Exercise 32

The wind velocity $\mathbf{v}_1$ is 40 miles per hour (mi/h) from east to west while an airplane travels with air speed $\mathbf{v}_2$ of 100 mi/h due north. The speed of the airplane relative to the ground is the vector sum $\mathbf{v}_1 + \mathbf{v}_2$.

(a) Find $\mathbf{v}_1 + \mathbf{v}_2$

(b) Draw a figure to scale.

Solution

Part (a)

If the airplane's speed relative to the air is 40 miles per hour to the west, and the air moves at 100 miles per hour to the north relative to the ground, then the airplane's speed relative to the ground is

$$(-40, 0) + (0, 100) = (-40, 100) \text{ mi/h.}$$

Part (b)