For Examiner's Use

This question paper consists of 25 questions. Answer **all** questions. Write your answers in the spaces provided in the question paper.
Kertas peperiksaan ini mengandungi 25 soalan. Jawab **semua** *soalan. Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.*

1 Table 1 shows the achievement of three classes, 5 Gamma, 5 Omega and 5 Beta in an Additional Mathematics test.
Jadual 1 menunjukkan pencapaian bagi tiga kelas, 5 Gamma, 5 Omega dan 5 Beta dalam satu ujian Matematik Tambahan.

Class *Kelas*	**Mean mark** *Min markah*	**Standard deviation of the marks** *Sisihan piawai bagi markah*
5 Gamma	75	4
5 Omega	70	1
5 Beta	75	2

Table 1
Jadual 1

Which class shows the most consistent achievement in the test?
Give reason for your answer.
Kelas manakah menunjukkan pencapaian yang paling konsisten dalam ujian itu?
Beri sebab untuk jawapan anda.

[2 *marks*]
[2 *markah*]

Answer / *Jawapan*:

1

2

2 Two fair coins are tossed simultaneously. H denotes the event of obtaining the head and T denotes the event of obtaining the tail.
Dua keping syiling adil dilambung serentak. H mewakili peristiwa mendapat kepala dan T mewakili peristiwa mendapat ekor.

(*a*) List the sample space using set notation.
Senaraikan ruang sampel menggunakan tatanda set.

(*b*) Given X is a discrete random variable which represents the number of heads obtained, list the possible values of X.
Diberi X ialah pemboleh ubah rawak diskret mewakili bilangan kepala diperoleh, senaraikan nilai-nilai X yang mungkin.

[2 *marks*]
[2 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

For Examiner's Use

2

2

---

3 Diagram 3 shows five cards of different letters.
Rajah 3 menunjukkan lima kad berlainan huruf.

B	O	L	E	H

Diagram 3
Rajah 3

Calculate the number of different ways to arrange all the cards in a row if
Hitung bilangan cara yang berlainan untuk menyusun semua kad itu dalam satu baris jika

(*a*) there is no restriction,
tiada syarat dikenakan,

(*b*) the first card and the last card are consonants.
kad pertama dan kad terakhir adalah huruf konsonan.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

3

3

For Examiner's Use

4 Ben and Chandran are qualified to the final of a badminton tournament in their school. The player who first wins any two sets of the match is the winner. The probability Ben wins in any of the sets is $\frac{3}{7}$.

Ben dan Chandran layak ke pertandingan peringkat akhir kejohanan badminton di sekolah mereka. Pemain yang pertama memenangi mana-mana dua set permainan adalah pemenang. Kebarangkalian Ben menang dalam mana-mana set ialah $\frac{3}{7}$.

Find the probability that
Cari kebarangkalian bahawa

(*a*) the winner is determined after two sets of the match,
pemenang ditentukan selepas dua set permainan,

(*b*) Ben will win the tournament after playing three sets of the match.
Ben akan menang kejohanan itu selepas bermain tiga set permainan.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

4

4

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5 Given $\int_1^h (2x - 6)\mathrm{d}x = -4$, find the value of h. [3 *marks*]

Diberi $\int_1^h (2x - 6)\mathrm{d}x = -4$, *cari nilai h.* [3 *markah*]

Answer / *Jawapan*:

5

3

For Examiner's Use

6 The surface area of a cube increases at a constant rate of $15\ \text{cm}^2\ \text{s}^{-1}$.
Find the rate of change of side length, in cm s^{-1}, when the volume of the cube is $125\ \text{cm}^3$.
[3 *marks*]
Luas permukaan bagi sebuah kiub bertambah pada kadar tetap pada kadar tetap $15\ \text{cm}^2\ \text{s}^{-1}$.
Cari kadar perubahan bagi panjang sisi, dalam cm s^{-1}, *ketika isi padu kiub ialah* $125\ \text{cm}^3$.
[3 *markah*]

Answer / *Jawapan*:

6

3

---

7 Diagram 7 shows a part of curve $y = \dfrac{2x-6}{x+2}$ and a straight line.

Rajah 7 menunjukkan sebahagian daripada lengkung $y = \dfrac{2x-6}{x+2}$ *dan satu garis lurus.*

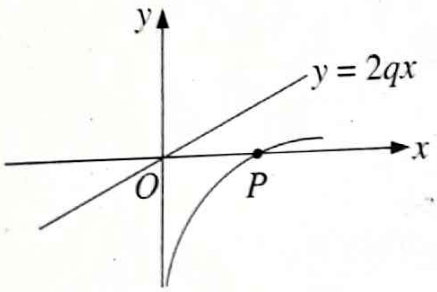

Diagram 7
Rajah 7

It is given that the straight line is parallel to the tangent of the curve at point P.
Find the value of q.
Diberi bahawa garis lurus itu selari dengan tangen kepada lengkung itu pada titik P.
Cari nilai q.
[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

7

4

For Examiner's Use

8

2

8 The straight line $2y = 3x + h + 4$ intersects the y-axis at $5k$, where h and k are constants. Express h in terms of k. [2 *marks*]

Garis lurus $2y = 3x + h + 4$ *menyilang paksi-y pada* $5k$, *dengan keadaan h dan k ialah pemalar. Ungkapkan h dalam sebutan k.* [2 *markah*]

Answer / *Jawapan*:

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9 Diagram 9 shows two straight lines on a Cartesian plane.
Rajah 9 menunjukkan dua garis lurus pada suatu satah Cartes.

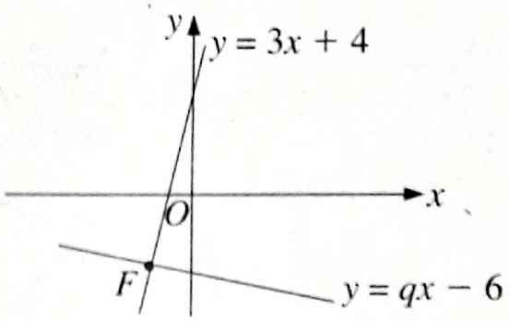

Diagram 9
Rajah 9

Both the straight are perpendicular to each other.
Kedua-dua garis lurus itu berserenjang antara satu sama lain.

(a) State the value of q.
Nyatakan nilai q.

(*b*) Find the coordinates of F.
Cari koordinat F.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

9

3

10 Diagram 10 shows a regular hexagon with centre O.
Rajah 10 menunjukkan sebuah heksagon sekata dengan pusat O.

For Examiner's Use

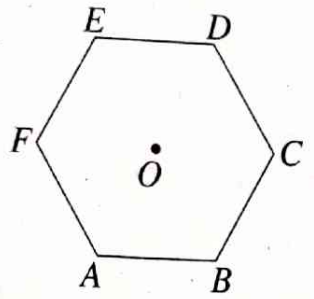

Diagram 10
Rajah 10

(*a*) Express $\overrightarrow{AC} + \overrightarrow{CE} + \overrightarrow{CB}$ as a single vector.
Ungkapkan $\overrightarrow{AC} + \overrightarrow{CE} + \overrightarrow{CB}$ *sebagai satu vektor tunggal.*

(*b*) Given $\overrightarrow{OA} = \underline{a}$, $\overrightarrow{OB} = \underline{b}$ and the length of each side of the hexagon is 3 units, find the unit vector in the direction of $\overrightarrow{AB}$, in terms of $\underline{a}$ and $\underline{b}$.
Diberi $\overrightarrow{OA} = \underline{a}$, $\overrightarrow{OB} = \underline{b}$ *dan panjang setiap sisi heksagon itu ialah 3 unit, cari vektor unit dalam arah* $\overrightarrow{AB}$ *dalam sebutan* $\underline{a}$ *dan* $\underline{b}$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

10

3

---

11 Given the function $f: x \rightarrow 3x - 2$, find
Diberi fungsi $f: x \rightarrow 3x - 2$, *cari*

(*a*) the value of x when $f(x)$ maps onto itself,
nilai x apabila f(x) memeta kepada diri sendiri,

(*b*) the value of h such that $f(2 - h) = 4h$.
nilai h dengan keadaan $f(2 - h) = 4h$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

11

4

For Examiner's Use

12 Given the functions $m: x \rightarrow px + 1$, $h: x \rightarrow 3x - 5$ and $mh(x) = 3px + q$.
Express p in terms of q. [3 *marks*]
Diberi fungsi $m: x \rightarrow px + 1$, $h: x \rightarrow 3x - 5$ *dan* $mh(x) = 3px + q$
Ungkapkan p dalam sebutan q. [3 *markah*]

12 | 3

Answer / *Jawapan*:

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13 Given the functions $g: x \rightarrow 3x + 1$, and $fg: x \rightarrow 9x^2 + 6x - 4$, find
Diberi fungsi $g: x \rightarrow 3x + 1$, and $fg: x \rightarrow 9x^2 + 6x - 4$, *cari*

(*a*) $g^{-1}(x)$,

(*b*) $f(x)$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

(*a*)

13 | 3

(*b*)

---

14 Given $\log_a 7 = r$, express in terms of r
Diberi $\log_a 7 = r$, *ungkapkan dalam sebutan r*

(*a*) $\log_a 49$,

(*b*) $\log_7 343a^2$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(*a*)

14 | 4

(*b*)

15 Given $3^p = 5^q = 15^r$, express r in terms of p and q. [3 *marks*]
Diberi $3^p = 5^q = 15^r$, *ungkapkan r dalam sebutan p dan q.* [3 *markah*]

Answer / *Jawapan*:

For Examiner's Use

15

3

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16 The variables x and y are related by the equation $y = 2x^2 - \frac{q}{x}$, where q is a constant. A straight line is obtained by plotting xy against x^3, as shown in Diagram 16.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y = 2x^2 - \frac{q}{x}$, *dengan keadaan q ialah pemalar. Suatu garis lurus diperoleh dengan memplotkan xy melawan* x^3, *seperti ditunjukkan pada Rajah* 16.

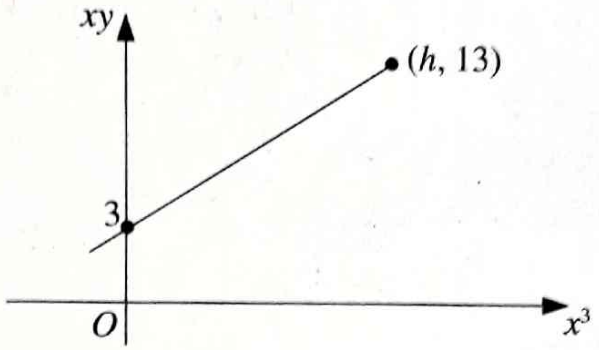

Diagram 16
Rajah 16

Find the value of h and of q.
Cari nilai h dan nilai q.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

16

3

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17 It is given that the quadratic equation $3x^2 + 8x + 7 = 0$ has roots α and β.
Form a quadratic equation with roots 3α and 3β. [3 *marks*]
Diberi bahawa persamaan kuadratik $3x^2 + 8x + 7 = 0$ *mempunyai punca-punca* α *dan* β.
Bentukkan persamaan kuadratik dengan punca-punca 3α *dan* 3β. [3 *markah*]

Answer / *Jawapan*:

17

3

For Examiner's Use

18 Given the quadratic function $f(x) = x^2 + 2wx + 3w - 2$, where w is a constant, is always positive when $p < w < q$.
Find the value of p and of q. [3 marks]
Diberi fungsi kuadratik $f(x) = x^2 + 2wx + 3w - 2$, *dengan keadaan* w *ialah pemalar, adalah sentiasa positif apabila* $p < w < q$.
Cari nilai p *dan nilai* q. [3 *markah*]

18

3

Answer / *Jawapan*:

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19 Diagram 19 shows a circle with centre O and radius 8 cm.
Rajah 19 *menunjukkan sebuah bulatan dengan pusat* O *dan jejari* 8 cm.

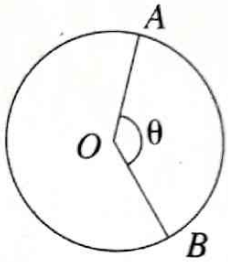

Diagram 19
Rajah 19

Given the length of the minor arc AB is 16 cm
Diberi panjang lengkok minor AB *ialah* 16 cm
[Use / *Guna*, $\pi = 3.142$]

(*a*) state the value of θ in radians,
nyatakan nilai θ *dalam radian,*

(*b*) find the area of the major sector OAB, in cm^2, correct to four significant figures.
cari luas sektor major OAB, *dalam* cm^2, *betul kepada empat angka bererti.*

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

19

4

20 Solve the equation $\tan \alpha = 4 - 3 \cot \alpha$ for $0° \leq \alpha \leq 180°$. [3 *marks*]
Selesaikan persamaan $\tan \alpha = 4 - 3$ kot α *untuk* $0° \leq \alpha \leq 180°$. [3 *markah*]

Answer / *Jawapan*:

For Examiner's Use

20

3

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21 A stall selling 'teh tarik' gives choice to the customers of using either condensed milk or evaporated milk in their drinks. On a particular day the stall has 70 cans of condensed milk and 48 cans of evaporated milk. The stall used 5 cans of condensed milk and 3 cans of evaporated milk in a day.
After how many days, the remainder cans of both milk are the same?
Suatu gerai menjual teh tarik memberikan pilihan kepada pelanggan-pelanggannya sama ada menggunakan susu pekat atau susu cair di dalam minuman mereka. Pada suatu hari tertentu gerai tersebut mempunyai 70 tin susu pekat dan 48 tin susu cair. Gerai itu menggunakan 5 tin susu pekat dan 3 tin susu cair dalam sehari.
Selepas berapa harikah, bilangan baki tin bagi kedua-dua jenis susu itu adalah sama banyak?
[3 *marks*]
[3 *markah*]

Answer / *Jawapan*:

21

3

---

22 It is given that $(x + 1)$, $(2x - 7)$ and $\left(\frac{x+1}{4}\right)$ are three consecutive terms of a geometric progression with a common ratio of $\frac{1}{2}$.
Diberi bahawa $(x + 1)$, $(2x - 7)$ *and* $\left(\frac{x+1}{4}\right)$ *ialah tiga sebutan berturutan bagi suatu janjang geometri dengan nisbah sepunya* $\frac{1}{2}$.

Find
Cari

(*a*) the value of x,
nilai x,

(*b*) the first term if $(x + 1)$ is the 12th term of the progression.
sebutan pertama jika $(x + 1)$ *ialah sebutan ke-12 janjang itu.*

[4 *marks*]
[4 *markah*]

For Examiner's Use

Answer / *Jawapan*:

(*a*)

(*b*)

22

4

---

23 Mohan took 4 minutes to complete the first kilometre of a 15 km run. He could not sustain his stamina thus for each subsequent kilometre, he took $\frac{1}{8}$ more time compared to the time he took for the previous kilometre.

The participants who finished the run more than two hours are not qualified for the state level run.

Didi Mohan qualified? Show calculation to support your answer.

Mohan mengambil masa 4 minit untuk menghabiskan kilometer pertama dalam suatu acara larian 15 km. Dia tidak dapat mengekalkan staminanya, maka bagi setiap kilometer berikutnya, dia mengambil $\frac{1}{8}$ *lebih masa berbanding dengan masa yang diambil untuk kilometer sebelumnya.*

Peserta-peserta yang menamatkan larian melebihi dua jam tidak layak untuk acara larian peringkat negeri.

Adakah Mohan layak? Tunjukkan kiraan untuk menyokong jawapan anda.

[4 *marks*]

[4 *markah*]

Answer / *Jawapan*:

23

4

24 Consumer Association ABC conduct a survey on lifespan of a particular brand light bulb. It is found that the probability lifespan of the bulb less than six months is p.
Persatuan Pengguna ABC menjalankan tinjauan tentang jangka hayat bagi jenama mentol lampu tertentu. Didapati bahawa kebarangkalian jangka hayat mentol lampu itu kurang daripada enam bulan ialah p.

For Examiner's Use

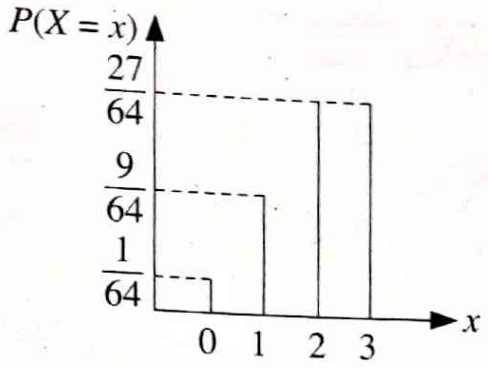

Diagram 24
Rajah 24

A sample of 3 light bulbs is selected at random. Diagram 24 shows the result of the survey, such that X represents the number of light bulbs with a lifespan less than six months.
Sampel 3 biji mentol lampu dipilih secara rawak. Rajah 24 menunjukkan keputusan tinjauan tersebut, dengan keadaan X mewakili bilangan mentol lampu yang mempunyai jangka hayat kurang daripada enam bulan.

(*a*) Find the value of p.
Cari nilai p.

(*b*) Calculate how many light bulbs are still functioning after six months, if 20 light bulbs from the same brand are used.
Hitung bilangan mentol lampu yang masih berfungsi selepas enam bulan, jika 20 mentol lampu dari jenama yang sama digunakan.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

(*a*)

(*b*)

24

4

For Examiner's Use

25 Diagram 25.1 shows the front view of four pieces of wood with the same width. The total front area of the four pieces of wood is 20 cm^2. The four pieces of wood are used to produce a rectangular photo frame as shown in Diagram 25.2.

Rajah 25.1 *menunjukkan pandangan hadapan bagi empat keping kayu dengan lebar yang sama. Jumlah luas permukaan hadapan keempat-empat kayu itu ialah* 20 cm^2. *Keempat-empat keping kayu itu diguna untuk menghasilkan sebuah bingkai gambar berbentuk segi empat tepat seperti yang ditunjukkan dalam Rajah* 25.2.

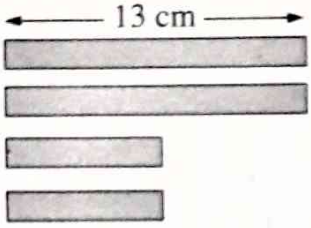

Diagram 25.1
Rajah 25.1

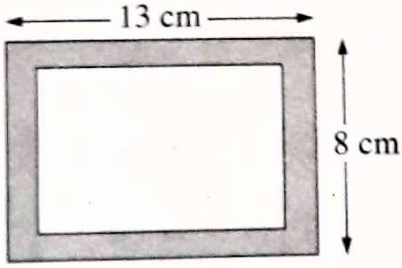

Diagram 25.2
Rajah 25.2

Calculate the width, in cm, of the wood.
Hitung lebar, dalam cm, *kepingan kayu itu.*

[3 *marks*]
[3 markah]

Answer / *Jawapan*:

25

3

END OF QUESTION PAPER
KERTAS PEPERIKSAAN TAMAT