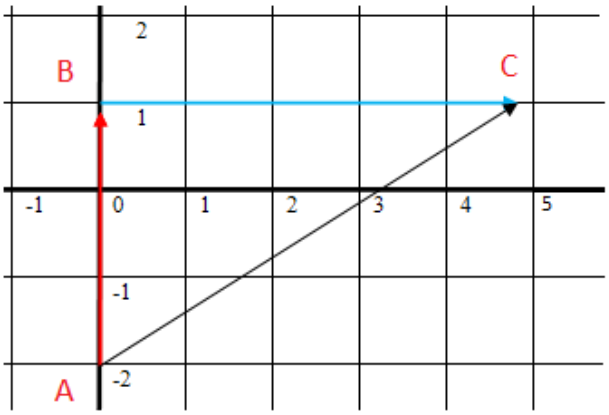
Solve.

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

Solution.



Blue is the speed vector of bird, red speed vector of wind, black the velocity of the bird with respects to the wind. The absolute values of our vectors are:

$$\left|\overrightarrow{AB}\right| = 3$$

$$\left|\overrightarrow{BC}\right| = 5$$

The velocity of the bird with respect to the wind we can found from the Pythagorean theorem:

$$\left|\overrightarrow{AC}\right| = \sqrt{(BC)^2 + (AB)^2} = \sqrt{9 + 25} = \sqrt{34} \approx 5{,}831$$

$$AC = 5{,}831 \left(\frac{m}{s}\right)$$

Answer:

The velocity of the bird with respect to the wind is $5{,}831 \left(\frac{m}{s}\right)$