

JAWAPAN

KERTAS MODEL SPM SET 1

Kertas 1

1 C

$$270\ 375 \text{ kepada/to } 270\ 000$$

2 C

$$\begin{aligned} (a-b)(a+2b) - (2b-a)^2 \\ = a^2 + 2ab - ab - 2a^2 - 4b^2 + 4ab - a^2 \\ = 5ab - 6b^2 \end{aligned}$$

3 A

$$50 \times 480 \times 6.2 \times 10^{-3} = 1.488 \times 10^2$$

4 D

$$\begin{aligned} 458_9 &= Q_5 \\ 458_9 &= 4 \times 81 + 5 \times 9 + 8 = 377_{10} \\ 377_{10} &= 3002_5 \end{aligned}$$

5 A

$$\begin{aligned} M_4 + 1 &= 2(2^4 + 2^3 + 2^0) \\ M_4 &= 2^5 + 2^4 + 2^1 - 1 \\ M_4 &= 110001_2 \end{aligned}$$

$$\begin{array}{r|l} 11 & 000 & 1 \\ 3 & 0 & 1 \end{array}$$

$$M = 301$$

6 D

$$\begin{aligned} \text{Sudut/ angle } GFI &= 360 - 150 - 145 = 65 \\ x &= 360 - 65 - 60 - 120 = 115 \end{aligned}$$

7 A

$$A = \{1, 2, 3, 5, 6, 7, 9, 10, 11, 13\}$$

Nombor perdana/Prime number

$$= \{2, 3, 5, 7, 11, 13\}$$

P(Nombor Perdana/prime number)

$$= \frac{6}{10} = \frac{3}{5}$$

P(Bukan Nombor Perdana/not prime

$$\text{number}) = 1 - \frac{3}{5} = \frac{2}{5}$$

8 A

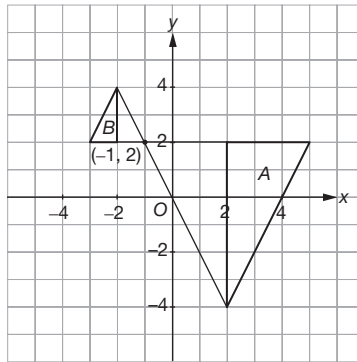
$$x = 180 - 85 - 32 + 35 = 98$$

$$\cos 98^\circ = -0.1392$$

9 B

$$(-3, 2) \xrightarrow{R} (-2, -3) \xrightarrow{T} (0, -6)$$

10 A



11 A

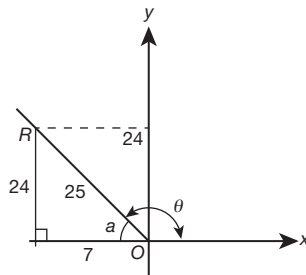
$$x < 5x + 2 \text{ dan/and } x \leq 12 - \frac{1}{3}x.$$

$$-2 < 4x \text{ dan/and } \frac{4}{3}x \leq 12.$$

$$-\frac{1}{2} < x \leq 9$$

12 D

θ ada pada sukuan kedua
 θ is in the second quadrant.
Nilai $\tan \theta$ adalah negatif
value of $\tan \theta$ is negative.



a adalah sudut sepadan dengan θ

a is the corresponding angle of θ .

$$\tan a = \frac{24}{7}, \text{ maka/therefore } \tan \theta = -\frac{24}{7}$$

13 B

$$\frac{6 - (-2)}{k - 8} = -\frac{2}{3}$$

$$\frac{8}{k - 8} = -\frac{2}{3}$$

$$2k - 16 = -24$$

$$2k = -8$$

$$k = -4$$

14 C

Set $X = \{5, 10, 15, 20, \dots\}$ dan/and

Set $Y = \{6, 12, 18, 24, \dots\}$,

90 adalah gandaan sepunya 5 dan 6,
maka ia berada dalam rantau III.

90 is a common multiple of 5 and 6,
therefore it is in the region III.

15 D

$$(\sqrt[n]{x})^m = \frac{x^{\frac{1}{3}} \times x^{\frac{4}{3}}}{x^{\frac{1}{2}}}$$

$$x^{\frac{m}{n}} = x^{\frac{1}{3} + \frac{4}{3} - \left(\frac{1}{2}\right)}$$

$$\frac{m}{n} = x^{\frac{13}{6}}$$

$$m = 13, n = 6$$

16 C

$$\frac{3}{4}(m-8) < 2(m-5)$$

$$3m - 24 < 8m - 40$$

$$5m > 16$$

$$m > \frac{16}{5}$$

17 A

$$\frac{x}{4} - \frac{2x-3}{5}$$

$$= \frac{5x}{20} - \frac{8x-12}{20}$$

$$= \frac{-3x+12}{20}$$

$$= -\frac{3(x-4)}{20}$$

18 B

$$\frac{8p^4q}{p^2 - q^2} \div \frac{4pq^2}{p - q}$$

$$= \frac{8p^4q}{p^2 - q^2} \times \frac{p - q}{4pq^2}$$

$$= \frac{8p^4q}{(p - q)(p + q)} \times \frac{p - q}{4pq^2}$$

$$= \frac{2p^3}{(p + q)} \times \frac{1}{q}$$

$$= \frac{2p^3}{q(p + q)}$$

19 D

$$p \propto \frac{m^2}{n^{\frac{1}{3}}}$$

$$p = k \frac{m^2}{n^{\frac{1}{3}}}$$

$$p = km^2 n^{-\frac{1}{3}}$$

20 A

$$5x - 4y - 9 = 0$$

$$-4y = -5x + 9$$

$$y = \frac{5}{4}x - \frac{9}{4}$$

$$\text{Pintasan-}y/\text{ }y\text{-intercept} = -\frac{9}{4}$$

21 B

6, 7, 10, 12, m , n , 20, 22, 24 dan/and 27
Selepas tambah 2/After adding 2
8, 9, 12, 14, $m+2$, $n+2$, 22, 24, 26 dan/
and 29

$$\frac{8 + 9 + 12 + 14 + m + 2 + n + 2 + 22 + 24 + 26 + 29}{10} = 18$$

	f	x	fx	fx^2
1 - 5	4	3	12	36
6 - 10	6	8	48	384
11 - 15	13	13	169	2197
16 - 20	12	18	216	3888
21 - 25	5	23	115	2645
	$\Sigma f = 40$		$\Sigma fx = 560$	$\Sigma fx^2 = 9150$

$$\begin{aligned}\bar{x} &= \frac{\Sigma fx}{\Sigma f} \\ &= \frac{560}{40} \\ &= 14\end{aligned}$$

$$\begin{aligned}\sigma &= \sqrt{\frac{9150}{40} - (14)^2} \\ &= \sqrt{32.75} \\ &= 5.723\end{aligned}$$

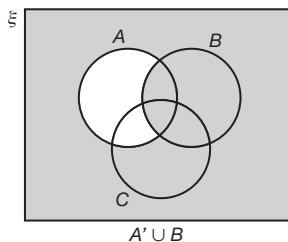
23 D

P (bola hijau/green ball)

$$= 1 - \frac{4}{9} - \frac{1}{3} = \frac{2}{9}$$

$$\frac{2}{9}T = 8 \quad T = 36$$

24 C



25 C

$x = 1$ dan $x = 3$ adalah punca-puncanya
 $x = 1$ and $x = 3$ are the roots

Maka $x - 1$ dan $x - 3$ adalah faktor-faktornya

Therefore $x - 1$ and $x - 3$ are the factors

$$f(x) = (x - 1)(x - 3)$$

$$f(x) = x^2 - 4x + 3$$

$$\frac{148 + m + n}{10} = 18$$

$$148 + m + n = 180$$

$$m + n = 32$$

$$\text{Median asal/ original median} = \frac{m + n}{2}$$

$$= \frac{32}{2} = 16$$

22 B

Sisihan piawai/ standard deviation,

$$\sigma = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - (\bar{x})^2}$$

26 A

$$y \propto \frac{z}{x^3}$$

$$y = k \frac{z}{x^3}$$

$$2 = k \frac{4}{2^3}$$

$$k = 8 \left(\frac{1}{9}\right)^{\frac{1}{2}}$$

$$m = 8 \frac{1}{3^3}$$

$$m = \frac{8}{81}$$

27 D

$$m = 2^{-3} \times 64^{\frac{5}{6}}$$

$$m = 2^{-3} \times 2^{6 \left(\frac{5}{6}\right)}$$

$$m = 2^2$$

$$m^3 = (2^2)^3$$

$$m^3 = (2^2)^3$$

$$m^3 = 2^6$$

$$m^3 = 64$$

28 D

n ialah 10% daripada jumlah murid

$$= 10\% \times 40 = 4$$

n is 10% of the total students

$$= 10\% \times 40 = 4$$

n adalah setengah daripada m , $m = 8$

n is half of m , $m = 8$

p pula adalah tiga kali ganda $n = 3 \times 4 = 12$

$$= 12$$

p is three times $n = 3 \times 4 = 12$

$$q = 40 - 8 - 4 - 12 = 16$$

Markah Marks	1 - 25	26 - 50	51 - 75	76 - 100
Bilangan murid Number of students	8	4	12	16

kelas mode/modal class = 76 - 100

29 D

$$\begin{pmatrix} \frac{1}{8} & 1 \\ 1 & 4 \end{pmatrix} - m \begin{pmatrix} \frac{1}{4} & 2 \\ 3 & 1 \end{pmatrix} = \begin{pmatrix} -\frac{5}{8} & -5 \\ -8 & 1 \end{pmatrix}$$

$$\begin{pmatrix} \frac{1}{8} & 1 \\ 1 & 4 \end{pmatrix} - \begin{pmatrix} -\frac{5}{8} & -5 \\ -8 & 1 \end{pmatrix} = m \begin{pmatrix} \frac{1}{4} & 2 \\ 3 & 1 \end{pmatrix}$$

$$m \begin{pmatrix} \frac{1}{4} & 2 \\ 3 & 1 \end{pmatrix} = \begin{pmatrix} \frac{6}{8} & 6 \\ 9 & 3 \end{pmatrix}$$

$$m \begin{pmatrix} \frac{1}{4} & 2 \\ 3 & 1 \end{pmatrix} = \begin{pmatrix} \frac{3}{4} & 6 \\ 9 & 3 \end{pmatrix}$$

$$m = 3$$

30 D

$$\frac{4}{7}T = 16$$

$$T = 28$$

Bilangan kad hijau dalam beg itu

$$= 28 - 16 = 12$$

Number of green cards in the bag

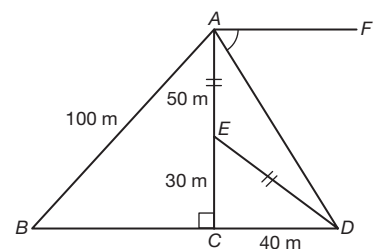
$$= 28 - 16 = 12$$

31 D

$$\sin \angle AED = \frac{4}{5}$$

$$\sin \angle CED = \sin \angle AED = \frac{4}{5}$$

$CE = 30$ m, maka/therefore $CD = 40$ m dan/and $DE = 50$ m



Sudut tunduk D dari A /Angle of depression of D from $A = \angle FAD = \angle ADC$

$$\tan \angle ADC = \frac{80}{40} = 2$$

$$\angle ADC = 63.43^\circ$$

32 C

Hanya tiga poligon sekata boleh membentuk teselasi. Mereka ialah segi tiga sama sisi, segi empat sama dan heksagon sekata.

Only three regular polygons can form tessellation. They are

equilateral triangles, squares,
and regular hexagons.

33 B

Hanya anak yang belajar di universiti layak mendapat pelepasan RM8 000. Only child studies in university can have tax relief of RM8 000.

34 C

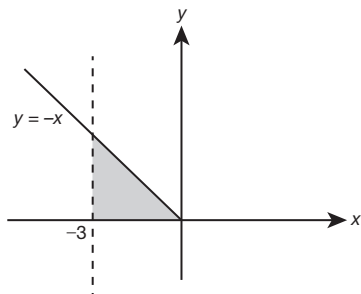
35 A

36 B

37 A

38 B

Selepas pantulan pada paksi-y After the region is reflected on the y-axis



$$y \leq -x, y \geq 0 \text{ dan/and } x > -3$$

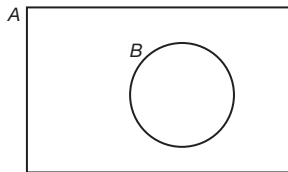
39 A

40 D

Kertas 2

Paper 2

1 (a)



(b) $B \cap A' \cup C$

2 $x = -1$ dan $x = 5$ merupakan punca-puncanya

$x = -1$ dan $x = 5$ are the roots

(a) (i) $p = -1$ (ii) $q = 5$

Apabila/when $x = 0$, $f(x) = 10$

(iii) $10 = a(0 - (-1))(0 - 5)$

$a = -2$

(b) $x = \frac{-1 + 5}{2}$

$x = 2$

(c) $c = -2(2 - (-1))(2 - 5)$

$c = 18$

3 $113_6 = 45_{10}$, $210_4 = 36_{10}$

$$45_{10} \times \frac{4}{3} = 60_{10}, 36_{10} \times \frac{4}{3} = 48_{10}$$

Harga asal minuman berkhasiat jenama

$A = \text{RM}60_{10}$

Original price of brand A nutrition drink

is $= \text{RM}60_{10}$

Harga asal minuman berkhasiat jenama

$B = \text{RM}48_{10}$

Original price of brand B nutrition drink

is $= \text{RM}48_{10}$

Maka diskaun untuk jenama A ialah

$\text{RM}15_{10}$

Then discount for brand A nutrition

drink is $\text{RM}15_{10}$

Maka diskaun untuk jenama B ialah

$\text{RM}12_{10}$

Then discount for brand B nutrition

drink is $\text{RM}12_{10}$

Jenama A mendapat diskaun yang lebih tinggi.

Discount for brand A is higher.

4 (a) $y = 2 \sin 2x - 3$

(b) $y = -2 \sin 2x - 3$

(c) $(45^\circ, -5), (225^\circ, -5)$.

5 $32x + 24y = 1760$

$$4x + 3y = 220 \dots (1)$$

$$20x + 30y = 1520$$

$$2x + 3y = 152 \dots (2)$$

$$\begin{pmatrix} 4 & 3 \\ 2 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 220 \\ 152 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{6} \begin{pmatrix} 3 & -3 \\ -2 & 4 \end{pmatrix} \begin{pmatrix} 220 \\ 152 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{6} \begin{pmatrix} 204 \\ 168 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 34 \\ 28 \end{pmatrix}$$

$x = 34, y = 28$

Harga sebuah buku rujukan matematik tambahan = RM34

Harga sebuah buku rujukan matematik = RM28

Price of one additional mathematics

reference book = RM34

Price of one mathematics reference book

= RM28

6 (a) 34 m

Dari P ke Q kemudian ke T

$$= 24 + 12 = 34 \text{ m}$$

From P to Q then to T = 24 + 12

$$= 34 \text{ m}$$

(b) 38 m

Dari P ke Q kemudian ke R

$$= 22 + 16 = 38 \text{ m}$$

From P to Q then to R = 22 + 16

$$= 38 \text{ m}$$

(c) 24 m

(d) 30 m

Dari Q ke R kemudian ke S

$$= 16 + 14 = 30 \text{ m}$$

$$\text{From } Q \text{ to } R \text{ then to } S = 16 + 14 = 30 \text{ m}$$

7 (a) $48 \text{ km j}^{-1}, 48 \text{ km h}^{-1}$

$$\frac{14 - 6}{\left(\frac{10}{60}\right)} = 48$$

(b) 1532

$$\frac{14}{\left(\frac{h - 1520}{60}\right)} = 70$$

$$\frac{h - 1520}{60} = \frac{14}{70}$$

$$h - 1520 = 12$$

$$h = 1532$$

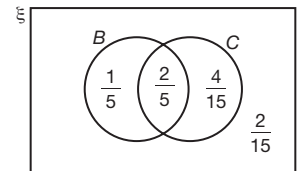
8 (a) Kebarangkalian kedua-dua Ben dan

$$\text{Chandran dipilih} = \frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$$

The probability both Ben and

Chandran are chosen

$$= \frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$$



(b) $\frac{7}{15}$

Kebarangkalian bahawa hanya seorang sahaja dipilih sebagai

$$\text{pengawas} = \frac{1}{5} + \frac{4}{15} = \frac{7}{15}$$

The probability that only one of them is chosen as prefect

$$= \frac{1}{5} + \frac{4}{15} = \frac{7}{15}$$

9 (a) $y = -\frac{3}{4}x + 8$

Kecerunan garis lurus AB =

kecerunan garis lurus CO

$$= \frac{-3 - 0}{4 - 0} = -\frac{3}{4}$$

Gradient of straight line AB =

gradient of straight line CO

$$= \frac{-3 - 0}{4 - 0} = -\frac{3}{4}$$

Pintasan-y/y-intercept = 8

(b) $A\left(\frac{32}{3}, 0\right)$

$$-\frac{3}{4} = -\frac{8}{\text{pintasan-x}}$$

$$\text{Pintasan-x/x-intercept} = \frac{32}{3}$$

10 $V = \pi r^2 t$, pemalar ubahan = π

Bahagian B

11 (a)

Pendapatan dan perbelanjaan <i>Income and expenditure</i>	Bulanan <i>Monthly</i>	
Aliran Tunai masuk/pendapatan	RM	
(a) Pendapatan aktif/ <i>Active income</i> : Gaji bersih/ <i>Net pay</i> Pendapatan locum/ <i>Income from locum</i> Jumlah pendapatan aktif/ <i>Total active income</i>	4000 500 4500	4500
(b) Pendapatan pasif/ <i>Passive income</i> : Jumlah pendapatan bulanan/ <i>Total monthly income</i> Tolak simpanan tetap bulanan <i>Minus fixed monthly savings</i> Jumlah pendapatan selepas tolak simpanan <i>Total income after deducting savings</i>	0 4500 900 3600	4500 3600
Tolak aliran tunai keluar/perbelanjaan <i>Minus cash outflow/expenses</i>		
(a) Perbelanjaan tetap/ <i>Fixed expenses</i> : Bayaran ansuran bulanan kereta <i>Monthly car instalment payment</i> Perbelanjaan Insurans/ <i>Insurance expenses</i> Jumlah perbelanjaan tetap/ <i>Total fixed expenses</i>	400 200 600	600
(b) Perbelanjaan tidak tetap/ <i>Variable expenses</i> : Belanja makanan/ <i>Food expenses</i> Bayaran utility/ <i>Utilities payments</i> Belanja petrol/ <i>Petrol expenses</i> Langganan perkhidmatan internet <i>Internet service subscription</i> Keraian dengan rakan/ <i>Entertainment with friends</i> Jumlah perbelanjaan tidak tetap <i>Total variable expenses</i> Lebihan/kurangan/ <i>Surplus/deficit</i>	800 100 120 53 300 1373	3000 1373 1627

(b) En. Wong mempunyai lebihan bagi pelan kewangan peribadinya, iaitu aliran tunai positif.

Mr. Wong has surplus for his personal financial plan, where there is a positive cash flow.

(c) Jumlah simpanan En. Wong selepas 5 tahun = $900 \times 60 = \text{RM}45\ 000$, iaitu cukup untuk bayaran pendahuluan.

Mr. Wong's total savings after 5 years $900 \times 60 = \text{RM}45\ 000$, that is enough for down payment.

(d) Jumlah pendapatan bulannannya selepas tolak simpanan tetap selepas lima tahun = $\text{RM}4\ 600$.

His total monthly income after deducting fixed savings after five years = $\text{RM}4\ 600$.

Jika perbelanjaan tidak berubah, maka aliran tunai positif = $\text{RM}2\ 627$.
If his expenditure does not change, then his positive cash flow = $\text{RM}2\ 627$

Dia mampu membayar dengan mengurangkan sedikit peratus simpanan tetapnya.

He can afford to pay by reducing his percentage of fixed monthly savings.

12 (a) $32\pi\ \text{cm}^3$, $80\pi\ \text{cm}^3$, $128\pi\ \text{cm}^3$.

$$\pi(4^2)(2) = 32\pi,$$

$$\pi(4^2)(5) = 80\pi,$$

$$\pi(4^2)(8) = 128\pi$$

(b) $16(3n - 1)\pi$, $8n(3n + 1)\pi$

$$32\pi = 16(3(1) - 1)\pi,$$

$$80\pi = 16(3(2) - 1)\pi,$$

$$128\pi = 16(3(3) - 1)\pi,$$

$$T_n = 16(3n - 1)\pi$$

$$32\pi = 8(1)(3(1) + 1)\pi$$

$$112\pi = 8(2)(3(2) + 1)\pi$$

$$240\pi = 8(3)(3(3) + 1)\pi$$

$$T_n = 8n(3n + 1)\pi$$

(c) $n = 9$

$$8n(3n + 1)\pi = 2016\pi$$

$$n(3n + 1) = 252$$

$$3n^2 + n - 252 = 0$$

$$(3n + 28)(n - 9) = 0$$

$$n = 9$$

13 (a) KWSP $\text{RM}4\ 000$ dan premium insurans nyawa $\text{RM}3\ 000$ $\text{RM}4\ 000$ for EPF and $\text{RM}3\ 000$ for life insurance premium

(b) perbelanjaan untuk kegunaan / manfaat diri sendiri, suami/isteri atau anak seperti pembelian computer, tablet, telefon pintar, surat khabar, langganan internet ...
Expenses for self usage/self benefit, husband/wife or children such as buying computer, tablet, smart phone, newspaper, internet subscription ...

(c) Mencarum dalam Skim Simpanan Pendidikan nasional, skim persaraan swasta dan membayar zakat.
Subscribe to National Scheme of Education Savings, private retirement scheme and pay zakat.

(d) $\text{RM}35\ 000$

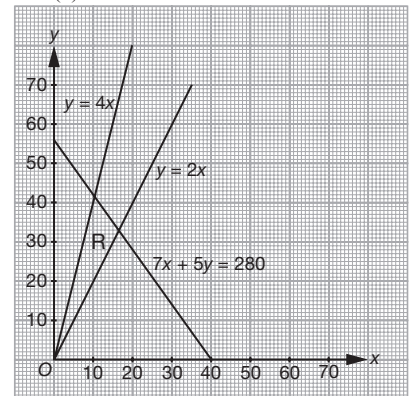
(e) $\text{RM}4\ 001$ sehingga/up to $\text{RM}8\ 000$

14 (a) $y \leq 4x$, $x \leq \frac{1}{2}y$ atau/or $y \geq 2x$,

$$35x + 25y \leq 1400 \text{ atau/or}$$

$$7x + 5y \leq 280$$

(b)



(c) (i) 41

(ii) 16

15 (a) fungsi eksponen/exponential function

(b) (i) 195

$$f(0) = a(2.5)^{(0)} = 2$$

$$a = 2$$

$$f(5) = 2(2.5)^{(5)} = 195$$

(ii) 8 hari/days

$$f(t) = 2(2.5)^{(t)} = 3052$$

$$(2.5)^{(t)} = 1526$$

$$t = \frac{\log 1526}{\log 2.5} = 8$$

(c) (i) 806

$$N(t) = N_0 e^{at}$$

$$N(5) = 2e^{1.2(5)} = 806$$

(ii) 8

$$2e^{1.2(t)} = 29500$$

$$2.718^{1.2(t)} = 14750$$

$$1.2(t) = \frac{\log 14750}{\log 2.718} = 9.600$$

$$t = 8$$

Kertas 1

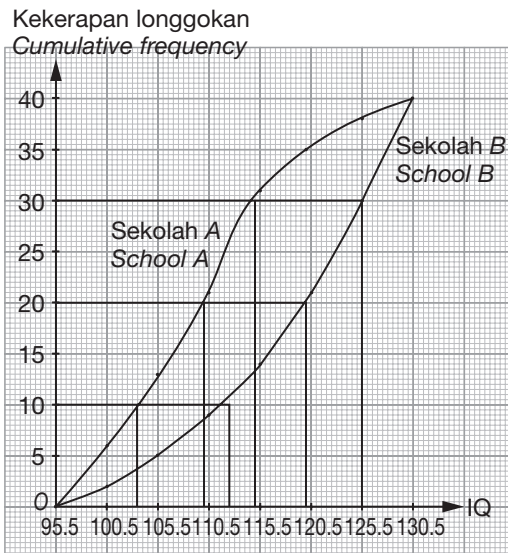
- (d) Menutup sekolah, mengadakan jarak sosial sekurang-kurangnya 1 m, memakai topeng semasa keluar, elakkan diri daripada tempat yang sesak dan sempit.
Close down schools, practice social distancing at least 1 m, wear face mask and avoid crowded and confined area.

- 16 (a) (i) (0, 3)
 (ii) (3, 3)
 (b) Q ialah putaran 180° pada pusat A .
 Q is rotation of 180° at centre A .
 P ialah pembesaran dengan faktor skala 3 pada pusat A .
 P is enlargement of scale factor 3 at centre A .
 (ii) Pembesaran dengan faktor skala -3 pada pusat A .
Enlargement of scale factor -3 at centre A .
 (iii) Luas segi empat $ABCD$ /Area of quadrilateral $ABCD$
 = 20 cm^2 .

17 (a)

IQ	Kekerapan longgokan/ Cumulative frequency (sekolah/school A)	Kekerapan longgokan/ Cumulative frequency (sekolah/school B)	Sempadan atas/ Upper boundary
96 – 100	6	2	100.5
101 – 105	13	5	105.5
106 – 110	21	9	110.5
111 – 115	31	14	115.5
116 – 120	35	21	120.5
121 – 125	38	30	125.5
126 – 130	40	40	130.5

(b)



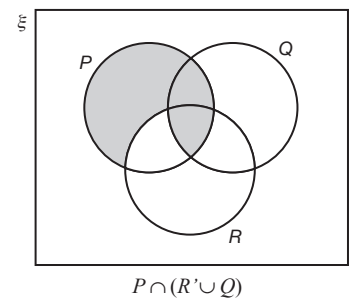
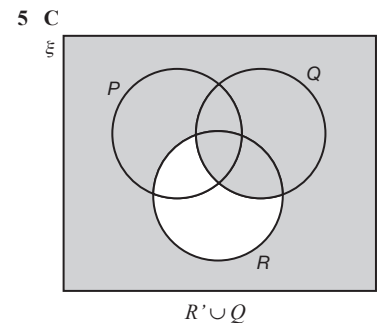
- (c) (i) 103.5, 112
 (ii) 110, 119.75
 (iii) 115, 125.5
 (d) Ketiga-tiga nilai kuartil pertama, median dan kuartil ketiga untuk sekolah B adalah lebih tinggi daripada sekolah A . Maka, murid-murid sekolah B mempunyai IQ yang lebih tinggi.
All the three values of first quartile, median and third quartile for school B is higher than school A . Therefore, students of school B have higher IQ.

1 B
 $5 \times 81 = 405$

2 D
 $2 \times 150 \times 3.2 \times 10^3$
 $= 9.6 \times 10^5$

3 B
 $A = 6005 - 37$
 $= 5968$
 $A = 5.97 \times 10^3$

4 D
 Graf $f(x) = x^2 - 4x + 3$ selepas dipantulkan pada paksi-y akan mengakibatkan bahagian yang ada di sebelah kanan graf berada di sebelah kiri dan sebaliknya.
Graph of $f(x) = x^2 - 4x + 3$ after reflected on y-axis will cause the part on the right to be on the left and vice-versa.
 Punca-punca yang asal $x = 1$ dan $x = 3$ akan menjadi $x = -1$ dan $x = -3$.
The original roots $x = 1$ and $x = 3$ will become $x = -1$ and $x = -3$.
 Maka fungsi itu akan menjadi $f(x) = (x + 1) + (x + 3)$.
Therefore the function will become $f(x) = (x + 1) + (x + 3)$.



6 D
 $(-2, 3)$ di bawah transformasi pembesaran dengan faktor skala 2 pada asalan $(-4, 6)$.
 $(-2, 3)$ under the enlargement of scale factor 2 at the origin $(-4, 6)$.

$(-4, 6)$ di bawah pantulan pada garis lurus $x = 2$ ialah $(8, 6)$.
 $(-4, 6)$ under reflection in the straight line $x = 2$ is $(8, 6)$.

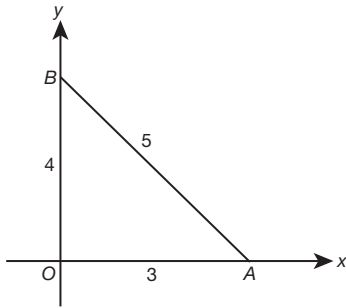
7 B

Untuk pembesaran dengan faktor skala k , luas imej = $k^2 \times$ luas objek.
 For enlargement with scale factor k , area of image = $k^2 \times$ area of object.

8 B

$$\text{Kecerunan/gradient} = \frac{6 - 0}{-8 - 0} = -\frac{3}{4}$$

9 C



10 D

$$\begin{aligned} \frac{3}{7}(21 - 7h) - h &= -11 \\ 9 - 3h - h &= -11 \\ -4h &= -20 \\ h &= 5 \end{aligned}$$

11 C

$$\begin{aligned} \sqrt{x^8 y^6} \times \sqrt{y^4} \times \sqrt[3]{x^9 y^{15}} \\ = x^4 y^3 \times y^2 \times x^3 y^5 \\ = x^7 y^{10} \end{aligned}$$

12 B

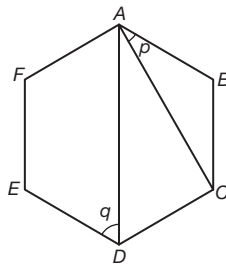
$$\begin{aligned} \frac{1}{5}(4m - 1) &\leq 4\frac{3}{5} \\ 4m - 1 &\leq 23 \\ 4m &\leq 24 \\ m &\leq 6 \end{aligned}$$

Integer terbesar yang memuaskan penyelesaian ialah $m = 6$
 The largest integer that satisfies the solution is $m = 6$

13 D

$$\begin{aligned} \frac{3m - 1}{m^2} - \frac{m - 3}{m} \\ = \frac{3m - 1 - m^2 + 3m}{m^2} \\ = \frac{-m^2 + 6m - 1}{m^2} \\ = -\frac{m^2 - 6m + 1}{m^2} \end{aligned}$$

14 C



$$\begin{aligned} p &= \frac{180 - 120}{2} = 30, q = \frac{360 - 240}{2} = 60 \\ p + q &= 90 \end{aligned}$$

17 D

$$\text{Varians, } \sigma^2 = \frac{\sum fx^2}{\sum f} - (\bar{x})^2$$

f	x	fx	fx^2
3	16	48	768
8	19	152	2888
10	22	220	4840
6	25	150	3750
3	28	84	2352
$\Sigma f = 30$		$\Sigma fx = 654$	$\Sigma fx^2 = 14598$

$$\sigma^2 = \frac{14598}{30} - (21.8)^2 = 11.36$$

18 C

19 A

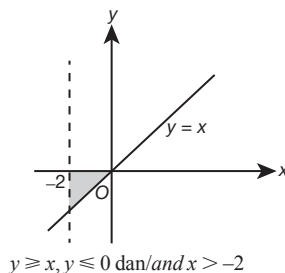
Bilangan bola merah dalam kotak/
 Number of red balls in the box
 $= \frac{1}{3} \times 24 = 8$

Katakan bilangan bola merah yang perlu ditambah ke dalam kotak/Assume the number of red balls need to be added into the box = x

$$\begin{aligned} \frac{8 + x}{24 + x} &= \frac{1}{2} \\ 16 + 2x &= 24 + x \\ x &= 8 \end{aligned}$$

20 D

Selepas pantulan pada paksi-x, rantau itu menjadi seperti di bawah.
 After the reflection on x -axis, the region below will be obtained.

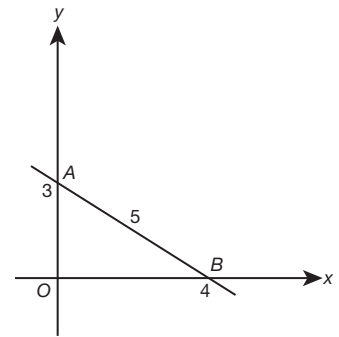


21 D

$$\begin{aligned} x(x - 3) &= 208 \\ x^2 - 3x - 208 &= 0 \end{aligned}$$

15 A

16 C



22 C

Songsangan bagi implikasi yang diberi sepatutnya benar.
 The inverse of the implication should be true.

23 D

$d(D) = 2$ dan/and $d(B) = 3$, maka/so $d(D) \neq d(B)$

24 C

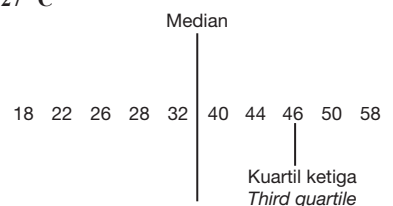
Oleh sebab laju untuk 5 saat yang pertama adalah sama dengan laju untuk 5 saat yang terakhir, maka jarak yang dilalui dalam 5 saat yang pertama adalah sama dengan jarak yang dilalui dalam 5 saat yang terakhir.

Because the speed for the first 5 seconds is the same as the speed for the last 5 seconds, therefore the distance travelled for the first 5 seconds is the same as the distance travelled for the last 5 seconds.

25 A

26 A

27 C



Beza di antara nilai kuartil ketiga dengan nilai median $46 - 36 = 10$
The different between the value of third quartile and median $46 - 36 = 10$

28 D

$$\frac{5}{12} \times \frac{4}{11} = \frac{5}{33}$$

29 B

30 D

31 B

$c = xe^{2n}$, apabila/when $n = 0$, $c = 3$

$$3 = xe^{2(0)}$$

$$x = 3$$

Apabila/when $n = 4$,

$$c = 3e^{2(4)}$$

$$c = 8942.87$$

$$c = 8943$$

32 D

Deduktibel yang perlu dibayar oleh pemegang polisi (Pn. Siti) = RM2 000.
 Ko-insurans yang perlu dibayar oleh Pn.

$$\text{Siti} = \frac{15}{100} \times (18\,000 - \text{RM}2\,000)$$

$$= \text{RM}2\,400 \text{ dan jumlah yang perlu dibayar oleh Pn. Siti}$$

$$= \text{RM}2\,400 + \text{RM}2\,000 = \text{RM}4\,400$$

33 B

sin $a = 0.68$ dan/and kos $b = -0.80$.

Maka/therefore sin $a +$ kos b

$$= 0.68 + (-0.80) = -0.12$$

34 A

35 A

Gaji bulanan keluarga mereka/monthly income of their family $4\,000 + 3\,600 = 7\,600$

Dengan lebih pendapatan RM180, perbelanjaan bulanan keluarga/With the surplus of income of RM180, the family's monthly expenses, $= 7\,600 - 180 = 7\,420$

Gaji bulanan keluarga mereka selepas kenaikan pangkat En. Hassan/Monthly income of their family after the promotion of En. Hassan

$$= 7\,600 + 3\,600 \times 12\%$$

$$= 8\,032$$

Perbelanjaan bulanan keluarga selepas kenaikan gaji/Monthly expenses of family after increment in pay

$$= 7\,420 + 7\,420 \times 8\%$$

$$= 8\,013.60$$

Aliran tunai selepas kenaikan gaji/Cash flow after increment in pay

$$= 8\,032 - 8\,013.60$$

$$= 18.40$$

36 D

37 D

m berubah secara songsang dengan

kuasa dua n , maka mn^2 ialah pemalar.
 m varies inversely as square of n , then mn^2 is a constant.

$$16(2)^2 = 256p^2$$

$$p^2 = \frac{1}{4}$$

$$p = \pm \frac{1}{2}$$

38 D

39 D

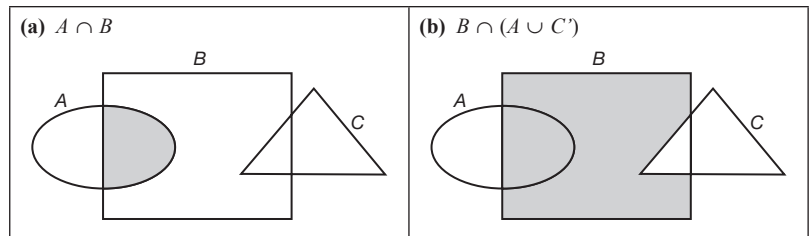
$$(x_1)^{\frac{1}{2}}y_1 = (x_2)^{\frac{1}{2}}y_2 = k$$

$$y = \frac{k}{(x)^{\frac{1}{2}}}$$

Kertas 2

Paper 2

1



2 (a) $(x+3)(x+2) = \frac{1}{2}(2x)(3x+1)$

$$x^2 + 5x + 6 = 3x^2 + x$$

$$2x^2 - 4x - 6 = 0$$

$$x^2 - 2x - 3 = 0$$

(b) $(x+1)(x-3) = 0$

$$(x+1) = 0 \text{ atau/or } (x-3) = 0$$

$$x = -1 \text{ atau/or } x = 3$$

$x = 3$ sebab/because $x = -1$ ditolak/
 is rejected.

3 (a) (i) Sisihan piawai akan menjadi lebih kecil dari asal

Standard deviation would be smaller than original

(ii) Sisihan piawai akan menjadi lebih besar dari asal

Standard deviation would be greater than original

(b) (i) varians akan menjadi lebih kecil dari asal

Variance would be smaller than original

(ii) varians akan menjadi lebih besar dari asal

Variance would be greater than original

4 (a) 325_{10}

$$156_8 = 110_{10}, 1110110_2 = 118_{10},$$

$$342_5 = 97_{10}$$

Jumlah wang saku bulanan mereka dalam asas 10 = 325_{10}

Maka, y berubah secara songsang dengan punca kuasa dua x .

Therefore, y varies inversely as square root of x .

40 A

$$\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\},$$

$$\text{set } A = \{5, 6, 7, 8, 9, 10\},$$

$$\text{set } B = \{8, 9, 10\} \text{ dan/and}$$

$$A \cap C = \{6, 7, 8\}$$

$$\xi = A \cup B \cup C, \text{ maka/therefore}$$

$$C = \{1, 2, 3, 4, 6, 7, 8\}, C' = \{5, 9, 10\}$$

$$\text{dan/and } n(C') = 3$$

Their total monthly pocket money in base 10 = 325_{10}

(b) 41_5

$$118_{10} - 97_{10} = 21_{10}$$

$$21_{10} = 41_5$$

5 (a) $y = 4 \sin 3x$

(b) $y = -4 \sin 3x$

(c) 7

(d) $(90^\circ, 4)$

6 $3m + 6n = 5 \dots (1)$

$$m - 4n = 1 \dots (2)$$

$$\begin{pmatrix} 3 & 6 \\ 1 & -4 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 5 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{-18} \begin{pmatrix} -4 & -6 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 5 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{-18} \begin{pmatrix} -26 \\ -2 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} \frac{13}{9} \\ \frac{1}{9} \end{pmatrix}$$

$$m = \frac{13}{9}, n = \frac{1}{9}$$

7 (a) 4 (c) 4

(b) 6 (d) 4

8 (a) $t = 100$

Jumlah jarak /Total distance = 3 km

$$\text{Purata laju/Average speed} = \frac{3\,000}{t}$$

$$= 30$$

$$t = 100$$

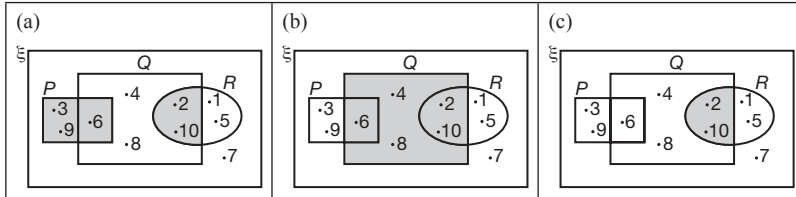
(b) 60

Katakan tempoh masa untuk lori itu bergerak dengan laju seragam dalam saat = h
 Assume the duration during which the lorry moves at a uniform speed in seconds = h

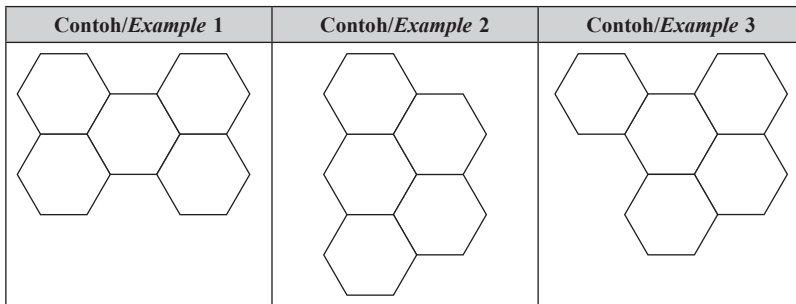
$$\frac{1}{2}(h + 140)30 = 3000$$

$$h = 60$$

9 (a) $\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{5}$



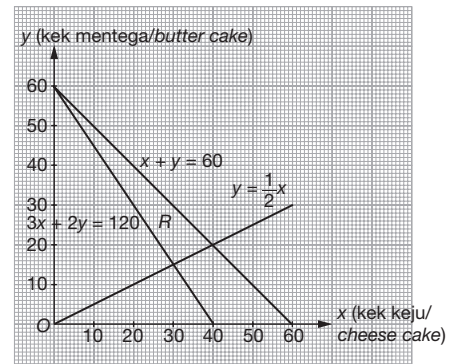
10 Cadangan jawapan/Suggested answers



Bahagian B

11 (a) $x + y \leq 60, y \geq \frac{1}{2}x$ dan/and
 $15x + 10y \geq 600$ atau/ or
 $3x + 2y \geq 120$

(b)



(c) (i) 40
 (ii) $20 \leq x \leq 30$

12 (a) RM3 000 sebab tuntutan pelepasan maksimum untuk insurans perubatan dan kesihatan ialah RM3 000 sahaja.
 RM3 000 because maximum tax relief for medical and health insurance is RM3 000 only.
 (b) RM1 929
 (c) RM100 000
 (d) RM5 901
 (e) RM37 500
 (f) Tidak boleh/ Cannot.
 Sebab selepas umur 60 tahun hanya diteruskan dengan pembaharuan sahaja.
 Because after 60 years old can be continued for renewal only.

13 (a) (i)

	(RM)	En. Azman (RM)
Pendapatan berkanun penggajian <i>Income from salary</i>		75 000
PENDAPATAN AGREGAT <i>AGGREGATE INCOME</i>		75 000
TOLAK: Derma yang diluluskan MINUS: <i>Donation approved</i>		(550)
JUMLAH PENDAPATAN <i>TOTAL INCOME</i>		74 450
TOLAK PELEPASAN MINUS RELIEF		
Individu dan saudara tanggungan <i>Individual and supporting relatives</i>	9 000	
Gaya hidup/ <i>Life style</i>	2 500	
Anak 1/1 st <i>Child</i>	8 000	
Anak 2/2 nd <i>Child</i>	2 000	
Anak 3/3 rd <i>Child</i>	2 000	
Insurans nyawa dan KWSP <i>Life insurance and EPF</i>	4 200	
Jumlah Pelepasan/ <i>Total relief</i>	27 700	(27 700)

PENDAPATAN BERCUKAI <i>TAXABLE INCOME</i>		46 750
PENGIRAAN CUKAI PENDAPATAN <i>CALCULATION OF INCOME TAX</i>		
35 000 pertama / <i>First 35 000</i>		600.00
11 750 @ 0.08		940.00
JUMLAH CUKAI PENDAPATAN <i>TOTAL INCOME TAX</i>		1 540.00
TOLAK: Rebat dan Zakat MINUS: <i>Rebate and Zakat</i>		(300)
Jumlah Cukai Kena Dibayar <i>Total Tax Need To Be Paid</i>		1 240.00

(ii)

	(RM)	Pn. Siti (RM)
Pendapatan berkanun penggajian <i>Income from salary</i>		42 000
PENDAPATAN AGREGAT <i>AGGREGATE INCOME</i>		42 000
TOLAK: Derma yang diluluskan MINUS: <i>Donation approved</i>		(300)

JUMLAH PENDAPATAN <i>TOTAL INCOME</i>		41 700
TOLAK PELEPASAN MINUS RELIEF		
Individu dan saudara tanggungan <i>Individual and supporting relatives</i>	9 000	
Pemeriksaan perubatan/ <i>Medical Checkup</i>	500	
Gaya hidup/ <i>Life style</i>	2 500	
Anak 1/1 st <i>Child</i>	–	
Anak 2/2 nd <i>Child</i>	–	
Anak 3/3 rd <i>Child</i>	–	
Insurans nyawa dan KWSP <i>Life insurance and EPF</i>	6 000	

Jumlah Pelepasan/ <i>Total relief</i>	18 000	(18 000)
PENDAPATAN BERCUKAI <i>TAXABLE INCOME</i>		23 750
PENGIRAAN CUKAI PENDAPATAN <i>CALCULATION OF INCOME TAX</i>		
20 000 pertama / <i>First 20 000</i>		150.00
3 750 @ 0.03		112.50
JUMLAH CUKAI PENDAPATAN <i>TOTAL INCOME TAX</i>		262.50
TOLAK: Rebat dan Zakat MINUS: <i>Rebate and Zakat</i>	200 + 400	(600.00)
Jumlah Cukai Kena Dibayar <i>Total Tax Need To Be Paid</i>		0.00

(b)

	(RM)	En. Azman (RM)	(RM)	(RM)	Pn. Siti (RM)
Pendapatan berkanun pengajian <i>Income from salary</i>		75 000			42 000
PENDAPATAN AGREGAT <i>AGGREGATE INCOME</i>		75 000			42 000
TOLAK: Derma yang diluluskan MINUS: <i>Donation approved</i>		(550)			(300)
JUMLAH PENDAPATAN/ <i>TOTAL INCOME</i>		74 450	116 150		41 700
TOLAK PELEPASAN/ MINUS RELIEF					
Individu dan saudara tanggungan <i>Individual and supporting relatives</i>	9 000			4 000	
Gaya hidup/ <i>Life style</i>	2 500			–	
Anak 1/1 st <i>Child</i>	8 000				
Anak 2/2 nd <i>Child</i>	2 000				
Anak 3/3 rd <i>Child</i>	2 000				
Insurans nyawa dan KWSP <i>Life insurance and EPF</i>	6 000				
Jumlah Pelepasan/ <i>Total relief</i>	29 500		33 500	4 000	
PENDAPATAN BERCUKAI <i>TAXABLE INCOME</i>			116 150 – 33 500 = 82 650		
PENGIRAAN CUKAI PENDAPATAN <i>CALCULATION OF INCOME TAX</i>					
70 000 pertama / <i>First 70 000</i>			4 600.00		
12 650 @ 0.21			2 656.50		
JUMLAH CUKAI PENDAPATAN <i>TOTAL INCOME TAX</i>			7 256.50		
TOLAK: Rebat dan Zakat MINUS: <i>Rebate and Zakat</i>		(300)	(500)	(200)	
Jumlah Cukai Kena Dibayar <i>Total Tax Need To Be Paid</i>			6 756.50		

(c) Pentafsiran berasingan lebih menguntungkan. Mereka dapat jimat RM5516.50.
Separate assessment more beneficial. They can save RM5516.50.

14 (a) $R = 0.1mV^2$
 $R \propto mV^2$

$R = kmV^2$ (k ialah pemalar/ k is a constant)
 Diberi/Given $R = 81\,000$ N apabila/
 when $m = 900$ kg dan/ $V = 30$ m
 s^{-1} , maka/ k
 $81\,000 = k(900)(30)^2$
 $81\,000 = 810\,000k$
 $k = 0.1$

Maka/ k , $R = 0.1mV^2$

(b) 38 400

Apabila/When $m = 960$ kg dan/ $V = 20$ m s^{-1} ,
 $R = 0.1(960)(20)^2 = 38\,400$ N

(c) 736.63

Apabila/When $R = 53\,700$ N dan/
 and $V = 27$ m s^{-1} ,
 $53\,700 = 0.1m(27)^2$
 $53\,700 = 72.9m$
 $m = 736.63$ kg

(d) 16

Apabila/When $m = 1080$ kg dan/ $R = 27\,648$ N,
 $27\,648 = 0.1(1080)V^2$
 $27\,648 = 108V^2$
 $V^2 = 256$
 $V = 16$ m s^{-1}

15 (a) $t = 0$

(b) 10 000

(c) $t = 7$

(d) $B = 10000e^{0.125(7)}$
 $= 23986.58$
 $= 23987$

(e) 21 Februari/February 2021

$10000e^{0.125t} = 121\,793$

$e^{0.125t} = 12.1793$

$2.718^{0.125t} = 12.1793$

$0.125t = \frac{\log 12.1793}{\log 2.718} = 2.500$

$t = 20$

21 Februari/February 2021

16 (a) (i) (1, 1)

$A(1, 2) \xrightarrow{T} A'(-1, 5) \xrightarrow{R} A''(1, 1)$

(ii) (-4, 2)

$A(1, 2) \xrightarrow{R} A'(-2, -1) \xrightarrow{T} A''(-4, 2)$

(b) Q ialah pantulan pada garis $x = -1$.

Q is reflection in the line $x = -1$.

P ialah pembesaran dengan faktor skala 3 pada pusat I .

P is enlargement of scale factor 3 at centre I .

(b) (ii) Q ialah pantulan pada garis $x = 1$.

Q is reflection in the line $x = 1$.

P ialah pembesaran dengan faktor skala 3 pada pusat N .

P is enlargement of scale factor 3 at centre N .

(b) (iii) 246 cm²

Luas Kawasan yang berlorek/

Area of the shaded region

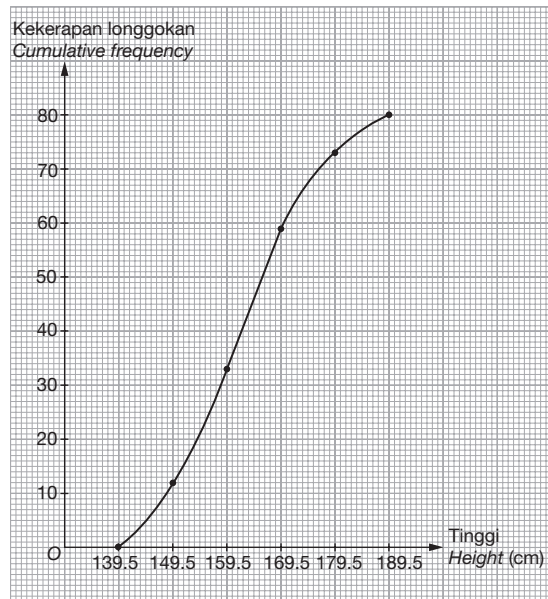
$= 30 \times (3^2) - 24$

$= 246$ cm²

17 (a)

Tinggi (cm)	130 – 139	140 – 149	150 – 159	160 – 169	170 – 179	180 – 189
Bilangan pelajar	0	12	21	26	14	7
Kekerapan longgokan	0	12	33	59	73	80
Sempadan atas	139.5	149.5	159.5	169.5	179.5	189.5

(b)



(c) (i) 153.5

(ii) 161.5 cm

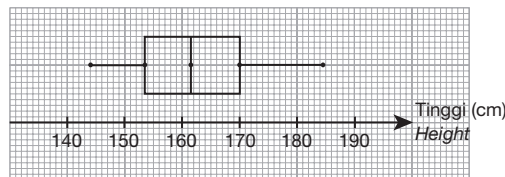
(iii) 170 cm

(iv) Julat antara kuartil = 16.5 cm bermaksud ketinggian untuk 50% pelajar baru matrikulasi itu yang berada ditengah-tengah mempunyai ketinggian 153.5 cm hingga 170 cm dengan beza 16.5 cm.

Interquartile range = 16.5 cm means that the height of the middle 50% of the new students have the height 153.5 cm to 170 cm with the difference 16.5 cm.

(v) 12 orang murid/students

(d)



KERTAS MODEL SPM SET 3

Kertas 1

1 C

0.0658 kepada/to 0.066

2 D

0.03579 = 3.58×10^{-2} (Betul kepada 3 angka bererti)

3 A
 $3.142 \times 6^2 \times 320 \times 75\% = 27146.88$
 $= 2.71 \times 10^4$

4 B
 $9^5 + 4 \times 9^3 + 9^1 + 1 = 1 \times 9^5 + 0 \times 9^4 + 4 \times 9^3 + 0 \times 9^2 + 1 \times 9^1 + 1 \times 9^0$
 $= 104011_9$

5 B
 Aliran tunai Cik Hanizah
 $= 18000 + 1200 + 4500 - 9800 - 4300$
 $= 9600$

6 D
 Tempoh masa, dalam minit, kereta itu bergerak dengan pecutan $= 10 + 6 = 16$
Duration, in minutes, of the car moving with acceleration $= 10 + 6 = 16$

7 C
 $f(x) = 5 + 4x - x^2$, apabila/when $x = 2$
 $f(2) = 5 + 4(2) - 2^2 = 9$
 Titik maksimum sepatutnya (2, 9)
Maximum point should be (2, 9).

8 C

9 C
 Kebarangkalian memilih sebiji bola bukan putih ialah $\frac{6}{7}$, maka kebarangkalian memilih sebiji bola putih ialah $\frac{1}{7}$.

Probability of picking a ball that is not white is $\frac{6}{7}$, then probability of picking a white ball is $\frac{1}{7}$.

$\frac{1}{7} = \frac{4}{T}$, T = Jumlah bola/Total balls

Jumlah bola/ Total balls = 28

Kebarangkalian memilih sebiji bola

hitam $= \frac{18}{28} = \frac{9}{14}$

Probability of picking a black ball

$= \frac{18}{28} = \frac{9}{14}$

10 D

$10 = k\sqrt{25}$

$k = 2$

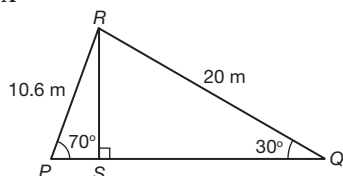
$y = 2\sqrt{z}$

$25 = 2\sqrt{z}$

$\sqrt{z} = 12.5$

$z = 156.25$

11 A

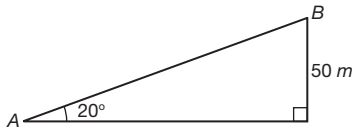


$PS = 10.6 \times \cos 70^\circ = 3.625$

$SQ = 20 \times \cos 30^\circ = 17.32$

$PQ = 20.95$

12 D



$AB = \frac{50}{\sin 20^\circ} = 146.19$

13 B

$\frac{5k + 4}{2} = \frac{3k + 2}{3}$

$-15k - 12 = 6k + 4$

$21k = -16$

$k = -\frac{16}{21}$

14 C

$\left(\frac{w^2}{x^4}\right)^3 \div \frac{x^3}{y} \div \frac{y^5}{w^3} = \frac{w^6}{x^{12}} \times \frac{y}{x^3} \times \frac{w^3}{y^5}$

$= \frac{w^9}{x^{15}y^4}$

15 B

$\frac{3}{4}(4p - 3) \leq -3p - 6$

$4p - 3 \leq -4p - 8$

$8p \leq -5$

$p \leq -\frac{5}{8}$

16 C

$180 - 6a + 3a + 54 = 180$

$3a = 54$

$b = 180 - 3a$

$b = 126$

17 D

Penambahan nilai yang tetap tidak akan mempengaruhi sisihan piawai bagi set data yang diberi. Begitu juga gabungan dua set data yang mempunyai sisihan piawai yang sama juga tidak akan mempengaruhi sisihan piawai yang asal. *Addition of a fixed value won't affect the standard deviation of the original set data given. Likewise, combination of two set of data with the same standard deviation won't affect the original standard deviation.*

18 A

$3x + 4y - 24 = 0$

$y = -\frac{3}{4}x + 6$

Pintasan- $y = 6/y$ -intercept = 6

$2c = 6$

$c = 3$

19 B

$\bar{x} = \frac{1360}{40} = 34$

Apabila satu nilai yang bersamaan dengan min dikeluarkan daripada set data itu, maka nilai variansnya akan bertambah.

When a value equal to the mean is removed from the set of data, the value of variance will increase.

20 C

Jika $A \subset B$, maka $A \cap B = A$ dan bukan $A \cap B = B$

If $A \subset B$, then $A \cap B = A$ and not

$A \cap B = B$

21 B

$2x + 1 + 6 + x = 19$

$3x = 12$

$x = 4$

22 D

$\frac{1}{x+2} - \frac{1}{x} = \frac{2}{3}$

Darab semua dengan $3x(x+2)$, maka kita dapat $3x - 3(x+2) = 2x(x+2)$

Multiply all with $3x(x+2)$, then we will get

$3x - 3(x+2) = 2x(x+2)$

$3x - 3x - 6 = 2x^2 + 4x$

$2x^2 + 4x + 6 = 0$

$x^2 + 2x + 3 = 0$

23 D

24 B

25 C

Jumlah darjah sepatutnya $= 8 \times 2 = 16$ bukan 14

Sum of degrees should be $= 8 \times 2 = 16$ not 14

26 A

$\frac{1}{2}(50+150)9 = \frac{1}{2}(t-9)150$

$(200)9 = (t-9)150$

$(t-9) = 12$

$t = 21$

27 D

$\begin{pmatrix} x & 1 \\ 3 & -y \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

$x + 2 = 4$

$x = 2$

$3 - 2y = -1$

$2y = 4$

$y = 2$

28 A

$5a - 4b = (1)(4) - (2)(3)$

$5a = -2 + 4b$

$a = -\frac{2}{5}(1 - 2b)$

29 C

$$\begin{aligned} \text{Nilai pelaburan awal} &= \frac{50000}{\left(1 + \frac{0.05}{4}\right)^{16}} \\ &= 40987.32 \end{aligned}$$

30 B

$$\begin{aligned} x = 52, y = 65 \text{ dan } z = 180 - 52 - 65 = 63 \\ x + y - z = 52 + 65 - 63 = 54 \end{aligned}$$

31 A

32 A

Sebab imej adalah dua kali ganda dan berada di kedudukan yang bertentangan dengan objek dengan merujuk kepada pusat pembesaran.

Because the image is double the size of object and at the opposite location with reference to the centre of enlargement.

33 B

34 C

35 D

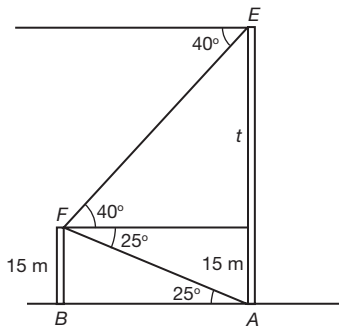
36 D

$$\begin{aligned} \sin \angle POQ &= -0.7071 \\ \angle POQ &= 315^\circ \\ \frac{315}{360} \times 12 \text{ jam/hour} &= 10\frac{1}{2} \text{ jam/hours} \\ \text{Maka/therefore} &= 10.30 \text{ am} \end{aligned}$$

37 B

Untuk graf $y = \tan 4x$, ia mesti menghabiskan 2 kitaran dalam 90° .
For graph $y = \tan 4x$, it must complete 2 cycles in 90° .

38 B



$$\begin{aligned} \tan 25^\circ &= \frac{15}{AB} \\ AB &= 32.17 \text{ m} \\ \tan 40^\circ &= \frac{t}{32.17} \\ t &= 26.99 \text{ m} \\ AE &= 26.99 + 15 = 41.99 \text{ m} \end{aligned}$$

39 A

40 B

$$\begin{aligned} \text{Kecerunan garis lurus } PQ &= \frac{3 - (-4)}{4 - (-3)} = 1 \\ \text{Gradient of straight line } PQ &= \frac{3 - (-4)}{4 - (-3)} \\ &= 1 \end{aligned}$$

Persamaan garis lurus PQ ialah $y = x + c$
Equation of straight line PQ is $y = x + c$
 $3 = 4 + c$
 $c = -1$
 $y = x - 1$
Pintasan- x /x-intercept = 1
Kecerunan garis lurus RS
 $= \frac{2 - (0)}{-3 - (1)} = \frac{2}{-4} = -\frac{1}{2}$
Gradient of straight line RS
 $= \frac{2 - (0)}{-3 - (1)} = \frac{2}{-4} = -\frac{1}{2}$

Kertas 2

Paper 2

1 252 cm³

$$\begin{aligned} \text{Isipadu/Volume} \\ &= (3)(5)(12) + \frac{1}{2}(3)(4)(12) \\ &= 252 \text{ cm}^3 \end{aligned}$$

2 (a) $y = -2x + 11$

$$7 = -2(-2) + c$$

$$c = 11$$

$$y = -2x + 11$$

$$(b) x = \frac{11}{2}$$

$$0 = -2x + 11$$

$$x = \frac{11}{2}$$

3 (a) Jika $(a + b)(a - b) \leq 0$, maka

$$a^2 - b^2 \leq 0.$$

$$\text{If } (a + b)(a - b) \leq 0, \text{ then } a^2 - b^2 \leq 0.$$

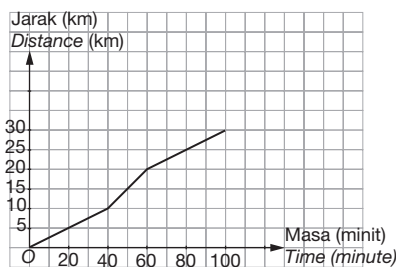
Songsangan tersebut adalah benar

The inverse is true

(b) $ax^2 + bx + c$ ialah suatu ungkapan kuadratik.

$ax^2 + bx + c$ is a quadratic expression.

4 (a)



(b) Laju, dalam kmj⁻¹, penunggang basikal dalam tempoh 40 minit

$$\text{terakhir} = \frac{10 \text{ km}}{\left(\frac{2}{3}j\right)} = 15 \text{ kmj}^{-1}$$

The speed, in kmh⁻¹, of the cyclist in

$$\begin{aligned} \text{the last 40 minutes} &= \frac{10 \text{ km}}{\left(\frac{2}{3}h\right)} \\ &= 15 \text{ kmj}^{-1} \end{aligned}$$

5 (a) Aliran tunai positif/Positive cash flow RM1 260

$$4300 + 1200 - 2760 - 1480 = 1260$$

Aliran tunai positif/Positive cash flow

Ini bermakna Encik Chester mempunyai lebih pendapatan selepas tolak perbelanjaan.

This means that Mr. Chester has a surplus of income after deducting the expenses.

(b) Aliran tunai negatif/Negative cash flow RM89.60

$$4300 \times 1.12 = 4816$$

$$(2760 + 1480) \times 1.44 = 6105.60$$

$$4816 + 1200 - 6105.60 = -89.60$$

Aliran tunai negatif/Negative cash flow

Encik Chester patut mengurangkan perbelanjaannya.

Mr. Chester should reduce his expenses.

6 (a) $q = 2$

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

(b) $m = 2, n = -1$

$$\begin{pmatrix} 5 & -3 \\ 4 & -2 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 13 \\ 10 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{2} \begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix} \begin{pmatrix} 13 \\ 10 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 4 \\ -2 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$$

$$m = 2, n = -1$$

7 (a) $\frac{64}{189}$

$$\begin{aligned} \frac{2}{3} \times \frac{4}{7} \times \frac{4}{9} + \frac{1}{3} \times \frac{3}{7} \times \frac{4}{9} + \frac{1}{3} \times \\ \frac{4}{7} \times \frac{5}{9} = \frac{64}{189} \end{aligned}$$

(b) $\frac{173}{189}$

$$1 - \frac{1}{3} \times \frac{4}{7} \times \frac{4}{9} = \frac{173}{189}$$

8 (a) 89_{10}

$$125_8 = 1 \times 64 + 2 \times 8 + 5 = 85_{10}$$

$$231_6 = 2 \times 36 + 3 \times 6 + 1 = 91_{10}$$

$$1123_4 = 1 \times 64 + 1 \times 16 + 2 \times 4 + 3 = 91_{10}$$

Min markah/Mean mark

$$= \frac{85 + 91 + 91}{3} = 89_{10}$$

(b) 110_2

$$91_{10} - 85_{10} = 6_{10}$$

$$6_{10} = 110_2$$

9 (a) Prinsip indemniti berprinsip

bahawa insuran tidak boleh digunakan untuk tujuan mencari keuntungan di mana pemegang polisi yang mengalami kerugian

hanya boleh dibayar pampasan mengikut nilai sebenar kerugian dan tidak boleh lebih daripada itu. *Indemnity principle is the principle that insurance cannot be used for the purpose of getting profit. The insured can only be paid with the actual loss and not more than that.*

- (b) Insurans hayat/ *Life insurance*
 (c) Insurans pihak ketiga dan Insurans komprehensif
Third party insurance and comprehensive insurance

- 10 (a) RM8 000
 (b) 28hb Februari/28th February
 (c) RM3 000
 (d) RM6 000

Bahagian B

- 11 (a) $a=2, b=-7$
 $f\left(\frac{1}{2}\right) = a\left(\frac{1}{2}\right)^2 + b\left(\frac{1}{2}\right) + 3 = 0$
 $\frac{1}{4}a + \frac{1}{2}b + 3 = 0$
 $a + 2b + 12 = 0 \dots (1)$
 $f(3) = a(3)^2 + b(3) + 3 = 0$
 $9a + 3b + 3 = 0$
 $3a + b + 1 = 0$
 $6a + 2b + 2 = 0 \dots (2)$
 $(2) - (1) \quad 5a = 10$
 $a = 2$
 $2 + 2b + 12 = 0$
 $2b = -14$
 $b = -7$

ATAU

$$f(x) = (2x - 1)(x - 3)$$

$$f(x) = 2x^2 - 7x + 3$$

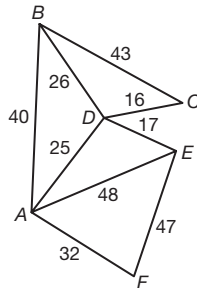
$$a = 2 \text{ dan } b = -7$$

- (b) $x = \frac{7}{4}$
 $x = \frac{\frac{1}{2} + 3}{2}$
 $x = \frac{7}{4}$
 (c) $\left(\frac{7}{4}, -\frac{25}{8}\right)$ ialah titik minimumnya/
is the minimum point
 $f\left(\frac{7}{4}\right) = 2\left(\frac{7}{4}\right)^2 - 7\left(\frac{7}{4}\right) + 3 = -\frac{25}{8}$
 (d) $f(x) = 2x^2 + 7x + 3$
 (e) $f(x) = -2x^2 + 7x - 3$

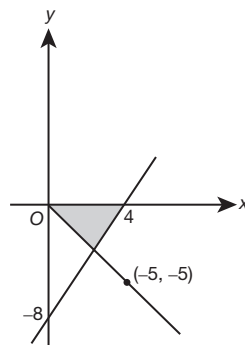
- 12 (a) $x=2, y=3$
 $3 + 1 + 5 + 4x + 1 -$
 $(2 + 1 + 5 + 2y + 2) = 2$
 $4x - 2y = 2$
 $2x - y = 1 \dots (1)$
 $4 + 3 + 2 + 1 + 5 + 4x + 1 + 2y + 2$
 $= 32$
 $4x + 2y = 14$

- $2x + y = 7 \dots (2)$
 $(1) + (2) \dots 4x = 8$
 $x = 2$
 $2(2) + y = 7$
 $y = 3$
 (b) 21
 $4 + 2y + 2 + 4x + 1$
 $= 4 + 2(3) + 2 + 4(2) + 1 = 21$
 (c) 10
 $3 + 2 + 5 = 10$
 (d) 13
 $5 + 2y + 2 = 5 + 2(3) + 2 = 13$
 (e) 16
 $4 + 3 + 4x + 1 = 4 + 3 + 4(2) + 1 = 16$

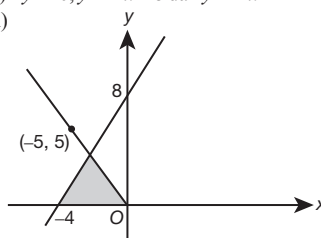
- 13 (a)



- (b) kampung A, B, C, D, E dan F.
Villages A, B, C, D, E and F.
 (c) Jarak dalam km.
Distance in km.
 (d) F
 (e) $A \rightarrow D \rightarrow C$ atau/ $A \rightarrow E \rightarrow D \rightarrow C$
 (f) 41 km
 14 (a) $y \geq 0, y \leq -2x + 8$ dan/ $y \leq x$
 (b)



- (c) $y \leq 0, y \geq 2x - 8$ dan $y \geq -x$
 (d)



- (e) $y \geq 0, y \leq 2x + 8$ dan/ $y \leq -x$
 15 (a) Apabila $t = 1, 2$ dan $3, N$ berubah secara langsung dengan $r; N$ berubah secara langsung dengan

kuasa dua r dan N berubah secara langsung dengan kuasa tiga r .
When $t = 1, 2$ and $3, N$ varies directly as $r; N$ varies directly as square of r and N varies directly as cube of r .

- (b) Fungsi linear, kuadratik dan eksponen.
Linear, quadratic and exponential function.
 (c) $A = 120, r = 1.03$
 (d) Bilangan haiwan itu pada awal tahun $2027 = 120(1.03)^6 = 143$
Number of the animal at the beginning of the year 2027 = $120(1.03)^6 = 143$

- 16 (a) (i) W ialah translasi $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

W is a translation $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

V ialah pembesaran dengan faktor skala 3 pada pusat P .
 V is an enlargement with scale factor 3 at center P .

Atau/Or
 W ialah translasi $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$.

W is a translation $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$.

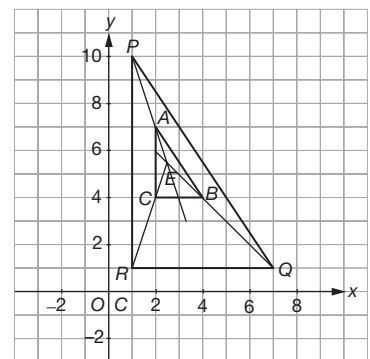
V ialah pembesaran dengan faktor skala 3 pada pusat R .
 V is an enlargement with scale factor 3 at center R .

Atau/Or
 W ialah translasi $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$.

W is a translation $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$.

V ialah pembesaran dengan faktor skala 3 pada pusat Q .
 V is an enlargement with scale factor 3 at center Q .

(ii)



Satu transformasi tunggal yang setara dengan VW ialah pembesaran pada titik E dengan faktor skala 3.

A single transformation which is equivalent to VW is an enlargement at center E with scale factor 3.

- (b) (i) $\tan \theta = \frac{1.2}{2.5}$, $\theta = 25.64^\circ$
 (ii) 45°
 (iii) $d = \frac{1.2}{\tan 13^\circ}$, $d = 5.198 \text{ m}$
 (iv) sehingga/up to 90°

17 (a)

Kategori cemerlang/excellent category

Markah Marks	Kekerapan Frequency	Sempadan atas Upper boundary	Kekerapan longgokan Cumulative frequency
51 – 60	0	60.5	0
61 – 70	3	70.5	3
71 – 80	10	80.5	13
81 – 90	12	90.5	25
91 – 100	15	100.5	40

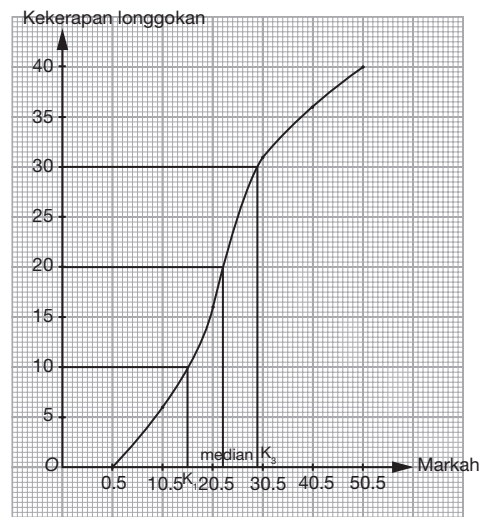
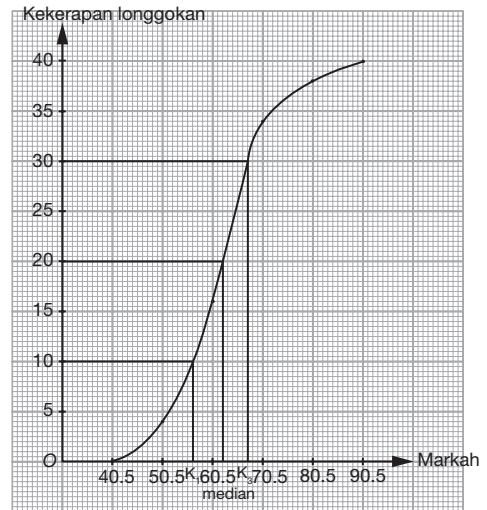
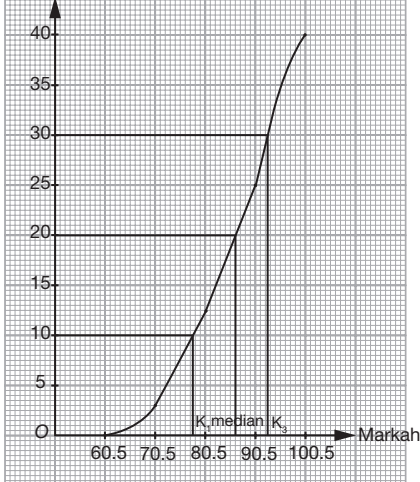
Kategori sederhana/average category

Markah Marks	Kekerapan Frequency	Sempadan atas Upper boundary	Kekerapan longgokan Cumulative frequency
31 – 40	0	40.5	0
41 – 50	4	50.5	4
51 – 60	12	60.5	16
61 – 70	18	70.5	34
71 – 80	4	80.5	38
81 – 90	2	90.5	40

Kategori Lemah/weak category

Markah Marks	Kekerapan Frequency	Sempadan atas Upper boundary	Kekerapan longgokan Cumulative frequency
1 – 10	6	10.5	6
11 – 20	10	20.5	16
21 – 30	15	30.5	31
31 – 40	5	40.5	36
41 – 50	4	50.5	40

(b) Kekerapan longgokan



(c)

Markah Marks	Kekerapan Frequency	Titik tengah Mid-point (x)	fx	fx^2
61 – 70	3	65.5	196.5	12870.75
71 – 80	10	75.5	755	57002.5
81 – 90	12	85.5	1026	87723
91 – 100	15	95.5	1432.5	136803.75
	$\Sigma f = 40$		$\Sigma fx = 3410$	$\Sigma fx^2 = 294400$

$$\text{Min, } \bar{x} = \frac{3410}{40} = 85.25 \text{ markah}$$

$$\begin{aligned} \text{Sisihan piawai, } \sigma &= \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2} \\ &= \sqrt{\frac{294400}{40} - \left(\frac{3410}{40}\right)^2} \\ &= \sqrt{92.4375} = 9.614 \text{ markah} \end{aligned}$$

more is larger compared to when they are grouped in their respective category.

KERTAS MODEL SPM SET 4

Kertas 1

- 1 D**
89 974 kepada/to 90 000
- 2 B**
 $5.02 \times 10^{-4} = 0.000502$
- 3 C**
 $\frac{300^3}{9^3} = 37\,037 = 3.7 \times 10^5$
- 4 A**
 $8^6 + 5 \times 8^4 + 8^3 + 4$
 $= 1 \times 8^6 + 0 \times 8^5 + 5 \times 8^4 + 1 \times 8^3 + 0 \times 8^2$
 $+ 0 \times 8^1 + 4 \times 8^0$
 $= 1051004_8$
- 5 C**
Aliran tunai Cik Hasnah
 $= 6235 \times 1.08 + 800 - 3750 - 900$
 $= 2\,883.80$
Cik Hasnah's monthly cash flow
 $= 6235 \times 1.08 + 800 - 3750 - 900$
 $= 2\,883.80$
- 6 D**
Tempoh masa, dalam minit, zarah itu bergerak dengan laju seragam $= 6 + 3 = 9$
The duration, in seconds, the particle is moving with uniform speed $= 6 + 3 = 9$
- 7 A**
Untuk $f(x) = ax^2 + bx + c$, semakin besar nilai a , semakin sempit graf itu.
For $f(x) = ax^2 + bx + c$, when the value of a is larger, the graph will be narrower.
- 8 D**
- 9 C**
Kebarangkalian memilih sebiji bola bukan hijau ialah $\frac{2}{5}$, maka kebarangkalian memilih sebiji bola hijau ialah $\frac{3}{5}$.
Probability of picking a ball that is not green is $\frac{2}{5}$, then probability of picking a green ball is $\frac{3}{5}$.
 $\frac{15}{T} = \frac{3}{5}$, $T =$ Jumlah bola asal/Total balls initially
 $T = 25$
 $\frac{15}{25 + x} = \frac{3}{7}$
 $x = 10$

Markah Marks	Kekerapan Frequency	Titik tengah Mid-point (x)	fx	fx^2
41 – 50	4	45.5	182	8281
51 – 60	12	55.5	666	36963
61 – 70	18	65.5	1179	77224.5
71 – 80	4	75.5	302	22801
81 – 90	2	85.5	171	14620.5
91 – 100	0	95.5	0	0
	$\Sigma f = 40$		$\Sigma fx = 2500$	$\Sigma fx^2 = 159890$

Min/Mean, $\bar{x} = \frac{2500}{40} = 62.5$ markah/marks

Sisihan piawai/Standard deviation,

$$\begin{aligned} \sigma &= \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2} \\ &= \sqrt{\frac{159890}{40} - \left(\frac{2500}{40}\right)^2} \\ &= \sqrt{91} = 9.539 \text{ markah/marks} \end{aligned}$$

Markah Marks	Kekerapan Frequency	Titik tengah Mid-point (x)	fx	fx^2
1 – 10	6	5.5	33	181.5
11 – 20	10	15.5	155	2402.5
21 – 30	15	25.5	382.5	9753.75
31 – 40	5	35.5	177.5	6301.25
41 – 50	4	45.5	182	8281
	$\Sigma f = 40$		$\Sigma fx = 930$	$\Sigma fx^2 = 26920$

Min/Mean, $\bar{x} = \frac{930}{40} = 23.25$ markah/marks

Sisihan piawai/Standard deviation,

$$\begin{aligned} \sigma &= \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2} \\ &= \sqrt{\frac{26920}{40} - \left(\frac{930}{40}\right)^2} \\ &= \sqrt{132.4375} \\ &= 11.508 \text{ markah/marks} \end{aligned}$$

Min markah kategori cemerlang > Min markah kategori sederhana > Min markah kategori lemah

Mean marks for excellent category > Mean marks for average category > Mean marks for weak category

Sisihan piawai kategori lemah > Sisihan piawai kategori cemerlang > Sisihan piawai kategori sederhana

Standard deviation for weak category > Standard deviation for excellent category > Standard deviation for average category

Kesimpulan/Conclusion:

Serakan markah untuk kumpulan kategori lemah adalah paling besar dan markah untuk kumpulan sederhana adalah paling kurang tersekat.

Dispersion of marks for weak category is largest and marks for average category is least dispersed.

- (d) Nilai sisihan piawai akan menjadi lebih besar. Ini adalah kerana jika markah ketiga-tiga kumpulan itu selepas digabungkan akan lebih jauh tersekat kerana julat markah yang diperolehi oleh murid-murid itu menjadi lebih besar berbanding dengan apabila markah mereka dikumpulkan mengikut kategori masing-masing.

The value of standard deviation will be larger. This is because if the marks of the three categories are combined, there are more dispersed because the range of the

10 D

$$p \propto \frac{q^3}{z^{\frac{1}{2}}}, p = k \frac{q^3}{z^{\frac{1}{2}}}$$

$$\text{Maka/then } \frac{pz^{\frac{1}{2}}}{q^3} = k$$

$$a = \frac{1}{2}, b = 3$$

11 A

$$s \propto \frac{1}{t^3}, st^3 = k$$

$$(3)(-8)^{\frac{1}{3}} = k$$

$$k = -6$$

$$(s)(27)^{\frac{1}{3}} = -6$$

$$s = -2$$

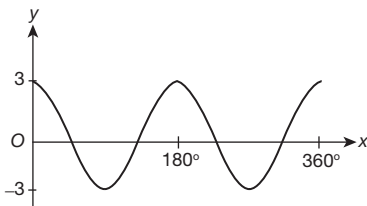
12 D

$$\sin \theta = \frac{5}{13}$$

$$\theta = 180 - 22.62$$

$$\theta = 157.38$$

13 D



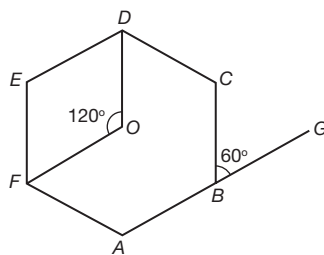
$$y = 3 \cos 2x$$

Apabila setiap titik dianjak 1 unit ke bawah, maka $y = 3 \cos 2x - 1$.

When each point moves down 1 unit, then $y = 3 \cos 2x - 1$.

14 C

15 D



dan/and $y = 120$, maka/then $x + y = 180$

16 D

$$\frac{1}{4}(7-p) \leq -5$$

$$7-p \leq -20$$

$$-p \leq -27$$

$$p \geq 27$$

17 C

Apabila setiap nilai dalam set data itu didarab dengan 2 dan ditambah 3, hanya pendaraban yang akan mengubah julat antara kuartil yang asal. Julat antara kuartil asal = $27.5 - 15 = 12.5$.

Maka, julat antara kuartil yang baru = $12.5 \times 2 = 25$

When each value of the set of data is multiplied by 2 and added by 3, only multiplication will change the value of the original interquartile range. The value of the original interquartile range = $27.5 - 15 = 12.5$.

So, the value of the new interquartile range = $12.5 \times 2 = 25$

18 D

Apabila setiap nilai dalam set data didarab dengan -1 atau ditambah dengan satu nilai yang sama, variansnya kekal tidak berubah.

When each value in a set of data is multiplied by -1 or is added a same value, its variance remains unchanged.

19 A

$$\frac{3-5}{3-(-1)} = \frac{3-(-4)}{3-a}$$

$$\frac{-2}{4} = \frac{7}{3-a}$$

$$-6 + 2a = 28$$

$$2a = 34$$

$$a = 17$$

20 B

set $A = \{1, 3, 5, 7, 9\}$, set $B = \{2, 3, 5, 7\}$, dan/and set $C = \{3, 6, 9\}$.

$A \cup B \cup C = \{1, 2, 3, 5, 6, 7, 9\}$

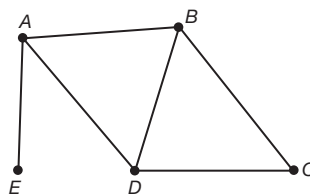
$n(\xi) = n(A \cup B \cup C) = 7$

21 C

$$n(P \cap Q \cup R) = 2 + 1 + 5 + 6 + 9 = 23$$

22 A

23 B



Jumlah darjah/Sum of degrees = $2 \times 6 = 12$

24 B

25 D

$$d(A) = 1$$

$$d(D) = 2$$

26 A

$$\frac{4}{\text{masa/time}} = 10$$

$$\text{Masa/time} = \frac{4}{10} \text{ j/h or } \frac{2}{5} \text{ j/h}$$

$$\frac{2}{5} \text{ j/h} = 24 \text{ minit/minutes}$$

$$t = 1014$$

27 C

John membeli 4 batang pembaris dan 3 buah kalkulator.

John bought 4 rulers and 3 calculators. Steven membeli 7 batang pembaris dan 5 buah kalkulator.

John bought 7 rulers and 5 calculators. Harga sebatang pembaris dan sebuah kalkulator masing-masing ialah RMx dan RMy.

Each ruler and each calculator cost RMx and RMy respectively.

Persamaan matriks ialah

$$\begin{pmatrix} 4 & 3 \\ 7 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 78 \\ 147.50 \end{pmatrix}$$

Matrix equation is

$$\begin{pmatrix} 4 & 3 \\ 7 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 78 \\ 147.50 \end{pmatrix}$$

28 A

$$-\frac{2}{5}x + 4\left(-\frac{1}{2}\right) = 6$$

$$-\frac{2}{5}x = 6 + 2$$

$$x = -\frac{5}{2}(8) = -20$$

29 D

Jumlah simpanan/Total savings

$$= \text{RM}88\,800 \left(1 + \frac{0.042}{12}\right)^{(12)(3)}$$

$$= \text{RM}100\,702.10$$

30 C

$$p = 50, q = 40$$

$$p + q = 90$$

31 B

32 B

Sebab imej adalah lima puluh kali ganda lebih kecil dan berada di kedudukan yang bertentangan dengan objek dengan merujuk kepada pusat pembesaran.

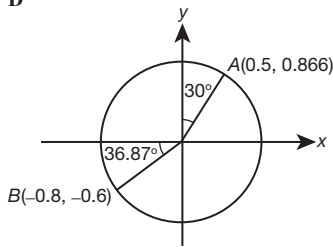
Because the image is fifty times smaller than the size of object and at the opposite location with reference to the centre of enlargement.

33 C

34 D

35 C

36 D



$$\sin a = 0.866$$

$$a = 60^\circ$$

Sudut OA dengan paksi- y /Angle OA and y -axis = 30°

$$\cos b = 0.8$$

$$b = 36.87^\circ$$

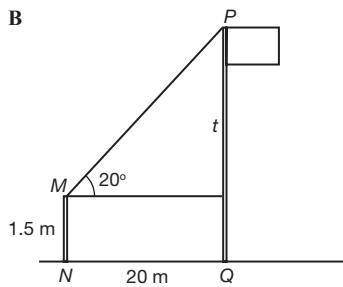
$$\text{Maka/therefore} = 60^\circ + 90^\circ + 53.13^\circ = 203.13^\circ$$

37 D

Untuk graf $y = 3 \sin 2x$, amplitudnya 3 dan ia mesti menghabiskan 1 kitaran dalam 180° .

For graph $y = 3 \sin 2x$, its amplitude is 3 and must complete 1 cycle in 180° .

38 B



$$\tan 20^\circ = \frac{t}{20}$$

$$t = 7.279 \text{ m}$$

$$PQ = 7.279 + 1.5 = 8.779 \text{ m}$$

39 A

40 B

$$2y - 3x = 6$$

$$y = \frac{3}{2}x + 3$$

$$m = \frac{3}{2}$$

$$c = 3$$

Kertas 2

1 350 cm^3

Isi padu/Volume

$$= (3)(5)(10) + \left[\frac{1}{2}(5+3)(5) \right] (10)$$

$$= 350 \text{ cm}^3$$

2 (a) $k = -\frac{3}{2}$

$$\frac{k}{3} = -\frac{1}{2}$$

$$k = -\frac{3}{2}$$

$$(b) \quad x = \frac{14}{3}$$

$$3y + \frac{3}{2}x - 7 = 0$$

$$\frac{3}{2}x = 7$$

$$x = \frac{14}{3}$$

3 (a) Hujah itu adalah kukuh dan munasabah sebab semua premis dan kesimpulan adalah benar. *The argument is strong and cogent because all the premises and conclusion are true.*

$$(b) \quad \frac{1}{n(n+1)}, n = 1, 2, 3, 4 \dots$$

$$4 (a) \quad \frac{80 - 44}{\left(\frac{24}{60}\right)} = 36 \times \frac{5}{2}$$

$$= 90 \text{ kmj}^{-1}/\text{kmh}^{-1}$$

$$\frac{44}{\left(\frac{t-44}{60}\right)} = 90$$

$$t - 44 = 44 \times \frac{60}{90}$$

$$t - 44 = \frac{88}{3}$$

$$t = \frac{220}{3} \text{ atau } 73\frac{1}{3} \text{ min}$$

(b) Laju purata, dalam kmj^{-1} , untuk seluruh perjalanan En. Ahmad

$$= \frac{80 \text{ km}}{\left(\frac{220}{3} - j\right)}$$

$$= 80 \times \frac{180}{220} \text{ kmj}^{-1}$$

$$= 65\frac{4}{11} \text{ or } 65.45 \text{ kmj}^{-1}$$

the average speed, in kmh⁻¹, for the whole journey of En. Ahmad

$$= \frac{80 \text{ km}}{\left(\frac{220}{3} - j\right)}$$

$$= 80 \times \frac{180}{220} \text{ kmh}^{-1}$$

$$= 65\frac{4}{11} \text{ or } 65.45 \text{ kmh}^{-1}$$

5 (a) Aliran tunai positif/Positive cash flow RM1 610
 $7500 + 2300 - 750 - 4860 - 2580 = 1610$ Aliran tunai positif/Positive cash flow

(b) En. Derek mampu mencapai matlamat kewangannya jika tiada perbelanjaan luar biasa berlaku. *Mr. Derek afford to achieve his financial goal if unexpected expenses never occur.* Simpanan bulanan 10% daripada pendapatan aktifnya = RM750

10% of his active income for monthly savings = RM750
Aliran tunai positif bulanan/Positive cash flow monthly = RM1 610
Jumlah mampu disimpan bulanan/Monthly affordable savings = RM2 360
Jumlah simpanan selepas 12 tahun/Total savings after 12 years = $12 \times 12 \times 2360 = \text{RM}339\ 840$.

6 (a) $b = 3$

$$b + 18 = 21$$

$$b = 3$$

$$(b) \quad m = -\frac{1}{3}, n = -4$$

$$\begin{pmatrix} 3 & -2 \\ 9 & 1 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 7 \\ -7 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{21} \begin{pmatrix} 1 & 2 \\ -9 & 3 \end{pmatrix} \begin{pmatrix} 7 \\ -7 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{21} \begin{pmatrix} -7 \\ -84 \end{pmatrix}$$

$$\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} -\frac{1}{3} \\ -4 \end{pmatrix}$$

$$m = -\frac{1}{3}, n = -4$$

7 (a) $0 < P(A) \leq \frac{4}{7}$

$$(b) \quad \frac{1}{2}$$

$$\frac{13}{14} - \frac{3}{7} = \frac{1}{2}$$

8 (a) $21_{10} = 2 \times 343 + 5 \times 49 + 2 \times 7 + 1 = 946_{10}$

$$\frac{1}{2}(x + 3 + 3x - 1)(x + 1) = 946_{10}$$

$$(2x + 1)(x + 1) = 946$$

$$2x^2 + 3x - 945 = 0$$

$$(2x + 45)(x - 21) = 0$$

$$x = 21$$

(b) 10212_5

$$946_{10} - 264_{10} = 682_{10}$$

$$682_{10} = 10212_5$$

9 (a) Pihak Ketiga, pihak ketiga
Third party, third party

(b) Diskaun tanpa tuntutan, 55%
No Claim Discount, 55%

10 (a) (i) 10% kenaikan daripada cukai yang kena bayar
10% of increment of the tax need to be paid
(ii) Tambahan 5% kenaikan atas baki (a)(i) jika bayaran tidak dibuat selepas 60 hari dari tarikh akhir
Additional 5% increment on the balance of (a) (i) if payment is made after 60 days of deadline

- (b) (i) RM200 hingga RM2000 / penjara / kedua-duanya
RM200 to RM2000 / imprisonment / both
- (ii) RM1000 hingga RM20 000 / penjara / kedua-duanya dan 300% atas cukai terkurang lapor
RM1000 to RM20 000 / imprisonment / both and 300% on the tax less reported

Bahagian B

- 11 (a) Nilai varians akan menjadi lebih kecil jika suatu nombor yang berhampiran dengan min ditambah kepada set data itu.

The value of variance would be smaller if a value close to mean is added to the set of data.

- (b) Nilai varians akan menjadi lebih besar jika suatu nombor yang jauh dari min ditambah kepada set data itu.

The value of variance would be larger if a value far from mean is added to the set of data.

- (c) Nilai sisihan piawai akan menjadi lebih besar jika suatu nombor yang berhampiran dengan min dikeluarkan daripada set data itu.

The value of variance would be larger if a value close to mean is removed from the set of data.

- (d) Nilai sisihan piawai akan menjadi lebih kecil jika suatu nombor yang jauh dari min dikeluarkan daripada set data itu.

The value of variance would be smaller if a value far from mean is removed from the set of data.

- (e) Nilai min, mod dan median akan didarab dengan 3 dan selepas itu tolak 2 sebab pendaraban dan penolakan akan mempengaruhi nilai min, mod dan median.

The value of min, mode and median would be multiplied by 3 and after that minus 2 because multiplication and subtraction will cause the value of min, mode and median change accordingly.

- (f) Nilai julat akan dibahagi dengan 2 sahaja sebab penolakan satu nilai tetap kepada setiap nilai tidak mempengaruhi nilai julat.

The value of range would be divided by 2 only cause subtraction of same value to each value of the data won't affect the value of range.

12 (a) (i) $v^2 + 20v - 8000 = 0$
 $\frac{200}{v} - \frac{200}{v+20} = \frac{1}{2}$

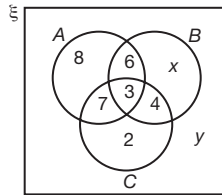
$$2(200)(v+20) - 2(200)(v) = v(v+20)$$

$$8000 = v^2 + 20v$$

$$v^2 + 20v - 8000 = 0$$

(ii) $v = 80$
 $v^2 + 20v - 8000 = 0$
 $(v+100)(v-80) = 0$
 $(v-80) = 0$
 $v = 80$

- (b) (i) 5

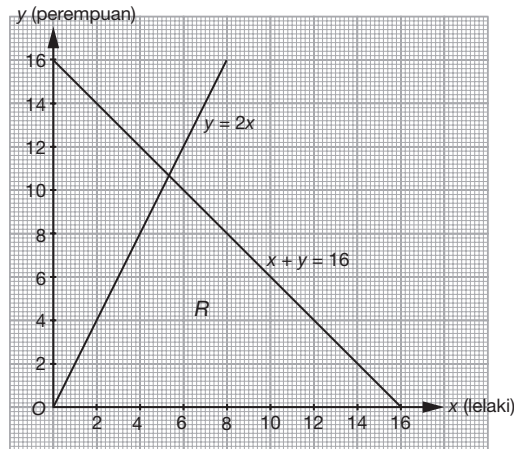


$$x = 18 - 6 - 3 - 4$$

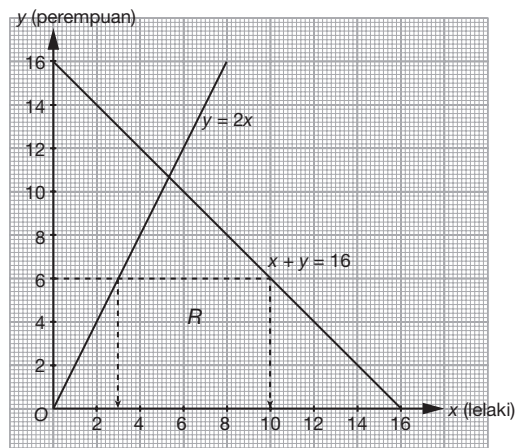
$$x = 5$$

- 14 (a) $x + y \leq 16$ dan/and $y \leq 2x$

- (b)



- (c) (i) $3 \leq x \leq 10$



- (ii) Tidak, kerana $y = 11$ sudah berada di luar rantau R.
No, because $y = 11$ is out of the region R.
- (iii) $0 \leq x \leq 16$

(ii) 5
 $y = 40 - 8 - 6 - 5 - 3 - 4 - 7 - 2$
 $y = 5$

- 13 (a) (i) 26
 $5 + 5 + 7 + 9 = 26$
- (ii) 17
 $4 + 13 = 17$
- (iii) 14
 $5 + 5 + 4 = 14$
- (iv) 26
 $9 + 11 + 6 = 26$
- (b) (i) H
(ii) A, C dan/and E
(iii) A, C, E dan/and H
(iv) B, D, F dan/and G
- (c) 22

- 15 (a) $a = 5, r = 3$
 $135 = ar^3 \dots (1)$
 $3645 = ar^6 \dots (2)$
 $(2) \div (1) \quad r^3 = 27$
 $r = 3$
 $a(3)^3 = 135$
 $a = 5$
- (b) Ubahan langsung, n berubah secara langsung dengan kuasa tiga r .
Direct variation, n varies directly as cube of r .
- (c) $n = 5(3)^t$
 (d) $t = 0$
 (e) 5
 (f) $5(3)^t > 100\,0000$
 $t = 12$
- 16 (a) $\theta = 18, 11.348\text{ m}$
 $\tan 18^\circ = \frac{y}{30}$
 $y = 9.748$
 Tinggi tiang lampu/ *The height of the lamp pole* = $9.748 + 1.6 = 11.348\text{ m}$
- (b) $\triangle ABC$ dan $\triangle ADC$ adalah kongruen
 $\triangle ABC$ and $\triangle ADC$ are congruent
- (c) $AB = DC, \angle ACD = \angle CAB = \theta$, dan sisi AC ialah sisi sepunya, maka

dengan menggunakan SAS,
 $\triangle ABC \cong \triangle ADC$
 $AB = DC, \angle ACD = \angle CAB = \theta$, and AC is common side, then using SAS,
 $\triangle ABC \cong \triangle ADC$

(d) V ialah putaran 180° pada pusat G
 V is 180° rotation about centre G
 W ialah pembesaran pada pusat G
 dengan faktor skala $\frac{1}{2}$
 W is enlargement with scale factor $\frac{1}{2}$ with centre G .

(e) Satu transformasi tunggal yang setara dengan VW ialah pembesaran pada titik G dengan faktor skala $-\frac{1}{2}$.
A single transformation which is equivalent to VW is an enlargement with center G with scale factor $-\frac{1}{2}$.

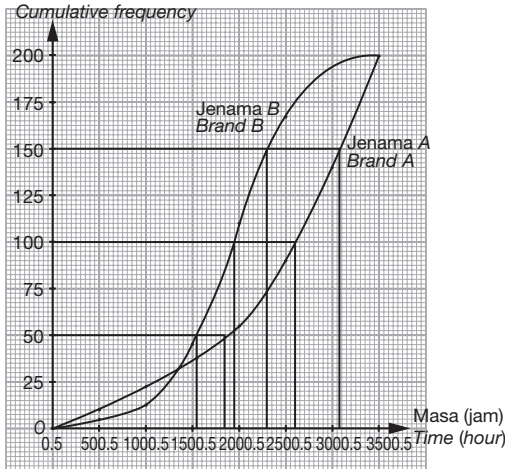
(f) Luas segi tiga $GHI = \frac{1}{4}$ luas segi tiga GBC
 $\text{Area of triangle } GHI = \frac{1}{4} \text{ area of triangle } GBC$

- (c) (i) 1925.5 jam, 1550.5 jam
 (ii) 2600.5 jam, 1950.5 jam
 (iii) 3075.5 jam, 2275.5 jam
- (d) Kalkulator jenama A adalah lebih berbaloi sebab didapati daripada kuartil pertama, 75% daripada jangka hayat kalkulator jenama A lebih daripada 1925.5 jam dan 75% daripada jangka hayat kalkulator jenama B lebih daripada 1550.5 jam. Daripada median, 50% daripada jangka hayat kalkulator jenama A lebih daripada 2600.5 jam dan 50% daripada jangka hayat kalkulator jenama B lebih daripada 1950.5 jam. Daripada kuartil ketiga, 25% daripada jangka hayat kalkulator jenama A lebih daripada 3075.5 jam dan 25% daripada jangka hayat kalkulator jenama B hanya lebih daripada 2275.5 jam. Maka didapati Jangka hayat untuk kalkulator A adalah jauh lebih tinggi daripada jangka hayat kalkulator B.
Calculator brand A is better buy because from the first quartile, 75% of the lifespan of calculator brand A more than 1925.5 hours and 75% of the lifespan of calculator brand B more than 1550.5 jam. From the median, 50% of the lifespan of calculator brand A more than 2600.5 hours and 50% of the lifespan of calculator brand B more than 1950.5 jam. From the third quartile, 25% of the lifespan of calculator brand A more than 3075.5 hours and 25% of the lifespan of calculator brand B only more than 2275.5 hours. So, the lifespan of calculator brand A is far higher than the lifespan of calculator brand B.

17 (a)

Sempadan atas Upper boundary (jam/hours)	Kekerapan longgokan Cumulative frequency (jenama A/brand A)	Kekerapan longgokan Cumulative frequency (jenama B/ brand B)
0.5	0	0
500.5	10	5
1000.5	22	13
1500.5	36	43
2000.5	54	103
2500.5	90	173
3000.5	140	193
3500.5	200	200

(b) Kekerapan longgokan
Cumulative frequency



KERTAS MODEL SPM SET 5

Kertas 1

- 1 D
 $76\,980$ kepada/to 7.70×10^4
- 2 A
 $\frac{4.28 \times 10^9 \times 10^3}{3 \times 10^8} = 1.43 \times 10^4$
- 3 A
 $3.142 \times \left(\frac{357}{2}\right)^2 \times 400 \times 0.6 = 2.40 \times 10^7$
- 4 C
- 5 C
 Sebab tidak dinyatakan pendapatan dan perbelanjaan bulannannya

Because his monthly income and expenses are not mentioned

6 D

Tempoh masa, dalam saat, objek itu bergerak dengan pecutan = $3 + 2 = 5$
The duration, in seconds, the particle is moving with acceleration = $3 + 2 = 5$

7 C

Untuk $f(x) = ax^2 + bx + c$, translasi $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ tidak akan menyebabkan nilai b bertambah 1 unit.

For $f(x) = ax^2 + bx + c$, translation $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ won't cause the value of b increase 1 unit.

8 C

Jika titik P ialah imej bagi titik Q dibawah pantulan pada garis $x = k$ diikuti translasi $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$, maka $k = 8$. Imej bagi titik P di bawah gabungan transformasi yang sama ialah C .
If point P is the image of point Q under reflection in the line $x = k$ followed by translation $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$, then $k = 8$. The image of point P under the same combined transformation is C .

9 C

Hasiltambah digit-digitnya lebih daripada 8/ Sum of digits of the number is more than 8 = {18, 19, 27, 28, 29}
Nombor perdana/Prime number = {13, 17, 19, 23, 29}
Hasil tambah digit-digitnya lebih daripada 8 dan suatu nombor perdana/ Sum of digits of the number is more than 8 and which is a prime number = {19, 29}
Hasil tambah digit-digitnya lebih daripada 8 atau suatu nombor perdana/ Sum of digits of the number is more than 8 or which is a prime number = {13, 17, 18, 19, 23, 27, 28, 29}
 $n(S) = 18$, n (hasiltambah digit-digitnya lebih daripada 8) = 5, n (nombor perdana) = 5, n (hasiltambah digit-digitnya lebih daripada 8 dan nombor perdana) = 2, n (hasiltambah digit-digitnya lebih daripada 8 atau nombor perdana) = $5 + 5 - 2 = 8$, maka kebarangkalian memilih sebiji bola yang hasiltambah digit-digitnya lebih daripada 8 atau suatu nombor perdana = $\frac{8}{18} = \frac{4}{9}$.
 $n(S) = 18$, n (sum of digits of the number is more than 8) = 5, n (prime number) = 5, n (sum of digits of the number is more than 8 and prime number) = 2, n (sum of

digits of the number is more than 8 or prime number) = $5 + 5 - 2 = 8$, then probability of choosing a ball with sum of digits of the number is more than 8 or which is a prime number = $\frac{8}{18} = \frac{4}{9}$.

10 A

$p \propto \frac{q}{z^2}$, $p = k \frac{q}{z^2}$
Maka/then $\frac{pz^2}{q} = k$

11 A

$s \propto \frac{1}{(2t-3)}$, $s(2t-3) = k$
 $(-3)(2(-1)-3) = k$
 $k = 15$
 $(s)(2(-3)-3) = 15$
 $s = \frac{15}{-9} = -\frac{5}{3}$

12 A

$\cos \theta = \frac{-6}{10} = -0.6$
 $\tan x = -2$
 $\cos \theta + \tan x = -0.6 + (-2) = -2.6$

13 B

Sebelum pantulan, graf fungsi ialah $y = 2 \cos 2x$
Before reflection, the function of the graph is $y = 2 \cos 2x$
Selepas pantulan, graf fungsi menjadi $y = -2 \cos 2x$
After reflection, the graph of function becomes $y = -2 \cos 2x$
Apabila setiap titik dianjak 1 unit ke atas, maka $y = -2 \cos 2x + 1$.
When each point moves up 1 unit, then $y = -2 \cos 2x + 1$.

14 C

15 B

$a + b + 76 = 360$, maka $a + b = 284$
 $\frac{284}{2} = 142$
 $a > b$ bermakna $a > 142$
 $n = 9$, sudut dalaman/interior angle = $\frac{(9-2)180^\circ}{9} = 140^\circ$
 $n = 10$, sudut dalaman/interior angle = $\frac{(10-2)180^\circ}{10} = 144^\circ$
 $n = 11$, sudut dalaman/interior angle = $\frac{(11-2)180^\circ}{11} = 147.27^\circ$
 $n = 12$, sudut dalaman/interior angle = $\frac{(12-2)180^\circ}{12} = 150^\circ$
Jawapan yang mungkin ialah 10, 11 atau 12. Tetapi $a + b = 284$, maka $n = 10$
The possible answers are 10, 11 or 12. But $a + b = 284$, therefore $n = 10$

16 B

$\frac{p}{4} - 5 \geq -6$
 $\frac{p}{4} \geq -1$
 $p \geq -4$
 $5 - 3p > 9$
 $-3p > 4$
 $p < -\frac{4}{3}$

17 D

Kuartil pertama/First quartile = 3
Kuartil ketiga/Third quartile = 5
Julat antara kuartil yang asal/Initial interquartile range = 2
Apabila setiap nilai dalam set data itu didarab dengan 3 dan ditolak 2, hanya pendaraban yang akan mengubah julat antara kuartil yang asal. Julat antara kuartil asal = $5 - 3 = 2$.
Maka, julat antara kuartil yang baru = $2 \times 3 = 6$
When each value of the set of data is multiplied by 3 and subtracted by 2, only multiplication will change the value of the original interquartile range. The value of the original interquartile range = $5 - 3 = 2$.
So, the value of the new interquartile range = $2 \times 3 = 6$

18 D

Apabila setiap nilai dalam set data didarab/dibahagi dengan -1 atau ditambah/ditolak dengan satu nilai yang sama, sisihan piawainya kekal tidak berubah.
When each value in a set of data is multiplied/divided by -1 or is added/subtracted by a same value, its standard deviation remains unchanged.

19 A

$5OQ = 12OP$
 $\frac{OP}{OQ} = \frac{5}{12}$ di mana OP ialah pintasan- y dan OQ ialah pintasan- x .
 $\frac{OP}{OQ} = \frac{5}{12}$ where OP is y -intercept and OQ is x -intercept.
Kecerunan = $-\frac{\text{pintasan-}y}{\text{pintasan-}x} = -\frac{5}{12}$
Gradient = $-\frac{\text{pintasan-}y}{\text{pintasan-}x} = -\frac{5}{12}$

20 D

set $A = \{1, 2, 3, 4\}$, set $B = \{3, 4, 5, 6, 7\}$, dan/and set $C = \{4, 5\}$
 $A \cup B \cup C = \{1, 2, 3, 4, 5, 6, 7\}$
 $A \cap B \cap C = \{4, 5, 6, 7\}$

21 B

$n(A) - n(B) = 12$

$$4x + x + 3 + 10 + 9 - (3 + 2 + 10 + x + 3) = 12$$

$$5x + 22 - (18 + x) = 12$$

$$4x = 8$$

$$x = 2$$

$$n(\xi) = 3(2) - 1 + 5 + 2 + 3 + 10 + (2) + 3 + 4(2) + 9 = 47$$

22 C

Apabila $a < 0$, paksi simetri berada di kanan paksi-y apabila $b < 0$.
When $a < 0$, axis of symmetry is on the right of y-axis when $b < 0$.

23 B

Sepatutnya Bilangan Bucu - 1
= Bilangan tepi
Should be Number of vertices - 1
= Number of edges

24 A

25 C

Sepatutnya/Should be $n(A \cup B) = 3$

26 C

Jumlah jarak yang dilalui dalam 8 saat yang pertama = $\frac{1}{2}(5 + 10)4 + 4 \times 10 = 70$ m
Total distance travelled in first 8 seconds = $\frac{1}{2}(5 + 10)4 + 4 \times 10 = 70$ m

Purata laju/Average speed = $\frac{70}{8}$ m/s or 8.75 m/s

27 B

Liza membeli 4 biji buah naga dan 6 biji buah betik dengan bayaran RM38.
Liza bought 4 dragon fruits and 6 papayas with payment RM38.
Susan membeli 3 biji buah naga dan 5 biji buah betik dengan bayaran RM30.
Susan bought 3 dragon fruits and 5 papayas with payment RM30.
Harga sebiji buah naga dan sebiji buah betik masing-masing ialah RMx dan RMy.
Each dragon fruit and each papaya costs RMx and RMy respectively.
Persamaan matriks ialah

$$\begin{pmatrix} 4 & 6 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 38 \\ 30 \end{pmatrix}$$

$$\text{Matrix equation is } \begin{pmatrix} 4 & 6 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 38 \\ 30 \end{pmatrix}$$

28 D

Penentu bagi P bukan sentiasa sama dengan penentu Q.
Determinant of P is not always same as determinant of Q.
Contohnya/For example

$$A = \begin{pmatrix} 7 & 5 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 9 \\ 9 \end{pmatrix} \text{ ialah songsang bagi}$$

$$B = \begin{pmatrix} 2 & -5 \\ -1 & 7 \end{pmatrix}$$

$$A = \begin{pmatrix} 7 & 5 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 9 \\ 9 \end{pmatrix} \text{ is inverse of } B = \begin{pmatrix} 2 & -5 \\ -1 & 7 \end{pmatrix}$$

$$\text{Penentu bagi } \begin{pmatrix} 7 & 5 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 9 \\ 9 \end{pmatrix} \text{ ialah}$$

$$\frac{7}{9} \times \frac{2}{9} - \frac{5}{9} \times \frac{1}{9} = \frac{9}{81} = \frac{1}{9}$$

$$\text{Determinant of } \begin{pmatrix} 7 & 5 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 9 \\ 9 \end{pmatrix} \text{ is}$$

$$\frac{7}{9} \times \frac{2}{9} - \frac{5}{9} \times \frac{1}{9} = \frac{9}{81} = \frac{1}{9}$$

$$\text{Penentu bagi } \begin{pmatrix} 2 & -5 \\ -1 & 7 \end{pmatrix} \text{ ialah}$$

$$2 \times 7 - (-5 \times -1) = 9$$

$$\text{Determinant of } \begin{pmatrix} 2 & -5 \\ -1 & 7 \end{pmatrix} \text{ is}$$

$$2 \times 7 - (-5 \times -1) = 9$$

Penentu bagi A tidak sama dengan penentu bagi B.
Determinant of A is not same as determinant of B.

29 A

Bayaran minimum/Minimum payment = $5\% \times \text{RM}400 = \text{RM}20$
Tetapi bayaran minimum yang ditetapkan ialah RM25 atau 5% daripada baki penyata tertakluk kepada yang mana lebih tinggi.
Minimum payment is fixed as RM25 or 5% of the statement balance whichever is higher.

$$\text{Baki masih tertunggak/Amount still outstanding} = \text{RM}400 - \text{RM}25 = \text{RM}375$$

$$\text{Faedah atas baki tertunggak/Interest on the outstanding balance} = \frac{18\% \times \text{outstanding balance}}{12}$$

$$= \frac{18\% \times \text{RM}375}{12}$$

$$= \text{RM}5.63$$

Baki hutang dalam penyata akan datang/
Outstanding balance in the following statement = $\text{RM}375 + \text{RM}5.63 = \text{RM}380.63$

30 B

Sudut BDE = 54° , Sudut DBE = Sudut DEB = 63°
 $x = 63$

31 D

32 C

Transformasi E^2 bermaksud transformasi E dijalankan dua Kali berturut-turut.
Transformation E^2 means transformation E is performed two times continuously.

33 D

34 C

35 A

36 B

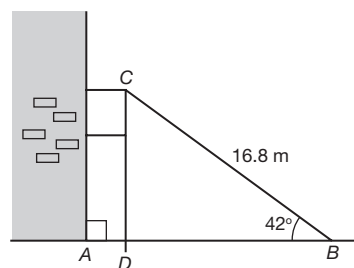
$$\sin \theta = 0.9165$$

$$\theta = 66.42^\circ$$

37 B

Untuk graf $y = -3 \tan 2x$, apabila $x = 67.5^\circ$, $y = -3 \tan 135^\circ = 3$.
For graph $y = -3 \tan 2x$, when $x = 67.5^\circ$, $y = -3 \tan 135^\circ = 3$.

38 A



Tinggi balkoni dari aras tanah = CD
= $16.8 \times \sin 42^\circ = 11.24$ m
The height of balcony from ground level = CD
= $16.8 \times \sin 42^\circ = 11.24$ m

39 B

40 C

Pintasan-x/ x-intercept = 5, AB = 13, maka/therefore Pintasan-y/ y-intercept = 12
Kecerunan/gradient = $-\frac{12}{5}$

Kertas 2

Paper 2

1 270 m^3
Isipadu/Volume = $\left[\frac{1}{2}(10 + 8)(6) \right] (5) = 270 \text{ m}^3$

2 (a) 7

$$2y + 3x + 6 = 0,$$

Apabila/When $y = 0$, $3x = -6$
 $x = -2$
Jarak/Distance of AB = $5 - (-2) = 7$

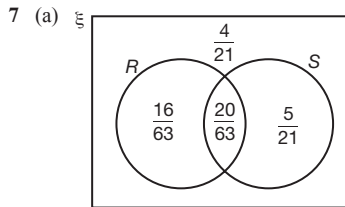
(b) $y = -\frac{3}{2}x + \frac{15}{2}$ atau/or
 $2y + 3x - 15 = 0$
 Persamaan bagi garis lurus BC,
 $y - 0 = -\frac{3}{2}(x - 5)$
 Equation of straight line BC,
 $y - 0 = -\frac{3}{2}(x - 5)$
 $y = -\frac{3}{2}x + \frac{15}{2}$ atau/or $2y + 3x - 15 = 0$

3 (a) $T_n = 3n - 1, n = 1, 2, 3, \dots$
 (b) 420π
 Jumlah isipadu/Total volume
 $= 35 \times \pi (2)^2 (3) = 420\pi$

4 (a) 4 ms^{-2}
 $\frac{64 - 40}{6} = 4 \text{ ms}^{-2}$
 (b) 502 m
 Jumlah jarak yang dilalui, dalam meter, untuk 14 saat yang pertama/
 The total distance travelled, in metre, for the first 14 seconds
 $= \frac{1}{2}(18 + 40)(6) + 40 \times 6$
 $+ \frac{1}{2}(40 + 48)(2)$
 $= 502 \text{ m}$

5 (a) Aliran tunai positif/Positive cash flow RM2 260
 $5200 + 1800 - 3460 - 1280 = 2260$
 Aliran tunai positif/Positive cash flow
 (b) $x = 32.49$
 Jumlah pendapatannya selepas
 Pendapatan pasifnya turun 40%
 $= 5200 + 1800 \times 0.6 = 6280$
 Her total income after her passive income decreases 40%
 $= 5200 + 1800 \times 0.6 = 6280$
 Jika Cik Zakiah tidak akan mempunyai aliran tunai positif, maka
 If Cik Zakiah doesn't have positive cash flow, then
 $(3460 + 1280) \times \frac{100 + x}{100} = 6280$
 $100 + x = 132.49$
 $x = 32.49$

6 RM4 dan/and RM3
 $\begin{pmatrix} 2 & 3 \\ 3 & 5 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 17 \\ 27 \end{pmatrix}$
 $\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 5 & -3 \\ -3 & 2 \end{pmatrix} \begin{pmatrix} 17 \\ 27 \end{pmatrix}$
 $\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$
 $a = 4, b = 3$



(b) $\frac{4}{21}$
 $1 - \frac{4}{7} - \frac{5}{21} = \frac{4}{21}$

8 (a) $x = 214, y = 103, z = 1231$
 $13_6 = 9_{10}, 42_8 = 34_{10}$, beza sepunya/
 common difference $= 34_{10} - 9_{10} = 25_{10}$
 $x_5 = 34_{10} + 25_{10} = 59_{10}, x = 214$
 $y_9 = 59_{10} + 25_{10} = 84_{10}, y = 103$
 $z_4 = 84_{10} + 25_{10} = 109_{10}, z = 1231$
 (b) 2021_3
 Sebutan ke-8/ The 8th term
 $= 109_{10} + 75_{10} = 184_{10}$
 $184_{10} = 2021_3$

- 9 (a) Mana-mana dua di bawah/ Any two below
- jenis bahan binaan/ type of building materials
 - jenis barang yang disimpan dalam bangunan/types of things stored in the building
 - lokasi atau bahaya sekeliling (seperti berhampiran dengan stesen petrol)/location or surrounding danger (such as next to petrol station)
 - jumlah nilai yang diinsurankan/total sum insured
 - langkah-langkah keselamatan yang diambil/any precaution steps taken
 - kemudahan perkhidmatan bomba/fire service facility
- (b) menampung perbelanjaan perubahan semasa dalam percutian/perjalanan, bagasi hilang, kemalangan penerbangan dan kerugian lain yang ditanggung semasa perjalanan
 Cover medical expenses during vacation/journey, loss luggage, flight accident or other loss incurred in the journey.

- 10 (a) 6%
 (b) RM150
 (c) kapasiti enjin/engine capacity
 (d) hasil atau pendapatan/revenue or income

Bahagian B

- 11 (a) Min/mean, $\bar{x} = \frac{192}{12} = 16$
 Varians/variance, $\sigma^2 = \frac{4320}{12} - (16)^2$
 $= 104$
 (b) Min baru/new mean, $\bar{x} = \frac{192 + 13}{13}$
 $= 15.77$
 Varians baru/new variance,
 $\sigma^2 = \frac{4320 + 169}{13} - (15.77)^2 = 96.61$
 atau/or $= 96.62$
 (c) Nilai min kekal tidak berubah. Nilai varians akan menjadi lebih besar.
 The value of mean remains unchanged. The value of variance will be larger.
 (d) Tambah nombor yang jauh dari min.
 Add a number which is far from mean.
 (e) Keluarkan satu nombor yang sama atau berhampiran dengan nilai min.
 Remove a value which is equal or close to the value of mean.

- 12 (a) $f(x) = -x^2 + 4x + 5$
 $f(x) = ax^2 + bx + c$
 $f(0) = 5, c = 5$
 $f(x) = -(x + 1)(x - 5)$
 $f(x) = -x^2 + 4x + 5$
 (b) $m = 2, n = 9$
 $m = \frac{-1 + 5}{2} = 2,$
 $f(2) = -(2)^2 + 4(2) + 5 = 9, n = 9$
 (c) $f(x) = x^2 - 4x - 5$
 Jika graf itu dipantulkan pada paksi-x, graf berbentuk minimum akan diperoleh. Nilai a akan menjadi positif.
 If the graph is reflected in the x-axis, a graph with minimum shape will be obtained. The value of a becomes positive.
 Maka/so $f(x) = (x + 1)(x - 5)$
 $f(x) = x^2 - 4x - 5$
 (d) Nilai m kekal tidak berubah. $x = m$ ialah paksi simetri bagi kedua-dua graf itu.
 The value of m remains unchanged. $x = m$ is the axis of symmetry of both graphs.

- 13 (a) Pokok/tree
 (b) 8190
 $6 + 24 + 96 + 384 + 1536 + 6144 = 8190$
 (c) $n = 9$
 $6(4)^{n-1} > 360\,000$
 $(4)^{n-1} > 60\,000$
 $4^7 = 16\,384$
 $4^8 = 65\,536 > 60\,000$
 $n - 1 = 8$
 $n = 9$

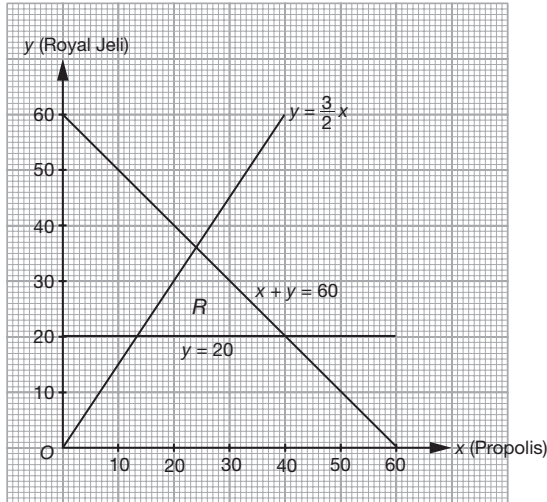
(d) 2 096 640

$n = 1$	$n = 2$	$n = 3$	$n = 4$	$n = 5$	$n = 6$	$n = 7$	$n = 8$	$n = 9$	$n = 10$
6	24	96	384	1536	6144	24 576	98 304	393 216	1 572 864

$$1\ 536 + 6\ 144 + 24\ 576 + 98\ 304 + 393\ 216 + 1\ 572\ 864 = 2\ 096\ 640$$

14 (a) $x + y \leq 60$, $y \leq \frac{3}{2}x$ dan/and $y \geq 20$

(b)



(c) (i) 36

(ii) Ya, sebab titik itu ada pada garis yang memang termasuk dalam rantau itu.

Yes, because the point lies on the line which is included in the region.

15 (a) 7

Jumlah murid/total students = 32
4 orang murid tidak bermain badminton atau ping pong
There are 4 students do not play badminton or ping pong

$$n(B \cup P) = 4$$

$$n(B \cup P) = 28$$

Katakan bilangan murid yang bermain badminton sahaja = x dan bilangan bermain ping pong = y
Let number of students who play badminton only = x and number of ping pong players = y

$$\text{Kita dapat/we have } x = \frac{1}{3}y$$

$$n(A \cup B) = \frac{1}{3}y + y = 28$$

$$\frac{4}{3}y = 28$$

$$y = 21$$

$$x = \frac{1}{3}(21) = 7$$

Katakan bilangan murid yang bermain badminton dan ping pong = a

Let number of students who play badminton and ping pong = a

$$a = \frac{1}{3}(7 + 21 - a)$$

$$\frac{4}{3}a = \frac{28}{3}$$

$$a = 7$$

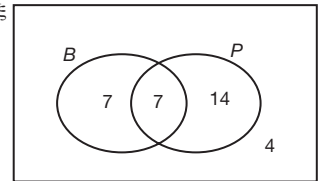
(b) 14

$$7 + 7 = 14$$

17 (a)

Sempadan atas Upper boundary (markah/marks)	Kekerapan longgokan Cumulative frequency (Matematik/Mathematics)	Kekerapan longgokan Cumulative frequency (Fizik/Physics)
19.5	0	0
29.5	7	5
39.5	15	14
49.5	25	40
59.5	43	61
69.5	61	70
79.5	71	76
89.5	77	79
99.5	80	80

(c)



16 (a) 32 km

$$160 \times \frac{12}{60} = 32 \text{ km}$$

(b) 13.52 km

$$32 \sin 25^\circ = 13.52 \text{ km}$$

(c) Tidak/No.

$$32 \sin 50^\circ = 24.51$$

Sebab/because $\sin 2x \neq 2 \sin x$

(d) 57.67°

$$\frac{1}{2} \times 160 = 80$$

$$80 \times \frac{12}{60} = 16$$

$$16 \sin \theta = 13.52$$

$$\sin \theta = 0.845$$

$$\theta = 57.67^\circ$$

(e) $320 \times \frac{1}{5} \sin 12.5^\circ = 13.85$.

$$80 \times \frac{1}{5} \sin 50^\circ = 12.26$$

$$320 \times \frac{1}{5} \sin 12.5^\circ \neq 80 \times \frac{1}{5} \sin 50^\circ$$

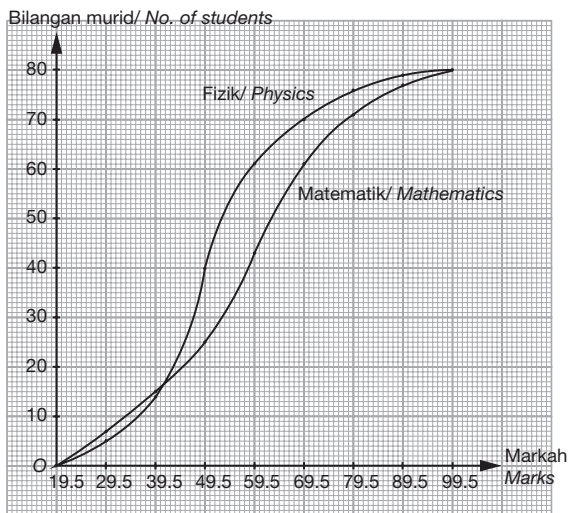
$$2a \sin \frac{1}{2} \theta \neq \frac{1}{2} a \sin 2\theta$$

(f) 36 minit/minutes.

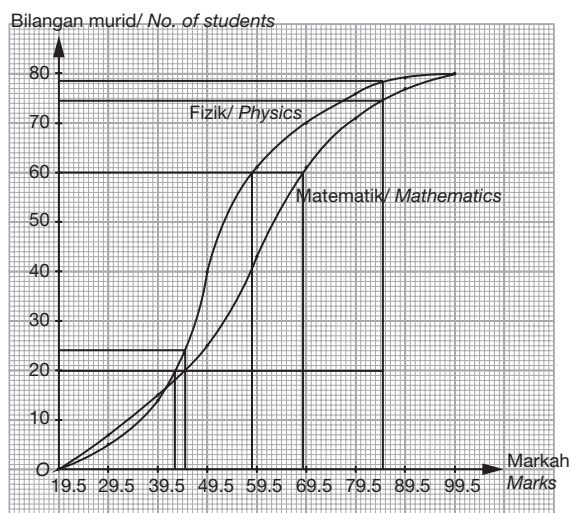
Gunakan nisbah/perkadaran/ segi tiga serupa atau pembesaran.

Using ratio/proportion/ similar triangles or enlargement.

(b)



(c)



(i) $68.5 - 58.5 = 10$ markah/marks

(ii) $5 - 2 = 3$

(iii) $20 + 24 = 44$

(d) Julat antara kuartil untuk matematik

Interquartile range for Mathematics

$68.5 - 45 = 23.5$

Julat antara kuartil untuk Fizik

Interquartile range for Physics

$58.5 - 42.5 = 16$

Mata pelajaran Fizik mempunyai sukatan serakan lebih kecil.

Subject Physics has smaller value in measure of dispersion.