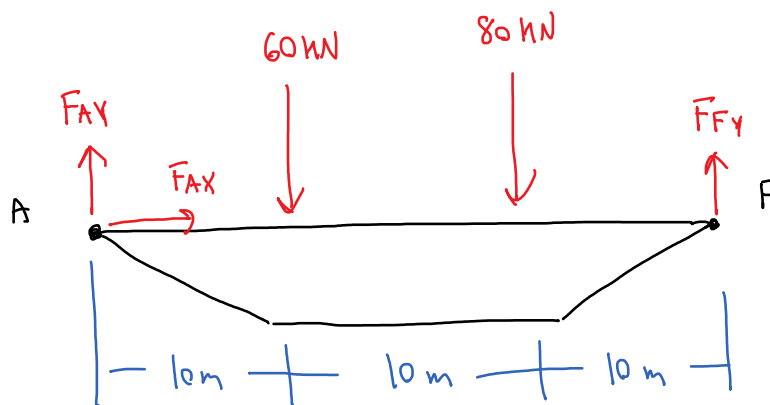
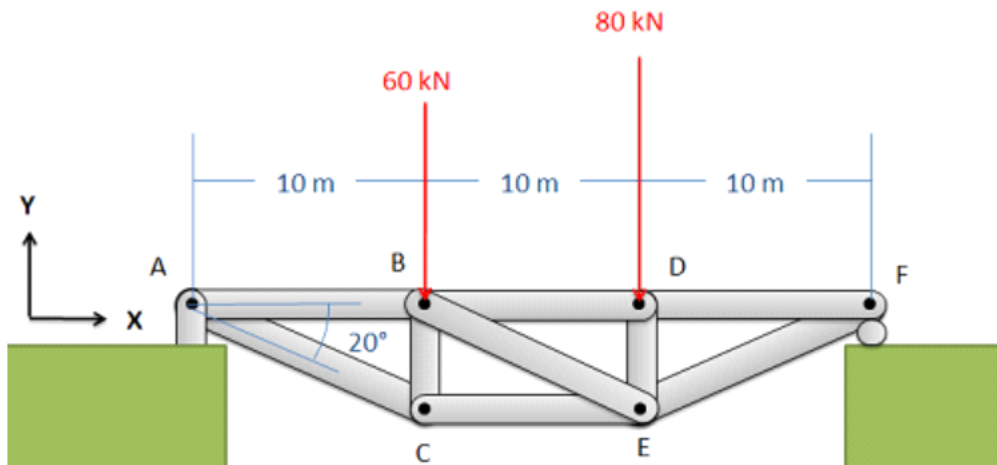


Question 1:

Find the force acting in each of the members in the truss bridge shown below. Remember to specify if each member is in tension or compression.



$$\sum F_x = F_{AX} = 0$$

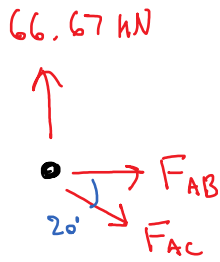
$$\sum F_y = F_{AY} + F_{FY} - 60 - 80 = 0$$

$$\sum M_A = (F_{FY})(30) - (60)(10) - (80)(20) = 0$$

$$\rightarrow F_{FY} = \frac{(60)(10) + (80)(20)}{30} = \underline{73.33 \text{ kN}}$$

$$\rightarrow F_{AY} = 60 + 80 - 73.33 = \underline{66.67 \text{ kN}}$$

Point A



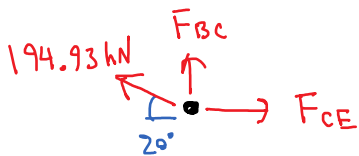
$$\sum F_x = F_{AB} + F_{AC} \cos(20) = 0$$

$$\sum F_y = 66.67 - F_{AC} \sin(20) = 0$$

$$F_{AC} = \frac{66.67}{\sin(20)} = \underline{194.93 \text{ kN}}$$

$$F_{AB} = -\cos(20)(194.93) = \underline{-183.17 \text{ kN}}$$

Point C



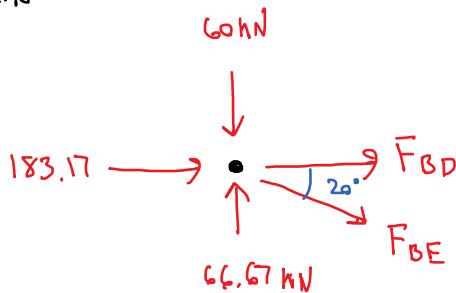
$$\sum F_x = -194.93 \cos(20) + F_{CE} = 0$$

$$\sum F_y = 194.93 \sin(20) + F_{BC} = 0$$

$$F_{CE} = 194.93 \cos(20) = \underline{183.17 \text{ kN}}$$

$$F_{BC} = -194.93 \sin(20) = \underline{-66.67 \text{ kN}}$$

Point B



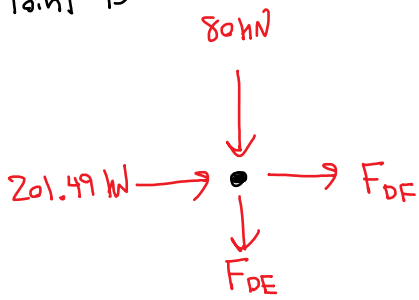
$$\sum F_x = 183.17 + F_{BD} + F_{BE} \cos(20) = 0$$

$$\sum F_y = 66.67 - 60 - F_{BE} \sin(20) = 0$$

$$F_{BE} = \frac{6.67}{\sin(20)} = \underline{19.50 \text{ kN}}$$

$$F_{BD} = -183.17 - (19.50) \cos(20) = \underline{-201.49 \text{ kN}}$$

Point D



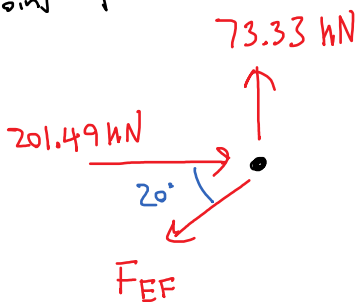
$$\sum F_x = 201.49 + F_{DF} = 0$$

$$\sum F_y = -80 - F_{DE} = 0$$

$$F_{DF} = -201.49 \text{ kN}$$

$$F_{DE} = -80 \text{ kN}$$

Point F



$$\sum F_y = 73.33 - F_{EF} \sin(20) = 0$$

$$F_{EF} = \frac{73.33}{\sin(20)} = \underline{214.40 \text{ kN}}$$

Solution:

$$F_{AB} = 183.17 \text{ kN C}$$

$$F_{AC} = 194.93 \text{ kN T}$$

$$F_{BC} = 66.67 \text{ kN C}$$

$$F_{BD} = 201.49 \text{ kN C}$$

$$F_{BE} = 19.50 \text{ kN T}$$

$$F_{CE} = 183.17 \text{ kN T}$$

$$F_{DE} = 80 \text{ kN C}$$

$$F_{DF} = 201.49 \text{ kN C}$$

$$F_{EF} = 214.40 \text{ kN T}$$