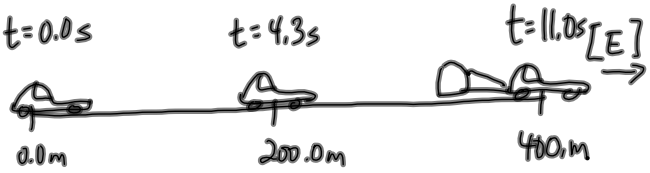
Velocity Problems

GRASP method

G - Given
R - Required
A - Analysis
S - Solution
P - Paraphrase

MP 1.2



Given

$t_0 = 0.0\,s$ $\quad \vec{d}_0 = 0.0\,m$
$t_1 = 4.3\,s$ $\quad \vec{d}_1 = 200.0\,m\,[E]$
$t_2 = 11.0\,s$ $\quad \vec{d}_2 = 400.0\,m\,[E]$

Required

a) $\vec{V}_{ave(0\to1)} = ?$
b) $\vec{V}_{ave(1\to2)} = ?$
c) $\vec{V}_{ave(0\to2)} = ?$

Analysis + Solution

a) $\vec{V}_{ave\,(0\to1)} = \dfrac{\Delta\vec{d}}{\Delta t}$ ← Analysis

$\vec{V}_{ave(0\to1)} = \dfrac{\vec{d}_1 - \vec{d}_0}{t_1 - t_0}$

Solution → $\vec{V}_{ave(0\to1)} = \dfrac{200.0\,m\,[E] - 0.0\,m}{4.3\,s - 0.0\,s}$

$\vec{V}_{ave(0\to1)} \doteq 47\,\frac{m}{s}\,[E]$

b) $\vec{V}_{ave\,(1\text{-}2)} = \dfrac{\Delta\vec{d}}{\Delta t}$

$\vec{V}_{ave(1\text{-}2)} = \dfrac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1}$

$\vec{V}_{ave\,(1\text{-}2)} = \dfrac{400.0\,m\,[E] - 200.0\,m\,[E]}{11.0\,s - 4.3\,s}$

$\vec{V}_{ave(1\text{-}2)} = \dfrac{200.0\,m\,[E]}{6.7\,s}$

$\vec{V}_{ave\,(1\text{-}2)} \doteq 3.0 \times 10^{1}\,\frac{m}{s}\,[E]$

c) $\vec{V}_{ave(0\to2)} = \dfrac{\Delta\vec{d}}{\Delta t}$

$\vec{V}_{ave(0\to2)} = \dfrac{\vec{d}_2 - \vec{d}_0}{t_2 - t_0}$

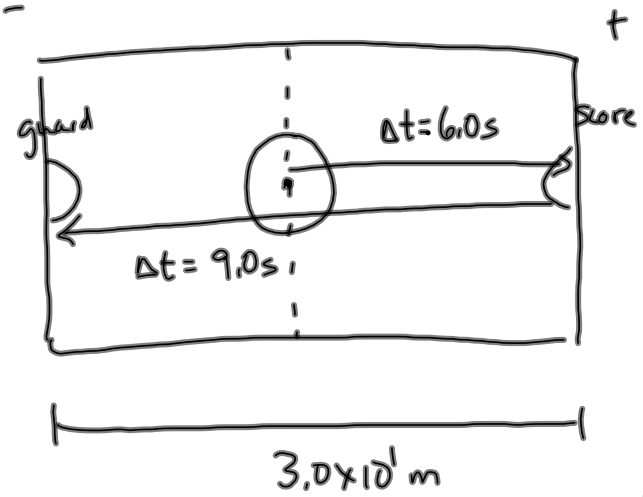
$\vec{V}_{ave(0\to2)} = \dfrac{400.0\,m\,[E] -$
$11.0\,s - 0.0$

$\vec{V}_{ave(0\to2)} \doteq 36.4\,\frac{m}{s}\,[E$

Paraphrase:

a) The average velocity for the first 200m was 47m/

2.



Given

$\vec{d}_0 = 0m$

$\vec{d}_1 = +15m$ } $\Delta t = 6.0s$

$\vec{d}_2 = -15m$ } $\Delta t = 9.0s$

Required

a) $\vec{v}_{ave(0\to1)}$

b) $\vec{v}_{ave(1\to2)}$

Analysis + Solution

a) $\vec{v}_{ave(0\to1)} = \frac{\Delta \vec{d}}{\Delta t}$

$\vec{v}_{ave(0\to1)} = \frac{\vec{d}_1 - \vec{d}_0}{\Delta t}$ Analysis

$\vec{v}_{ave(0\to1)} = \frac{+15m - 0}{6.0s}$ Solution

$\vec{v}_{ave(0\to1)} = +2.5 m/s$

b) $\vec{v}_{ave(1\to2)} = \frac{\Delta \vec{d}}{\Delta t}$

$\vec{v}_{ave(1\to2)} = \frac{\vec{d}_2 - \vec{d}_1}{\Delta t}$ Analysis

$\vec{v}_{ave(1-2)} = \frac{-15m - (+15m)}{9.0s}$ Solution

$\vec{v}_{ave(1-2)} = \frac{-30m}{9.0s}$

$\vec{v}_{ave(1\to2)} = -3.3 m/s$

Paraphrase

a) The average velocity for the first part was +2.5m/s

b) " " " second part. -3.3 m/s

TO DO: . PP|45-46

• Look over MP|55-56