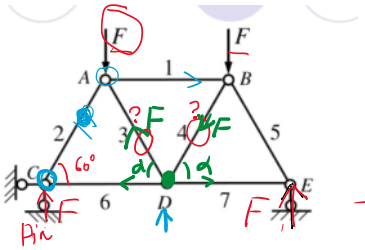
R7

Thursday, February 15, 2024 1:56 PM

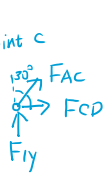



Solve force on AD & BD

$\Rightarrow F_{1x} = 0$

$\Leftarrow F_{1y} = F_{2y} = F$

point C

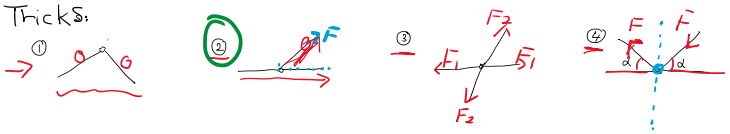



$\Sigma F_y = 0 \Rightarrow F_{1y} + F_{AC}\cos(30°) = 0$

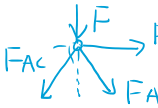
$\Sigma F_x = 0 \Rightarrow F_{AC}\sin(30°) + F_{CD} = 0$

$\Rightarrow F_{AC} = \dfrac{-F}{\cos(30°)}$

Tricks:



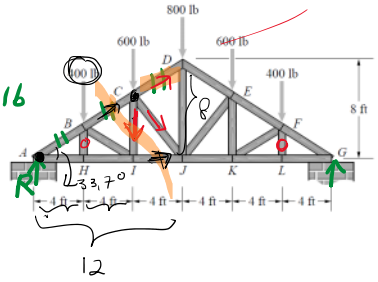

point A




$\Sigma F_y = 0 \Rightarrow F_{AC}\cos(30°) + F + F_{AD}\cos(\theta°) = 0$ (0)

$\Sigma F_x = 0 \Rightarrow F_{AC}\sin(30°) = F_{AB} + F_{AD}\sin(\theta°)$

**Problem 6.26** The Howe truss helps support a roof. Model the supports at *A* and *G* as roller supports. Determine the axial forces in members *AB*, *BC*, and *CD*.




$R = \dfrac{400+600+800+600+400}{2} = 1400\,lb$

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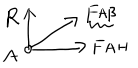
method of joint @ A:



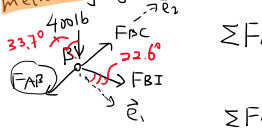

$\Sigma F_y: F_{AB}\sin(33.7°) + R = 0$

$F_{AB} = -2523.916$

method of section along moment @ A = 0

$400 \times 4 = F_{CI} \times 8 \Rightarrow F_{CI} = 200\,lb$

method of joint @ B:



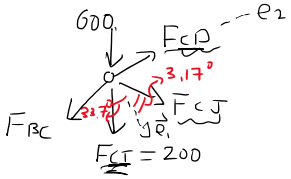

$\Sigma F_{e_1} = 0: \quad 400\cos(33.7°) + F_{BI}\cos(22.6°) = 0$

$\Rightarrow F_{BI} = -360\,lb$ Compression

$\Sigma F_{e_2} = 0: \quad F_{AB} + 400\sin(33.7°) = F_{BI}\sin(62.6°) + F_{BC}$

$\Rightarrow F_{BC} = 2163\,lb$

Method of joint @ C




$F_J = 666\,lb$

$\Sigma F_{e_1} = 0 \Rightarrow 600\cos(33.7°) + F_{CI}\cos(33.7°) + F_{CJ}\cos(3.17°) = 0$

$\Sigma F_{e_2} = 0 \Rightarrow F_{CD} + F_{CJ}\sin(3.17°) = F_{BC} + 600\sin(33.7°) = 0$

$\Rightarrow F_{CD} = -1682\,lb$