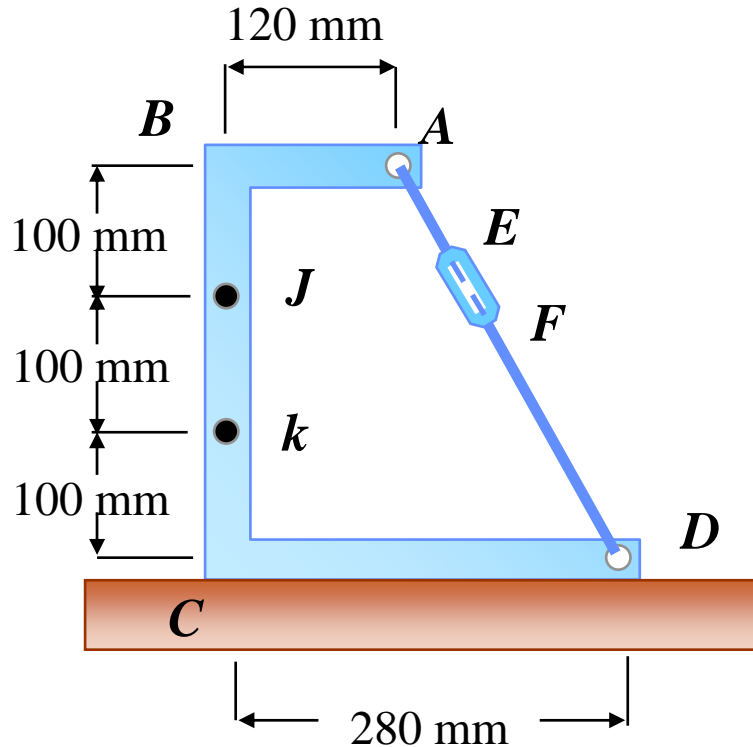
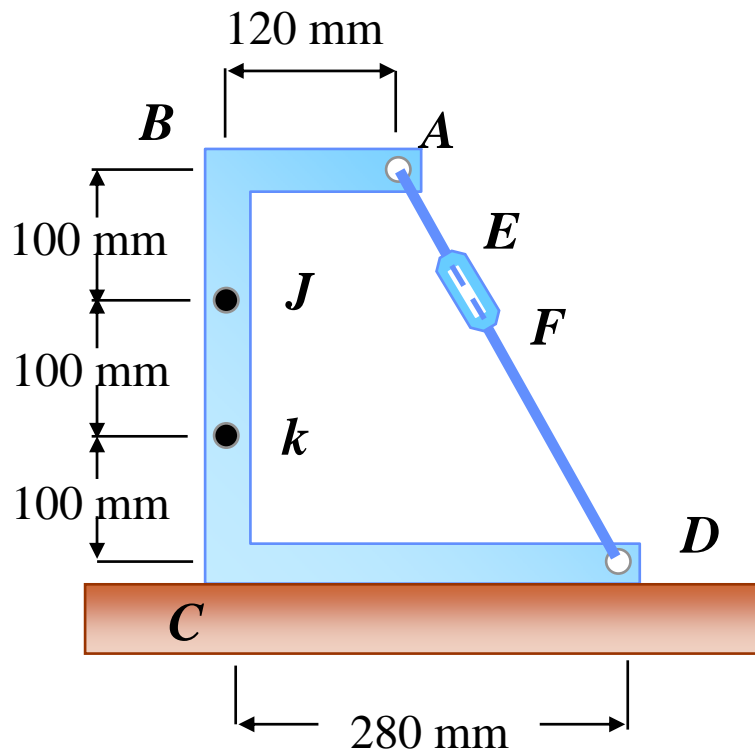


Problem 7.161



It has been experimentally determined that the bending moment at point K of the frame shown is 300 N-m. Determine (a) the tension in rods AE and FD , (b) the corresponding internal forces at point J .

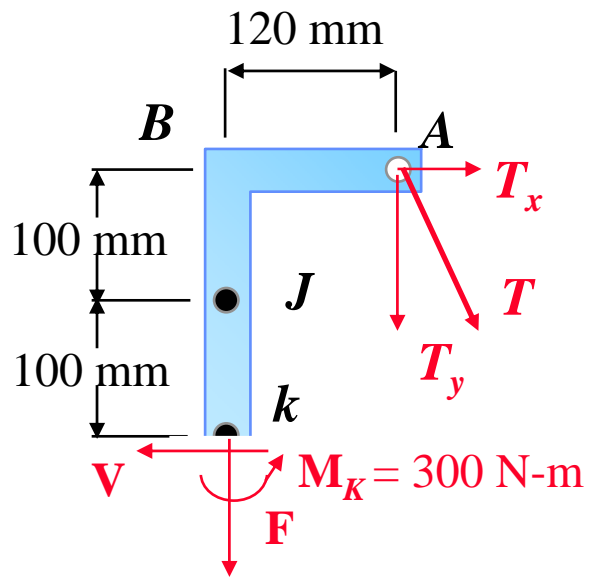


Solving Problems on Your Own

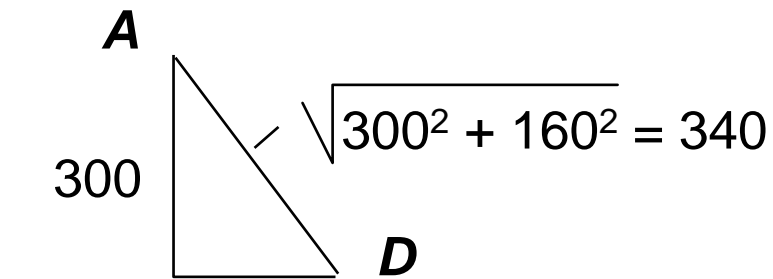
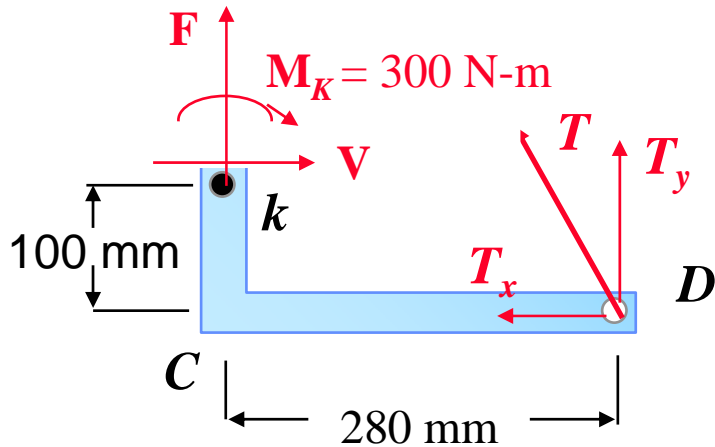
It has been experimentally determined that the bending moment at point K of the frame shown is 300 N-m. Determine (a) the tension in rods AE and FD , (b) the corresponding internal forces at point J .

1. *Cut the member at a point, and draw the free-body diagram of each of the two portions.*
2. *Select one of the two free-body diagrams* and use it to write the equations of equilibrium.

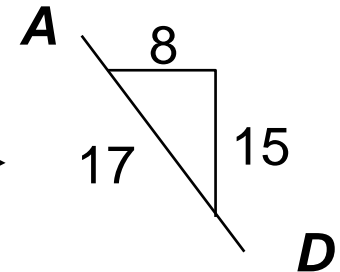
Problem 7.161 Solution



Cut the member at a point, and draw the free-body diagram of each of the two portions.

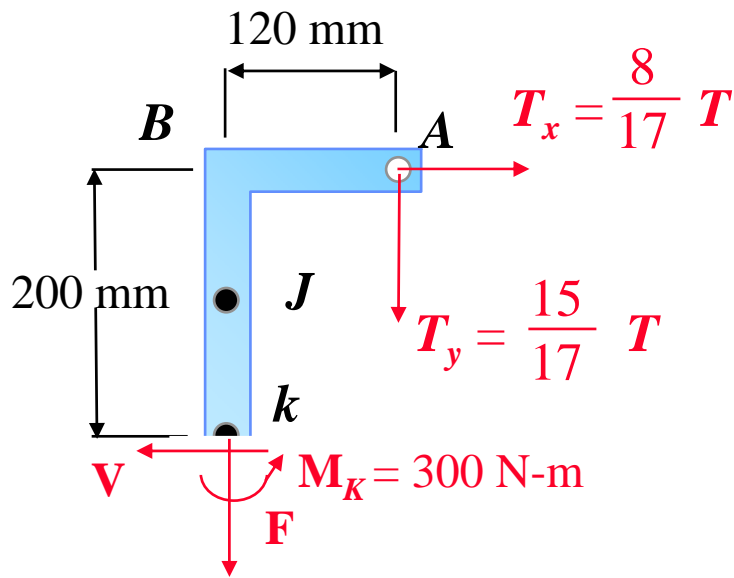


$$280 - 120 = 160$$



$$T_y = \frac{15}{17} T$$

$$T_x = \frac{8}{17} T$$

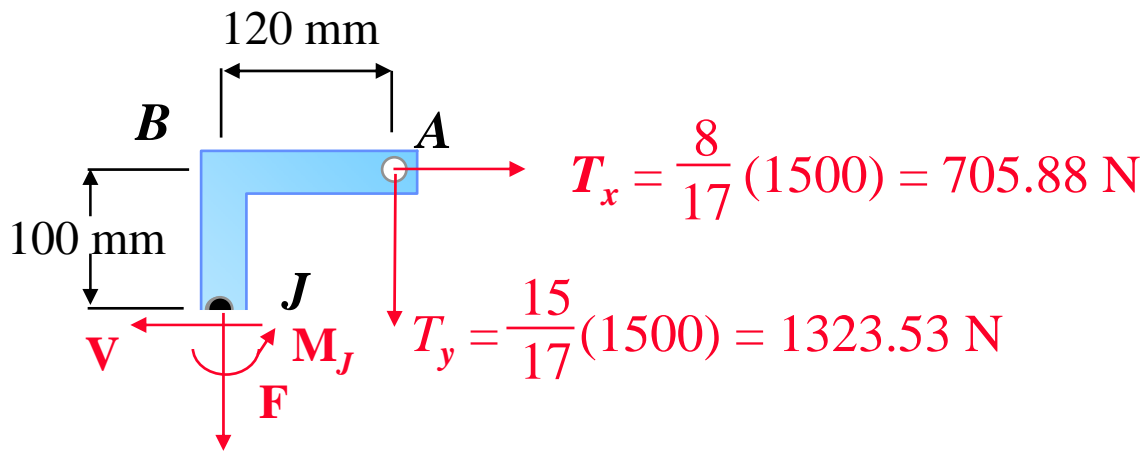


Select one of the two free-body diagrams and use it to write the equations of equilibrium.

Free Body: ABK

$$+ \left(\sum M_k = 0: \quad 300 \text{ N-m} - \frac{8}{17} T(0.2 \text{ m}) - \frac{15}{17} T(0.12 \text{ m}) = 0 \right.$$

$$T = 1500 \text{ N}$$



Free Body: ABJ

$$+\curvearrowleft \sum M_J = 0: M_J - (705.88 \text{ N})(0.1 \text{ m}) - (1323.53 \text{ N})(0.12 \text{ m}) = 0$$

$$M_J = 229 \text{ N}\cdot\text{m} \quad \curvearrowright$$

$$\rightarrow \sum F_x = 0: 705.88 \text{ N} - V = 0$$

$$V = 706 \text{ N} \quad \leftarrow$$

$$+\uparrow \sum F_y = 0: -F - 1323.53 \text{ N} = 0$$

$$F = 1324 \text{ N} \quad \uparrow$$