DTY Tutoring, inc.
Email: dtytutoring@gmail.com
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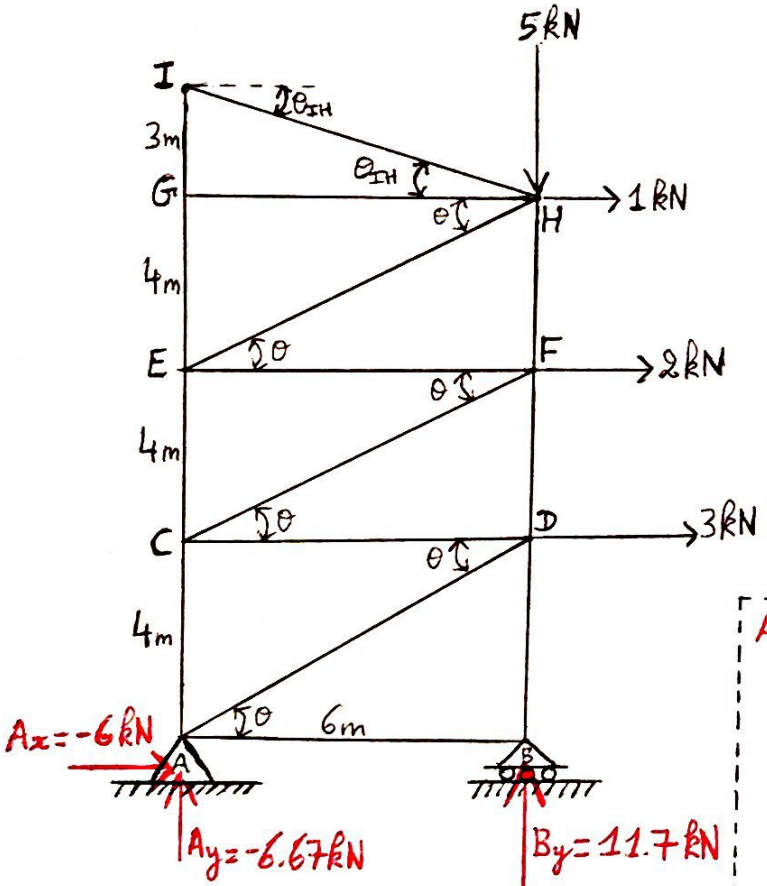
Date: 11th December 2020



$\tan(\theta) = \frac{4m}{6m} \Rightarrow \theta = \tan^{-1}\left(\frac{4}{6}\right) = 33.69°$

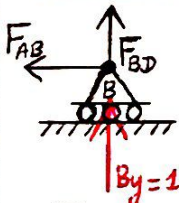
$\tan(\theta_{IH}) = \frac{3m}{6m} \Rightarrow \theta_{IH} = \tan^{-1}\left(\frac{3}{6}\right) = 26.6°$

$\pm\rightarrow \sum F_x = 0$; $A_x + 3kN + 2kN + 1kN = 0 \Rightarrow A_x = -6kN = 6kN\leftarrow$

$+\circlearrowleft \sum M_A = 0$; $(B_y)(6m) + (-3kN)(4m) + (-2kN)(8m) + (-1kN)(12m) + (-5kN)(6m) = 0 \Rightarrow B_y = 11.7kN$

$+\uparrow \sum F_y = 0$; $A_y + B_y - (5kN) = 0 \Rightarrow A_y = 5 - 11.7 = -6.67kN = 6.67kN\downarrow$

Joint B



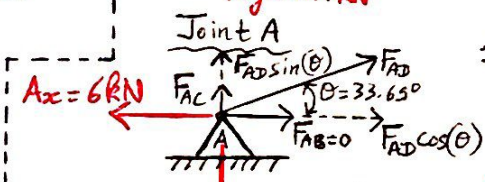
$\pm\rightarrow \sum F_x = 0$; $F_{AB} = 0$

$+\uparrow \sum F_y = 0$; $F_{BD} + B_y = 0$

$F_{BD} = -B_y = -11.7kN$

$F_{BD} = 11.7kN(C)$

Joint A



$\pm\rightarrow \sum F_x = 0$;

$F_{AD}\cos(\theta) - A_x = 0$

$F_{AD}\cos(33.69) - 6.67 = 0$

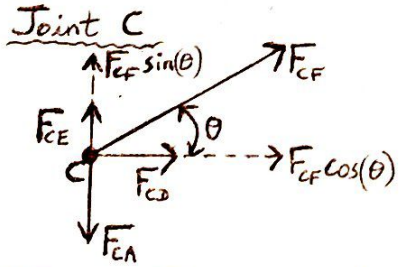
$F_{AD} = 7.211kN(T)$

$+\uparrow \sum F_y = 0$; $F_{AC} + F_{AD}\sin(\theta) - A_y = 0$

$F_{AC} + 7.211\sin(33.69) - 6.67 = 0$

$F_{AC} = 2.67kN(T)$

Joint C



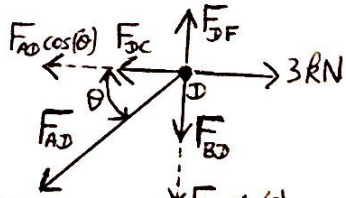
$\pm\rightarrow \sum F_x = 0$; $F_{CD} + F_{CF}\cos(\theta) = 0$

$(-3kN) + F_{CF}\cos(33.69) = 0 \Rightarrow F_{CF} = 3.60kN(T)$

$+\uparrow \sum F_y = 0$; $F_{CF}\sin(\theta) + F_{CE} - F_{CA} = 0$

$[(3.60)\sin(33.69)] + F_{CE} - (2.67) = 0 \Rightarrow F_{CE} = 0.67kN(T)$

Joint D



$\pm\rightarrow \sum F_x = 0$;

$(3kN) - (F_{DC}) - F_{AD}\cos(\theta) = 0$

$(3kN) - F_{DC} - (7.211)\cos(33.69) = 0$

$F_{DC} = -2.99kN = -3kN = 3kN(C) = F_{CD}$

$+\uparrow \sum F_y = 0$; $F_{DF} - F_{BD} - F_{AD}\sin(\theta) = 0$

$F_{DF} - (-11.7) - (7.211)\sin(33.69) = 0$

$F_{DF} = -7.7kN = 7.70kN(C)$

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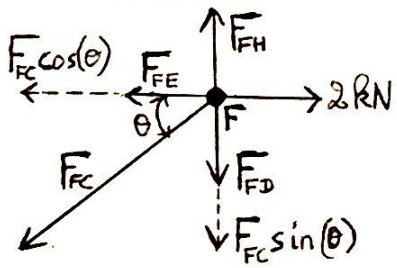
Joint F



$+\uparrow \sum F_y = 0;\ F_{FH} - F_{FD} - F_{FC}\sin(\theta) = 0$

$F_{FH} - (-7.7\,kN) - [(3.60)\sin(33.69)] = 0$

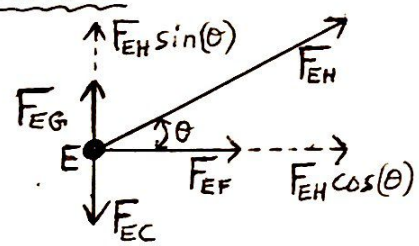
$\boxed{F_{FH} = -5.71\,kN = 5.71\,kN\,(C)}$

$\pm\rightarrow \sum F_x = 0;\ (2\,kN) - F_{FE} - F_{FC}\cos(\theta) = 0$

$(2\,kN) - F_{FE} - [(3.60)\cos(33.69)] = 0 \Rightarrow F_{FE} = -0.987\,kN$

$\boxed{F_{FE} = 0.987\,kN\,(C)}$

Joint E



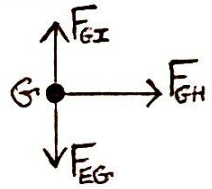
$\pm\rightarrow \sum F_x = 0;\ F_{EF} + F_{EH}\cos(\theta) = 0$

$\boxed{F_{EH} = -\frac{F_{EF}}{\cos(\theta)} = -\frac{(-0.987)}{\cos(33.69)} = 1.20\,kN\,(T)}$

$+\uparrow \sum F_y = 0;\ F_{EH}\sin(\theta) + F_{EG} - F_{EC} = 0 \Rightarrow [1.20\sin(33.69)] + F_{EG} - 0.67 = 0 \Rightarrow$

$\boxed{F_{EG} = 7.36\times10^{-3}\,kN\,(T) \approx 0}$

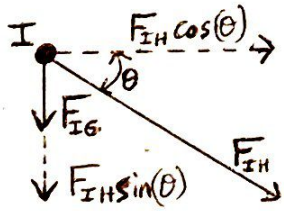
Joint G



$\pm\rightarrow \sum F_x = 0;\ \boxed{F_{GH} = 0}$

$+\uparrow \sum F_y = 0;\ \boxed{F_{GI} = F_{EG} = 0}$

Joint I



$\pm\rightarrow \sum F_x = 0;\ F_{IH}\cos(\theta) = 0$

$\boxed{F_{IH} = 0}$

$+\downarrow \sum F_y = 0;\ F_{IG} + F_{IH}\sin(\theta) = 0$

$\boxed{F_{IG} = 0}$

Zero force members:

$F_{AB}, F_{EG}, F_{GH}, F_{GI}, F_{IH}$