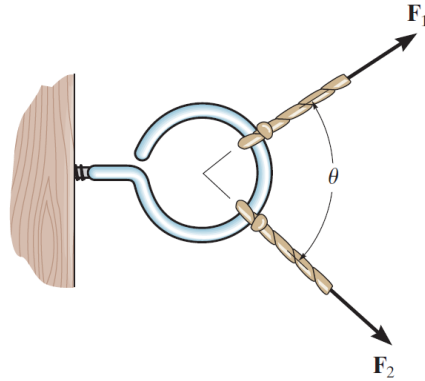


Problem 2-23

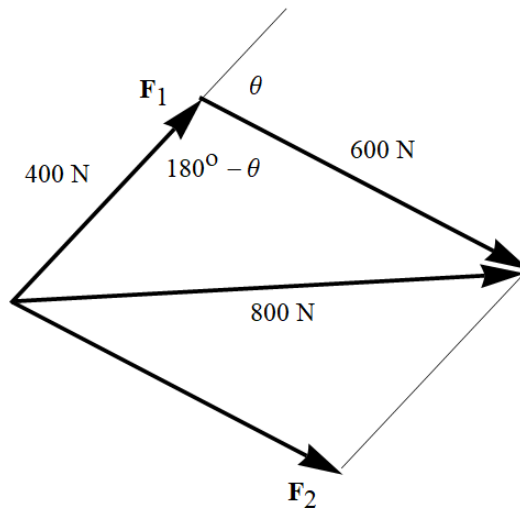
Two forces act on the screw eye. If $F_1 = 400$ N and $F_2 = 600$ N, determine the angle θ ($0^\circ \leq \theta \leq 180^\circ$) between them, so that the resultant force has a magnitude of $F_R = 800$ N.



Probs. 2-23/24

Solution

Draw the triangle that \mathbf{F}_1 and \mathbf{F}_2 and their resultant make.



Use the law of cosines to determine θ .

$$800^2 = 400^2 + 600^2 - 2(400)(600) \cos(180^\circ - \theta)$$

Note that $\cos(180^\circ - \theta) = \cos 180^\circ \cos \theta + \sin 180^\circ \sin \theta = -\cos \theta$.

$$800^2 = 400^2 + 600^2 + 2(400)(600) \cos \theta$$

Solve for θ .

$$\cos \theta = \frac{800^2 - 400^2 - 600^2}{2(400)(600)} \rightarrow \theta \approx 75.5^\circ$$