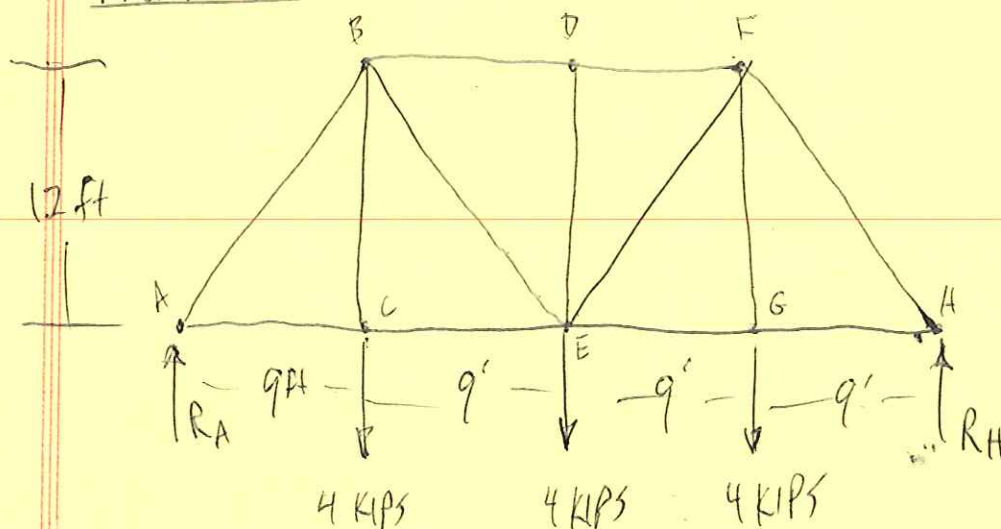


RETURN TO DR. THOMAS

①

HOMWORK #6 SOLUTIONS 6.15, 6.49, 6.95, 6.145

PROB. 6.15



FIND FORCES
IN MEMBERS

ENTIRE TRUSS:

$$\sum F_y = 0:$$

$$R_A + R_H = 12$$

$$\sum M_A = 0: +\curvearrowright$$

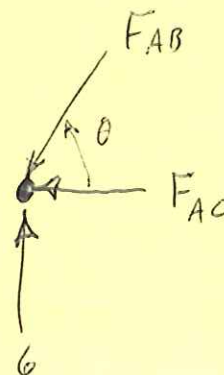
$$(36 \text{ ft}) R_H = (9 \text{ ft})(4 \text{ kips}) + (18)(4) + (27)(4)$$

$$R_H = 6 \text{ kips}$$

$$R_A = 6 \text{ kips}$$

FBD OF PIN A:

$$\theta = \tan^{-1}\left(\frac{12}{9}\right) = 53.1^\circ$$



PROB 6.15

$$\sum F_x = 0 \rightarrow \vec{F}_{AB} = (-\cos 53.1^\circ F_{AB})\hat{i} + (-\sin 53.1^\circ F_{AB})\hat{j}$$

$$\vec{F}_{AB} = (-0.6 F_{AB})\hat{i} + (-0.8 F_{AB})\hat{j} \text{ KIPS}$$

$$\sum F_x = 0: -F_{AC} - 0.6 F_{AB} = 0$$

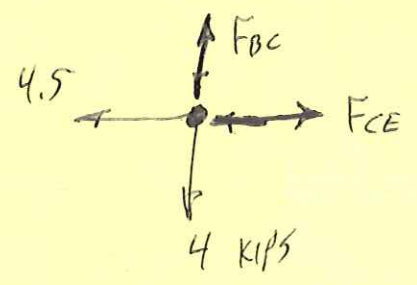
$$F_{AC} = -0.6 F_{AB} \quad \text{EQN. (1)}$$

$$\sum F_y = 0: -0.8 F_{AB} + 6 = 0$$

$$F_{AB} = 7.5 \text{ KIPS (COMPRESSION)}$$

$$F_{AC} = -0.6(7.5) = -4.5 \text{ KIPS (TENSION)}$$

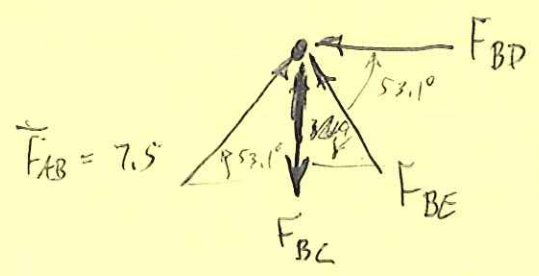
FBD OF PIN C:



$$F_{CE} = 4.5 \text{ KIPS (TENSION)}$$

$$F_{BC} = 4 \text{ KIPS (TENSION)}$$

FBD OF PIN B:



PROB. 6.15

$$\vec{F}_{AB} = (0.6 \cdot 7.5) \hat{i} + (0.8 \cdot 7.5) \hat{j} = (4.5) \hat{i} + (6) \hat{j}$$

$$\vec{F}_{BE} = (-\cos 53.1^\circ F_{BE}) \hat{i} + (\sin 53.1^\circ F_{BE}) \hat{j}$$

$$\vec{F}_{BE} = (-0.6 F_{BE}) \hat{i} + (0.8 F_{BE}) \hat{j} \quad \text{KIPS}$$

$$\sum F_x = 0 : 4.5 - F_{BD} - 0.6 F_{BE} = 0$$

$$\sum F_y = 0 : 6 - 4 + 0.8 F_{BE} = 0$$

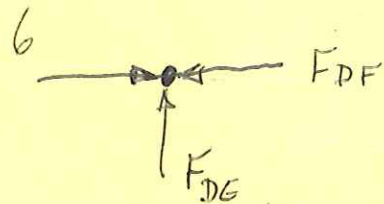
$$F_{BE} = -2.5 \quad \text{KIPS (TENSION)}$$

$$F_{BD} = 4.5 - 0.6(-2.5) = 6 \quad \text{KIPS (COMPRESSION)}$$

FBD OF PIN D:

$$F_{DF} = 6 \quad \text{KIPS (COMPRESSION)}$$

$$F_{DE} = 0$$



BY SYMMETRY,

$$F_{AB} = F_{FH} = 7.5 \quad \text{KIPS (C)}$$

$$F_{AC} = F_{GH} = 4.5 \quad \text{KIPS (T)}$$

$$F_{BC} = F_{FG} = 4 \quad \text{KIPS (T)}$$

$$F_{BE} = F_{EF} = 2.5 \quad \text{KIPS (T)}$$

$$F_{CE} = F_{EG} = 4.5 \quad \text{KIPS (T)}$$

$$F_{BD} = F_{DF} = 6 \quad \text{KIPS (C)}$$