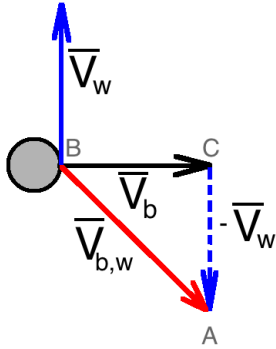


A bird flies in the east direction with a speed of  $5 \text{ ms}^{-1}$ . The wind is blowing towards north at a speed of  $3 \text{ ms}^{-1}$ . Determine the relative velocity of the bird with respect to the wind. Draw appropriate diagram for solving the problem.

**Solution:**



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

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

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

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

Hypotenuse of the right triangle ABC:

$$\begin{aligned} |\vec{V}_{b,w}| &= \sqrt{\vec{V}_b^2 + \vec{V}_w^2} = \sqrt{\left(5 \frac{\text{m}}{\text{s}}\right)^2 + \left(3 \frac{\text{m}}{\text{s}}\right)^2} = \sqrt{34 \frac{\text{m}}{\text{s}}} \\ &= 5.8 \frac{\text{m}}{\text{s}} \end{aligned}$$

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