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某運動體目前以 $100 \frac{\text{m}}{\text{s}}$ 的速度往東。
 10 秒後的速度是 $100 \frac{\text{m}}{\text{s}}$ 往北。求該
 運動體的平均加速度及第 5 秒
 的瞬時速度。

$$\vec{v}_0 = 100 \left(\frac{\text{m}}{\text{s}} \right) \vec{i}$$

$$\textcircled{1/1} \xrightarrow{100 \left(\frac{\text{m}}{\text{s}} \right)}$$

$$\vec{v}_f = 100 \left(\frac{\text{m}}{\text{s}} \right) \vec{j}$$

$$\vec{a} = \frac{\Delta \vec{v}}{t} = \frac{\vec{v}_f - \vec{v}_0}{t} = \frac{100 \vec{j} - 100 \vec{i}}{10}$$

$$= -10 \left(\frac{\text{m}}{\text{s}^2} \right) \vec{i} + 10 \left(\frac{\text{m}}{\text{s}^2} \right) \vec{j}$$

$$a = \sqrt{(10)^2 + (10)^2} = 10\sqrt{2} = 14.1 \left(\frac{\text{m}}{\text{s}^2} \right)$$

$$\theta = \tan^{-1} \frac{10}{10} = 45^\circ \quad (\text{西偏北})$$

$$v_f = v_0 + a t$$

$$v_x(5) = 100 - 10 \times 5 = 50 \left(\frac{\text{m}}{\text{s}} \right)$$

$$v_y(5) = 0 + 10 \times 5 = 50 \left(\frac{\text{m}}{\text{s}} \right)$$

$$v = \sqrt{(50)^2 + (50)^2} = 50\sqrt{2} = 70.7 \left(\frac{\text{m}}{\text{s}} \right)$$

$$\theta = \tan^{-1} \frac{50}{50} = 45^\circ \quad (\text{東偏北})$$