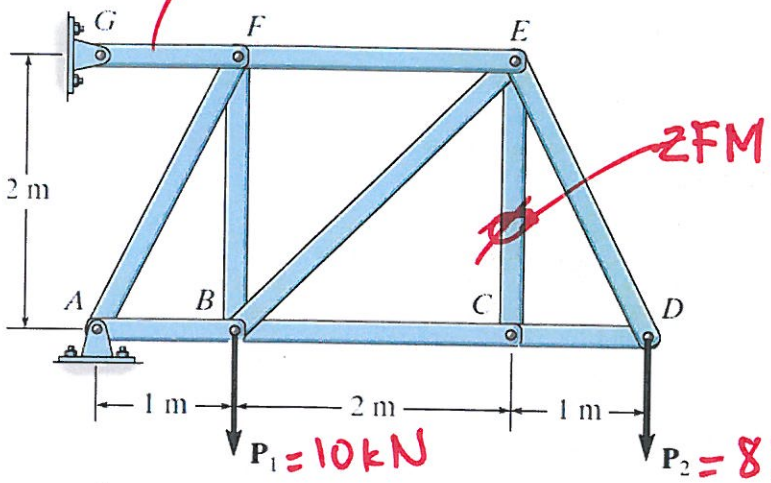
6-18

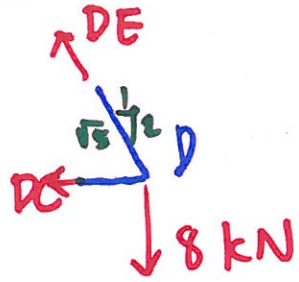
Determine the force in each member of the truss and state if the members are in tension or compression. Set $P_1 = 10$ kN, $P_2 = 8$ kN.



2 Force member

2FM

Joint D:



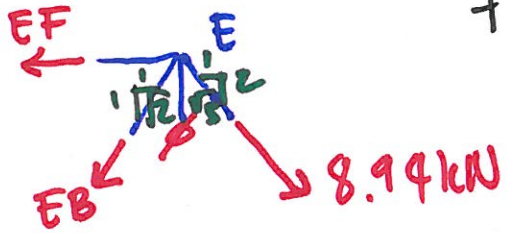
$+\uparrow \Sigma F_y = 0 = \left(\frac{2}{\sqrt{5}}\right) DE - 8 \Rightarrow DE = 8.94\ \text{kN (T)}$ Ans

$+\rightarrow \Sigma F_x = 0 = -DC - \frac{1}{\sqrt{5}} DE \Rightarrow DC = -4.00$

$DC = 4.00\ \text{kN (C)}$

By inspection joint C: $BC = DC = 4.00\ \text{kN (C)}$

Joint E:

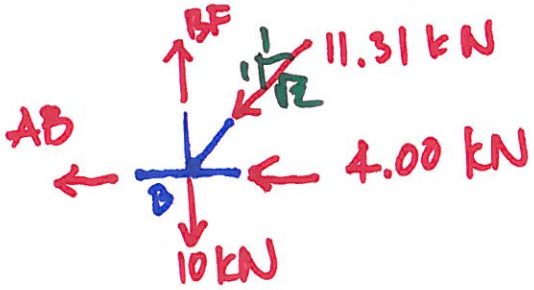


$+\uparrow \Sigma F_y = 0 = -\frac{1}{\sqrt{2}} EB - \frac{2}{\sqrt{5}} DE \Rightarrow EB = -11.31\text{kN}$ (8.94 kN)

$\Rightarrow EB = 11.31\ \text{kN (C)}$

$+\rightarrow \Sigma F_x = 0 = -EF - \frac{1}{\sqrt{2}} EB + \frac{1}{\sqrt{5}} DE \Rightarrow EF = 12.00\text{kN (T)}$ (−11.3 kN, 8.94 kN)

Joint B:



$+\uparrow \Sigma F_y = 0 = BF - 10 - \frac{1}{\sqrt{2}}(11.31)$

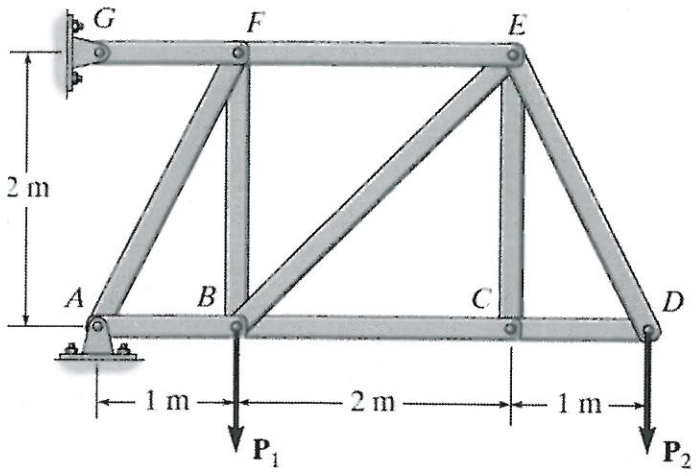
$BF = 18.00\ \text{kN (T)}$

$+\rightarrow \Sigma F_x = 0 = -AB - 4 - \frac{1}{\sqrt{2}}(11.31)$

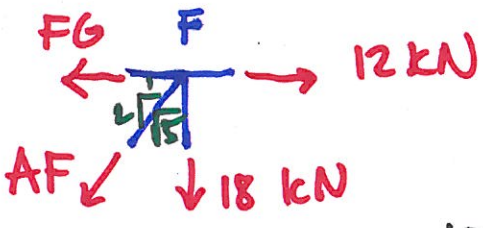
$AB = -12.00\ \text{kN} \Rightarrow AB = 12.00\text{kN (C)}$

6-18 (con't)

Determine the force in each member of the truss and state if the members are in tension or compression. Set $P_1 = 10$ kN, $P_2 = 8$ kN.



Joint F:



$+\uparrow \Sigma F_y = 0 = -AF\left(\frac{2}{\sqrt{5}}\right) - 18 \Rightarrow AF = -20.12$

$AF = 20.12 \text{ kN (C)}$

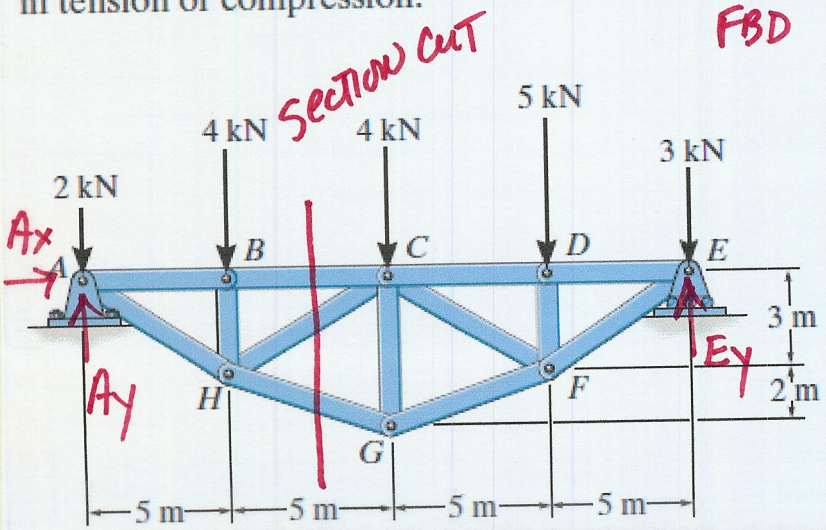
-20.12

$+\rightarrow \Sigma F_x = 0 = -FG - \frac{1}{\sqrt{5}} AF + 12$

$FG = 20.0 \text{ kN (T)}$

5.35.

Determine the force in members *BC*, *HC*, and *HG*. After the truss is sectioned use a single equation of equilibrium for the calculation of each force. State if these members are in tension or compression.

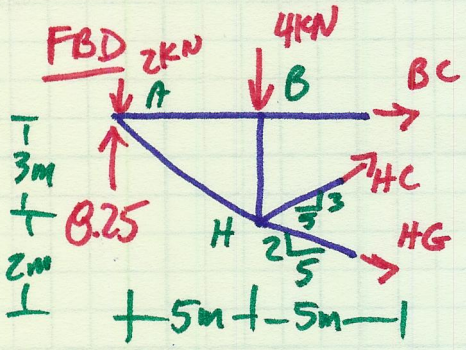


$\circlearrowright \Sigma M_E = 0$

$20A_y - 15(4) - 10(4) - 5(5) - 20(2) = 0$

$A_y = 8.25\ kN \uparrow$

$A_x = 0$



$\uparrow Y$ $\rightarrow X$

$\circlearrowright \Sigma M_H = 0$

$3BC + 5(8.25) - 3(5) = 0$

$BC = 70.4 = 10.4\ kN\ (C)$

$\uparrow \Sigma F_y = 8.25 - 2 - 4 + \frac{3}{\sqrt{34}} HC - \frac{2}{\sqrt{29}} HG = 0$

$\rightarrow \Sigma F_x = 0$

$BC + \frac{5}{\sqrt{34}} HC + \frac{5}{\sqrt{29}} HG = 0$

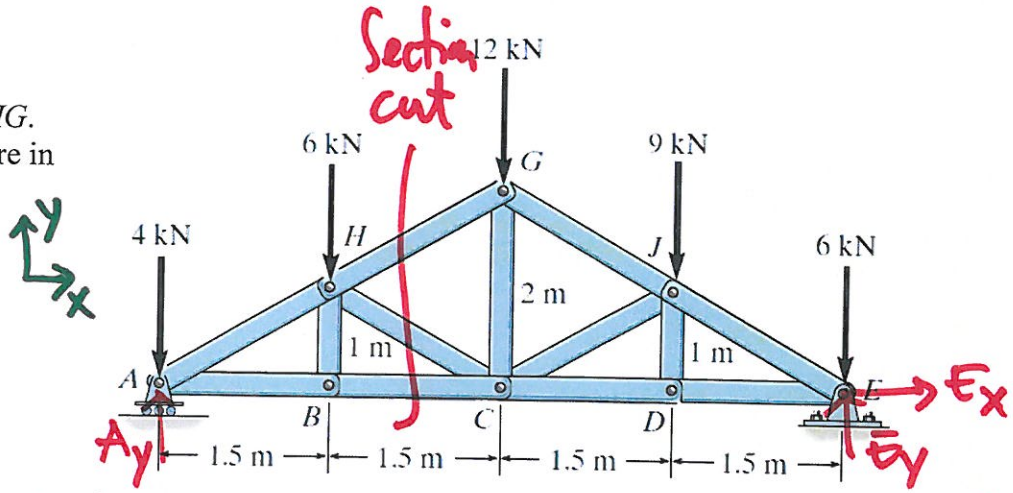
$$\begin{bmatrix} \frac{3}{\sqrt{34}} & -\frac{2}{\sqrt{29}} \\ \frac{5}{\sqrt{34}} & \frac{5}{\sqrt{29}} \end{bmatrix} \begin{Bmatrix} HC \\ HG \end{Bmatrix} = \begin{Bmatrix} -7.25 \\ 10.4 \end{Bmatrix}$$

$HC = 2.23\ kN\ (T)$

$HG = 9.14\ kN\ (T)$

6-42

Determine the force in members *BC*, *HC*, and *HG*. State if these members are in tension or compression.

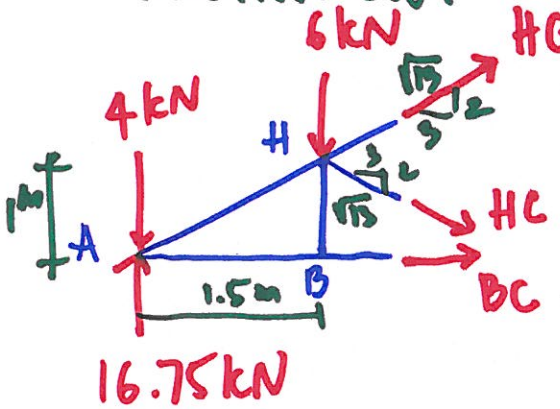


FBD for the whole truss (to find support rxns):

$\circlearrowleft \Sigma M_E = 0 = -A_y(6) + 4(6) + 6(4.5) + 12(3) + 9(1.5)$

$A_y = 16.75\ kN \uparrow$

Section cut:



$\circlearrowleft \Sigma M_H = 0 = BC(1) + 4(1.5) - 16.75(1.5)$

$BC = 19.13\ kN\ (T)$

$\circlearrowleft \Sigma M_A = 0 = -\frac{3}{\sqrt{13}} HC(1) - \frac{2}{\sqrt{13}} HC(1.5) - 6(1.5)$

$\Rightarrow HC = -5.41\ kN \circlearrowleft \quad HC = 5.41\ kN\ (C)$

$+\uparrow \Sigma F_y = 0 = 16.75 - 4 - 6 - \frac{2}{\sqrt{13}}(-5.41\ kN) + \frac{2}{\sqrt{13}} HG$

$HG = -17.58\ kN \Rightarrow HG = 17.58\ kN\ (C)$