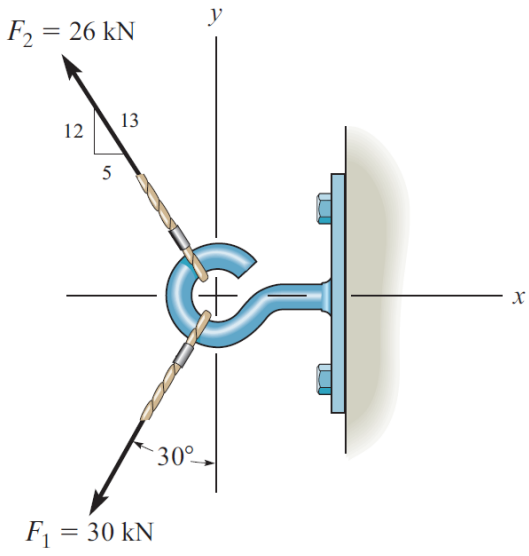
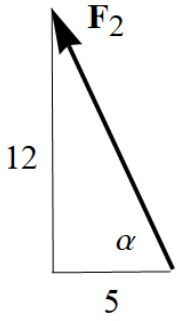
Problem 2-53

Express $\mathbf{F}_1$ and $\mathbf{F}_2$ as Cartesian vectors.



Solution

Begin by finding the angle that $\mathbf{F}_2$ makes with the x-axis.



$$\tan\alpha = \frac{12}{5} \quad \rightarrow \quad \alpha = \tan^{-1}\left(\frac{12}{5}\right) \approx 67.4^\circ$$

Write each of the forces in component form.

$$\mathbf{F}_1 = 30\,\langle -\sin 30^\circ, -\cos 30^\circ\rangle \text{ kN} \approx \langle -15.0, -26.0\rangle \text{ kN}$$

$$\mathbf{F}_2 = 26\,\langle -\cos\alpha, \sin\alpha\rangle \text{ kN} = 26\left\langle -\frac{5}{13}, \frac{12}{13}\right\rangle \text{ kN} = \langle -10.0, 24.0\rangle \text{ kN}$$