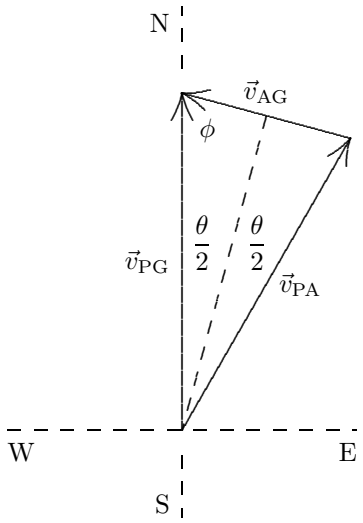
65. We denote $\vec{v}_{\text{PG}}$ as the velocity of the plane relative to the ground, $\vec{v}_{\text{AG}}$ as the velocity of the air relative to the ground, and $\vec{v}_{\text{PA}}$ be the velocity of the plane relative to the air.

(a) The vector diagram is shown below. $\vec{v}_{\text{PG}} = \vec{v}_{\text{PA}} + \vec{v}_{\text{AG}}$. Since the magnitudes v_{PG} and v_{PA} are equal the triangle is isosceles, with two sides of equal length. Consider either of the right triangles formed when the bisector of θ is drawn (the dashed line). It bisects $\vec{v}_{\text{AG}}$, so

$$\sin(\theta/2) = \frac{v_{\text{AG}}}{2v_{\text{PG}}} = \frac{70.0\,\text{mi/h}}{2(135\,\text{mi/h})}$$

which leads to $\theta = 30.1°$. Now $\vec{v}_{\text{AG}}$ makes the same angle with the E-W line as the dashed line does with the N-S line. The wind is blowing in the direction 15° north of west. Thus, it is blowing *from* 75° east of south.



(b) The plane is headed along $\vec{v}_{\text{PA}}$, in the direction 30° east of north. There is another solution, with the plane headed 30° west of north and the wind blowing 15° north of east (that is, from 75° west of south).