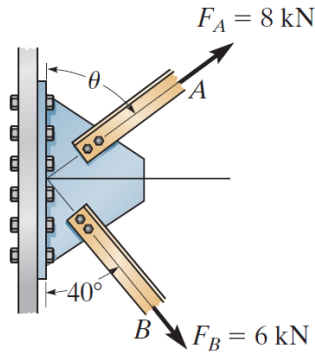


Problem 2-12

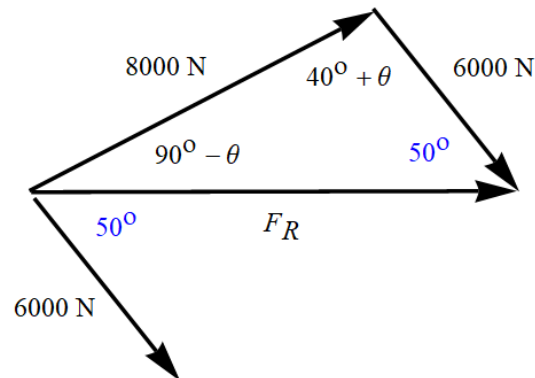
Determine the angle θ for connecting member A to the plate so that the resultant force of \mathbf{F}_A and \mathbf{F}_B is directed horizontally to the right. Also, what is the magnitude of the resultant force?



Probs. 2-11/12

Solution

Draw the triangle that the two forces and their resultant make. Use geometry to determine the angles.



Use the law of sines to determine θ .

$$\frac{8000 \text{ N}}{\sin 50^\circ} = \frac{6000 \text{ N}}{\sin(90^\circ - \theta)}$$

$$\sin(90^\circ - \theta) = \frac{6000 \text{ N}}{8000 \text{ N}} \sin 50^\circ$$

$$\cos \theta = \frac{6000 \text{ N}}{8000 \text{ N}} \sin 50^\circ$$

$$\theta \approx 54.9^\circ$$

Use the law of sines again to determine F_R .

$$\frac{8000 \text{ N}}{\sin 50^\circ} = \frac{F_R}{\sin(40^\circ + \theta)} \rightarrow F_R = \frac{8000 \text{ N}}{\sin 50^\circ} \sin(40^\circ + \theta) \approx 1.04 \times 10^4 \text{ N} = 10.4 \text{ kN}$$