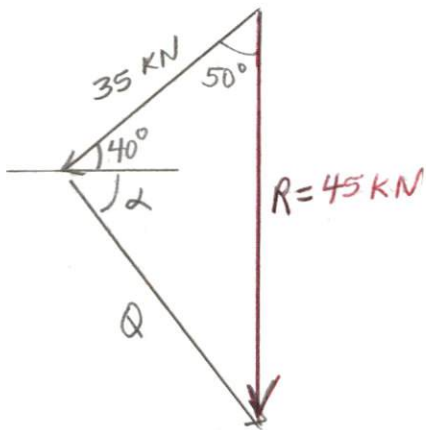
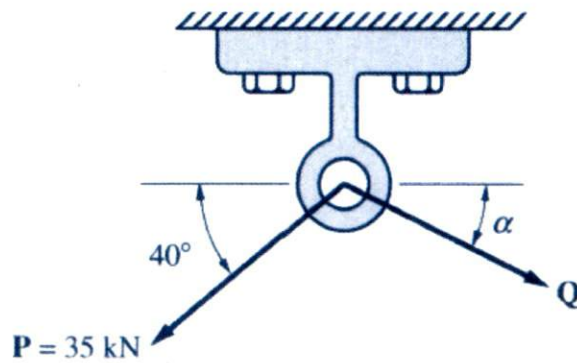


2-8

If the resultant of the two forces P and Q acting on the ring in Fig. P2-8 is a vertical force equal to 45 kN, find the magnitude and direction of force Q.

Solution. Triangle Rule



Law of Cosines

$$Q = \sqrt{35\text{ kN}^2 + 45\text{ kN}^2 - 2(35\text{ kN})(45\text{ kN}) \cos 50^\circ}$$
$$= \underline{\underline{35\text{ kN}}}$$

Law of Sines

$$\frac{\sin(40^\circ + \alpha)}{45\text{ kN}} = \frac{\sin 50^\circ}{35\text{ kN}}$$

$$\sin(40^\circ + \alpha) = \frac{45\text{ kN}(\sin 50^\circ)}{35\text{ kN}}$$

$$40^\circ + \alpha = \sin^{-1}(0.984914284)$$

$$40^\circ + \alpha = 80^\circ$$

$$\alpha = 80^\circ - 40^\circ = \underline{\underline{40^\circ}}$$

$$Q = 35\text{ kN} \searrow 40^\circ$$

and  $Q = 35\text{ kN} \curvearrowleft 320^\circ$