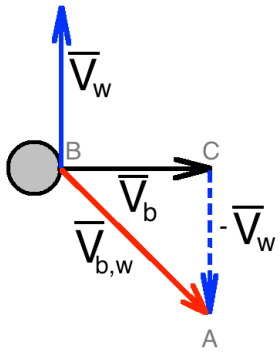
Answer on Question#40323 – Physics – Mechanics

A bird flies in the east direction with a speed of 5 ms−1. The wind is blowing towards north at a speed of 3 ms−1. Determine the relative velocity of the bird with respect to the wind. Draw appropriate diagram for solving the problem.

Solution:



$V_b = 5\frac{m}{s} -$ speed of the bird;

$V_w = 3\frac{m}{s} -$ speed of the wind;

Relative velocity of the bird with respect to the wind is the difference between vectors of the bird's and the wind's velocities:

$$\overline{V}_{b,w} = \overline{V}_b - \overline{V}_w = \overline{V}_b + (-\overline{V}_w)$$

Hypotenuse of the right triangle ABC:

$$|\overline{V}_{b,w}| = \sqrt{\overline{V}_b{}^2 + \overline{V}_w^2} = \sqrt{\left(5\frac{m}{s}\right)^2 + \left(3\frac{m}{s}\right)^2} = \sqrt{34\frac{m}{s}}$$

$$= 5.8\ \frac{m}{s}$$

Answer: relative velocity of the bird with respect to the wind is $5.8\ \frac{m}{s}$