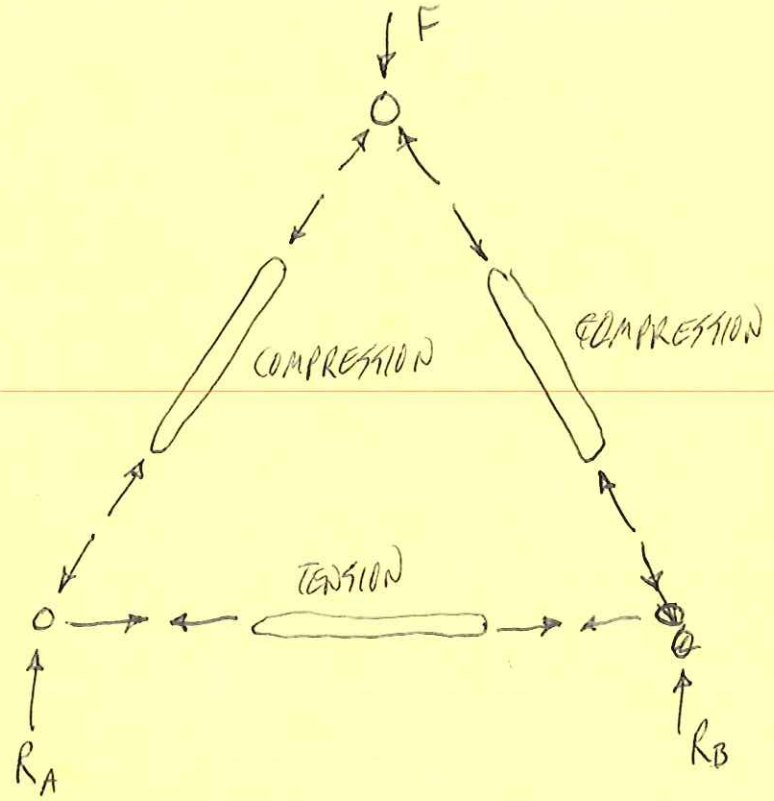
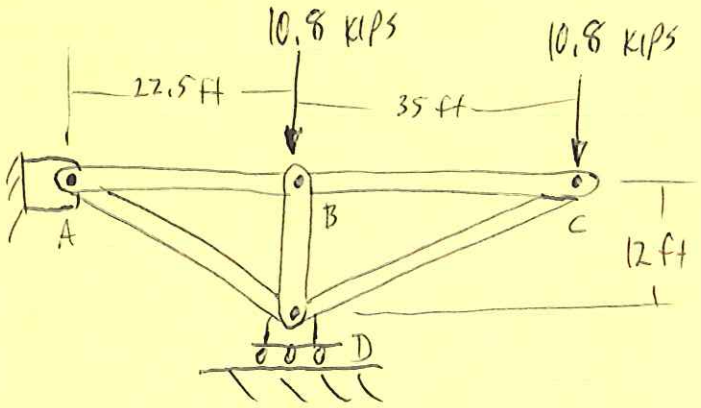
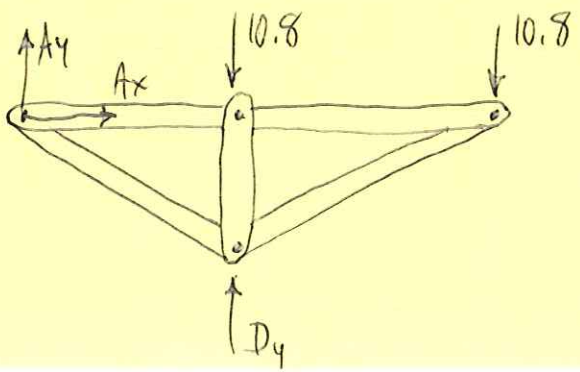


EXAMPLE PROB. 6.4



FREE-BODY DIAGRAM OF TRUSS:



$\Sigma F_x = 0 : \quad A_x = 0$

$\Sigma F_y = 0 : \quad A_y + D_y = 21.6$

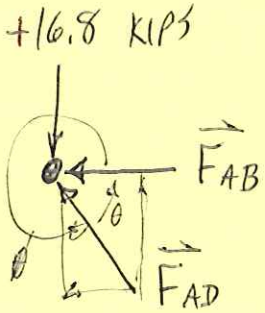
$\Sigma M_A = 0 \; +\circlearrowleft$

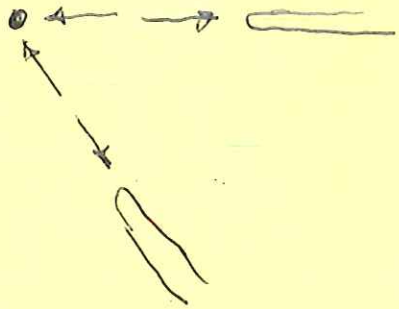
$(22.5^{FT} D_y) - (22.5^{FT})(10.8 \text{ KIPS}) - (57.5 \text{ FT})(10.8 \text{ KIPS}) = 0$

$D_y = 38.4 \text{ KIPS}$

$A_y = 21.6 - 38.4 = -16.8 \text{ KIPS}$

FBD OF PIN A:





$\theta = \tan^{-1}\left(\frac{12}{22.5}\right) = 28.1^\circ$

$\vec{F}_{AB} = (-F_{AB})\,\hat{i}$

$\vec{F}_{AD} = (-\cos 28.1^\circ F_{AD})\,\hat{i} + (\sin 28.1^\circ F_{AD})\,\hat{j}$

$\vec{F}_{AD} = (-0.882 F_{AD})\,\hat{i} + (0.471 F_{AD})\,\hat{j}$

$\Sigma F_x = 0$:

$-F_{AB} - 0.882 F_{AD} = 0$

$F_{AB} = -0.882 F_{AD}$ EQN. (1)

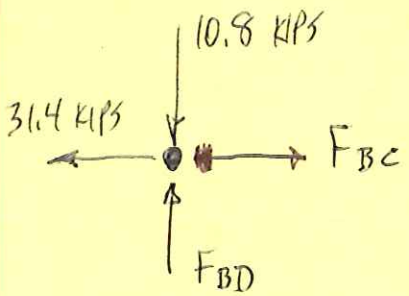
$\Sigma F_y = 0$:

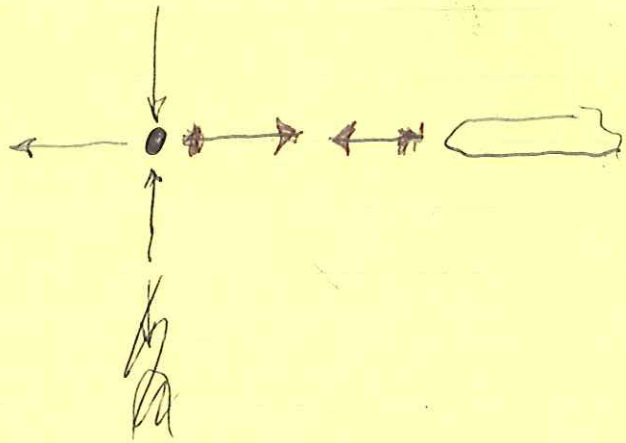
$-16.8 + 0.471 F_{AD} = 0$

$F_{AD} = 35.7$ KIPS (COMPRESSION)

$F_{AB} = -0.882(35.7) = -31.4$ KIPS (TENSION)

FBD AT PIN B:





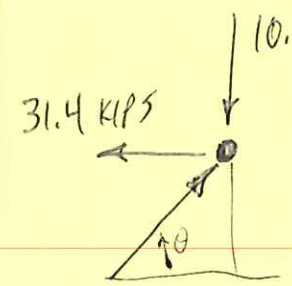
$\Sigma F_x = 0$:

$F_{BC} = +31.4$ KIPS (TENSION)

$\Sigma F_y = 0$:

$F_{BD} = 10.8$ KIPS (COMPRESSION)

FBD AT PIN C:



$$\theta = \tan^{-1}\left(\frac{12}{35}\right) = 18.9^\circ$$

$$\vec{F}_{CD} = (\cos 18.9^\circ F_{CD})\,\hat{i} + (\sin 18.9^\circ F_{CD})\,\hat{j}$$

$$\vec{F}_{CD} = (0.946\,F_{CD})\,\hat{i} + (0.324\,F_{CD})\,\hat{j} \text{ KIPS}$$

$$\Sigma F_x = 0$$

$$-31.4 + 0.946\,F_{CD} = 0$$

$$F_{CD} = 33.2 \text{ KIPS} \quad (\text{COMPRESSION})$$

$$\Sigma F_y = 0:$$

$$-10.8 + 0.324\,F_{CD} = 0$$

$$F_{CD} = 33.3 \text{ KIPS} \quad \text{CHECKS} \checkmark$$

METHOD OF SECTIONS

METHOD OF JOINTS IS USED WHEN ALL FORCES IN MEMBERS IS NEEDED; M.O.S. IS USED WHEN A SELECT FEW ARE NEEDED.