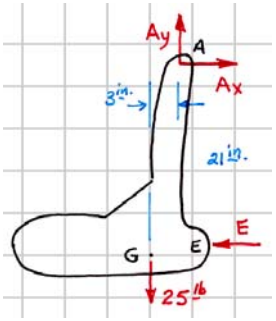
1-35*

From an overall free-body diagram, the equations of equilibrium give



$$\rightarrow \Sigma F_x = 0: \qquad A_x - E = 0$$

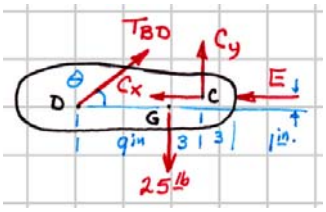
$$\uparrow \Sigma F_y = 0: \qquad A_y - 25 = 0$$

$$\circlearrowleft \Sigma M_A = 0: \qquad 3(25) - 21E = 0$$

$$A_x = E = 3.57143 \text{ lb}$$

$$A_y = 25 \text{ lb}$$

Assume that the weight of the seat back is very small compared to the weight of the seat. Then the center of gravity of the seat and the center of gravity of the entire chair are the same point. A free-body diagram of the seat gives



$$\rightarrow \Sigma F_x = 0: \qquad T_{BD}\cos\theta - C_x = 0$$

$$\uparrow \Sigma F_y = 0: \qquad C_y + T_{BD}\sin\theta - 25 = 0$$

$$\circlearrowleft \Sigma M_C = 0: \qquad 3(25) - 12(T_{BD}\sin\theta) + 1(T_{BD}\cos\theta) = 0$$

in which $\theta = \tan^{-1}\dfrac{10}{12} = 39.806°$

$$T_{BD} = 10.8476 \text{ lb} \qquad C_x = 4.76188 \text{ lb} \qquad C_y = 18.0555 \text{ lb}$$

A = 25.3 lb ◢ 81.87° ..... **Ans.**

T_{BD} = 10.85 lb ◤ 39.81° ..... **Ans.**

C = 18.67 lb ◥ 75.23° ..... **Ans.**