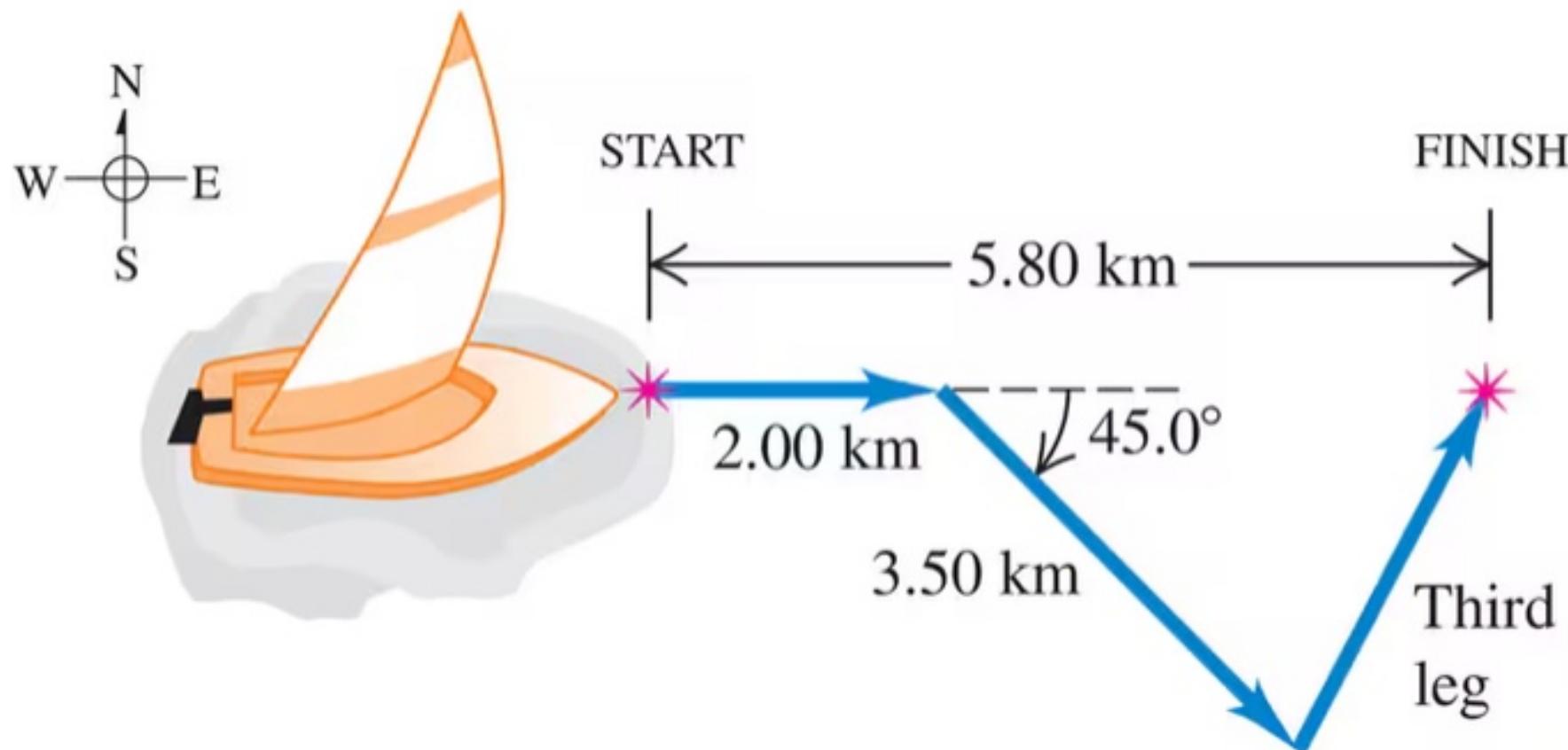


1.60

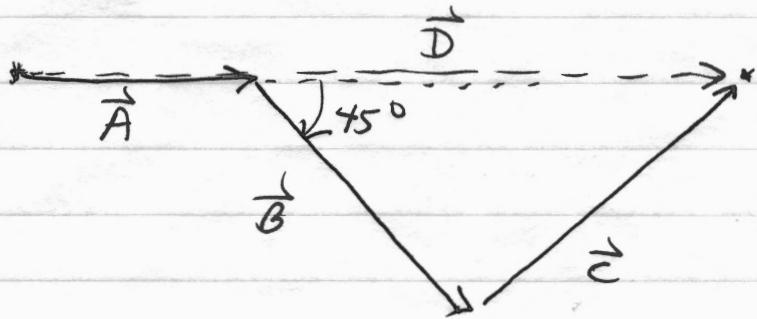
•• A sailor in a small sailboat encounters shifting winds. She sails 2.00 km east, next 3.50 km southeast, and then an additional distance in an unknown direction. Her final position is 5.80 km directly east of the starting point (Fig. P1.60). Find the magnitude and direction of the third leg of the journey. Draw the vector-addition diagram and show that it is in qualitative agreement with your numerical solution.

Figure P1.60



Eg

Young ~~1.60~~ 1.74 (12th edition) [1.84 (14th edition)]



Given:

$$\begin{array}{l} \vec{A} = 2.0 \text{ @ } 0^\circ \\ \vec{B} = 3.50 \text{ @ } -45^\circ \\ \vec{C} = ? \\ \vec{D} = 5.80 \text{ km @ } 0^\circ \end{array} \quad \left| \begin{array}{ll} A_x = 2 & A_y = 0 \\ B_x = 2.475 & B_y = -2.475 \\ C_x = ? & C_y = ? \\ D_x = 5.80 & D_y = 0 \end{array} \right.$$

and $\vec{A} + \vec{B} + \vec{C} = \vec{D}$.

what is \vec{C} ?

$$\vec{C} = \vec{D} - \vec{A} - \vec{B}$$

Solve by components:

$$C_x = D_x - A_x - B_x = 1.325$$

$$C_y = D_y - A_y - B_y = 2.475$$

$$\boxed{\vec{C} = 2.81 \text{ @ } 61.8^\circ}$$

or writing it with

unit vectors: $\vec{C} = 1.325 \hat{i} + 2.475 \hat{j}$.