

NAMA .....

KELAS .....

3472/2  
Matematik  
Tambahan  
Kertas 2  
Julai / Ogos  
2026  
2 ½ jam



MAJLIS PENGETUA SEKOLAH MALAYSIA  
NEGERI SEMBILAN  
PROGRAM PENINGKATAN AKADEMIK TINGKATAN LIMA  
SEKOLAH MENENGAH NEGERI SEMBILAN 2026

MATEMATIK TAMBAHAN  
Kertas 2  
2 jam 30 minit

JANGAN BUKA KERTAS SOALAN INI  
SEHINGGA DIBERITAHU

- 1 Tulis nama dan kelas anda pada ruangan yang disediakan.
- 2 Kertas soalan ini adalah dalam dwibahasa.
- 3 Soalan dalam Bahasa Melayu mendahului soalan yang sepadan dalam Bahasa Inggeris.
- 4 Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
- 5 Calon dikehendaki membaca maklumat di halaman 36.

| Untuk Kegunaan Pemeriksa |        |              |                  |
|--------------------------|--------|--------------|------------------|
| Bahagian                 | Soalan | Markah Penuh | Markah Diperoleh |
| A                        | 1      | 7            |                  |
|                          | 2      | 8            |                  |
|                          | 3      | 8            |                  |
|                          | 4      | 8            |                  |
|                          | 5      | 6            |                  |
|                          | 6      | 6            |                  |
|                          | 7      | 7            |                  |
| B                        | 8      | 10           |                  |
|                          | 9      | 10           |                  |
|                          | 10     | 10           |                  |
|                          | 11     | 10           |                  |
| C                        | 12     | 10           |                  |
|                          | 13     | 10           |                  |
|                          | 14     | 10           |                  |
|                          | 15     | 10           |                  |
| Jumlah                   |        | 100          |                  |

Kertas soalan ini mengandungi 40 halaman bercetak

## Bahagian A

[50 markah]

Jawab semua soalan.

- 1 (a) Diberi persamaan linear.  
*Given the linear equation.*

$$\begin{aligned}2x + 2y - 2z &= 7 \\ -2x + 5y - 12z &= 6 \\ y &= 2z - 3\end{aligned}$$

Selesaikan persamaan linear dan tentukan jenis penyelesaian.  
*Solve the linear equations and state the type of solution.*

[3 markah]  
[3 marks]

- (b) Rajah 1 menunjukkan sebuah poster berbentuk segi empat tepat.  
*Diagram 1 shows a rectangular poster.*



Rajah 1  
Diagram 1

Diberi perimeter poster ialah 80 cm dan luasnya ialah  $384 \text{ cm}^2$ . Cari panjang dan lebar poster tersebut.

*Given the perimeter of the poster is 80 cm and the area is  $384 \text{ cm}^2$ . Find the value of the length and the width of the poster.*

[4 markah]  
[4 marks]

Jawapan / Answer :

Jawapan / Answer :



Diagram 2

Diagram 2

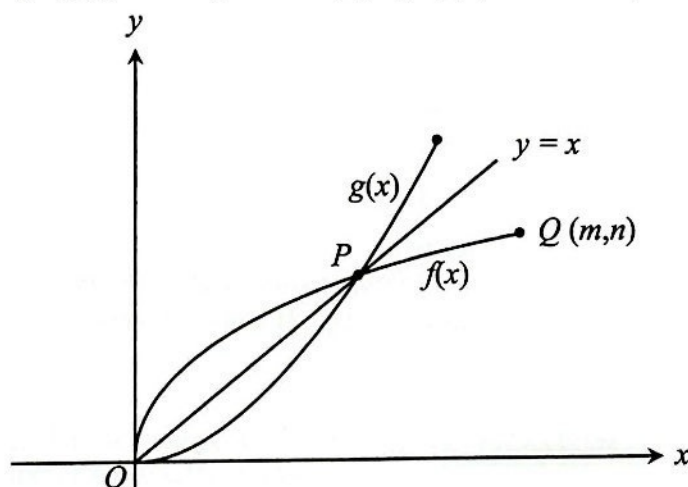
Diagram 2 shows a curve in the first quadrant of a Cartesian coordinate system. The curve starts at the origin (0,0) and ends at a point on the y-axis. A tangent line is drawn at a point on the curve, and a normal line is also shown. The area under the curve is shaded. The x-axis is labeled 'x' and the y-axis is labeled 'y'.

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[Lihat halaman sebelah  
SULIT

- 2 (a) Rajah 2 menunjukkan graf bagi fungsi  $f$  yang ditakrifkan oleh  $f: x \rightarrow \sqrt[3]{x}$  untuk domain  $0 \leq x \leq m$ . Graf  $g(x)$  ialah pantulan bagi graf  $f(x)$  pada garis  $y = x$ .  
*Diagram 2 shows the graph of function  $f$  denoted as  $f: x \rightarrow \sqrt[3]{x}$  for domain  $0 \leq x \leq m$ . Graph  $g(x)$  is the reflection of graph  $f(x)$  in the line  $y = x$ .*



Rajah 2  
Diagram 2

Cari  
Find

- (i)  $g(x)$ ,  
 [2 markah]  
 [2 marks]
- (ii) koordinat titik yang sepadan dengan titik  $Q$  pada graf  $g(x)$ , dalam sebutan  $m$  dan  $n$ ,  
*the corresponding coordinate of point  $Q$  in graph  $g(x)$ , in terms of  $m$  and  $n$ ,*  
 [1 markah]  
 [1 mark]
- (iii) koordinat titik  $P$ .  
*coordinate of point  $P$ .*  
 [2 markah]  
 [2 marks]
- (b) Diberi fungsi  $k$  ditakrif oleh  $k(x) = \frac{5}{x}, x \neq 0$ .  
*Given function  $k$  is defined by as  $k(x) = \frac{5}{x}, x \neq 0$ .*
- (i) Cari fungsi  $k^2(x)$  dan  $k^3(x)$ .  
*Find function  $k^2(x)$  and  $k^3(x)$ .*
- (ii) Seterusnya, cari fungsi  $k^{67}(x)$ .  
*Hence, find the function  $k^{67}(x)$ .*  
 [3 markah]  
 [3 marks]

Jawapan / Answer :



Diagram 1

Diagram 1 menunjukkan dua titik, A dan B, pada satah Cartesian. Titik A terletak pada koordinat  $(-2, 4)$  dan Titik B terletak pada koordinat  $(2, 4)$ . Garisan lurus menghubungkan titik A dan B.

(3 markah)

(b) Garisan lurus yang melalui titik A dan B dipanjangkan. Garisan ini dipotong oleh paksi x pada titik C. Berapakah koordinat titik C?

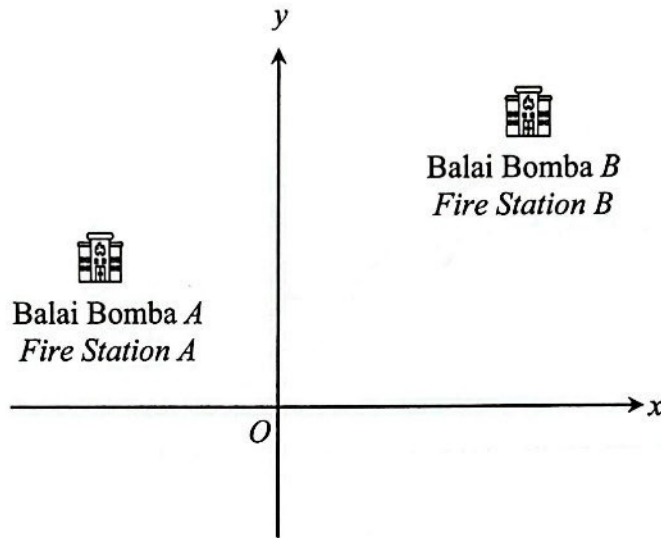
(3 markah)

(c) Garisan lurus yang melalui titik A dan B dipanjangkan. Garisan ini dipotong oleh paksi y pada titik D. Berapakah koordinat titik D?

(3 markah)

[Lihat halaman sebelah  
SULIT

- 3 Dalam satu sistem pemantauan digital, Balai Bomba  $A$  terletak pada koordinat  $(-3, 2)$  dan Balai Bomba  $B$  terletak pada koordinat  $(5, 6)$  seperti dalam Rajah 3.  
*In a digital monitoring system, Fire Station  $A$  is located at coordinates  $(-3, 2)$  and Fire Station  $B$  is located at coordinates  $(5, 6)$  as in Diagram 3.*



Rajah 3  
 Diagram 3

- (a) Sebuah pili bomba dibina di atas jalan lurus yang menghubungkan Balai Bomba  $A$  dan Balai Bomba  $B$  dengan keadaan jaraknya dari Balai Bomba  $A$  adalah tiga kali ganda jaraknya dari Balai Bomba  $B$ . Cari koordinat pili bomba tersebut.  
*A fire hydrant is built on a straight road connecting Fire Station  $A$  and Fire Station  $B$  such that its distance from Fire Station  $A$  is three times the distance from Fire Station  $B$ . Find the coordinates of the fire hydrant.*
- [2 markah]  
 [2 marks]
- (b) Balai Bomba  $C$  akan dibina pada koordinat  $(-2, k)$ . Cari nilai  $k$ , ( $k > 0$ ), jika luas di antara Balai Bomba  $A$ ,  $B$  dan  $C$  ialah  $22 \text{ unit}^2$ .  
*A Fire Station  $C$  will be built at coordinates  $(-2, k)$ . Find the value of  $k$ , ( $k > 0$ ), if the area between Fire Stations  $A$ ,  $B$  and  $C$  is  $22 \text{ unit}^2$ .*
- [3 markah]  
 [3 marks]
- (c) Cari persamaan lokus bagi titik  $P$  yang bergerak dengan keadaan jaraknya dari Balai Bomba  $B$  sentiasa 7 unit. Seterusnya, tentukan sama ada Balai Bomba  $C$  berada di atas persamaan lokus tersebut atau tidak.  
*Find the equation of the locus of moving point  $P$  such that its distance from Fire Station  $B$  always 7 units. Hence, state whether the Fire Station  $C$  lies on the equation of the locus or not.*

[3 markah]  
 [3 marks]

Jawapan / Answer :

[Lihat halaman sebelah  
SULIT

- 4 (a) Tunjukkan  $\frac{\sec x}{2\cos x - \sec x} = \sec 2x$ .  
 Show that  $\frac{\sec x}{2\cos x - \sec x} = \sec 2x$ .

[3 markah]

[3 marks]

- (b) Lakarkan graf bagi  $y = \frac{2}{\sec 2x} + 2$  untuk  $0 \leq x \leq \pi$ .  
 Sketch the graph  $y = \frac{2}{\sec 2x} + 2$  for  $0 \leq x \leq \pi$ .

[3 markah]

[3 marks]

- (c) Seterusnya, tentukan nilai  $m$  jika  $\frac{2}{\sec 2x} = m$  mempunyai hanya satu penyelesaian.

Hence, determine the value of  $m$  if  $\frac{2}{\sec 2x} = m$  has only one solution.

[2 markah]

[2 marks]

Jawapan / Answer :

Jawapan / Answer :

1. (a) (i)

(ii)

(b) (i) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(ii) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(iii) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(iv) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(v) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(vi) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(vii) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(viii) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(ix) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(x) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(xi) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

(xii) The diagram shows a cross-section of a plant stem with a central vascular cylinder.

[Lihat halaman sebelah

SULIT

- 5 (a) Permudahkan  $\sqrt{18}p - \sqrt{8}q$  dalam sebutan surd paling ringkas.

*Simplify  $\sqrt{18}p - \sqrt{8}q$  in a simplest surd form.*

[2 markah]

[2 marks]

- (b) Sekumpulan ahli biologi mengkaji pembiakan sejenis tumbuhan unik di sebuah makmal. Pertumbuhan ini mengikut persamaan  $4 \ln x + \ln \left( \frac{x}{e^3} \right) = t + \ln(x^3)$  dengan keadaan  $x$  ialah saiz tumbuhan yang tumbuh dalam mm dan  $t$  ialah masa pertumbuhan dalam jam. Setelah 1 jam, ungkapkan saiz tumbuhan,  $x$  dalam sebutan  $e$ .

*A group of biologists are studying the growth of a unique type of plant in a laboratory. The growth follows an equation  $4 \ln x + \ln \left( \frac{x}{e^3} \right) = t + \ln(x^3)$  where  $x$  is the height of the plant and  $t$  is the growth time in hours. After 1 hour, express the size of the plant,  $x$  in terms of  $e$ .*

[4 markah]

[4 marks]

Jawapan / Answer :

Jawapan / Answer :

1. (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$  (e)  $\frac{1}{32}$

2. (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$  (e)  $\frac{1}{32}$

3. (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$  (e)  $\frac{1}{32}$

4. (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$  (e)  $\frac{1}{32}$

5. (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{8}$  (d)  $\frac{1}{16}$  (e)  $\frac{1}{32}$

- 6 Satu persamaan kuadratik diberi oleh  $x^2 + x = 2rx - r^2$ , dengan keadaan  $r$  ialah pemalar.  
*A quadratic equation is given by  $x^2 + x = 2rx - r^2$ , where  $r$  is a constant.*

- (a) Cari julat nilai  $r$  jika persamaan itu mempunyai punca-punca khayalan.  
*Find the range value of  $r$  such that the equation has imaginary roots.*

[2 markah]

[2 marks]

- (b) Diberi bahawa persamaan  $x^2 + x = 2rx - r^2$  mempunyai punca-punca  $\alpha$  dan  $\beta$ ,  
bentukkan persamaan yang mempunyai punca-punca  $\alpha - \beta$  dan  $\beta - \alpha$  dalam  
sebutan  $r$ .

*Given that the equation  $x^2 + x = 2rx - r^2$  has roots  $\alpha$  and  $\beta$ , form an equation  
whose roots are  $\alpha - \beta$  and  $\beta - \alpha$  in terms of  $r$ .*

[4 markah]

[4 marks]

Jawapan / Answer :



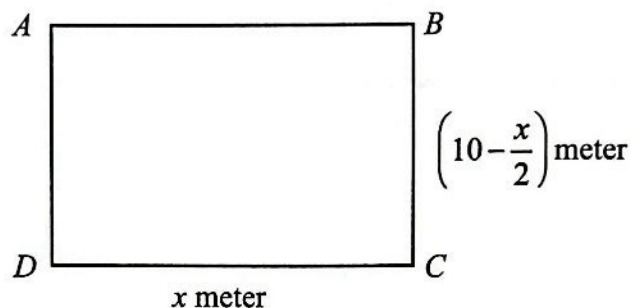
Jawapan / Answer :



[Lihat halaman sebelah  
SULIT

- 7 Rajah 4 menunjukkan pelan sebuah kolam berbentuk segiempat tepat  $ABCD$  yang diusahakan oleh seorang peladang. Lebar dan panjang kolam masing-masing ialah  $\left(10 - \frac{x}{2}\right)$  meter dan  $x$  meter.

Diagram 4 shows the plan of a rectangular pond  $ABCD$  managed by a farmer. The width and the length of the pond are  $\left(10 - \frac{x}{2}\right)$  meter and  $x$  meter respectively.



Rajah 4  
Diagram 4

Diberi kedalaman kolam ialah  $\frac{x}{5}$  meter.

Given the depth of the pond is  $\frac{x}{5}$  meter.

- (a) Cari nilai bagi  $x$ , apabila luas,  $L \text{ m}^2$  kolam ialah maksimum.  
Find the value of  $x$ , when the area,  $L \text{ m}^2$  of the pond is maximum.

[3 markah]

[3 marks]

- (b) Semasa musim kemarau, air kolam mengalami penyejatan dengan kadar  $0.004 \text{ m}^3\text{s}^{-1}$ . Hitung kadar perubahan kedalaman air,  $h$  ketika  $h = \frac{3}{5}$  meter.

During the dry season, the pond water experiences evaporation at a rate of

$0.004 \text{ m}^3\text{s}^{-1}$ . Calculate the rate of change of water depth,  $h$  when  $h = \frac{3}{5}$  meter.

[4 markah]

[4 marks]

Jawapan / Answer :



Jawapan / Answer :

1. (a) The first part of the question is about the definition of a function. A function is a relation between a set of inputs (the domain) and a set of possible outputs (the codomain), where each input is related to exactly one output.

(b) The second part of the question is about the domain and codomain of a function. The domain is the set of all possible inputs, and the codomain is the set of all possible outputs.

(c) The third part of the question is about the range of a function. The range is the set of all possible outputs that the function can produce.

(d) The fourth part of the question is about the graph of a function. A graph is a visual representation of a function, showing the relationship between the input and output values.

(e) The fifth part of the question is about the properties of a function. A function can be one-to-one, onto, or both. A one-to-one function is a function where each input is related to exactly one output, and no two different inputs are related to the same output.

(f) The sixth part of the question is about the composition of functions. The composition of two functions is a new function that is formed by applying one function to the output of another function.

(g) The seventh part of the question is about the inverse of a function. The inverse of a function is a function that reverses the mapping of the original function.

(h) The eighth part of the question is about the properties of the inverse of a function. The inverse of a function exists if and only if the function is one-to-one and onto.

(i) The ninth part of the question is about the properties of the composition of functions. The composition of two functions is associative, meaning that the order in which the functions are applied does not matter.

(j) The tenth part of the question is about the properties of the identity function. The identity function is a function that maps every input to itself.

(k) The eleventh part of the question is about the properties of the constant function. The constant function is a function that maps every input to the same output.

(l) The twelfth part of the question is about the properties of the linear function. The linear function is a function that maps every input to a unique output, and the output is a linear function of the input.

(m) The thirteenth part of the question is about the properties of the quadratic function. The quadratic function is a function that maps every input to a unique output, and the output is a quadratic function of the input.

(n) The fourteenth part of the question is about the properties of the cubic function. The cubic function is a function that maps every input to a unique output, and the output is a cubic function of the input.

(o) The fifteenth part of the question is about the properties of the exponential function. The exponential function is a function that maps every input to a unique output, and the output is an exponential function of the input.

(p) The sixteenth part of the question is about the properties of the logarithmic function. The logarithmic function is a function that maps every input to a unique output, and the output is a logarithmic function of the input.

(q) The seventeenth part of the question is about the properties of the trigonometric functions. The trigonometric functions are functions that map every input to a unique output, and the output is a trigonometric function of the input.

(r) The eighteenth part of the question is about the properties of the hyperbolic functions. The hyperbolic functions are functions that map every input to a unique output, and the output is a hyperbolic function of the input.

(s) The nineteenth part of the question is about the properties of the Bessel functions. The Bessel functions are functions that map every input to a unique output, and the output is a Bessel function of the input.

## BAHAGIAN B

[30 markah]

Bahagian ini mengandungi empat soalan. Jawab tiga soalan.

- 8 Jadual 1 menunjukkan nilai-nilai bagi dua pemboleh ubah,  $x$  dan  $y$ , yang diperoleh daripada suatu eksperimen. Pemboleh ubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = \frac{a}{x^b}$ , dengan keadaan  $a$  dan  $b$  ialah pemalar.

Table 1 shows the values of two variables,  $x$  and  $y$ , obtained from an experiment. The variables  $x$  and  $y$  are related by the equation  $y = \frac{a}{x^b}$ , such that  $a$  and  $b$  are constants.

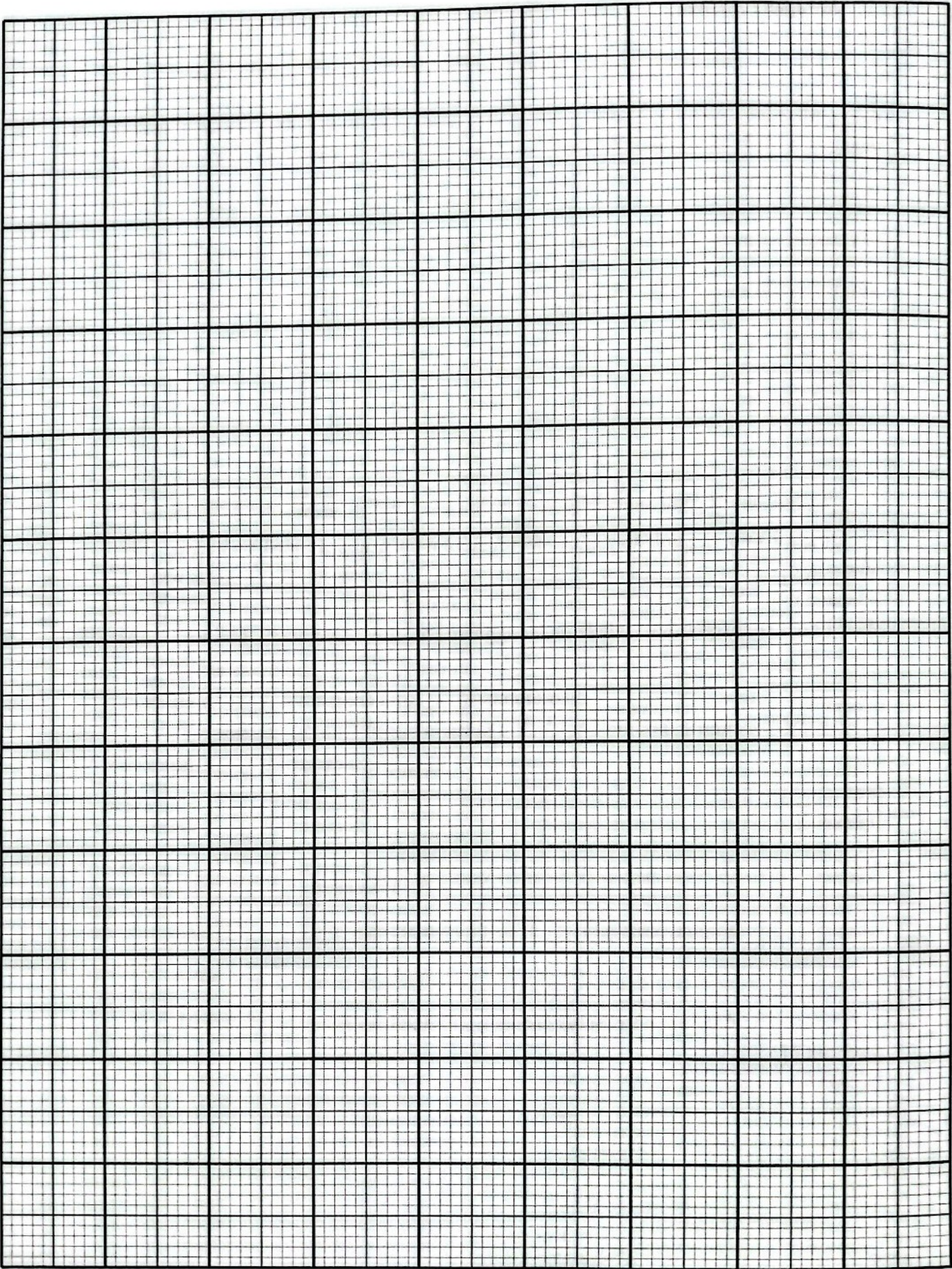
|     |      |      |      |      |      |      |
|-----|------|------|------|------|------|------|
| $x$ | 1.26 | 1.66 | 2.04 | 2.69 | 3.72 | 5.25 |
| $y$ | 5.13 | 3.63 | 2.51 | 1.48 | 0.87 | 0.54 |

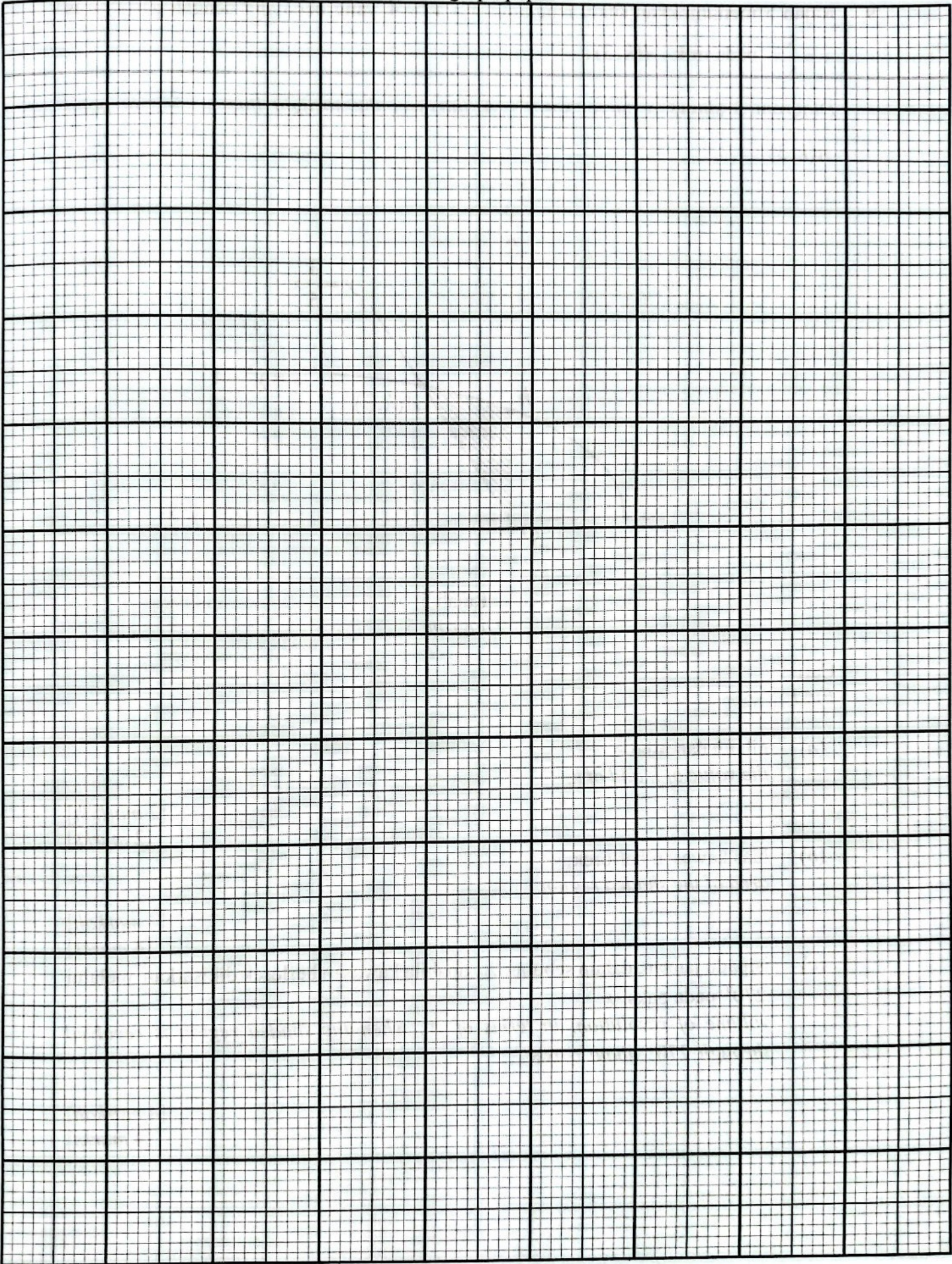
Jadual 1

Table 1

- (a) Berdasarkan Jadual 1, bina satu jadual bagi nilai-nilai  $\log_{10} x$  dan  $\log_{10} y$ .  
Based on Table 1, construct a table for the values of  $\log_{10} x$  and  $\log_{10} y$ .  
[2 markah]  
[2 marks]
- (b) Plot  $\log_{10} y$  melawan  $\log_{10} x$ , menggunakan skala 2 cm kepada 0.1 unit pada kedua-dua paksi.  
Seterusnya, lukis garis lurus penyuaian terbaik.  
Plot  $\log_{10} y$  against  $\log_{10} x$ , using a scale of 2 cm to 0.1 unit on both axes.  
Hence, draw the line of best fit.  
[3 markah]  
[3 marks]
- (c) Tulis  $y = \frac{a}{x^b}$  dalam bentuk linear.  
Seterusnya, dengan menggunakan graf di (b), cari nilai  $a$  dan  $b$ .  
Write  $y = \frac{a}{x^b}$  in linear form.  
Hence, by using the graph in (b), find the values of  $a$  and of  $b$ .  
[5 markah]  
[5 marks]

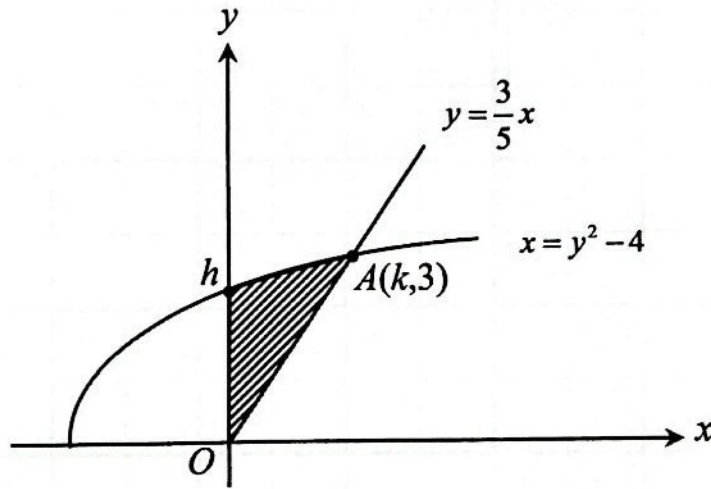
Jawapan / Answer :





- 9 Rajah 5 menunjukkan suatu lengkung  $x = y^2 - 4$  yang bersilang dengan garis lurus  $y = \frac{3}{5}x$  pada titik  $A(k, 3)$ .

Diagram 5 shows a curve  $x = y^2 - 4$  intersect the straight line  $y = \frac{3}{5}x$  at point  $A(k, 3)$ .



Rajah 5  
Diagram 5

Cari  
Find

- (a) nilai  $h$  dan nilai  $k$ ,  
the value of  $h$  and of  $k$ ,  
[2 markah]  
[2 marks]
- (b) luas kawasan berlorek,  
area of the shaded region,  
[4 markah]  
[4 marks]
- (c) isipadu janaan, dalam sebutan  $\pi$ , apabila kawasan berlorek dikisarkan melalui  $270^\circ$  pada paksi- $x$ .  
volume of revolution, in terms of  $\pi$ , when the shaded region is revolved through  $270^\circ$  about  $x$ -axis.

[4 markah]  
[4 marks]

Jawapan / Answer :

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Markah: 1]

[Lihat halaman sebelah  
SULIT

- 10 Sebuah kilang menghasilkan komponen elektronik untuk televisyen. Didapati bahawa 7% daripada komponen tidak berfungsi.

*A factory produces electronic components for televisions. It is found that 7% of the components are defective.*

- (a) Jika 15 komponen dipilih secara rawak, hitung kebarangkalian bahawa  
*If 15 components are selected at random, calculate the probability that*

- (i) tepat 4 komponen adalah rosak.  
*exactly 4 components are faulty.*

[2 markah]

[2 marks]

- (ii) selebih-lebihnya 13 komponen tidak rosak.  
*at most 13 components are not faulty.*

[3 markah]

[3 marks]

- (b) Jangka hayat bagi panel televisyen yang dihasilkan adalah mengikut satu taburan normal dengan min,  $\mu = 2000$  jam dan varians,  $\sigma^2 = 7500$  jam<sup>2</sup>.

*The lifespan of the television panels produced follows a normal distribution with mean,  $\mu = 2000$  hours and variance,  $\sigma^2 = 7500$  hours<sup>2</sup>.*

- (i) Cari kebarangkalian bahawa sekeping panel televisyen yang dipilih secara rawak mempunyai jangka hayat antara 1850 jam hingga 2150 jam.

*Find the probability that a randomly selected piece of television panel has a lifespan between 1850 hours and 2150 hours.*

[2 markah]

[2 marks]

- (ii) Diberi 2.5% daripada komponen televisyen mempunyai jangka hayat maksimum  $k$  jam, cari nilai  $k$ .

*Given that 2.5% of the television components have a maximum lifespan of  $k$  hours, find the value of  $k$ .*

[3 markah]

[3 marks]

Jawapan / Answer :

Jawapan / Answer :



Diagram  
Geometric

1. The locus of point R is the line segment PQ.

2. The locus of point R is the line segment PQ.

3. The locus of point R is the line segment PQ.

4. The locus of point R is the line segment PQ.

5. The locus of point R is the line segment PQ.

6. The locus of point R is the line segment PQ.

7. The locus of point R is the line segment PQ.

8. The locus of point R is the line segment PQ.

9. The locus of point R is the line segment PQ.

10. The locus of point R is the line segment PQ.

11. The locus of point R is the line segment PQ.

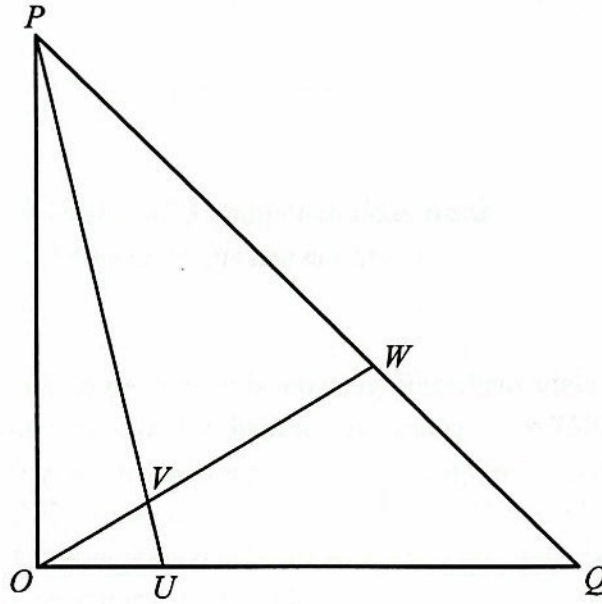
12. The locus of point R is the line segment PQ.

13. The locus of point R is the line segment PQ.

[Lihat halaman sebelah  
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- 11 Rajah 6 menunjukkan segi tiga  $POQ$ . Titik  $U$  terletak pada  $OQ$  dan titik  $W$  terletak pada  $PQ$ . Garis lurus  $PU$  bersilang dengan garis lurus  $OW$  di titik  $V$ .

Diagram 6 shows triangle  $POQ$ . Point  $U$  lies on  $OQ$  and point  $W$  lies on  $PQ$ . The straight line  $PU$  intersects the straight line  $OW$  at point  $V$ .



Rajah 6  
Diagram 6

Diberi bahawa  $OU : UQ = 1 : 5$ ,  $PW : WQ = 3 : 2$ ,  $\overrightarrow{OQ} = 24\mathbf{x}$  dan  $\overrightarrow{OP} = 7\mathbf{y}$ .

It is given that  $OU : UQ = 1 : 5$ ,  $PW : WQ = 3 : 2$ ,  $\overrightarrow{OQ} = 24\mathbf{x}$  and  $\overrightarrow{OP} = 7\mathbf{y}$ .

- (a) Ungkapkan dalam sebutan  $\mathbf{x}$  dan/atau  $\mathbf{y}$ ,

Express in terms of  $\mathbf{x}$  and/or  $\mathbf{y}$ ,

(i)  $\overrightarrow{PU}$

(ii)  $\overrightarrow{OW}$

[3 markah]

[3 marks]

- (b) Dengan menggunakan  $\overrightarrow{OV} = h\overrightarrow{OW}$  dan  $\overrightarrow{PV} = k\overrightarrow{PU}$ , dengan keadaan  $h$  dan  $k$  adalah pemalar, cari nilai  $h$  dan  $k$ .

Using  $\overrightarrow{OV} = h\overrightarrow{OW}$  and  $\overrightarrow{PV} = k\overrightarrow{PU}$ , where  $h$  and  $k$  are constants, find the value of  $h$  and of  $k$ .

[5 markah]

[5 marks]

(c) Diberi bahawa  $|\underline{x}| = 2$  unit,  $|\underline{y}| = 3$  unit dan  $\angle POQ = 90^\circ$ , cari  $|\overline{PQ}|$ .

Given that  $|\underline{x}| = 2$  units,  $|\underline{y}| = 3$  units and  $\angle POQ = 90^\circ$ , find  $|\overline{PQ}|$ .

[2 markah]

[2 marks]

Jawapan / Answer :



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## BAHAGIAN C

[20 markah]

*Bahagian ini mengandungi empat soalan. Jawab dua soalan.*

- 12 Penyelesaian secara lakaran graf **tidak** diterima.

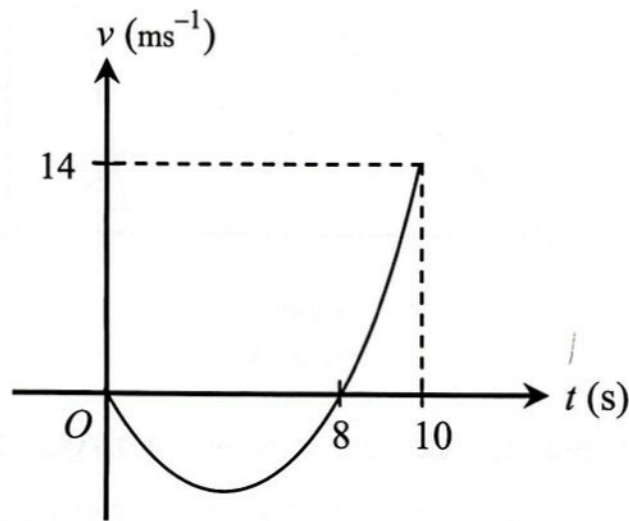
*Solutions by graph sketching are **not** accepted.*

Suatu zarah bergerak di sepanjang suatu garis lurus dari satu titik tetap  $O$ . Rajah 7 menunjukkan graf halaju-masa bagi gerakan zarah itu.

*A particle moves along a straight line from a fixed point  $O$ . Diagram 7 shows the velocity-time graph of the particles motion.*

[ Anggapkan gerakan ke arah kanan sebagai positif ]

[ Assume motion to the right is positive ]



Rajah 7  
Diagram 7

- (a) Nyatakan masa, dalam saat, ketika zarah itu bertukar arah.

*State the time, in seconds, when the particle changes its direction.*

[1 markah]

[1 mark]

- (b) Diberi bahawa graf halaju-masa itu ialah suatu fungsi kuadratik.

*It is given that the velocity-time graph is a quadratic function.*

- (i) Tunjukkan bahawa  $v = \frac{7}{10}t(t-8)$

*Show that  $v = \frac{7}{10}t(t-8)$*

[3 markah]

[3 marks]

- (ii) Cari masa, dalam saat, apabila pecutan zarah itu ialah  $7 \text{ m s}^{-2}$ .

*Find the time, in seconds, when the acceleration of the particle is*

$7 \text{ m s}^{-2}$ .

[2 markah]

[2 marks]

- (iii) Cari jumlah jarak, dalam m, yang dilalui oleh zarah itu dari mula dia mencapai halaju minimum sehingga  $t = 10 \text{ s}$ .

*Find the total distance, in m, travelled by the particle from the first time it reaches minimum velocity until  $t = 10 \text{ s}$ .*

[4 markah]

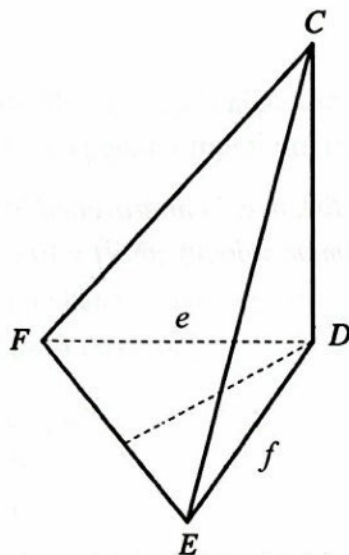
[4 marks]

Jawapan / Answer :

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- 13 Rajah 8 menunjukkan sebuah piramid dengan tapak segitiga yang diletakkan pada satah mengufuk. Panjang sisi  $FD$  dan  $ED$  masing-masing ialah  $e$  cm dan  $f$  cm.

*Diagram 8 shows a pyramid with its triangle base placed on a horizontal plane. The length of sides  $FD$  and  $ED$  are  $e$  cm and  $f$  cm respectively.*



Rajah 8  
Diagram 8

- (a) Dengan menggunakan segi tiga  $FED$ , buktikan petua sinus  $\frac{e}{\sin E} = \frac{f}{\sin F}$ .

*By using a triangle  $FED$ , derive the sine rule  $\frac{e}{\sin E} = \frac{f}{\sin F}$ .*

[2 markah]

[2 marks]

- (b) Puncak  $C$  berada tegak di atas  $D$ . Diberi  $\angle DFE = 38^\circ$ ,  $FD = 12$  cm,  $FE = 10$  cm dan  $\angle CFD = 52^\circ$ .

*Vertex  $C$  is vertically above  $D$ . Given  $\angle DFE = 38^\circ$ ,  $FD = 12$  cm,  $FE = 10$  cm and  $\angle CFD = 52^\circ$ .*

Cari

Find

- (i) panjang  $DE$ ,  
the length of  $DE$ ,

[2 markah]

[2 marks]

- (ii) panjang  $CE$ ,  
the length of  $CE$ ,

[2 markah]

[2 marks]

(iii)  $\angle CFE$  dan seterusnya, tentukan luas segitiga  $CFE$ .

$\angle CFE$  and hence, determine the area of the triangle  $CFE$ .

[4 markah]

[4 marks]

Jawapan / Answer :

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- 14 Jadual 2 menunjukkan harga sewaan bagi tiga jenis bilik yang diuruskan oleh Hotel Raya pada tahun 2020 dan 2025, indeks harga pada tahun 2025 berasaskan tahun 2020 dan bilangan bilik masing-masing.

*Table 2 shows rental prices for three types of rooms managed by Hotel Raya on the year 2020 and 2025, price indices on the year 2025 based on the year 2020 and the number of rooms respectively.*

| Jenis bilik<br><i>Types of rooms</i> | Harga 2020<br>(RM)<br><i>Price 2020 (RM)</i> | Harga 2025<br>(RM)<br><i>Price 2025 (RM)</i> | Indeks harga<br>pada tahun 2025<br><i>Price index on the year 2025 (2020=100)</i> | Bilangan bilik<br><i>Number of rooms</i> |
|--------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------|
| Bilik Asas<br><i>Standard Room</i>   | 180.00                                       | 198.00                                       | $p$                                                                               | 40                                       |
| Bilik Selesa<br><i>Superior Room</i> | 200.00                                       | 260.00                                       | 130                                                                               | 35                                       |
| Bilik Mewah<br><i>Deluxe Room</i>    | $r$                                          | 448.00                                       | 128                                                                               | 25                                       |

Jadual 2  
Table 2

- (a) Cari nilai  $p$  dan  $r$ .  
*Find the values of  $p$  and  $r$ .* [3 markah]  
[3 marks]
- (b) Hitung indeks gubahan bagi harga sewaan bilik-bilik tersebut pada tahun 2025 berasaskan tahun 2020.  
*Calculate the composite index for rental price of the rooms in the year 2025 based on the year 2020.* [2 markah]  
[2 marks]
- (c) Pada tahun 2026, harga semua bilik meningkat sebanyak 13.5% berbanding tahun 2025 dan  $x$  buah Bilik Mewah terpaksa ditutup untuk menjimatkan kos pengurusan. Hitung nilai minimum  $x$  jika indeks gubahan bagi harga sewaan bilik-bilik tersebut pada tahun 2026 berasaskan tahun 2020 selebih-lebihnya 137.  
*On the year 2026, the prices of all rooms increase 13.5% compared to the year 2025 and  $x$  Deluxe Rooms have to be closed to save management cost. Calculate the minimum value of  $x$  if the composite index for the price of the rental rooms on the year 2026 based on the year 2020 is at most 137.* [5 markah]  
[5 marks]

Jawapan / Answer :

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- 15 Sebuah kilang mengeluarkan dua jenis piala,  $P$  dan  $Q$ . Jadual 3 menunjukkan masa yang diambil untuk menghasilkan piala  $P$  dan  $Q$ .  
*A factory produces two types of trophies,  $P$  and  $Q$ . Table 3 shows the time taken to produce trophies,  $P$  and  $Q$ .*

| Piala<br>Trophy | Masa yang diambil (minit)<br><i>Time taken (minutes)</i> |                             |
|-----------------|----------------------------------------------------------|-----------------------------|
|                 | Mesin A<br><i>Machine A</i>                              | Mesin B<br><i>Machine B</i> |
| $P$             | 30                                                       | 40                          |
| $Q$             | 42                                                       | 30                          |

Jadual 3  
*Table 3*

Kilang tersebut mengeluarkan  $x$  unit piala  $P$  dan  $y$  unit piala  $Q$  setiap hari. Penghasilan piala-piala tersebut adalah berdasarkan kekangan yang berikut:  
*The factory produces  $x$  units of trophy  $P$  and  $y$  units of trophy  $Q$  daily. The production of these trophies is based on the following constraints:*

- I Masa minimum bagi penggunaan mesin  $A$  ialah 7 jam.  
*The minimum time of the usage of machine  $A$  is 7 hours.*

II Masa maksimum bagi penggunaan mesin  $B$  ialah 10 jam.  
*The maximum time of the usage of machine  $B$  is 10 hours.*

III Nisbah bilangan piala  $P$  kepada bilangan piala  $Q$  adalah sekurang-kurangnya 1 : 3 .  
*The ratio of the number of trophy  $P$  to the number of trophy  $Q$  is at least 1 : 3 .*
- (a) Tuliskan tiga ketaksamaan, selain  $x \geq 0$  dan  $y \geq 0$ , yang memenuhi kesemua kekangan di atas.  
*Write down three inequalities, other than  $x \geq 0$  and  $y \geq 0$ , which satisfy all the above constraints.*

[3 markah]  
[3 marks]

(b) Menggunakan skala 2 cm kepada 2 piala pada kedua-dua paksi, bina dan lorek rantau  $R$  yang memenuhi kesemua kekangan di atas.  
*Using a scale of 2 cm to 2 trophies on both axes, construct and shade the region  $R$  which satisfies all of the above constraints.*

[3 markah]  
[3 marks]

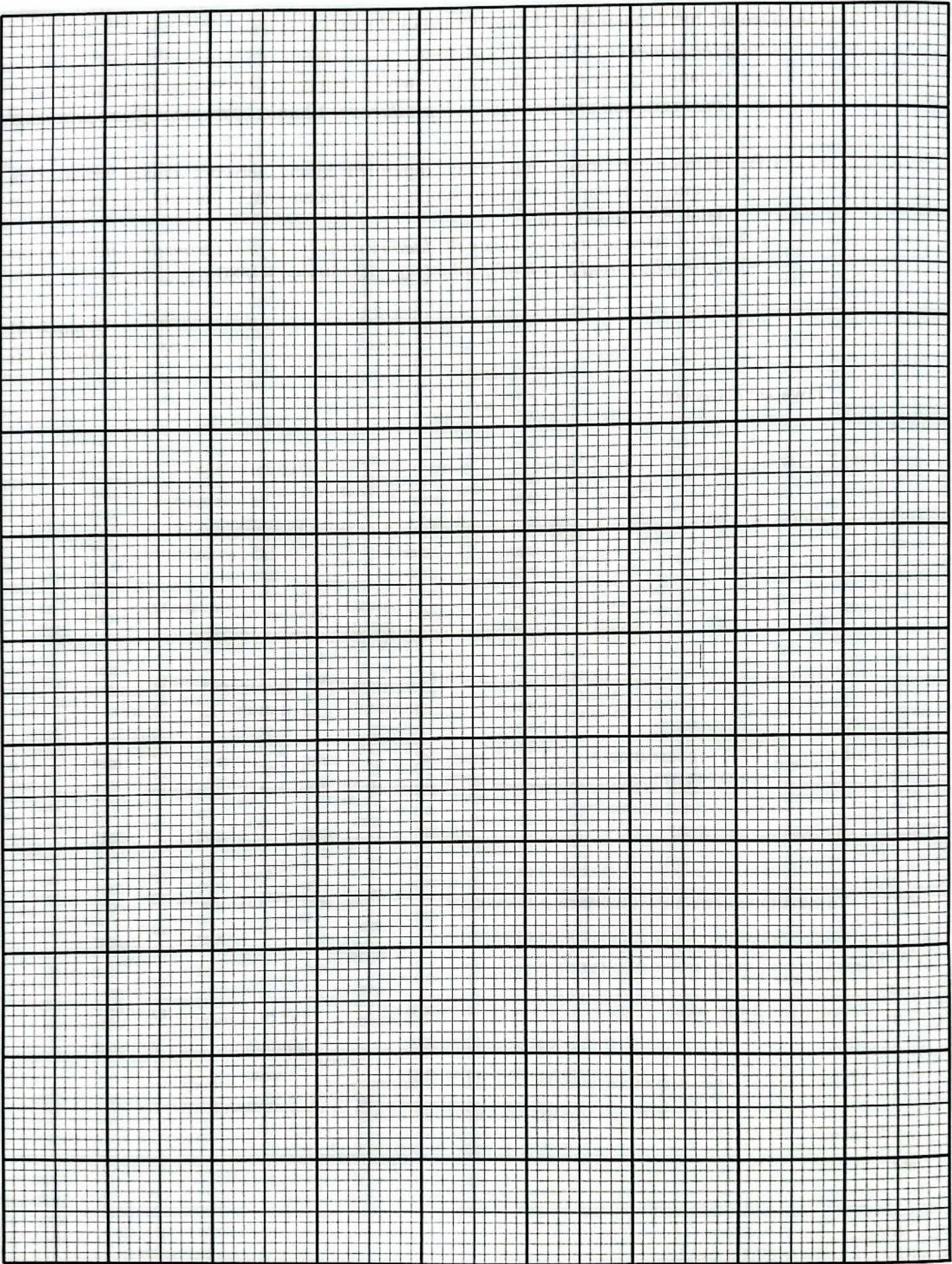
- (c) Dengan menggunakan graf yang dibina di (b), cari  
*Using the graph constructed in (b), find*
- (i) bilangan maksimum bagi piala  $P$  jika 12 unit piala  $Q$  dikeluarkan dalam sehari.  
*the maximum unit of trophies  $P$  produced if 12 units of trophies  $Q$  are produced in a day.*
  - (ii) keuntungan maksimum yang diperoleh kilang tersebut dalam sehari jika keuntungan daripada jualan seunit piala  $P$  dan seunit piala  $Q$  masing-masing ialah RM50 dan RM80.  
*the maximum profit made by the factory daily if the profit from the sales of a unit of trophy  $P$  and a unit of trophy  $Q$  are RM50 and RM80 respectively.*

[4 markah]

[4 marks]

Jawapan / Answer :

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KERTAS PEPERIKSAAN TAMAT