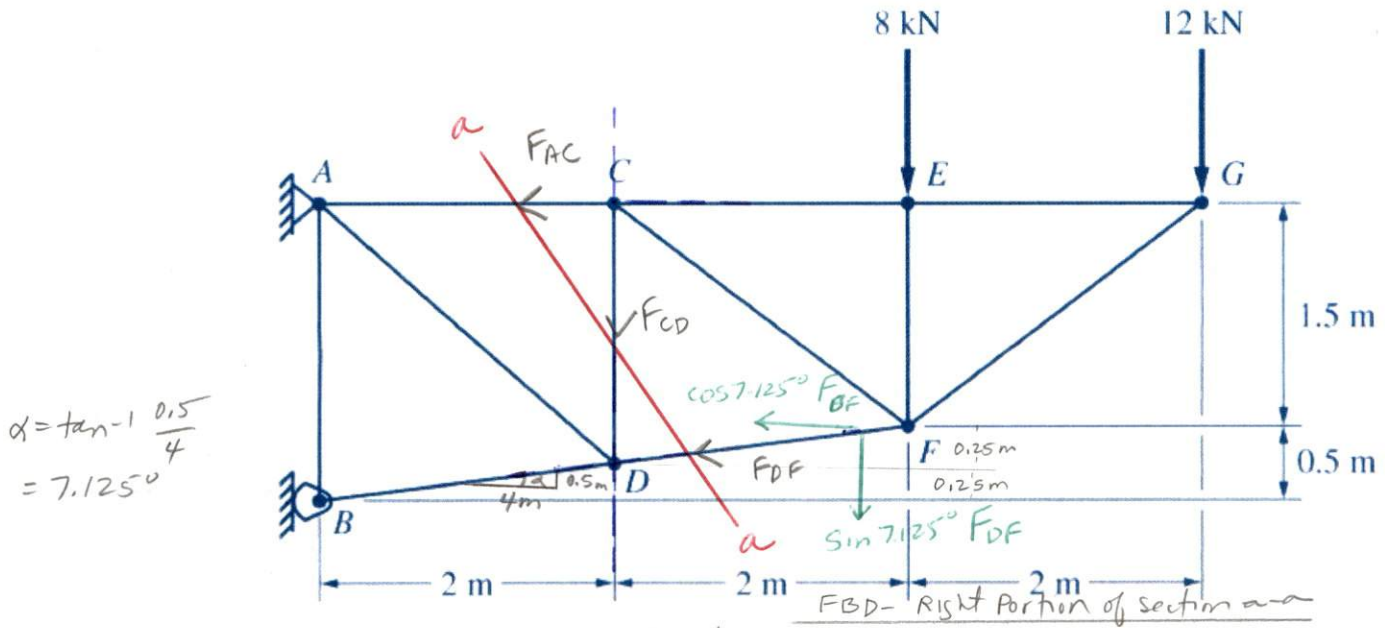


4-20 Refer to Fig. P4-20. Determine the forces in members AC, CD, and DF of the truss due to the loading shown.

Solution.



If we use the right-portion of section a-a we do not need to solve for the reactions at the supports A and B, F_{DF} resolved at D

$$[\sum M_C = 0] - 8\text{ kN}(2\text{ m}) - 12\text{ kN}(4\text{ m}) - \cos 7.125^\circ F_{DF}(1.75\text{ m}) = 0$$

$$F_{DF} = \frac{-64\text{ kN}\cdot\text{m}}{\cos 7.125^\circ (1.75\text{ m})} = -36.9\text{ kN (T)}$$

$$\text{and } F_{DF} = 36.9\text{ kN (C)}$$

$$[\sum M_D = 0] - 8\text{ kN}(2\text{ m}) - 12\text{ kN}(4\text{ m}) + F_{AC}(1.75\text{ m}) = 0$$

$$F_{AC} = \frac{64\text{ kN}\cdot\text{m}}{1.75\text{ m}} = \underline{\underline{36.6\text{ kN (T)}}$$

$$[\sum F_y = 0] - F_{CD} - 8\text{ kN} - 12\text{ kN} - \sin 7.125^\circ F_{DF} = 0$$

$$F_{CD} = -20\text{ kN} - \sin 7.125^\circ (-36.9\text{ kN}) = -15.4\text{ kN (T)}$$

$$\text{and } F_{CD} = 15.4\text{ kN (C)}$$