

PVA Quiz Review Problem

Given:

$$s(2) = 40 \text{ m}$$

$$s(4) = 10 \text{ m}$$

$$v(2) = -15 \text{ m/s}$$

$$v(4) = -12 \text{ m/s}$$

$$v(6) = -4 \text{ m/s}$$

$$a(4) = 3 \text{ m/s}^2$$

$$a(6) = 7 \text{ m/s}^2$$

Find the following:

a) Average velocity on $[2, 4]$

b) Instantaneous velocity at $t=4$

c) Is velocity positive or negative at $t=4$?

d) Is velocity increasing or decreasing at $t=4$?

e) Is speed increasing or decreasing at $t=4$?

f) Find average acceleration ~~at $t=4$~~ on $[4, 6]$.

$$\text{a) Avg. velocity} = \frac{\text{change in position}}{\text{change in time}} = \frac{s(4) - s(2)}{4 - 2} = \frac{10 - 40}{4 - 2} = \frac{-30}{2} = -15 \text{ m/s}$$

$$\text{b) } v(4) = -12 \text{ m/s}$$

c) $v(4) < 0$, negative

d) velocity is increasing at $t=4$ because $a(4) > 0$

e) speed is decreasing at $t=4$ because velocity and acceleration have opposite signs: $v(4) < 0$ and $a(4) > 0$.

$$\begin{aligned} \text{f) avg. acceleration} &= \frac{\text{change in velocity}}{\text{change in time}} = \frac{v(6) - v(4)}{6 - 4} \\ &= \frac{-4 - (-12)}{6 - 4} = \frac{8}{2} = \boxed{4 \text{ m/s}^2} \end{aligned}$$