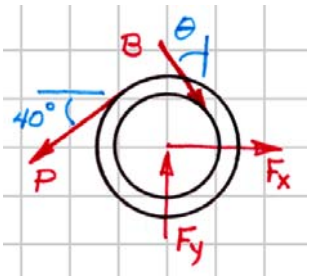
1-41

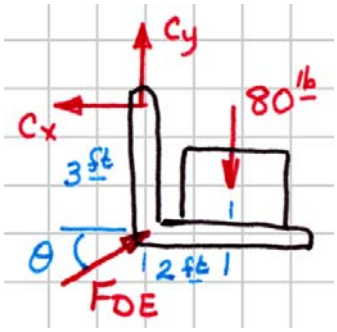
First draw a free-body diagram of the wheel. It is stated that the pin *B* is at or near the surface of the wheel. Then, the equations of equilibrium give



$$\circlearrowleft \Sigma M_{axle} = 0: \qquad 2P - 2B = 0$$

$$P = B$$

Next, from a free-body diagram of the platform, the equations of equilibrium give



$$\rightarrow \Sigma F_x = 0: \qquad F_{DE}\cos\theta - C_x = 0$$

$$\uparrow \Sigma F_y = 0: \qquad C_y + F_{DE}\sin\theta - 80 = 0$$

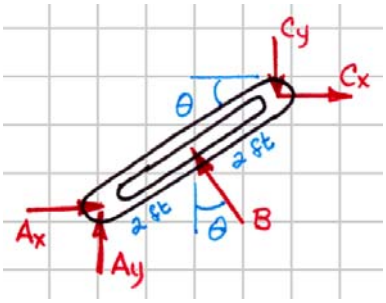
$$\circlearrowleft \Sigma M_C = 0: \qquad 3\left(F_{DE}\cos\theta\right) - 2\left(80\right) = 0$$

$$\theta = \sin^{-1}\frac{2}{4} = 30°$$

$$F_{DE} = 61.5840 \text{ lb}$$

$$C_x = 53.3333 \text{ lb} \qquad C_y = 49.2080 \text{ lb}$$

Finally, from a free-body diagram of the arm *ABC*, the equations of equilibrium give



$$\rightarrow \Sigma F_x = 0: \qquad A_x + \left(53.3333\right) - B\sin\theta = 0 = 0$$

$$\uparrow \Sigma F_y = 0: \qquad A_y + B\cos\theta - \left(49.2080\right) = 0$$

$$\circlearrowleft \Sigma M_A = 0: \qquad 2B - \left(4\cos\theta\right)\left(49.2080\right) - \left(4\sin\theta\right)\left(53.3333\right) = 0$$

$$B = 138.5641 \text{ lb}$$

$$A_x = 15.9487 \text{ lb} \qquad A_y = 70.7920 \text{ lb}$$

A = 72.6 lb ◥ 77.3° ..... **Ans.**

B = 138.6 lb ◺ 60° ..... **Ans.**

C = 72.6 lb ◥ 42.7° ..... **Ans.**