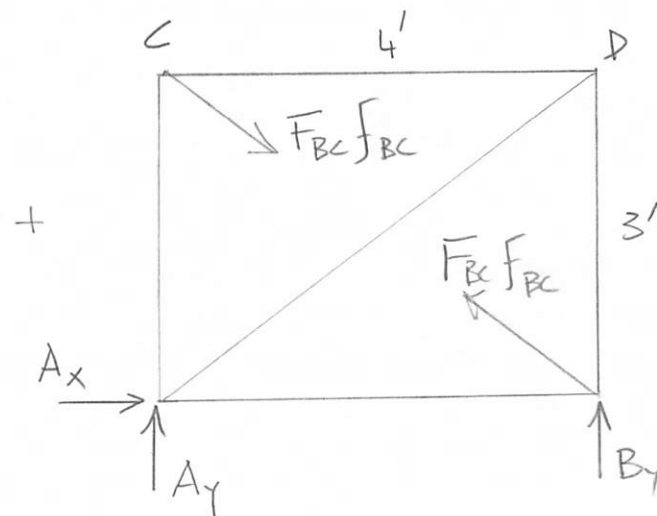
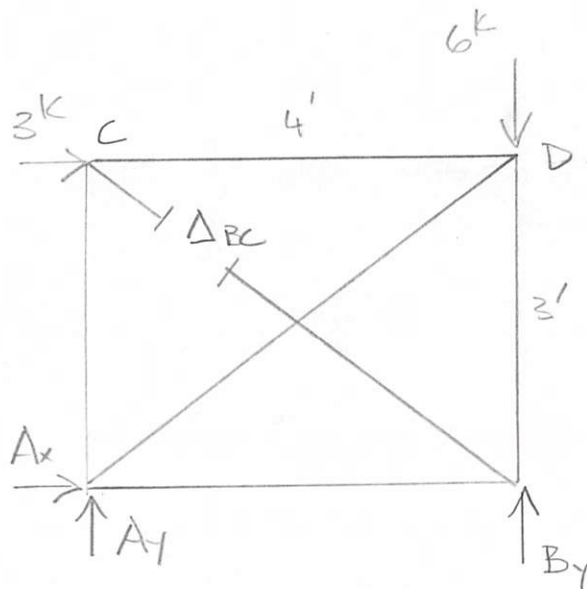
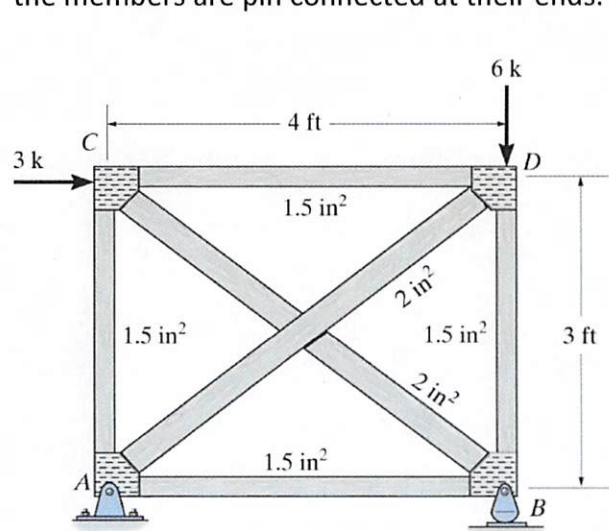


Problem 9-30 – Determine the force in each truss member. The cross-sectional area of each member is indicated in the figure. $E=29(103)$ ksi. Assume the members are pin connected at their ends.



$$\Delta_{BC} + F_{BC} f_{BC} = 0$$

REAL FORCES

JOINT C

$$+\uparrow \sum F_y = 0 = F_{AC}$$

$$+\rightarrow \sum F_x = 0$$

$$= F_{CD} + 3k$$

$$\underline{F_{CD} = -3k}$$

JOINT D

$$+\rightarrow \sum F_x = 0$$

$$= -F_{CD} - \frac{4}{5} F_{AD}$$

$$\underline{F_{AD} = 3.75k}$$

$$+\uparrow \sum F_y = 0$$

$$= -F_{BD} - \frac{3}{5} F_{AD} - 6k$$

$$\underline{F_{BD} = -8.25k}$$

JOINT B

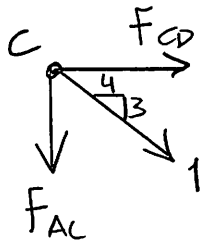
$$+\rightarrow \sum F_x = 0$$

$$= F_{AB} = 0$$

Problem 9-30 – Determine the force in each truss member. The cross-sectional area of each member is indicated in the figure. $E=29(103)$ ksi. Assume the members are pin connected at their ends.

VIRTUAL FORCES

JOINT C



$$+\uparrow \sum F_y = 0$$

$$= -\frac{3}{5}(1) - f_{AC}$$

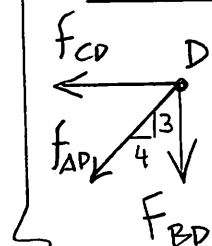
$$\underline{f_{AC} = -0.6}$$

$$+\rightarrow \sum F_x = 0$$

$$= f_{CD} + \frac{4}{5}(1)$$

$$\underline{f_{CD} = -0.8}$$

JOINT D



$$+\rightarrow \sum F_x = 0$$

$$= -f_{CD} - \frac{4}{5}f_{AD}$$

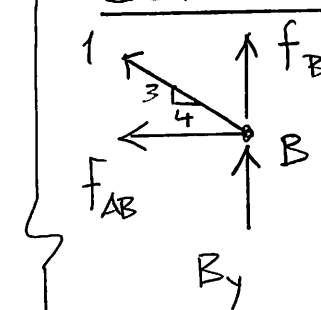
$$\underline{f_{AD} = 1}$$

$$+\uparrow \sum F_y = 0$$

$$= -f_{BD} - \frac{3}{5}f_{AD}$$

$$\underline{f_{BD} = -0.6}$$

JOINT B



$$+\rightarrow \sum F_x = 0$$

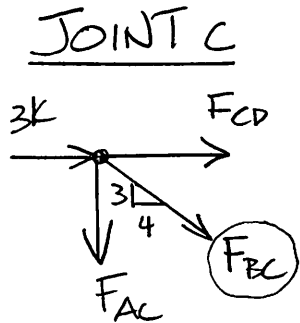
$$= -\frac{4}{5}(1) - f_{AB}$$

$$\underline{f_{AB} = -0.8}$$

MEMBERS	F(k)	f	L(ft)	A(in ²)	FfL/A (kft/in ²)	fFL/A (f/in ²)
AB	0	-0.8	4	1.5	0	1.71
BD	-8.25	-0.6	3	1.5	9.90	0.72
DC	-3	-0.8	4	1.5	6.40	1.71
CA	0	-0.6	3	1.5	0	0.72
AD	3.75	1	5	2	-9.38	2.50
BC	0	1	5	2	0	2.50
Σ					25.60	9.86

Problem 9-30 – Determine the force in each truss member. The cross-sectional area of each member is indicated in the figure. $E=29(103)$ ksi. Assume the members are pin connected at their ends.

$$F_{BC} = -\frac{\Delta_{BC}}{f_{BC}} = -\frac{25.68 \text{ k ft/in}^2}{9.86 \text{ ft/in}^2} = \underline{\underline{-2.61 \text{ k}}}$$

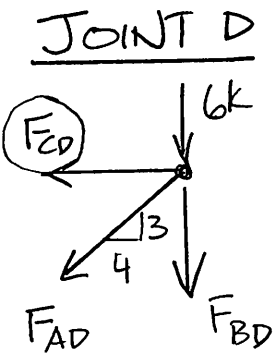


$$+\uparrow \sum F_y = 0 = -F_{AC} - \frac{3}{5} F_{BC}$$

$$\underline{\underline{F_{AC} = 1.56 \text{ k}}}$$

$$+\rightarrow \sum F_x = 0 = F_{CD} + \frac{4}{5} F_{BC} + 3 \text{ k}$$

$$\underline{\underline{F_{CD} = -0.92 \text{ k}}}$$

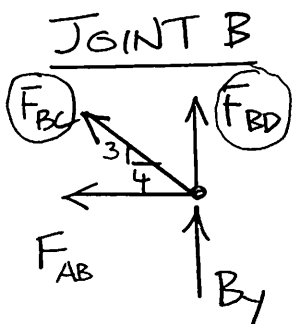


$$+\rightarrow \sum F_x = 0 = -F_{CD} - \frac{4}{5} F_{AD}$$

$$\underline{\underline{F_{AD} = 1.15 \text{ k}}}$$

$$+\uparrow \sum F_y = 0 = -F_{BD} - \frac{3}{5} F_{AD} - 6 \text{ k}$$

$$\underline{\underline{F_{BD} = -6.69 \text{ k}}}$$



$$+\rightarrow \sum F_x = 0 = -F_{AB} - \frac{4}{5} F_{BC}$$

$$\underline{\underline{F_{AB} = 2.08 \text{ k}}}$$

$$+\uparrow \sum F_y = 0 = F_{BD} + \frac{3}{5} F_{BC} + B_y$$

$$\underline{\underline{B_y = 8.25 \text{ k}}}$$