

# Jawapan

## Praktis 8

### Praktis Formatif

1 (a)  $s = (0)^2 + 3(0) - 4$   
 $= -4 \text{ m}$

Zarah berada pada 4 m ke kiri dari titik O.

*The particle is located 4 m to the left from point O.*

(b)  $s = (1)^2 + 3(1) - 4$   
 $= 0$

Zarah berada pada titik O.

*The particle is located at point O.*

(c)  $s = (1)^2 + 3(1) - 4$   
 $= 6 \text{ m}$

Zarah berada pada 6 m ke kanan dari titik O.

*The particle is located 6 m to the right from point O.*

2 (a)  $2t^2 - 7t + 3 = 0$   
 $(2t - 1)(t - 3) = 0$   
 $t = \frac{1}{2} \text{ s}, 3 \text{ s}$

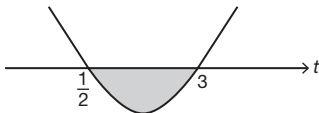
(b)  $s = -2$   
 $2t^2 - 7t + 3 = -2$   
 $2t^2 - 7t + 5 = 0$   
 $(2t - 5)(t - 1) = 0$

$t = 1 \text{ s}, \frac{5}{2} \text{ s}$

(c)  $s = 7$   
 $2t^2 - 7t + 3 = 7$   
 $2t^2 - 7t - 4 = 0$   
 $(2t + 1)(t - 4) = 0$   
 $t = -\frac{5}{2}$  (ditolak/rejected),  $\therefore t = 4 \text{ s}$

$s < 0$

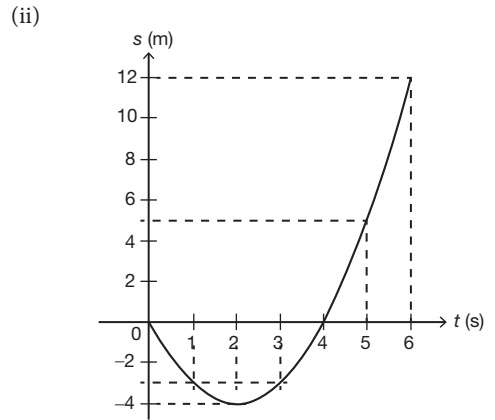
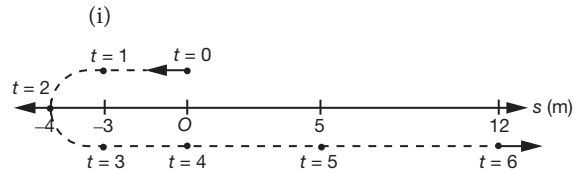
$2t^2 - 7t + 3 < 0$   
 $(2t - 1)(t - 3) < 0$



$\therefore \frac{1}{2} < t < 3$

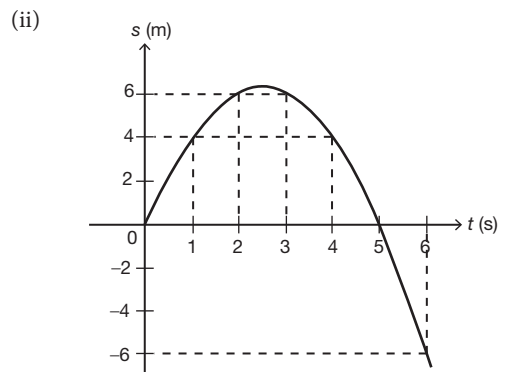
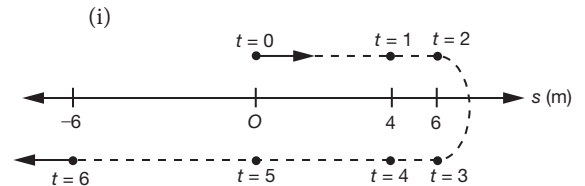
3 (a)  $s = t^2 - 4t$

t	0	1	2	3	4	5	6
s	0	-3	-4	-3	0	5	12



(b)  $s = 5t - t^2$

t	0	1	2	3	4	5	6
s	0	4	6	6	4	0	-6



4 (a) (i)  $v = 6(0) - 10$   
 $= -10 \text{ ms}^{-1}$

(ii)  $t = 1, v = 6(1) - 10$   
 $= -4 \text{ ms}^{-1}$

Zarah bergerak dengan halaju  $4 \text{ ms}^{-1}$  menuju ke arah kiri.

*The particle moves towards the left with velocity  $4 \text{ ms}^{-1}$ .*

Apabila/When  $t = 3$ ,

$$v = 6(3) - 10$$

$$= 8 \text{ ms}^{-1}$$

Zarah bergerak dengan halaju  $8 \text{ ms}^{-1}$  menuju ke arah kanan.

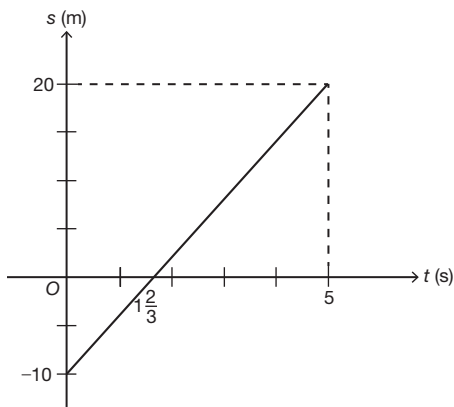
*The particle moves towards the right with velocity  $8 \text{ ms}^{-1}$ .*

(iii)  $6t - 10 = 0$

$$t = 1\frac{2}{3} \text{ s}$$

(b)

$t$	0	5
$s$	-10	20



5 (a)  $a = 13 - 6(2)$

$$= 1 \text{ ms}^{-2}$$

(b)  $a = 0$

$$13 - 6t = 0$$

$$t = 2\frac{1}{6} \text{ s}$$

(c) (i)  $v = 0, a > 0$

$$13 - 6t > 0$$

$$t < 2\frac{1}{6}$$

$$\therefore 0 < t < 2\frac{1}{6}$$

(ii)  $v = 0, a < 0$

$$13 - 6t < 0$$

$$t > 2\frac{1}{6}$$

$$\therefore 2\frac{1}{6} < t < 4\frac{1}{3}$$

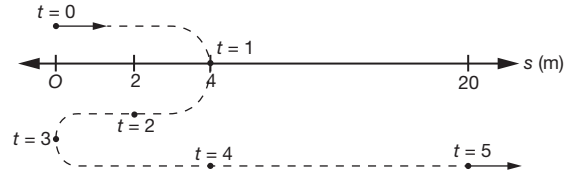
6 (a)  $s = 2(2 - 3)^2$

$$= 2 \text{ m}$$

(b)  $s = t(t - 3)^2$

$t$	0	1	2	3	4	5
$s$	0	4	2	0	4	20

$$\begin{aligned} \text{Jumlah jarak/Total distance} &= (4 + 4 + 20) \text{ m} \\ &= 28 \text{ m} \end{aligned}$$



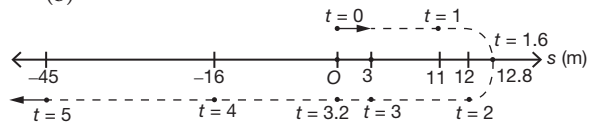
(c)  $s = s_5 - s_4$   
 $= (20 - 4) \text{ m}$   
 $= 16 \text{ m}$

7  $s = 16t - 5t^2$

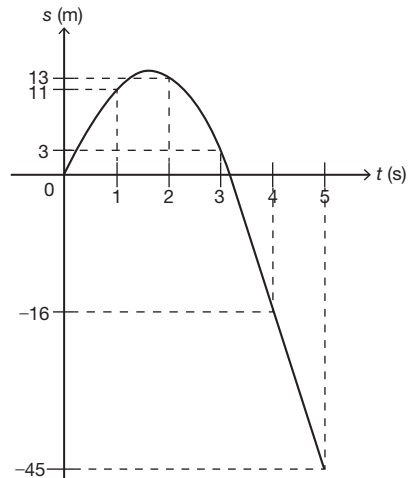
(a)

$t$	0	1	1.6	2	3	3.2	4	5
$s$	0	11	12.8	12	3	0	-16	-45

(b)



(c)



(d) Dalam julat masa  $0 \leq t \leq 1.6 \text{ s}$ , bola bergerak ke atas langit dan mencapai sesaran maksimum 12.8 m.

*In the time range of  $0 \leq t \leq 1.6 \text{ s}$ , the ball moves upwards and achieves the maximum height of 12.8 m.*

Pada  $t = 1.6 \text{ s}$ , bola berhenti seketika dan bertukar arah gerakan ke arah bawah.

*At  $t = 1.6 \text{ s}$ , the ball is at instantaneous rest and changes the direction of motion to move downwards.*

Pada  $t = 3.2 \text{ s}$ , bola melalui titik permulaan semula dan terus bergerak ke arah bawah bangunan.

*At  $t = 3.2 \text{ s}$ , the ball passes through the starting point again and continue to move downwards the building.*

Pada  $t = 5 \text{ s}$ , bola mencecah tapak bangunan.

*At  $t = 5 \text{ s}$ , the ball reaches the bottom of the building.*

8 (a) Halaju awal/Initial velocity =  $16 \text{ ms}^{-1}$

(b)  $v = 0$

$$t = 2 \text{ s}, 8 \text{ s}$$

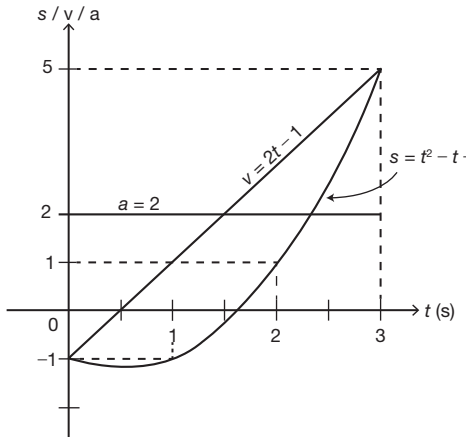
(c)  $v > 0$   
 $t < 2, t > 8$

(d)  $t = 5, v_{\min} = -9 \text{ ms}^{-1}$

9 (a)  $s = t^2 - t - 1, 0 \leq t \leq 3$

$$v = \frac{ds}{dt} = 2t - 1$$

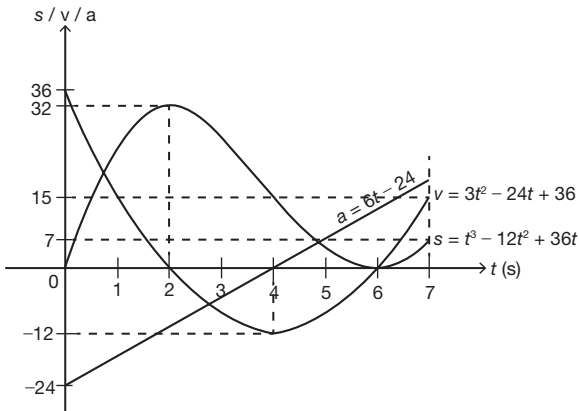
$$a = \frac{dv}{dt} = 2$$



(b)  $s = t^3 - 12t^2 + 36t, 0 \leq t \leq 7$

$$v = \frac{ds}{dt} = 3t^2 - 24t + 36$$

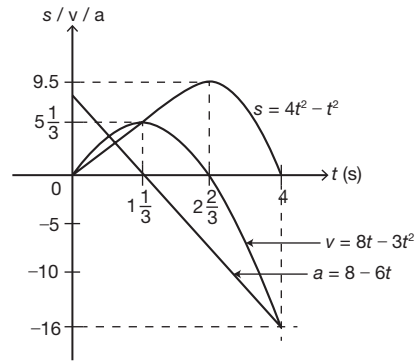
$$a = \frac{dv}{dt} = 6t - 24$$



(c)  $s = 4t^2 - t^3, 0 \leq t \leq 4$

$$v = \frac{ds}{dt} = 8t - 3t^2$$

$$a = \frac{dv}{dt} = 8 - 6t$$



10 (a)  $0 \leq t < 3$

(b)  $t = 3, s = -9 \text{ m}$

Zarah berada pada jarak maksimum 9 m ke kiri dari titik O.

The particle is at the maximum distance of 9 m to the left from point O.

(c)  $a = 0$

(d)  $v = 12 \text{ ms}^{-1}$   
 $a = 8 \text{ ms}^{-2}$

11  $s = t(t-6)^2$   
 $= t(t^2 - 12t + 36)$   
 $= t^3 - 12t^2 + 36t$

$$v = \frac{ds}{dt} = 3t^2 - 24t + 36$$

$$a = \frac{dv}{dt} = 6t - 24$$

(a)  $v = 0$   
 $3t^2 - 24t + 36 = 0$   
 $t^2 - 8t + 12 = 0$   
 $(t-2)(t-6) = 0$   
 $t = 2, 6$

Berhenti seketika untuk kali pertama pada  $t = 2 \text{ s}$ .

First instantaneous rest at  $t = 2 \text{ s}$ .

(b)  $t = 2, a = 6(2) - 24 = -12 \text{ ms}^{-2}$

(c)  $s = 0$   
 $t(t-6)^2 = 0$   
 $t = 0, 6$   
 $\therefore T = 6 \text{ s}$

(d)  $s = s_2 + [s_6 - s_2]$   
 $= [2(2-6)^2] + [[6(6-6)^2 - 2(2-6)^2]]$   
 $= 32 + |0 - 32|$   
 $= 64 \text{ m}$

12  $s = 12t - t^3$

$$v = \frac{ds}{dt} = 12 - 3t^2$$

$$a = \frac{dv}{dt} = -6t$$

$$\begin{aligned}
 \text{(a)} \quad v &= 0 \\
 12 - 3t^2 &= 0 \\
 t^2 &= 4 \\
 t &= 2 \\
 s &= 12(2) - (2)^3 \\
 &= 16 \text{ m}
 \end{aligned}$$

Kedudukan zarah = 16 m ke kanan dari titik O.  
*The position of the particle = 16 m to the right from point O.*

$$\begin{aligned}
 \text{(b)} \quad s_4 &= 12(4) - (4)^3 \\
 &= -16 \text{ m} \\
 s_3 &= 12(3) - (3)^3 \\
 &= 9 \text{ m}
 \end{aligned}$$

Jarak dilalui pada saat ke-4  
*The distance travelled in the 4<sup>th</sup> second*  
 $= 9 + |-16|$   
 $= 25 \text{ m}$

$$\begin{aligned}
 \text{(c)} \quad a &= 0 \\
 -6t &= 0 \\
 t &= 0 \\
 v &= 12 - 3(0)^2 \\
 &= 12 \text{ ms}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{13} \quad s &= (m - 2t)t + n \\
 &= mt - 2t^2 + n \\
 v &= \frac{ds}{dt} \\
 &= m - 4t
 \end{aligned}$$

$$\begin{aligned}
 \text{(a)} \quad \text{Apabila/When } t &= 0, \\
 s &= 10, & v &= 8 \\
 m(0) - 2(0)^2 + n &= 10 & m - 4(0) &= 8 \\
 n &= 10 & m &= 8
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad v &= 0 \\
 8 - 4t &= 0 \\
 t &= 2 \text{ s}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad s &= 0 \\
 8t - 2t^2 + 10 &= 0 \\
 t^2 - 4t - 5 &= 0 \\
 (t - 5)(t + 1) &= 0 \\
 t &= 5 \text{ (-1 ditolak/rejected)} \\
 v &= 8 - 4(5) \\
 &= -12 \text{ ms}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{(d)} \quad t &= 2 \text{ zarah tukar arah/particle changes direction} \\
 s_0 &= 10 \\
 s_2 &= 8(2) - 2(2)^2 + 10 \\
 &= 18 \\
 s_5 &= 8t - 2t^2 + 10 \\
 &= 0 \\
 \text{Jumlah jarak/The total distance} &= (s_2 - s_0) + |s_5 - s_2| \\
 &= 18 - 10 + |0 - 18| \\
 &= 26 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{14} \quad v &= 2t^2 - 5t - 12 \\
 a &= \frac{dv}{dt} \\
 &= 4t - 5
 \end{aligned}$$

$$\text{(a) Halaju awal/The initial velocity, } v = 2(0)^2 - 5(0) - 12 = -12 \text{ ms}^{-1}$$

$$\text{(b) Pecutan awal/The initial acceleration, } a = 4(0) - 5 = -5 \text{ ms}^{-2}$$

$$\begin{aligned}
 \text{(c)} \quad v_{\min} \text{ apabila/when } a &= 0 \\
 4t - 5 &= 0 \\
 t &= 1.25 \text{ s} \\
 v_{\min} &= 2(1.25)^2 - 5(1.25) - 12 \\
 &= -15 \text{ ms}^{-1} \\
 &= -15\frac{1}{8} \text{ ms}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{(d)} \quad v < 0 \\
 2t^2 - 5t - 12 < 0 \\
 (2t + 3)(t - 4) < 0 \\
 t > 0, \therefore 0 \leq t < 4
 \end{aligned}$$

$$\text{15} \quad s = 10t - 5t^2$$

$$\begin{aligned}
 v &= \frac{ds}{dt} \\
 &= 10 - 10t
 \end{aligned}$$

$$\begin{aligned}
 \text{(a)} \quad h &= |s_5| \\
 &= |10(5) - 5(5)^2| \\
 &= 75 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad v &= 0 \\
 10 - 10t &= 0 \\
 t &= 1 \text{ s}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad |s_5 - s_4| &= |[10(5) - 5(5)^2] - [10(4) - 5(4)^2]| \\
 &= |-75 - (-40)| \\
 &= 35 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(d) Apabila } t &= 1 \text{ s, zarah bertukar arah gerakan} \\
 \text{When } t &= 1 \text{ s, the particle changes its direction of motion} \\
 s_1 &= 10(1) - 5(1)^2 \\
 &= 5 \text{ m} \\
 \text{Jumlah jarak/Total distance} &= 5 + 5 + 75 \\
 &= 85 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{16} \quad s &= \frac{3t^2}{25}(20 - t) \\
 &= \frac{12t^2}{5} - \frac{3t^3}{25}
 \end{aligned}$$

$$\begin{aligned}
 v &= \frac{ds}{dt} \\
 &= \frac{24t}{5} - \frac{9t^2}{25}
 \end{aligned}$$

$$\begin{aligned}
 a &= \frac{dv}{dt} \\
 &= \frac{24}{5} - \frac{18t}{25}
 \end{aligned}$$

$$\begin{aligned}
 \text{(a) Zarah bertukar arah gerakan apabila } v &= 0 \\
 \text{The particle changes the direction when } v &= 0 \\
 \frac{24t}{5} - \frac{9t^2}{25} &= 0 \\
 \frac{120t - 9t^2}{5} &= 0 \\
 3t(40 - 3t) &= 0 \\
 t &= 0, \frac{40}{3} \text{ s} \\
 &= 0, 13\frac{1}{3} \text{ s}
 \end{aligned}$$

Jumlah jarak/The total distance

$$\begin{aligned}
 &= s_{10} - s_0 \\
 &= \left[ \frac{3(10)^2}{25}(20 - 10) \right] - \left[ \frac{3(0)}{25}(20 - 0) \right] \\
 &= 120 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Halaju purata/Average velocity} &= \frac{120 \text{ m}}{10 \text{ s}} \\
 &= 12 \text{ ms}^{-1}
 \end{aligned}$$

(b)  $a = 0$

$$\frac{24}{5} - \frac{18t}{25} = 0$$

$$t = \frac{20}{3} \text{ s}$$

$$\begin{aligned}
 v &= \frac{24}{5} \left( \frac{20}{3} \right) - \frac{9}{25} \left( \frac{20}{3} \right)^2 \\
 &= 16 \text{ ms}^{-1}
 \end{aligned}$$

$$t = \frac{20}{3} \text{ s}, \frac{d^2v}{dt^2} = -\frac{18}{25} < 0$$

$\therefore$  Maksimum/Maximum

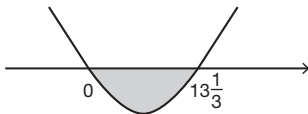
(c)  $v > 0, a > 0$

$$\frac{24t}{5} - \frac{9t^2}{25} > 0, \quad \frac{24}{5} - \frac{18t}{25} > 0$$

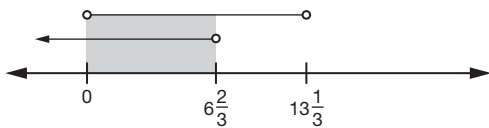
$$\frac{120t - 9t^2}{25} > 0, \quad \frac{18t}{25} - \frac{24}{5} > 0$$

$$\frac{9t^2 - 120t}{25} < 0, \quad t < \frac{20}{3} \text{ s}$$

$$\frac{3t(3t - 40)}{25} < 0, \quad t < 6\frac{2}{3} \text{ s}$$



$$0 < t < 13\frac{1}{3}$$



$$0 < t < 6\frac{2}{3}$$

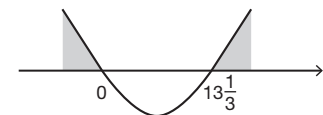
atau/or

$$v < 0, a < 0$$

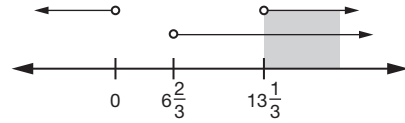
$$\frac{24t}{5} - \frac{9t^2}{25} < 0, \quad \frac{24}{5} - \frac{18t}{25} < 0$$

$$\frac{9t^2 - 120t}{25} > 0, \quad \frac{18}{25}t > \frac{24}{5}$$

$$\frac{3t(3t - 40)}{25} > 0, \quad t > \frac{20}{3}$$



$$t < 13\frac{1}{3}$$



$$\therefore 0 < t < 6\frac{2}{3} \text{ atau/or } t > 13\frac{1}{3}$$

17  $v = 3t(6 - 3t)$   
 $= 18t - 9t^2$

$$\begin{aligned}
 a &= \frac{dv}{dt} \\
 &= 18 - 18t
 \end{aligned}$$

$$\begin{aligned}
 s &= \int v \, dt \\
 &= \int 18t - 9t^2 \, dt \\
 &= 9t^2 - 3t^3 + c
 \end{aligned}$$

$$t = 0, s = 0, \therefore c = 0$$

$$s = 9t^2 - 3t^3$$

(a)  $v_{\max}$  apabila/when  $a = 0$

$$18 - 18t = 0$$

$$t = 1$$

$$\frac{d^2v}{dt^2} = -18$$

$$\frac{d^2v}{dt^2} < 0 \therefore v_{\max} = 18(1) - 9(1)^2 = 9 \text{ ms}^{-1}$$

(b)  $s = |s_4 - s_3|$   
 $= |[9(4)^2 - 3(4)^3] - [9(3)^2 - 3(3)^3]|$   
 $= |-48 - 0|$   
 $= 48 \text{ m}$

(c)  $v = 0$

$$18t - 9t^2 = 0$$

$$9t(2 - t) = 0$$

$$t = 0, 2$$

$$t = 2, s = 9(2)^2 - 3(2)^3$$

$$= 12 \text{ m}$$

18  $a = 8t - 20$

$$\begin{aligned}
 v &= \int a \, dt \\
 &= \int 8t - 20 \, dt \\
 &= 4t^2 - 20t + c
 \end{aligned}$$

$$t = 0, v = -24, \therefore c = -24$$

$$v = 4t^2 - 20t - 24$$

$$\begin{aligned}
 s &= \int v \, dt \\
 &= \int 4t^2 - 20t - 24 \, dt \\
 &= \frac{4}{3}t^3 - 10t^2 - 24t + c
 \end{aligned}$$

$$t = 0, s = 0, \therefore c = 0$$

$$s = \frac{4}{3}t^3 - 10t^2 - 24t$$

(a)  $v = 0$

$$4t^2 - 20t - 24 = 0$$

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

$$(t + 1)(t - 6) = 0$$

$$t = 6 \text{ (-1 ditolak/rejected)}, \therefore t = 6$$

$$a = 8(6) - 20$$

$$= 28 \text{ ms}^{-2}$$

$$\begin{aligned} \text{(b) } s &= |s_5 - s_0| \\ &= \left| \left[ \frac{4}{3}(5)^3 - 10(5)^2 - 24(5) \right] - 0 \right| \\ &= 203\frac{1}{3} \text{ m} \end{aligned}$$

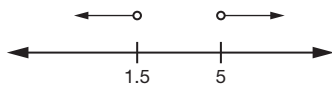
$$\begin{aligned} 19 \quad a &= 2t - 3 \\ v &= \int a \, dt \\ &= \int 2t - 3 \, dt \\ &= t^2 - 3t + c \\ t = 0, v &= -10, & \therefore c &= -10 \\ v &= t^2 - 3t - 10 \\ s &= \int v \, dt \\ &= \int t^2 - 3t - 10 \, dt \\ &= \frac{1}{3}t^3 - \frac{3}{2}t^2 - 10t + c \\ t = 0, s &= 0, & \therefore c &= 0 \end{aligned}$$

$$\begin{aligned} s &= \frac{1}{3}t^3 - \frac{3}{2}t^2 - 10t \\ \text{(a) } a &= 0 \\ 2t - 3 &= 0 \\ t &= 1.5 \text{ s} \\ v &= (1.5)^2 - 3(1.5) - 10 \\ &= -12.25 \text{ ms}^{-1} \end{aligned}$$

$$\begin{aligned} \text{(b) Apabila/When} \\ v &> 0, & a &< 0 \\ t^2 - 3t - 10 &> 0, & 2t - 3 &< 0 \\ (t - 5)(t + 2) &> 0, & t &< 1.5 \end{aligned}$$

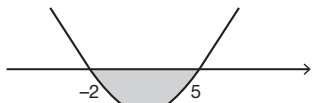


$$t > 5 \text{ (} t < -2 \text{ ditolak/rejected), } t < 1.5$$

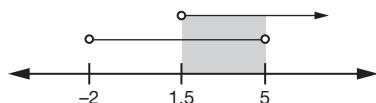


tiada penyelesaian/no solution

$$\begin{aligned} v &< 0, & a &> 0 \\ t^2 - 3t - 10 &< 0, & 2t - 3 &> 0 \\ (t - 5)(t + 2) &< 0, & t &> 1.5 \end{aligned}$$



$$-2 < t < 5$$



$$1.5 \leq t < 5$$

$\therefore$  Zarah mengalami nyahpecutan bagi  $1.5 \leq t < 5$ .

*The particle experiences deceleration for  $1.5 \leq t < 5$ .*

(c) Arah gerakan bertukar apabila

*The direction of motion changes when*

$$v = 0$$

$$\begin{aligned} t^2 - 3t - 10 &= 0 \\ (t - 5)(t + 2) &= 0 \\ t &= -2 \text{ (ditolak/rejected), } \therefore t = 5 \\ s_5 &= \frac{1}{3}(5)^3 - \frac{3}{2}(5)^2 - 10(5) \\ &= -45\frac{5}{6} \text{ m} \end{aligned}$$

$$\begin{aligned} s_6 &= \frac{1}{3}(6)^3 - \frac{3}{2}(6)^2 - 10(6) \\ &= -42 \text{ m} \end{aligned}$$

Jumlah jarak/The total distance

$$\begin{aligned} &= \left| -45\frac{5}{6} \right| + \left[ -42 - \left( -45\frac{5}{6} \right) \right] \\ &= 49\frac{2}{3} \text{ m} \end{aligned}$$

$$\begin{aligned} 20 \quad a &= p + qt \\ t = 0, a &= -2, & \therefore p &= -2 \end{aligned}$$

$$\begin{aligned} a &= qt - 2 \\ v &= \int a \, dt \\ &= \int qt - 2 \, dt \\ &= \frac{q}{2}t^2 - 2t + c \end{aligned}$$

$$t = 0, v = 8, \quad \therefore c = 8$$

$$v = \frac{q}{2}t^2 - 2t + 8$$

$$\begin{aligned} s &= \int v \, dt \\ &= \int \frac{q}{2}t^2 - 2t + 8 \, dt \\ &= \frac{q}{6}t^3 - t^2 + 8t + c \end{aligned}$$

$$t = 0, s = 0, \quad \therefore c = 0$$

$$s = \frac{q}{6}t^3 - t^2 + 8t$$

$$\begin{aligned} \frac{q}{6}(1)^3 - (1)^2 + 8(1) &= 9 \\ \frac{q}{6} &= 2 \\ q &= 12 \end{aligned}$$

$$21 \quad v = t^2 - 4t - 5$$

$$\begin{aligned} \text{(a) } a &= \frac{dv}{dt} \\ &= 2t - 4 \\ s &= \int v \, dt \\ &= \int t^2 - 4t - 5 \, dt \\ &= \frac{1}{3}t^3 - 2t^2 - 5t + c \end{aligned}$$

$$t = 0, s = 5, \quad \therefore c = 5$$

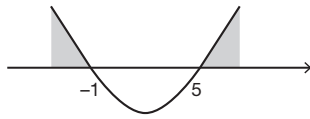
$$s = \frac{1}{3}t^3 - 2t^2 - 5t + 5$$

$$\begin{aligned} \text{(b) } v &= 0 \\ t^2 - 4t - 5 &= 0 \\ (t - 5)(t + 1) &= 0 \\ t &= 5 \text{ (-1 ditolak/rejected)} \end{aligned}$$

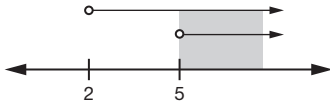
$$\begin{aligned} s_5 &= \left[ \frac{1}{3}(5)^3 - 2(5)^2 - 5(5) + 5 \right] \\ &= 28\frac{1}{3} \text{ m} \end{aligned}$$

(c) Apabila/When

$$\begin{aligned} v &> 0, & a &> 0 \\ t^2 - 4t - 5 &> 0, & 2t - 4 &> 0 \\ (t - 5)(t + 1) &> 0, & t &> 2 \end{aligned}$$



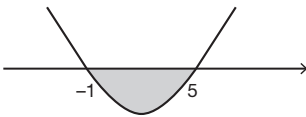
$t > 5$  ( $t < -1$  ditolak/rejected),  $t > 2$



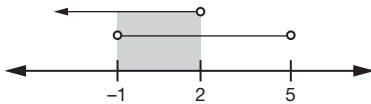
$\therefore t > 5$

atau/or

$$\begin{aligned} v &< 0, & a &< 0 \\ t^2 - 4t - 5 &< 0, & 2t - 4 &< 0 \\ (t - 5)(t + 1) &< 0, & t &< 2 \end{aligned}$$



$-1 < t < 5$



$0 \leq t < 2$

$\therefore$  Zarah bergerak dengan halaju menokok bagi

$0 \leq t < 2$  dan  $t > 5$ .

The particle moves in increasing velocity for  $0 \leq t < 2$  and  $t > 5$ .

22  $a = 2 - t$

$$v = \int a \, dt$$

$$= \int 2 - t \, dt$$

$$= 2t - \frac{1}{2}t^2 + c$$

$$t = 0, v = 100,$$

$$\therefore c = 100$$

$$v = 100 + 2t - \frac{1}{2}t^2$$

$$s = \int v \, dt$$

$$= \int 100 + 2t - \frac{1}{2}t^2 \, dt$$

$$= 100t + t^2 - \frac{1}{6}t^3 + c$$

$$t = 0, s = 50,$$

$$\therefore d = 50$$

$$s = 50 + 100t + t^2 - \frac{1}{6}t^3$$

(a)  $a = 0$

$$2 - t = 0$$

$$t = 2 \text{ j/h}$$

(b)  $v_{\max} = 100 + 2(2) - \frac{1}{2}(2)^2$

$$= 102 \text{ kmj}^{-1}/\text{kmh}^{-1}$$

(c)  $s = 50 + 100(2) + (2)^2 - \frac{1}{6}(2)^3$

$$= 252\frac{2}{3} \text{ km}$$

23 (a)  $v_s = 15$

$$s_s = \int v \, dt$$

$$= 15t + c$$

$$t = 0, s_s = 0, \therefore c = 0$$

$$s_s = 15t$$

$$a_c = 3$$

$$v_c = \int a \, dt$$

$$= \int 3 \, dt$$

$$= 3t + c$$

$$t = 0, v_c = 0, \therefore c = 0$$

$$v_c = 3t$$

$$s_c = \int v \, dt$$

$$= \int 3t \, dt$$

$$= \frac{3}{2}t^2 + c$$

$$t = 0, s_c = 0, \therefore c = 0$$

$$s_c = \frac{3}{2}t^2$$

(b)  $s_c = s_s$

$$\frac{3}{2}t^2 = 15t$$

$$t^2 = 10t$$

$$t(t - 10) = 0$$

$$t = 0, 10$$

$$\therefore t = 10 \text{ s}$$

(c)  $v_c = 3(10)$

$$= 30 \text{ ms}^{-1}$$

(d)  $s_s = 15(10)$

$$= 150 \text{ m}$$

$$s_c = \frac{3}{2}(10)^2$$

$$= 150 \text{ m}$$

24  $v = 18 + 12t - 6t^2$

$$a = \frac{dv}{dt}$$

$$= 12 - 12t$$

$$s = \int v \, dt$$

$$= \int 18 + 12t - 6t^2 \, dt$$

$$= 18t + 6t^2 - 2t^3 + c$$

$$t = 0, s = 0,$$

$$\therefore c = 0$$

$$s = 18t + 6t^2 - 2t^3$$

(a)  $v = 18 + 12(0) - 6(0)^2$

$$= 18 \text{ ms}^{-1}$$

(b)  $a = 0$

$$12 - 12t = 0$$

$$t = 1$$

$$v = 18 + 12(1) - 6(1)^2$$

$$= 24 \text{ ms}^{-1}$$

(c)  $v > 0$

$$18 + 12t - 6t^2 > 0$$

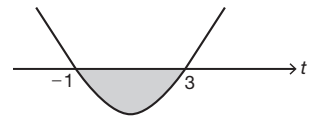
$$t^2 - 2t - 3 < 0$$

$$(t + 1)(t - 3) < 0$$

$$t \geq 0, \therefore 0 \leq t < 3$$

(d)  $s_3 = 18(3) + 6(3)^2 - 2(3)^3$

$$= 54 \text{ m}$$



25  $v_A = 14 + 9t$

$$a_A = \frac{dv}{dt}$$

$$= 9$$

$$s_A = \int v_A \, dt$$

$$= \int 14 + 9t \, dt$$

$$= 14t + \frac{9}{2}t^2 + c$$

$$t = 0, s_A = 0, \therefore c = 0$$

$$v_B = 3t$$

$$v_B = \int a_B \, dt$$

$$= \int 3t \, dt$$

$$= \frac{3}{2}t^2 + c$$

$$t = 0, v = 18, \therefore c = 18$$

$$v_B = \frac{3}{2}t^2 + 18$$

$$s_B = \int v_B \, dt$$





$$t = 3 \text{ s}$$

$$a = \frac{dv}{dt}$$

$$= 12t$$

$$t = 3, a = 12(3)$$

$$= 36 \text{ ms}^{-2}$$

$$(b) s = \int_4^5 6t^2 dt$$

$$= [2t^3]_4^5$$

$$= 2(5)^3 - 2(4)^3$$

$$= 122 \text{ m}$$

$$(c) s = \int_0^5 6t^2 dt$$

$$= [2t^3]_0^5$$

$$= 2(5)^3 - 2(0)^3$$

$$= 250 \text{ m}$$

### Praktis Sumatif

#### Kertas 2

1  $v = 48t - 6t^2$

$$a = \frac{dv}{dt}$$

$$= 48 - 12t$$

$$s = \int v dt$$

$$= \int 48t - 6t^2 dt$$

$$= 24t^2 - 2t^3 + c$$

$t = 0, s = 0, \therefore c = 0$

$$s = 24t^2 - 2t^3$$

(a)  $a = 0$

$$48 - 12t = 0$$

$$t = 4 \text{ s}$$

(b)  $v = 0$

$$6t(8 - t) = 0$$

$$t = 0, 8$$

$$\therefore t = 8 \text{ s}$$

(c)  $s_8 = 24(8)^2 - 2(8)^3$

$$= 512 \text{ m}$$

(d)  $s = 0$

$$24t^2 - 2t^3 = 0$$

$$2t^2(12 - t) = 0$$

$$t = 0, 12$$

$$v_{12} = 48(12) - 6(12)^2$$

$$= -288 \text{ ms}^{-1}$$

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

$$v = \frac{ds}{dt}$$

$$= 4 - 4t$$

(a)  $s_0 = 9 + 4(0) - 2(0)^2$

$$= 9 \text{ m}$$

(b)  $v = 0$

$$4 - 4t = 0$$

$$t = 1$$

$$s_1 = 9 + 4(1) - 2(1)^2$$

$$= 11 \text{ m}$$

(c) Ben bertukar arah pada  $t = 1$   
Ben changes direction at  $t = 1$

$$s_0 = 9 \text{ m}$$

$$s_1 = 11 \text{ m}$$

$$s_3 = 9 + 4(3) - 2(3)^2$$

$$= 3$$

Jumlah jarak/the total distance covered

$$= (s_1 - s_0) + |s_3 - s_1|$$

$$= 2 + 8$$

$$= 10 \text{ m}$$

(d)  $v_3 = 4 - 4(3)$

$$= -8 \text{ ms}^{-1}$$

$$a = 8 - t$$

$$v = \int a dt$$

$$= \int 8 - t dt$$

$$= 8t - \frac{1}{2}t^2 + c$$

$$t = 3, v = -8$$

$$\frac{1}{2}(3)^2 - 8(3) + c = 8$$

$$c = -\frac{55}{2}$$

$$v = 8t - \frac{1}{2}t^2 - \frac{55}{2}$$

$$\frac{1}{2}t^2 - 8t + \frac{55}{2} = 0$$

$$t^2 - 16t + 55 = 0$$

$$(t - 11)(t - 5) = 0$$

$$t = 5, 11$$

$$\therefore t = 5 \text{ s}$$

3 (a)  $v = \alpha t - \beta t^2$

$$a = \frac{dv}{dt}$$

$$= \alpha - 2\beta t$$

Apabila/When  $t = 0, a = 5. \therefore \alpha = 5$

$v_{\max}$  apabila/when  $a = 0$

$$5 - 2\beta t = 0$$

$$t = \frac{5}{2\beta}$$

$$v = 3.125$$

$$5\left(\frac{5}{2\beta}\right) - \beta\left(\frac{5}{2\beta}\right)^2 = 3.125$$

$$\frac{25}{2\beta} - \frac{25}{4\beta} = 3.125$$

$$50 - 25 = 12.5\beta$$

$$\beta = 2$$

(b)  $v_{\max}$  di titik Q/at point Q,  $a = 0$

$$5 - 2(2)t = 0$$

$$= \frac{5}{4} \text{ s}$$

(c)  $s = \int v dt$

$$= \int 5t - 2t^2 dt$$

$$= \frac{5}{2}t^2 - \frac{2}{3}t^3 + c$$

$$t = 0, s_p = 0, \therefore c = 0$$

$$s = \frac{5}{2}t^2 - \frac{2}{3}t^3$$

$$t = \frac{5}{4}, s_Q = \frac{5}{2}\left(\frac{5}{4}\right)^2 - \frac{2}{3}\left(\frac{5}{4}\right)^3$$

$$= 2\frac{29}{48} \text{ m}$$

Jarak PQ/Distance  $PQ = 2\frac{29}{48}$  m

4  $s = 50 + t^2 - \frac{1}{15}t^3$

(a)  $v = 0$

$$\frac{ds}{dt} = 0$$

$$2t - \frac{1}{5}t^2 = 0$$

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

$$t(10 - t) = 0$$

$$t = 0, 10$$

$$\frac{d^2s}{dt^2} = 2 - \frac{2}{5}t$$

$$t = 0, \frac{d^2s}{dt^2} = 2 - \frac{2}{5}(0) > 0 \rightarrow \text{minimum}$$

$$t = 10, \frac{d^2s}{dt^2} = 2 - \frac{2}{5}(10) < 0 \rightarrow \text{maksimum/maximum}$$

$$\therefore s_{\text{max}} = 50 + (10)^2 - \frac{1}{15}(10)^3$$

$$= 83\frac{1}{3} \text{ cm}$$

(b)  $a = 0$

$$\frac{dv}{dt} = 0$$

$$2 - \frac{2}{5}t = 0$$

$$10 - 2t = 0$$

$$t = 5$$

$$v = 2(5) - \frac{1}{5}(5)^2$$

$$= 5 \text{ cms}^{-1}$$

$$t = 5, \frac{d^2v}{dt^2} = -\frac{2}{5} < 0 \rightarrow \text{maksimum/maximum}$$

(c)  $s_5 = 50 + (5)^2 - \frac{1}{15}(5)^3$

$$= 66\frac{2}{3} \text{ cm}$$

5  $v = 3t^2 - 15t + 18$

(a)  $v = 0$

$$3t^2 - 15t + 18 = 0$$

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

$$(t - 3)(t - 2) = 0$$

$$t = 2, 3$$

(b)  $s = \int v dt$

$$= \int 3t^2 - 15t + 18 dt$$

$$= t^3 - \frac{15}{2}t^2 + 18t + c$$

$$t = 0, s = 0, \therefore c = 0$$

$$s = t^3 - \frac{15}{2}t^2 + 18t$$

Zarah bertukar arah pada  $t = 2$  s dan  $3$  s

The particle changes its direction at  $t = 2$  s and  $3$  s

$$s_0 = 0$$

$$s_2 = (2)^3 - \frac{15}{2}(2)^2 + 18(2)$$

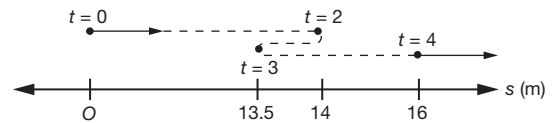
$$= 14$$

$$s_3 = (3)^3 - \frac{15}{2}(3)^2 + 18(3)$$

$$= 13.5$$

$$s_4 = (4)^3 - \frac{15}{2}(4)^2 + 18(4)$$

$$= 16$$



Jumlah jarak/Total distance

$$= 14 + (14 - 13.5) + (16 - 13.5)$$

$$= 17 \text{ cm}$$

(c)  $a = 0$

$$\frac{dv}{dt} = 0$$

$$6t - 15 = 0$$

$$t = 2.5$$

$$v = 3(2.5)^2 - 15(2.5) + 18$$

$$= -0.75 \text{ cms}^{-1}$$