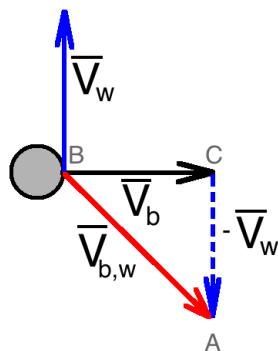


A bird flies in the east direction with a speed of  $5 \text{ ms}^{-1}$ . The wind is blowing towards north at a speed of  $3 \text{ ms}^{-1}$ . Determine the relative velocity of the bird with respect to the wind. Draw appropriate diagram for solving the problem.

**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:

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

Hypotenuse of the right triangle ABC:

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

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

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