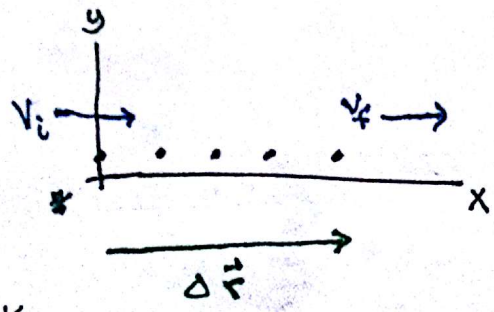
Avg Quantities Example

Acceleration ($\vec{a}$)
Velocity ($\vec{v}$)
Position ($\vec{r}$)



We Know

$\Delta t = 1 min.$

$\Delta \vec{r} = \langle 6, 0 \rangle m$

(1) What is avg. velocity?

$$\vec{V} = \frac{\Delta \vec{r}}{\Delta t}$$

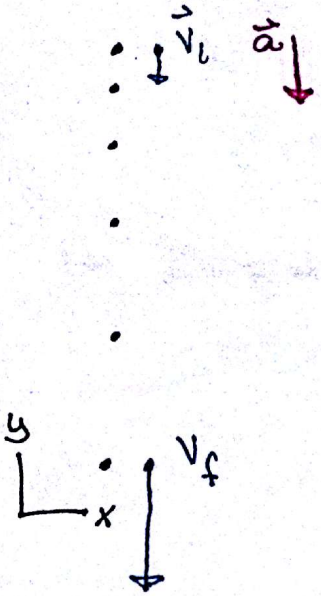
$$\vec{V} = \frac{\langle 6, 0 \rangle m}{60 s} = \langle 0.1, 0 \rangle \, m/s$$

The average velocity is 0.1 m/s in the X-Direction.

Convert minutes to seconds

$$\frac{1 min}{1 min} \left| \frac{60 sec}{} \right. = 60 \text{ Seconds}$$

(2.)



We Know

$\Delta t = 2s$

$\vec{V}_i = \langle 0, -5 \rangle \frac{m}{s}$

$\vec{V}_f = \langle 0, -24.6 \rangle \frac{m}{s}$

What is the average acceleration?

$$\vec{a} = \frac{\Delta \vec{V}}{\Delta t} = \frac{\vec{V}_f - \vec{V}_i}{\Delta t}$$

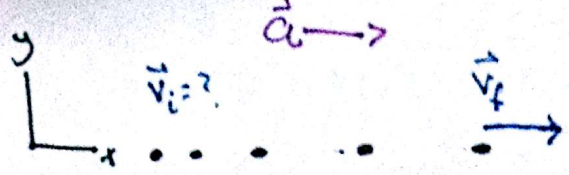
$$\vec{a} = \frac{\langle 0, -24.6 \rangle - \langle 0, -5 \rangle}{2} \frac{m}{s^2}$$

$$\vec{a} = \frac{\langle 0, -19.6 \rangle}{2} \frac{m}{s^2}$$

$$\vec{a} = \langle 0, -9.8 \rangle \frac{m}{s^2}$$

The average acceleration is $9.8 \frac{m}{s^2}$ Downward.

③



We Know

$\Delta t = 3s$

$\vec{a} = \langle 10, 0 \rangle \frac{m}{s^2}$

$\vec{V}_f = \langle 45, 0 \rangle \frac{m}{s}$

What is $\vec{V}_i$?

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_f - \vec{v}_i}{\Delta t}$$

$$\vec{a} \cdot \Delta t = \vec{v}_f - \vec{v}_i$$

$$\vec{a} \cdot \Delta t - \vec{v}_f = -\vec{v}_i$$

$$\vec{V}_f - \vec{a} \cdot \Delta t = \vec{v}_i$$

$$\langle 45, 0 \rangle \frac{m}{s} - \langle 10, 0 \rangle \frac{m}{s^2} \cdot 3s = \vec{V}_i$$

$$\vec{V}_i = \langle 45, 0 \rangle \frac{m}{s} - \langle 30, 0 \rangle \frac{m}{s}$$

$$\vec{V}_i = \langle 15, 0 \rangle \frac{m}{s}$$

The Initial Velocity was $15 \frac{m}{s}$ in the x-Direction.