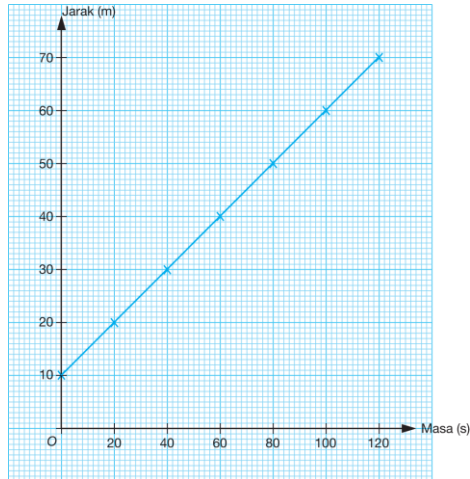


Excel Matematik SPM
Tingkatan 4 Bab 7
Graf Gerakan
Penyelesaian Lengkap

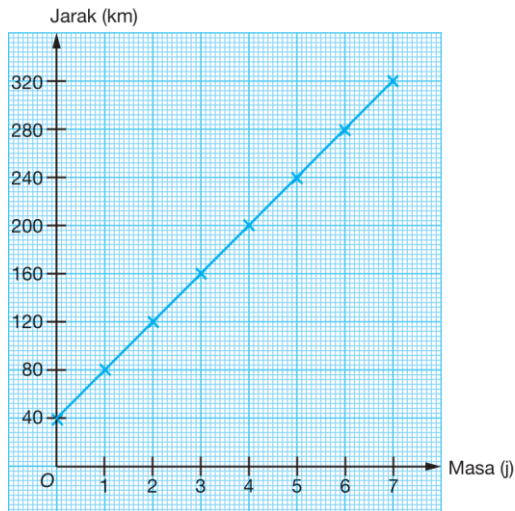
Praktis Formatif 7.1

1



2

s (m)	0	80	120	160	200	240	280	320
t (km)	0	1	2	3	4	5	6	7



3

Graf	Kecerunan graf	Tafsiran graf
AB	$\frac{10 \text{ m}}{5 \text{ s}} = 2 \text{ m s}^{-1}$	Laju seragam 2 m s^{-1} dari H ke K
BC	0 m s^{-1}	Berada dalam keadaan rehat K selama 7 saat 10 m dari H
CD	$-\frac{10 \text{ m}}{4 \text{ s}} = -2.5 \text{ m s}^{-1}$	Kembali dari K ke H dengan laju seragam 2.5 m s^{-1}

4 (a) Laju = $\frac{140 - 40}{1} = 100 \text{ km j}^{-1}$

(b) Laju = 0 km j^{-1}

(c) Kecerunan = $-\frac{140}{2} = -70$

Maka, laju = 70 km j^{-1}

5 (a) Laju purata trak = $\frac{300}{16} = 18.75 \text{ m s}^{-1}$

(b) Kecerunan = $-\frac{300}{10} = -30$

Maka, laju teksi = 30 m s^{-1}

(c) Jarak dari Q = $300 - 60 = 240 \text{ m}$

6 (a) Beza jarak = $24 - 12 = 12 \text{ m}$

(b) Laju basikal = $\frac{16 - 4}{8 - 0} = \frac{16 - 4}{8} = 1.5 \text{ m s}^{-1}$

(c) Masa yang diambil untuk bertemu = $2\frac{2}{3} \text{ s}$

7 (a) Masa kedua-dua kenderaan bertuma = 0840

(b) Laju bas = $\frac{60}{\frac{50}{60}} = 72 \text{ km j}^{-1}$

(c) Kecerunan = $-\frac{120}{\frac{60}{60}} = -120$

Maka, laju teksi = 120 km j^{-1}

8 (a) Laju = $\frac{15}{6} = 2\frac{1}{2} \text{ m s}^{-1}$

(b) Masa dalam keadaan rehat = $14 - 6 = 8 \text{ s}$

(c) $\frac{x}{24} = \frac{5}{4}$
 $x = 30$

9 (a) Kecerunan = $-\frac{100}{10} = -10$
 Laju = 10 m s^{-1}

(b) Tempoh masa dalam keadaan rehat 10 s

(c) Laju purata = $\frac{200}{T} = \frac{20}{3}$
 $T = \frac{3}{20} \times 200$
 $T = 30$

10 (a) Kecerunan = $-\frac{180}{6} = -30$
 Laju kereta = 30 m s^{-1}

(b) Laju van = $\frac{80}{3} = 26\frac{2}{3} \text{ m s}^{-1}$

(c) Jarak yang dilalui kereta = $180 - 80 = 100 \text{ m}$

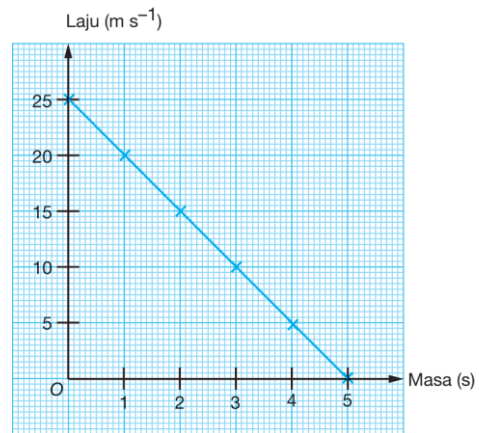
11 (a) Jarak yang dilalui
 = $80 - 30 = 50 \text{ m}$

(b) Laju = $\frac{30}{2} = 15 \text{ m s}^{-1}$

(c) Laju purata = $\frac{100}{t} = \frac{25}{3}$
 $t = 12$

2

v (m)	25	20	15	10	5	0
t (m s ⁻¹)	0	1	2	3	4	5



3 (a) Jarak = $110 \times 2 = 220 \text{ km}$

(b) Jarak = $\frac{1}{2} \times 6 \times 20 = 60 \text{ m}$

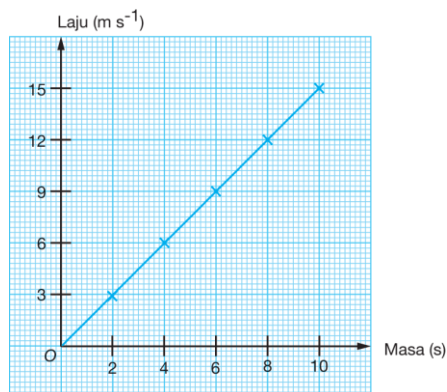
(c) Jarak = $\frac{1}{2} \times (6 + 16)(8) = 88 \text{ m}$

4 (a) Jumlah jarak
 = $6 \times 10 + \frac{1}{2}(10 + 24)(5) + \frac{1}{2}(7)(24)$
 = 229 m

(b) Jumlah jarak
 = $\frac{1}{2}(10 + 30)(5) + \frac{1}{2}(30 + 18)(2) + 3(18)$
 = $100 + 48 + 54 = 202 \text{ m}$

Praktis Formatif 7.2

1



5 (a)

Graf	Luas di bawah graf	Tafsiran graf
HK	90 km	Jarak yang dilalui ialah 90 km.
KL	30 km	Jarak yang dilalui ialah 30 km.
LM	97.5 km	Jarak yang dilalui ialah 97.5 km.

(b)

Graf	Kecerunan graf	Tafsiran graf
HK	-15 km j^{-2}	Nyahpecutan ialah 15 km j^{-2} .
KL	0 km j^{-2}	Pecutan ialah 0 km j^{-2} / Laju seragam ialah 30 km j^{-1} .
LM	$46\frac{2}{3} \text{ km j}^{-2}$	Pecutan ialah $46\frac{2}{3} \text{ km j}^{-2}$.

(c) Kereta itu menyahpecut secara seragam daripada laju 60 km j^{-1} dengan nyahpecutan 15 km j^{-2} hingga laju 30 km j^{-1} dalam masa 2 jam. Jarak yang dilalui semasa nyahpecutan ini ialah 90 km. Kemudian, kereta itu bergerak dengan laju seragam 30 km j^{-1} sejauh 30 km selama 1 jam.

Seterusnya, kereta itu memecut secara seragam dengan pecutan $46\frac{2}{3} \text{ km j}^{-2}$ sejauh 97.5 km sehingga ia mencapai laju 100 km j^{-1} dalam tempoh masa 1.5 jam.

6 (a) Jarak = 265

$$\begin{aligned} \frac{1}{2}(10+40)(7) + \frac{1}{2}(40+u)(3) &= 265 \\ 175 + \frac{3(40+u)}{2} &= 265 \\ \frac{3(40+u)}{2} &= 90 \\ 40+u &= \frac{180}{3} \\ 40+u &= \frac{180}{3} \\ u &= 20 \end{aligned}$$

(b) Laju purata = $\frac{175}{7} = 25 \text{ m s}^{-1}$

(c) Kadar perubahan laju

$$\begin{aligned} &= -\frac{40-20}{3} \\ &= -6\frac{2}{3} \text{ m s}^{-1} \end{aligned}$$

7 (a) Masa bergerak dengan laju purata = 12

$$\begin{aligned} t-4 &= 12 \\ t &= 16 \end{aligned}$$

(b) Jumlah jarak = 330 m

$$\begin{aligned} \frac{1}{2}(v+15)(8) + 4(15) + \frac{1}{2}(4)(15) &= 330 \\ 4v+60+60+30 &= 330 \\ 4v &= 180 \\ v &= 45 \end{aligned}$$

(c) Kadar perubahan laju

$$= \frac{30}{14}$$

$$= 7.5 \text{ m s}^{-2}$$

8 (a) Laju seragam = 10 m s^{-1}

(b) (i) Kadar perubahan laju = $\frac{5}{7}$

$$\frac{10}{t} = \frac{5}{7}$$

$$5t = 70$$

$$t = 14$$

(ii) Jumlah jarak

$$= \frac{1}{2}(14)(10) + 10(2) + \frac{1}{2}(10+16)(8)$$

$$= 194 \text{ m}$$

Laju purata = $\frac{194}{24} = 8\frac{1}{12} \text{ m s}^{-1}$

9 (a) Jarak yang dilalui dengan laju seragam
 $= 144 \text{ m}$

$$18(12-t) = 144$$

$$12-t = 8$$

$$t = 4$$

(b) Kadar perubahan laju

$$= -\frac{18}{3}$$

$$= -6 \text{ m s}^{-2}$$

(c) Jumlah jarak

$$= \frac{1}{2} \times (30+18) \times 4 + 144 + \frac{1}{2}(3)(18)$$

$$= 267 \text{ m}$$

Laju purata = $\frac{267}{15} = 17\frac{4}{5} \text{ m s}^{-1}$

10 (a) Jarak yang dilalui dengan laju seragam
 $10 \times 8 = 80 \text{ m}$

(b) Kadar perubahan laju

$$= \frac{8}{4} = 2 \text{ m s}^{-2}$$

(c) Jumlah jarak = 156

$$\frac{1}{2}(v+8)(8) + 10(8) = 156$$

$$4(v+8) + 80 = 156$$

$$4v + 32 + 80 = 156$$

$$4v = 44$$

$$v = 11$$

11 (a) Laju = 20 m s^{-1}

(b) Kadar perubahan laju

$$= \frac{20}{6} = 3\frac{1}{3} \text{ m s}^{-2}$$

(c) Jumlah jarak motosikal P

$$= \frac{1}{2} \times T \times 20$$

$$= 10T$$
 Jumlah jarak motosikal Q

$$= \frac{1}{2}(6)(20) + 20(T-6)$$

$$= 60 + 20T - 120$$

$$= 20T - 60$$

$$20T - 60 - 10T = 30$$

$$10T = 90$$

$$T = 9$$

12 (a) Laju seragam = 25 m s^{-1}

(b) Kadar perubahan laju = $\frac{25-10}{5} = 3 \text{ m s}^{-1}$

(c) Jumlah jarak = 212.5 m

$$\frac{1}{2}(10+25)(5) + 25(t-5) = 212.5$$

$$\frac{175}{2} + 25t - 125 = 212.5$$

$$175 + 50t - 250 = 425$$

$$50t = 500$$

$$t = 10$$

13 (a) Jarak yang dilalui dengan laju seragam
 $= 2 \times 12 = 24 \text{ m}$

(b) Kadar perubahan laju

$$= \frac{12}{4} = 3 \text{ m s}^{-2}$$

(c) Jarak yang dilalui dalam 4 saat pertama
 $= \frac{1}{2}(4)(12) = 24 \text{ m}$
 Jarak yang dilalui dari saat ke-6 hingga
 saat ke- $t = \frac{1}{2}(12+20)(t-6)$

$$= 16(t-6)$$

$$= 16t - 96$$

Maka, $24 = \frac{1}{3}(16t - 96)$

$$72 = 16t - 96$$

$$16t = 168$$

$$t = 10.5$$

14 (a) Jarak yang dilalui oleh kereta

$$= \frac{1}{2}(6)(30) + \frac{1}{2}(30+10)(4) = 170 \text{ m}$$

Jarak yang dilalui oleh motosikal

$$= \frac{1}{2}(10)(10) = 50 \text{ m}$$

$$\text{Beza jarak} = 170 - 50 = 120 \text{ m}$$

(b) Kadar perubahan laju

$$= \frac{30}{6} = 5 \text{ m s}^{-1}$$

(c) Kecerunan sepanjang garis OP

$$\frac{v}{12} = \frac{10}{10}$$

$$v = 12$$

Praktis Sumatif 7

Soalan Objektif

1 Laju = $\frac{120-70}{0.5} = 100 \text{ j}^{-1}$

Jawapan: D

2 Laju purata = $\frac{60+120}{30} = 6 \text{ m s}^{-1}$

Jawapan: C

3 Jarak = 260 m

$$\frac{1}{2}(9+16)t + (18-t)(16) = 260$$

$$\frac{25}{2}t + 288 - 16t = 260$$

$$25t + 576 - 32t = 520$$

$$-7t = -56$$

$$t = 8$$

Jawapan: C

4 Jumlah jarak

$$= \frac{1}{2}(6)(8) + \frac{1}{2}(8+24)(4) + 5(24)$$

$$= 208 \text{ m}$$

Jawapan: C

5 Kadar perubahan laju

$$= -\frac{11-3}{5} = -\frac{8}{5} \text{ m s}^{-2}$$

Jawapan: C

Soalan Struktur

1 (a) (i) Jarak di antara rumah Abidin dan kedai kek = 5 km

(ii) Jarak di antara kedai kek dan perpustakaan awam
= 12 - 5 = 7 km

(b) (i) Laju = $\frac{5}{\frac{15}{60}} = 20 \text{ km j}^{-1}$

(ii) Laju = $\frac{12-5}{\frac{45-15}{60}} = 14 \text{ km j}^{-1}$

(c) Laju purata = $\frac{12}{\frac{45}{60}} = 16 \text{ km j}^{-1}$

2 (a) Laju = $\frac{25}{5} = 5 \text{ m s}^{-1}$

(b) Kecerunan = $-\frac{25}{13-5} = -3\frac{1}{8}$

$$\text{Laju} = 3\frac{1}{8} \text{ m s}^{-1}$$

(c) Jarak = 25 m

(d) Laju purata = $\frac{50}{13} = 3\frac{11}{13} \text{ m s}^{-1}$

3 (a) $h = 3 - 1.75 = 1.25 \text{ jam} = 75 \text{ minit}$

(b) $k = 5.5 - 4 = 1.5 \text{ jam} = 90 \text{ minit}$

(c) Jarak = 90 - 50 = 40 km

(d) (i) Laju = $\frac{50}{1.75} = 28\frac{4}{7} \text{ km j}^{-1}$

(ii) Laju = $\frac{90-50}{1} = 40 \text{ km j}^{-1}$

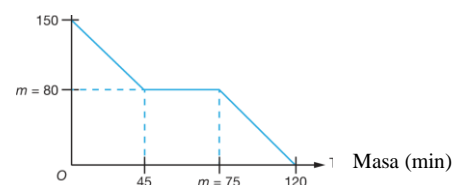
(iii) Kecerunan = $-\frac{90}{2} = -45$

$$\text{Laju} = 45 \text{ km j}^{-1}$$

(e) Laju purata = $\frac{180}{7.5} = 24 \text{ km j}^{-1}$

4 (a) (i) $m = 80, n = 75$

(ii) Jarak (km)



(b) Laju purata = $\frac{150}{\frac{120}{60}} = 75 \text{ km j}^{-1}$

5 (a) Selva memenangi perlumbaan itu

(b) 36 - 18 = 18 saat

(c) 200 - 140 = 60 m

(d) Laju purata Aishah = $\frac{200}{40} = 5 \text{ m s}^{-1}$

6 (a) Kadar perubahan laju = 60 km j⁻¹

$$\frac{110-u}{0.5} = 60$$

$$110-u = 30$$

$$u = 80$$

(b) Jarak dengan laju seragam = 66 km

$$110(k - 0.5) = 66$$

$$110k - 55 = 66$$

$$k = 1.1$$

(c) Jumlah jarak

$$= \frac{1}{2}(80 + 110)(0.5) + 66 + \frac{1}{2}(0.4)(110)$$

$$= 47.5 + 66 + 22$$

$$= 135.5 \text{ km}$$

$$\text{Laju purata} = \frac{135.5}{1.5} = 90\frac{1}{3} \text{ km j}^{-1}$$

7 (a) Kadar perubahan laju = 1.5 m s^{-2}

$$\frac{v-6}{4} = 1.5$$

$$v - 6 = 6$$

$$v = 12$$

(b) Jumlah jarak = 122 m

$$\frac{1}{2}(6 + v)(4) + 8v = 122$$

$$12 + 2v + 8v = 122$$

$$10v = 110$$

$$v = 11$$

8 (a) Kadar perubahan laju = 1.2 m s^{-2}

$$\frac{v-8}{10} = 1.2$$

$$v - 8 = 12$$

$$v = 20$$

(b) Jumlah jarak = 184

$$\frac{1}{2}(8 + v)(10) + \frac{1}{2}(6)(v) = 184$$

$$40 + 5v + 3v = 184$$

$$8v = 144$$

$$v = 18$$

9 (a) Jarak = 120 m

$$\frac{1}{2}(25 + 15)(x) = 120$$

$$20x = 120$$

$$x = 6$$

(b) Kadar perubahan laju = 3 m s^{-1}

$$\frac{v-15}{10-x} = 3$$

$$\frac{v-15}{10-6} = 3$$

$$v - 15 = 12$$

$$v = 27$$

10 (a) $\frac{1}{2}(8 + v)(4) = \frac{1}{5} \times 14v$

$$5(8 + v)(4) = 2(14v)$$

$$160 + 20v = 28v$$

$$8v = 160$$

$$v = 20$$

(b) Jumlah jarak

$$= \frac{1}{2}(8 + 20)(4) + 14(20)$$

$$= 56 + 280$$

$$= 336 \text{ m}$$

$$\text{Laju purata} = \frac{336}{18} = 18\frac{2}{3} \text{ m s}^{-1}$$

11 (a) Kadar perubahan laju = -3 m s^{-2}

$$-\frac{30-u}{4} = -3$$

$$30 - u = 12$$

$$u = 18$$

(b) Jarak yang dilalui semasa laju seragam

$$= 18(2)$$

$$= 36 \text{ m}$$

(c) Jumlah jarak

$$= \frac{1}{2}(30 + 18)(4) + 36 + \frac{1}{2}(18)(6)$$

$$= 186 \text{ m}$$

$$\text{Laju purata} = \frac{186}{12} = 15.5 \text{ m s}^{-1}$$