

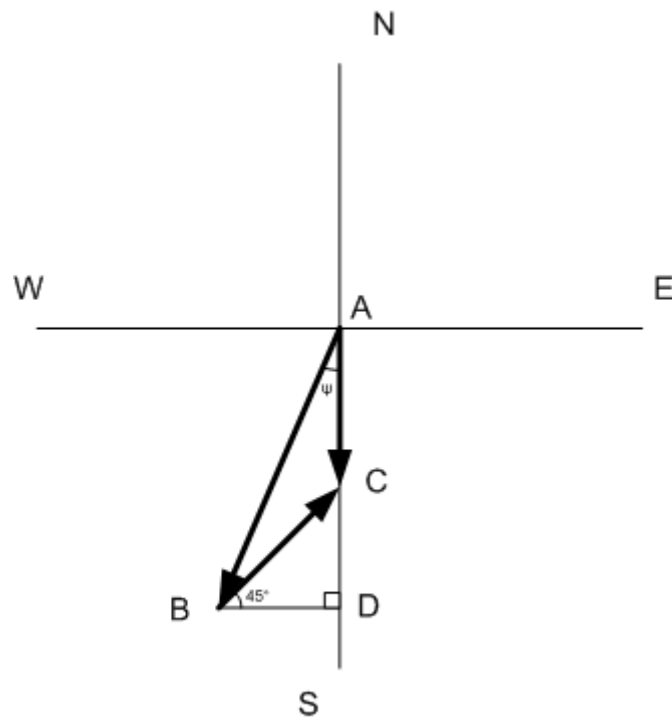
Answer on Question #85202 - Physics - Mechanics | Relativity

An airplane is heading due south at a speed of 620 km/h . A wind begins blowing from the southwest at a speed of 105 km/h (average).

In what direction should the pilot aim the plane so that it will fly due south?

Solution:

Figure out the velocity triangle (not to scale):



On this figure:

\overrightarrow{AB} - the vector of the airplane's air speed;

\overrightarrow{BC} - the vector of the wind's speed;

\overrightarrow{AC} - the vector of the airplane's ground speed, that equals a vector sum of air speed and wind speed vectors.

In the additional rectangular triangle BDC the angle CBD equals 45° , because wind blows from southwest.

So from the rectangular triangle ADB we get

$$\psi = \arcsin\left(\frac{BD}{AB}\right).$$

From the rectangular triangle BDC we get

$$BD = BC \cdot \cos 45^\circ.$$

So

$$\psi = \arcsin\left(\frac{BC \cdot \cos 45^\circ}{AB}\right) = \arcsin\left(\frac{105 \cdot 0.707}{620}\right) = 6.88^\circ.$$

The angle of the aircraft heading, measured from the direction of the north, will be equal to $180 + \psi$, that is 186.88° .

Answer: The angle of the aircraft heading, measured from the direction of the north, will be equal to 186.88° .

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