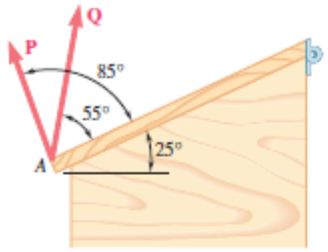


PROBLEM 2.127

Two forces **P** and **Q** are applied to the lid of a storage bin as shown. Knowing that $P = 48$ N and $Q = 60$ N, determine by trigonometry the magnitude and direction of the resultant of the two forces.

SOLUTION

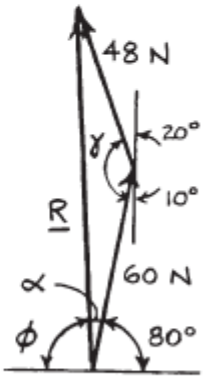
Using the force triangle and the laws of cosines and sines:

We have
$$\gamma = 180^\circ - (20^\circ + 10^\circ)$$
$$= 150^\circ$$

Then
$$R^2 = (48\text{ N})^2 + (60\text{ N})^2 - 2(48\text{ N})(60\text{ N})\cos 150^\circ$$
$$R = 104.366\text{ N}$$

and
$$\frac{48\text{ N}}{\sin\alpha} = \frac{104.366\text{ N}}{\sin 150^\circ}$$
$$\sin\alpha = 0.22996$$
$$\alpha = 13.2947^\circ$$

Hence:
$$\phi = 180^\circ - \alpha - 80^\circ$$
$$= 180^\circ - 13.2947^\circ - 80^\circ$$
$$= 86.705^\circ$$



$\mathbf{R} = 104.4\text{ N} \searrow 86.7^\circ$ ◀