Answer on Question #70263-Physics-Other

Initially, a swift-moving hawk is moving due west (in the -x-direction) with a speed of 50 m/s; 5.0 s later it is moving due north (in the +y direction) with a speed of 25 m/s. (A)What are the magnitude and direction of Δvav vector during this 5 s interval? and (B) What are the magnitude and direction of vector aav during this 5 s interval?

Solution

(A)

$$\boldsymbol{v_i} = (-50,0)\frac{m}{s}$$

$$\boldsymbol{v_f} = (0,25)\frac{m}{s}$$

$$\mathbf{\Delta v_{av}} = \boldsymbol{v_f} - \boldsymbol{v_i} = (50,25)\frac{m}{s}.$$

The magnitude is

$$\Delta v_{av} = \sqrt{25^2 + 50^2} = 56\frac{m}{s}.$$

The direction is

$$\theta = \tan^{-1}\frac{25}{50} = 27°\ from\ positive\ x\ axis.$$

(B)

$$\mathbf{a_{av}} = \frac{\mathbf{\Delta v_{av}}}{t} = \left(\frac{50}{5}, \frac{25}{5}\right) = (10,5)\frac{m}{s^2}.$$

The magnitude is

$$a_{av} = \sqrt{5^2 + 10^2} = 11\frac{m}{s^2}.$$

The direction is

$$\theta = \tan^{-1}\frac{5}{10} = 27°\ from\ positive\ x\ axis.$$