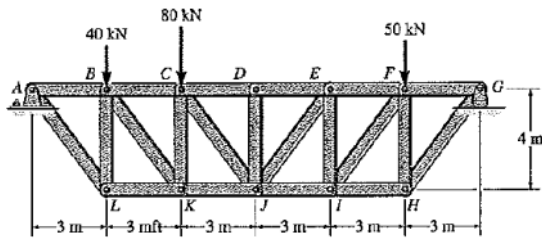
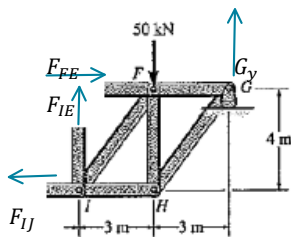


Forces in Truss (Solution)

5-21. Determine the force in members *EI* and *JI* of the truss which serves to support the deck of a bridge. State if these members are in tension or compression.



- (1) Make the cut such that members *EI* and *JI* remain.
- (2) FBD includes the external reaction force at *G* and the forces between members made by the cut.



Q5-21 from Statics & Mechanics of Materials 2e by Hibbeler

Why: Need to solve for the forces in each member.

Steps:

1. Determine where to make the Section
2. FBD
3. Solve external forces
4. Solve for forces in each member using Method of Sections

(3) Solve for G_y using the external forces from the full diagram.

$$\sum M_A = 18G_y - (3)(40) - (6)(80) - (15)(50) = 0$$

$$\Rightarrow G_y = 75 \text{ kN}$$

(4) Solve for the forces F_{IE} and F_{IJ} using the section.

$$\sum F_x = F_{FE} - F_{IJ} = 0$$

$$\sum F_y = G_y - 50 + F_{IE} = 0$$

$$\Rightarrow F_{IE} = 50 - 75 = -25 \text{ kN}$$

$$F_{IE} = 25 \text{ kN (C)}$$

$$\sum M_E = 6G_y - 4F_{IJ} - 3(50) = 0$$

$$\Rightarrow F_{IJ} = 75 \text{ kN}$$

$$F_{IJ} = 75 \text{ kN (T)}$$

Can also solve for F_{FE} then use $\sum F_x$ to solve for F_{IJ}

$$\sum M_I = 6G_y - (3)(50) - 4F_{FE}$$

$$\Rightarrow F_{FE} = 75 \text{ kN}$$

$$\sum F_x = F_{FE} - F_{IJ} = 0$$

$$\Rightarrow F_{IJ} = 75 \text{ kN}$$

Can also solve using

$$\sum M_F = 3G_y - 3F_{IE} - 4F_{IJ} = 0$$

$$\Rightarrow F_{IJ} = 75 \text{ kN}$$