Answer on Question #70682, Physics / Other

A bird experiences a wind gust of 13 m/s [E] while flying 16m/s [W]. What is the overall velocity of the bird? Which direction is it moving?

SOLUTION

Consider the bird travels at a speed of 16 m/s to the west in still air. It would give a velocity vector of 16 m/s in length pointed in its direction of travel. Now let us account a wind. It is directed to the east, i.e. opposite to the bird's direction. So, it is a headwind. This situation is shown in the fig. 1. The overall velocity of the bird is the sum of 16 m/s and -13 m/s, or 3 m/s in the direction of travel. Actually, we just use a vector addition. In general,

$$\overrightarrow{v_{overall}} = \overrightarrow{v_{bird}} + \overrightarrow{v_{wind}}$$

In the projection to the EW axis $\overrightarrow{v_{bird}}_{EW} = 16\ m/s$, $\overrightarrow{v_{wind}}_{EW} = -13\ m/s$. Sign "-" indicates the opposite direction to the axis EW.

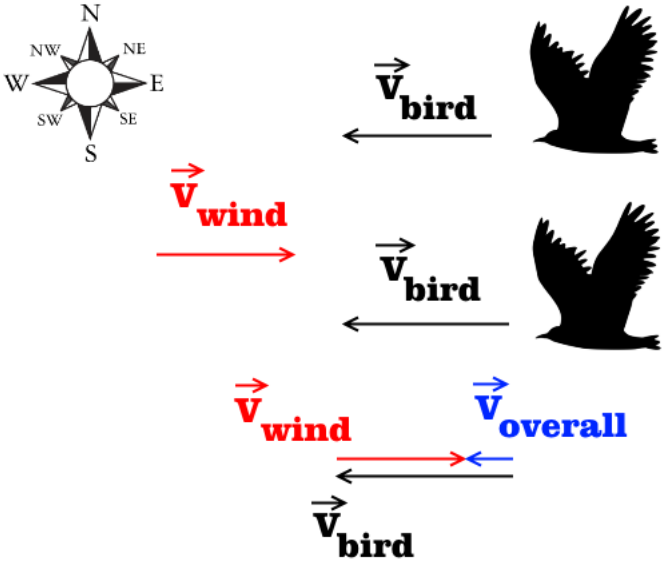

Fig. 1.

ANSWER: the overall velocity of the bird is 3 m/s, directed to the west.