

Q1.

S

$v = 2t^2 - 9t + 4$

$a = 4t - 9$

a) Find t when $v = 0$

$$0 = 2t^2 - 9t + 4$$

$$t = 4 \text{ or } t = 0.5$$

b) Find a when $t = 5$

$$a = 4(5) - 9$$

$$a = \underline{\underline{11 \text{ ms}^{-2}}}$$

Q2.

S

$$v \quad v = 12 + 4t - t^2$$

$$a \quad a = 4 - 2t$$

Find t when $v = 0$

$$0 = 12 + 4t - t^2$$

$$t = 6 \text{ or } t = -2$$

Find a when $t = 6$

$$a = 4 - 2(6)$$

$$a = \underline{\underline{-8 \text{ ms}^{-2}}}$$

Q3.

S

$$v \quad v = 15 - t^2 - 2t$$

$$a \quad a = -2t - 2$$

a) Find t when $v = 0$

$$0 = 15 - t^2 - 2t$$

$$\underline{\underline{t = 3}} \text{ or } t = -5$$

b) Find a when $t = 3$

$$a = -2(3) - 2$$

$$a = \underline{\underline{-8 \text{ ms}^{-2}}}$$

$$|a| = \underline{\underline{8 \text{ ms}^{-2}}}$$

Q4.

S

$$v \quad v = 3t^2 - 16t + 21$$

$$a \quad a = 6t - 16$$

a) Find t when $v=0$

$$0 = 3t^2 - 16t + 21$$

$$t = 3 \text{ or } t = \frac{7}{3}$$

$$t_1 = \frac{7}{3}$$

Find a when $t = \frac{7}{3}$

$$a = 6\left(\frac{7}{3}\right) - 16$$

$$a = -2$$

$$|a| = \underline{\underline{2\text{ms}^{-2}}}$$

Q5.

$$S \quad s = \frac{1}{3}t^3 - \frac{5}{2}t^2 + 6t$$

$$v \quad v = t^2 - 5t + 6$$

$$a \quad a = 2t - 5$$

Find a when P is at rest

$\therefore$ Find t when $v=0$

$$0 = t^2 - 5t + 6$$

$$t = 3 \text{ or } t = 2$$

$\therefore$ Find a when $t=3$ and $t=2$

$$a = 2(3) - 5 = \underline{\underline{1 \text{ ms}^{-2}}}$$

$$a = 2(2) - 5 = \underline{\underline{-1 \text{ ms}^{-2}}}$$

Q5.

S

$$V \quad V = 10t - t^2 - 15$$

$$a \quad a = 10 - 2t$$

$$a) \quad a = 10 - 2t$$

$$b) \quad v = 0 \text{ when } t = 6$$

$$0 = 10(6) - (6)^2 - 15$$

$$0 = 60 - 36 - 15$$

$$15 = 24$$

$$V = 10t - t^2 - 24$$

Find t when $v = 0$

$$0 = 10t - t^2 - 24$$

$$t = 6 \text{ or } \underline{\underline{t = 4}}$$

Q7.

S

V $V = 2t^2 - 14t + 20$

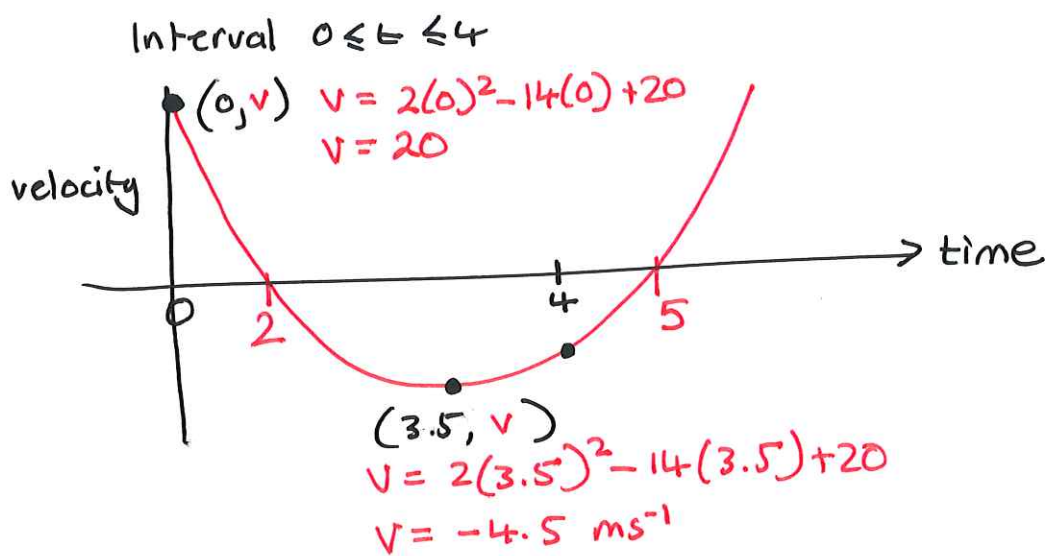
a $a = 4t - 14$

a) Find t when $v = 0$

$$0 = 2t^2 - 14t + 20$$

$$t = 5 \text{ or } t = 2$$

b)



max speed $v = \underline{\underline{20 \text{ ms}^{-1}}}$
in
interval
 $0 \leq t \leq 4$

Q8.

$$S \quad s = \frac{1}{2}t^4 - t^3 + \frac{1}{2}t^2$$

$$V \quad v = 2t^3 - 3t^2 + t$$

$$a \quad a = 6t^2 - 6t$$

a) Find t when $v = 0$

$$0 = 2t^3 - 3t^2 + t$$

$$0 = t(2t^2 - 3t + 1)$$

$$t = 0, \frac{1}{2}, 1$$

b)

$$t = 0 \quad S = 0$$

$$t = \frac{1}{2} \quad S = \frac{1}{2}\left(\frac{1}{2}\right)^4 - \left(\frac{1}{2}\right)^3 + \frac{1}{2}\left(\frac{1}{2}\right)^2 = 0.03125$$

$$t = 1 \quad S = \frac{1}{2}(1)^4 - (1)^3 + \frac{1}{2}(1)^2 = 0$$

$$t = 2 \quad S = \frac{1}{2}(2)^4 - (2)^3 + \frac{1}{2}(2)^2 = 2$$

$$t = 0$$

$$\dots \xrightarrow{0.03125} t = 0.5$$

$$t = 1$$

$$\leftarrow \dots \xleftarrow{0.03125}$$

$$t = 2$$

$$\dots \xrightarrow{2}$$

$$\begin{aligned} \text{Total Distance} &= 2\frac{1}{16} \\ &= \underline{\underline{2.0625\text{m}}} \end{aligned}$$

Q8.

$$c) \quad S = \frac{1}{2}t^2(t^2 - 2t + 1)$$

$$S = \frac{1}{2}t^2(t-1)(t-1)$$

$$S = \frac{1}{2}t^2(t-1)^2$$

$$\frac{1}{2}t^2 \geq 0$$

$$(t-1)^2 \geq 0$$

$$\therefore \frac{1}{2}t^2(t-1)^2 \geq 0$$