1-19

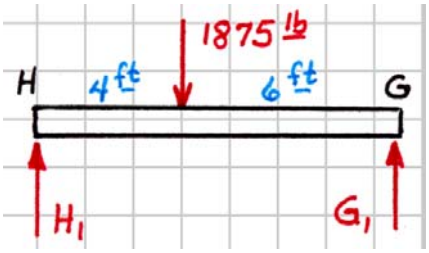
Use $W = 3750$ lb (the weight carried by one truss). Then by symmetry (or from equilibrium of a free-body diagram of the entire truss) each support carries half of the total weight

$$E_y = A_y = W/2 = 1875 \text{ lb}$$

Also by symmetry (or equilibrium of a free-body diagram of the truck), the truck's weight is divided equally between its front and rear wheels.

$$N_F = N_R = W/2 = 1875 \text{ lb}$$

Then equilibrium of the floor panel between pins *G* and *H* gives



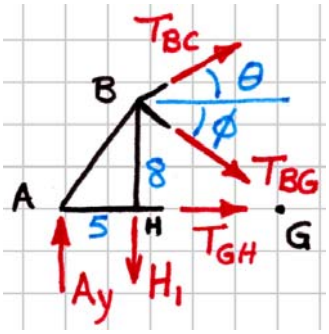
$$\circlearrowleft \Sigma M_H = 0: \quad 10G_1 - 4(1875) = 0$$

$$G_1 = 750 \text{ lb}$$

$$\circlearrowleft \Sigma M_G = 0: \quad 6(1875) - 10H_1 = 0$$

$$H_1 = 1125 \text{ lb}$$

Next, from a free-body diagram of a section of the left side of the truss



$$\theta = \tan^{-1}\frac{5}{10} = 26.565^\circ \qquad \phi = \tan^{-1}\frac{8}{10} = 38.660^\circ$$

$$\circlearrowleft \Sigma M_B = 0: \quad 8T_{GH} - 5(1875) = 0$$

$$T_{GH} = 1171.875 \text{ lb}$$

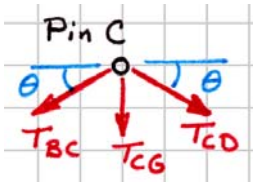
$$\circlearrowleft \Sigma M_G = 0: \quad -15(1875) - 8(T_{BC}\cos\theta) - 10(T_{BC}\sin\theta) + 10(1125) = 0$$

$$T_{BC} = -1451.295 \text{ lb} \cong 1451 \text{ lb (C)} \quad \text{Ans.}$$

$$\uparrow \Sigma F_y = 0: \quad 1875 + T_{BC}\sin\theta - T_{BG}\sin\phi - 1125 = 0$$

$$T_{BG} = +161.6 \text{ lb} = 161.6 \text{ lb (T)} \quad \text{Ans.}$$

Finally, from a free-body diagram of pin *C*



$$\rightarrow \Sigma F_x = 0: \quad T_{CD}\cos\theta - T_{BC}\cos\theta = 0$$

$$\uparrow \Sigma F_y = 0: \quad -T_{BC}\sin\theta - T_{CD}\sin\theta - T_{CG} = 0$$

$$T_{CD} = -1451.295 \text{ lb}$$

$$T_{CG} = +1298 \text{ lb} = 1298 \text{ lb (T)} \quad \text{Ans.}$$