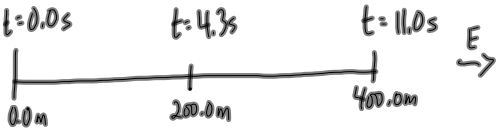
Velocity

MP|42



Given

$t_1 = 0.0s$
$t_2 = 4.3s$
$t_3 = 11.0s$

$\vec{d}_1 = 0.0m$
$\vec{d}_2 = 200.0m\ [E]$
$\vec{d}_3 = 400.0m\ [E]$

Required

a) $\vec{V}_{ave}\ (t_1 - t_2)$
b) $\vec{V}_{ave}\ (t_2 - t_3)$
c) $\vec{V}_{ave}\ (t_1 - t_3)$

Analysis

$$\vec{V}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$$

Solution

a) $$\vec{V}_{ave} = \frac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1}$$

$$\vec{V}_{ave} = \frac{200.0m\ [E] - 0.0m}{4.3s - 0.0s}$$

$$\vec{V}_{ave} = \frac{200.0m\ [E]}{4.3s}$$

$$\vec{V}_{ave} \doteq 47m/s\ [E]$$

b) $$\vec{V}_{ave} = \frac{\vec{d}_3 - \vec{d}_2}{t_3 - t_2}$$

$$\vec{V}_{ave} = \frac{400.0m\ [E] - 200.0m\ [E]}{11.0s - 4.3s}$$

$$\vec{V}_{ave} = \frac{200.0m\ [E]}{6.7s}$$

$$\vec{V}_{ave} = 3.0 \times 10^1\ m/s\ [E]\ (29.8507\ldots)$$

c) $$\vec{V}_{ave} = \frac{\vec{d}_3 - \vec{d}_1}{t_3 - t_1}$$

$$\vec{V}_{ave} = \frac{400.0m\ [E] - 0.0m}{11.0s - 0.0s}$$

$$\vec{V}_{ave} = \frac{400.0m\ [E]}{11.0s}$$

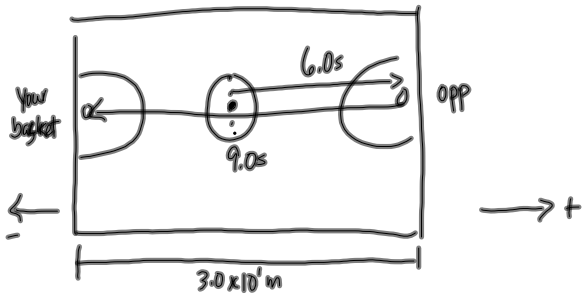
$$\vec{V}_{ave} \doteq 36.4\frac{m}{s}\ [E]$$

NOTE: This is NOT the average of 47m/s and 30m/s

Paraphrase

The average velocity for the first 200m was 47m/s [E]
" " second 200m was 30m/s [E]
" " whole trip was 36.4m/s [E]

MP|44



Given

$\vec{d}_1 = 0.0\,m$, $\vec{d}_2 = +15\,m$ $\Rightarrow \Delta t = 6.0s$

$\vec{d}_2 = +15\,m$, $\vec{d}_3 = -15\,m$ $\Rightarrow \Delta t = 9.0s$

Required

a) $\vec{v}_{ave}$ ($\vec{d}_1$ to $\vec{d}_2$)

b) $\vec{v}_{ave}$ ($\vec{d}_2$ to $\vec{d}_3$)

Analysis

$$\vec{v}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$$

Solution

a) $$\vec{v}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$$

$$\vec{v}_{ave} = \frac{\vec{d}_2 - \vec{d}_1}{\Delta t}$$

$$\vec{v}_{ave} = \frac{+15m - 0}{6.0s}$$

$$\vec{v}_{ave} = +2.5\,m/s$$

$$\vec{v}_{ave} = 2.5\,m/s\ [\text{towards opp net}]$$

b) $$\vec{v}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$$

$$\vec{v}_{ave} = \frac{\vec{d}_3 - \vec{d}_2}{\Delta t}$$

$$\vec{v}_{ave} = \frac{-15m - (+15m)}{9.0s}$$

$$\vec{v}_{ave} = -\frac{30\,m}{9.0s}$$

$$\vec{v}_{ave} = -3.3\,\frac{m}{s}$$

$$\vec{v}_{ave} = 3.3\,\frac{m}{s}\ [\text{toward your own net}]$$

Paraphrase

The average velocity for the first 6.0s was 2.5 m/s [towards the opp net]

and . . . . . .