

Name :

Form :



**BAHAGIAN PENGURUSAN SEKOLAH BERASRAMA PENUH
DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA**

PEPERIKSAAN PERCUBAAN SELARAS SPM 2009

3472 / 1

ADDITIONAL MATHEMATICS

Kertas 1

Ogos 2009

2 jam

Dua jam

**JANGAN BUKA KERTAS SOALAN INI
SEHINGGA DIBERITAHU**

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

<i>Untuk Kegunaan Pemeriksa</i>		
Soalan	Markah Penuh	Markah Diperolehi
1	2	
2	4	
3	4	
4	3	
5	2	
6	3	
7	3	
8	3	
9	4	
10	3	
11	3	
12	4	
13	3	
14	3	
15	3	
16	3	
17	4	
18	4	
19	3	
20	3	
21	3	
22	3	
23	3	
24	3	
25	4	
TOTAL	80	

Kertas soalan ini mengandungi 18 halaman bercetak

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

ALGEBRA

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{nm}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad (r \neq 1)$$

$$13 \quad S_\infty = \frac{a}{1 - r}, \quad |r| < 1$$

CALCULUS

$$1 \quad y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2 \quad y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2},$$

$$3 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4 Area under a curve

$$= \int_a^b y \, dx \quad \text{or}$$

$$= \int_a^b x \, dy$$

5 Volume generated

$$= \int_a^b \pi y^2 \, dx \quad \text{or}$$

$$= \int_a^b \pi x^2 \, dy$$

GEOMETRY

$$1 \quad \text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

2 Midpoint

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad |r| = \sqrt{x^2 + y^2}$$

$$4 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

5 A point dividing a segment of a line

$$(x, y) = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$$

6 Area of triangle

$$= \frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

STATISTIC

$$1 \quad \bar{x} = \frac{\sum x}{N}$$

$$2 \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$3 \quad \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

$$4 \quad \sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$5 \quad m = L + \left[\frac{\frac{1}{2}N - F}{f_m} \right] C$$

$$6 \quad I = \frac{Q_1}{Q_0} \times 100$$

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

$$8 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$9 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$10 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$11 \quad P(X = r) = {}^n C_r p^r q^{n-r}, p + q = 1$$

$$12 \quad \text{Mean } \mu = np$$

$$13 \quad \sigma = \sqrt{npq}$$

$$14 \quad z = \frac{x - \mu}{\sigma}$$

TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

$$2 \quad \text{Area of sector, } L = \frac{1}{2} r^2 \theta$$

$$3 \quad \sin^2 A + \cos^2 A = 1$$

$$4 \quad \sec^2 A = 1 + \tan^2 A$$

$$5 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$6 \quad \sin 2A = 2 \sin A \cos A$$

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$8 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$9 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$10 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$11 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$12 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

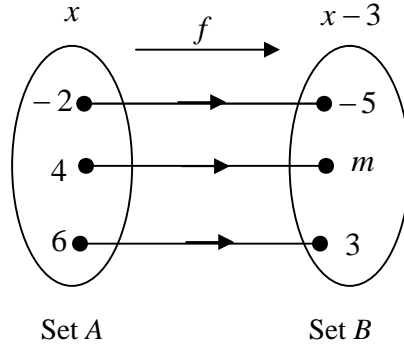
$$13 \quad a^2 = b^2 + c^2 - 2bc \cos A$$

$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

For
examiner's
use only

Answer all questions.

- 1 Diagram 1 shows a function that maps set A to set B.
Rajah 1 menunjukkan fungsi yang memeta set A ke set B.



It is given that the function that maps set A to set B is $f : x \rightarrow x - 3$.
Diberi bahawa fungsi yang memeta set A ke set B ialah $f : x \rightarrow x - 3$.

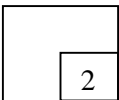
Find
Cari

- (a) the value of m ,
nilai m ,
- (b) the value of $ff^{-1}(3)$.
nilai $ff^{-1}(3)$.

[2 marks]
[2markah]

Answer/Jawapan : (a)
(b).....

1

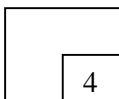


- 2 Given that $g : x \rightarrow \frac{4}{x}$, $x \neq 0$ and the composite function $gf : x \rightarrow x + 2$, find
Diberi $g : x \rightarrow \frac{4}{x}$, $x \neq 0$ dan fungsi gubahan $gf : x \rightarrow x + 2$, cari

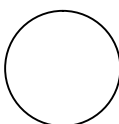
- (a) $f(x)$,
- (b) the value of x when $fg(x) = 6$.
nilai bagi x bila $fg(x) = 6$.

[4 marks]
[4 markah]

2



Answer/Jawapan : (a)



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5

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examiner's
use only*

3 Given that $f : x \rightarrow 8 - px$ and $g^{-1} : x \rightarrow \frac{6 - 2x}{5}$,

Diberi $f : x \rightarrow 8 - px$ dan $g^{-1} : x \rightarrow \frac{6 - 2x}{5}$,

find
cari

(a) $g(x)$,

(b) the value of p if $g(x - 2) = f(x)$.
nilai p jika $g(x - 2) = f(x)$.

[4 marks]
[4 markah]

(b)

Answer/Jawapan : (a)

(b)

3

4

4 Given that $x = 2$ and $x = -\frac{1}{3}$ are the roots of the equation $3x^2 + bx + c = 0$, find the value of b and the value of c .

Diberi $x = 2$ dan $x = -\frac{1}{3}$ ialah punca-punca persamaan $3x^2 + bx + c = 0$, cari nilai b dan nilai c .

[3 marks]
[3 markah]

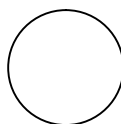
Answer/ Jawapan : $b = \dots\dots\dots c = \dots\dots\dots$

4

3

3472/1

**[Lihat sebelah
SULIT**



For
examiner's
use only

SULIT

6

3472/1

- 5 Find the range of values of x for $x^2 + 20 < 9x$.
 Cari julat nilai x bagi $x^2 + 20 < 9x$.

[2 marks]
[2 markah]

5

2

Answer/Jawapan :.....

- 6 Given quadratic function $f(x) = -(x + 6p)^2 - 5 + q$ has a maximum point $T(-3n, 15n^2)$.
 Diberi fungsi kuadratik $f(x) = -(x + 6p)^2 - 5 + q$ mempunyai titik maksimum. $T(-3n, 15n^2)$.
 Express q in terms p .
 Nyatakan q dalam sebutan p .

[3 marks]
[3 markah]

6

3

Answer /Jawapan:

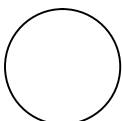
- 7 Solve the equation $25^{x+2} = \frac{1}{625^x}$.
 Selesaikan persamaan $25^{x+2} = \frac{1}{625^x}$.

[3 marks]
[3 markah]

7

3

Answer / Jawapan:



3472/1

**[Lihat sebelah
SULIT**

SULIT

7

3472/1

*For
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use only*

8 Solve the equation $\log_3 x - \log_3(x - 2) = -1$.

Selesaikan persamaan $\log_3 x - \log_3(x - 2) = -1$.

[3 marks]
[3 markah]

Answer/Jawapan :

8

3

9 Given $\log_5 2 = h$ and $\log_5 3 = k$, express $\log_{12} 90$ in terms of h and k .

Diberi $\log_5 2 = h$ dan $\log_5 3 = k$, ungkapkan $\log_{12} 90$ dalam sebutan h dan k .

[4 marks]
[4 markah]

Answer/ Jawapan :

9

4

10 It is given an arithmetic progression is 5 , 7 , 9 ,, 87. Find the number of terms of this progression.

Diberi bahawa suatu jantang aritmetik ialah 5 , 7 , 9 ,, 87 . Cari ilangan sebutan dalam jantang itu..

[3 marks]
[3 markah]

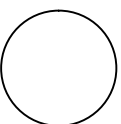
Answer/Jawapan:

10

3

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**[Lihat sebelah
SULIT**



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use only

SULIT

8

3472/1

11 It is given the first three terms of a geometric series are $\frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \dots$. Find the sum to infinity of the series.

Diberi bahawa tiga sebutan pertama dalam siri geometri ialah $\frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \dots$. Cari

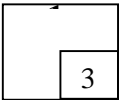
hasil tambah hingga sebutan ketakterhinggaan siri itu..

[3 marks]

[3 markah]

Answer/Jawapan: :

11



12 The variables x and y are related by the equation $y = px^2 + 2x + 5q$, where p and q are constants.

Diagram 12 shows a straight line graph $(y - 2x)$ against x^2 .

Pembolehubah x dan y dihubungkan oleh persamaan $y = px^2 + 2x + 5q$, dengan keadaan p dan q ialah pemalar.

Rajah 12 menunjukkan graph $(y - 2x)$ melawan x^2 .

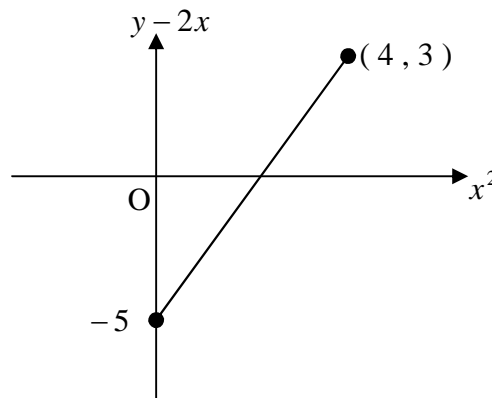


Diagram 12
Rajah 12

Find the value of p and of q .

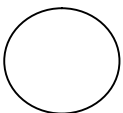
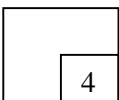
Cari nilai p dan nilai q .

[4 marks]

[4 markah]

Answer : $p = \dots \dots \dots q = \dots \dots \dots$

12



*For
examiner's
use only*

13 Diagram 13 shows a straight line PQ with the equation $\frac{y}{8} - \frac{x}{6} = 1$.

Rajah 13 menunjukkan garis lurus PQ yang mempunyai persamaan $\frac{y}{8} - \frac{x}{6} = 1$.

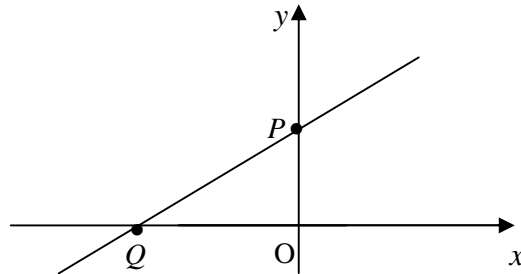


Diagram 13
Rajah 13

Find the equation of the straight line which is perpendicular to PQ and passes through the point Q .

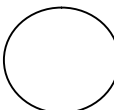
Cari persamaan garislurus yang berserenjang dengan PQ dan melalui titik Q .

[3 marks]
[3 markah]

13

3

Answer/Jawapan :



For
examiner's
use only

SULIT

10

3472/1

14 Diagram 14 shows A, B and C are three points on a straight line .

Rajah 14 menunjukkan A , B dan C merupakan tiga titik yang terletak di atas garis lurus.

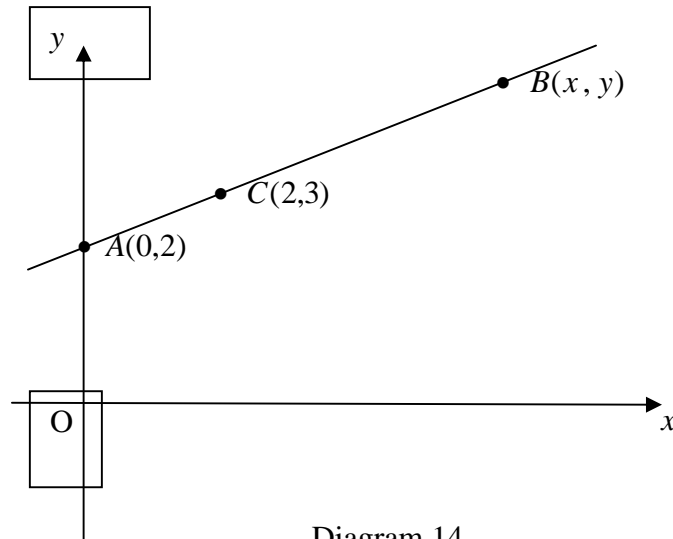


Diagram 14
Rajah 14

It is given that $5AC = AB$. Find the coordinates of B.
Diberi $5AC = CB$. Cari koordinat B.

[3 marks]
[3 markah]

Answer/Jawapan :

14

3

15 Given $\vec{PQ} = 3\vec{x} - 2\vec{y}$ and $\vec{QR} = (1-h)\vec{x} + 4\vec{y}$. The points P , Q and R are collinear.

Diberi $\vec{PQ} = 3\vec{x} - 2\vec{y}$ dan $\vec{QR} = (1-h)\vec{x} + 4\vec{y}$. Titik-titik P , Q dan R adalah segaris.

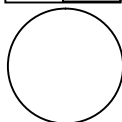
Find the value of h .
Cari nilai h .

[3 marks]
[3 markah]

Answer/Jawapan :

15

3



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[Lihat sebelah
SULIT

- 16** *Solution by graph is not accepted for this question.
Penyelesaian secara graf tidak diterima bagi soalan ini.*

Diagram 16 shows $OABC$ is a parallelogram such that $\vec{OA} = 4\vec{i} + 3\vec{j}$ and $\vec{OB} = 11\vec{i} + 5\vec{j}$.

Rajah 16 menunjukkan $OABC$ ialah sebuah segiempat selari dengan keadaan $\vec{OA} = 4\vec{i} + 3\vec{j}$ dan $\vec{OB} = 11\vec{i} + 5\vec{j}$.

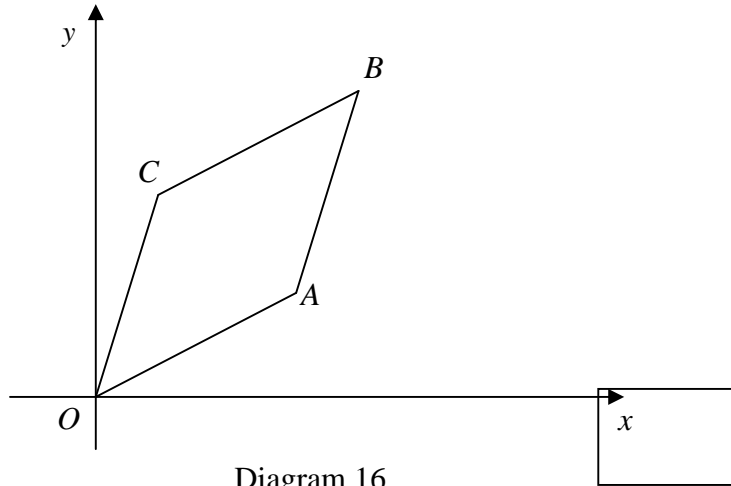


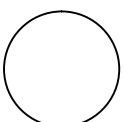
Diagram 16
Rajah 16

Find the unit vector in the direction of \vec{OC} .

Cari vektor unit pada arah \vec{OC} .

[3 marks]
[3 markah]

Answer/Jawapan:.....



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17 Solve the equation $3\cos^2 x + \sin 2x = 0$ for $0^\circ \leq x \leq 360^\circ$

Selesaikan persamaan $3\cos^2 x + \sin 2x = 0$ bagi $0^\circ \leq x \leq 360^\circ$

[4 marks]
[4 markah]

Answer / Jawapan :

17



18 Diagram 18 shows a semicircle PQR with center O .
Rajah 18 menunjukkan sebuah semibulatan PQR berpusat O .

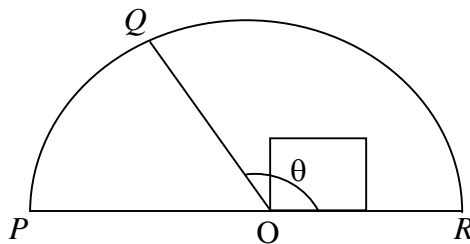


Diagram 18
Rajah 18

It is given that the arc length PQ is 6.5 cm and the radius of the semicircle is 5 cm.
Diberi bahawa panjang lengkung PQ ialah 6.5 cm dan jejari semibulatan ialah 5 cm.
[Use / Guna $\pi = 3.142$]

Find
Cari

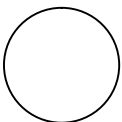
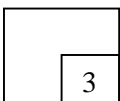
- (a) the value of θ in radian ,
nilai θ dalam radian,
- (b) area , in cm^2 , of sector QOR .
luas , dalam cm^2 , sektor QOR .

[4 marks]
[4 markah]

Answer / Jawapan : (a)

(b).....

18



SULIT

13

3472/1

*For
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use only*

- 19** Given that $f(x) = x^3(5 - 3x)^2$, find $f'(2)$.
 Diberi $f(x) = x^3(5 - 3x)^2$, cari $f'(2)$.

[3 marks]
[3 markah]

Answer/Jawapan :

19

3

- 20** Two variables P and x are related by the equation $P = 3x + \frac{2}{x}$. Given x increases at a constant rate of 4 units per second when $x = 2$, find the rate of change of P .

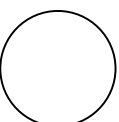
*Dua pembolehubah P dan x dihubungkan dengan persamaan $P = 3x + \frac{2}{x}$.
 Diberi x bertambah dengan kadar malar 4 unit sesaat apabila $x = 2$, cari kadar perubahan bagi P .*

[3 marks]
[3 markah]

Answer / Jawapan :

20

3



*For
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use only*

21 Given $y = \frac{h}{(2x-5)^3}$ and $\frac{dy}{dx} = g(x)$, find the value of h if $\int_2^3 [g(x) + 1]dx = 7$.

Diberi $y = \frac{h}{(2x-5)^3}$ dan $\frac{dy}{dx} = g(x)$, cari nilai bagi h jika $\int_2^3 [g(x) + 1]dx = 7$.

[3 marks]

[3 markah]

21

3

Answer/Jawapan:

22 The mean of a set of data $2m - 3, 8, m+1$ is 7.
Min bagi set data $2m - 3, 8, m+1$ ialah 7.

Find
Cari

- (a) the value of m ,
nilai m ,
- (b) the new mean if each of the data multiplied by 3.
Cari min yang baru jika setiap data didarabkan dengan 3.

[3 marks]

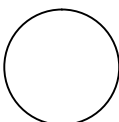
[3 markah]

22

3

Answer /Jawapan (a)

(b).....



23 Bag A contains 1 green pen, 2 red pens and 3 blue pens. Bag B contains 2 black erasers and 3 white erasers. Bag C contains 6 gift cards labeled 1, 2, 3, 4, 5 and 6. An item is picked randomly from each bag.
Beg A mengandungi 1 pen hijau, 2 pen merah dan 3 pen biru. Beg B mengandungi 2 pemadam hitam dan 3 pemadam putih. Beg C mengandungi 6 kad hadiah yang dilabel 1, 2, 3, 4, 5 dan 6. Satu item diambil secara rawak daripada setiap beg.

Find the probability of getting a blue pen, a black eraser and a gift card with a number less than 3.

Cari kebarangkalian mendapat satu pen biru, satu pemadam hitam dan satu kad hadiah yang berlabel nombor kurang daripada 3.

[3 marks]
[3 markah]

Answer /Jawapan:

23

3

24 The probability that it will rain on a particular day is $\frac{2}{5}$.

If X is the number of rainy days in a week, find

Kebarangkalian bahawa hujan akan turun pada sebarang hari ialah $\frac{2}{5}$.

Jika X ialah bilangan hari hujan turun dalam seminggu, cari

- (a) the mean of the distribution of X,
min bagi taburan X,
- (b) the standard deviation of the distribution of X.
sisihan piawai bagi taburan X.

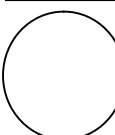
[3 marks]
[3 markah]

Answer/ Jawapan: (a).....

(b)

24

3



[Lihat sebelah
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For
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use only

25 Diagram 25 shows a standardized normal distribution graph.
Rajah 25 menunjukkan satu graf taburan normal piawai.

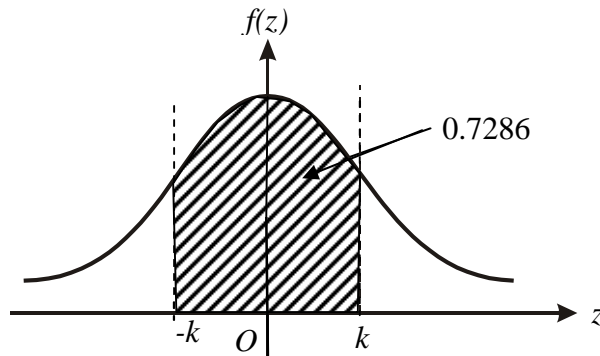


Diagram 25
Rajah 25

The probability represented by the area of the shaded region is 0.7286.
Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.7286.

- (a) Find the value of k ,
Cari nilai k ,
- (b) X is a continuous random variable which is normally distributed with a mean of μ and a standard deviation of 8. Find the value of μ if $X = 70$ when the z -score is k .

X ialah pembolehubah rawak selanjar bertaburan secara normal dengan min μ dan sisihan piawai 8. Cari nilai μ jika $X = 70$ apabila skor- z ialah k .

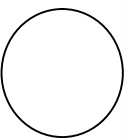
[4 marks]
[4 markah]

Answer/Jawapan : (a).....

(b)

END OF THE QUESTION PAPER

25



INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions
Kertas soalan ini mengandungi 25 soalan
2. Answer **all** questions.
*Jawab **semua** soalan*
3. Write your answers in the spaces provided in the question paper.
Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.
4. Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.
5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.
6. The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
7. The marks allocated for each question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.
8. A list of formulae is provided on pages 3 to 5.
Satu senarai rumus disediakan di halaman 3 hingga 5.
9. A booklet of four-figure mathematical tables is provided.
Sebuah buku sifir matematik empat angka disediakan.
10. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.
11. Hand in this question paper to the invigilator at the end of the examination.
Serahkan kertas soalan ini kepada pengawas peperiksaan di akhir peperiksaan.

SULIT
3472/1
Additional
Mathematics
Kertas 1
Peraturan
Pemarkahan
August
2009



BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009

PEPERIKSAAN PERCUBAAN SPM
TAHUN 2009

ADDITIONAL MATHEMATICS

KERTAS 1

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Question	Working / Solution	Marks	Total
6	$q = 60p^2 - 5$ $q = 15(2p)^2 - 5$ $-6p = -3n \text{ or } 5 + q = 15n^2$	3 B2 B1	3
7	$-\frac{2}{3}$ $2(x+2) = -4$ $5^{2(x+2)} \text{ or } 5^{-4x} \text{ OR } 25^{-2x}$	3 B2 B1	3
8	$-\frac{1}{x-2} = \frac{1}{3}$ $\log\left(\frac{x}{x-2}\right)$	3 B2 B1	3
9	$\frac{2k+h+1}{2h+k}$ $\frac{2\log_5 3 + \log_5 2 + \log_5 5}{2\log_5 2 + \log_5 3}$ $\log_5 2^2 + \log_5 2 + \log_5 5 \text{ or } \log_5 2^2 + \log_5 3 \text{ or}$ $\log_{12} 3^2 + \log_{12} 2 + \log_{12} 5$ $\frac{\log_5 90}{\log_5 12} \text{ or } 2 \log_5 3 \text{ or } 2 \log_5 2$	4 B3 B2 B1	4
10	$n = 42$ $5 + (n-1)(2) = 87$ $d = 2$	3 B2 B1	3
11	$\frac{1}{6}$ $\frac{\frac{1}{9}}{1 - \frac{1}{3}}$ $r = \frac{1}{3}$	3 B2 B1	3

Question	Working / Solution	Marks	Total
12	$p = 2$ and $q = -1$ $p = 2$ or $q = -1$ $p = \frac{3 - (-5)}{4 - 0}$ or $5q = -5$ $y - 2x = px^2 + 5q$	4 B3 B2 B1	4
13	$y = \frac{3}{4}x - \frac{9}{2}$ $y - 0 = -\frac{3}{4}(x + 6)$ $P(0, 8)$ or $Q(-6, 0)$ or $m \perp_{PQ} = -\frac{3}{4}$	3 B2 B1	3
14	$(10, 7)$ $x = 10$ or $y = 7$ $\frac{x+0}{5} = 2$ or $\frac{y+8}{5} = 3$	3 B2 B1	3
15	$h = 7$ $4\lambda = -2$ or $3 = -\frac{1}{2}(1 - h)$ $\begin{pmatrix} 3 \\ -2 \end{pmatrix} = \lambda \begin{pmatrix} 1-h \\ 4 \end{pmatrix}$	3 B2 B1	3
16	$\frac{7i + 2j}{\sqrt{53}}$ $ OC = \sqrt{53}$ $11i + 5j - 4i - 3j$	3 B2 B1	3
17	$90^\circ, 123.69^\circ, 270^\circ, 303.69^\circ$ $90^\circ, 270^\circ$ or $123.69^\circ, 303.69^\circ$ $\cos x(3 \cos x + 2 \sin x) = 0$ $3 \cos 2x + 2 \sin x \cos x = 0$	4 B3 B2 B1	4

Question	Working / Solution	Marks	Total
18 (a)	$\theta = 1.842$ $5\alpha = 6.5$	2 B1	4
(b)	23.025 $\frac{1}{2}(5)^2(1.842)$ * (candidate's θ from a)	2 B1	
19	60 $x^3 2(5-3x)^1(-3) + (5-3x)^2 3x^2$ $2(5-3x)(-3)$ or $3x^2$	3 B2 B1	3
20	10 $\left(3 - \frac{2}{x^2}\right) \times 4$ or $\left(3 - \frac{2}{2^2}\right) \times 4$ $\frac{dp}{dr} = 3 - \frac{2}{x^2}$	3 B2 B1	3
21	$h = 3$ $\frac{h}{[2(3)-5]^3} - \frac{h}{[2(2)-5]^3} = 7$ $\left[\frac{h}{(2x-5)^3}\right]_2^3$ (with the correct limit) or $[x]_2^3$	3 B2 B1	3
22	a) $m = 5$ $\frac{2m-3+8+m+1}{3} = 7$ b) 21	2 B1 1	3
23	$\frac{1}{15}$ or an equivalent single fraction $\frac{3}{6} \times \frac{2}{5} \times \frac{2}{6}$ $\frac{3}{6}$ or $\frac{2}{5}$ or $\frac{2}{6}$	3 B2 B1	3

Question	Working / Solution	Marks	Total
24(a)	$\frac{14}{5}$ or 2.8	1	3
24(b)	1.296 $7 \times \frac{2}{5} \times \left(1 - \frac{2}{5}\right)$ or equivalent	2 B1	
25 (a)	1.1 0.1357	2 B1	4
25(b)	61.2 $\frac{70 - \mu}{8} = *1.1$ (candidate's <i>k</i>)	2 B1	

“END OF MARKING SCHEME”

SULIT

3472/2

3472/2
Matematik
Tambahan
Kertas 2
2 ½ jam
Ogos 2009



**SEKTOR SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA**

**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009**

ADDITIONAL MATHEMATICS

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *This question paper consists of three sections : **Section A**, **Section B** and **Section C**.*
 2. *Answer **all** questions in **Section A** , **four** questions from **Section B** and **two** questions from **Section C**.*
 3. *Give only **one** answer / solution to each question.*
 4. *Show your working. It may help you to get marks.*
 5. *The diagram in the questions provided are not drawn to scale unless stated.*
 6. *The marks allocated for each question and sub-part of a question are shown in brackets.*
 7. *A list of formulae is provided on pages 2 to 3.*
 8. *A booklet of four-figure mathematical tables is provided.*
 9. *You may use a non-programmable scientific calculator.*
-

Kertas soalan ini mengandungi **19** halaman bercetak

3472/2

SULIT

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

ALGEBRA

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{nm}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad (r \neq 1)$$

$$13 \quad S_\infty = \frac{a}{1 - r}, \quad |r| < 1$$

CALCULUS

$$1 \quad y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2 \quad y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$3 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4 Area under a curve

$$= \int_a^b y \, dx \quad \text{or}$$

$$= \int_a^b x \, dy$$

5 Volume generated

$$= \int_a^b \pi y^2 \, dx \quad \text{or}$$

$$= \int_a^b \pi x^2 \, dy$$

GEOMETRY

$$1 \quad \text{Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

2 Midpoint

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad |r| = \sqrt{x^2 + y^2}$$

$$4 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

5 A point dividing a segment of a line

$$(x, y) = \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$$

6. Area of triangle =

$$\frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

STATISTIC

$$1 \quad \bar{x} = \frac{\sum x}{N}$$

$$2 \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$3 \quad \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

$$4 \quad \sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$5 \quad M = L + \left[\frac{\frac{1}{2}N - F}{f_m} \right] C$$

$$6 \quad I = \frac{P_1}{P_0} \times 100$$

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

$$8 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$9 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$10 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$11 \quad p(X=r) = {}^n C_r p^r q^{n-r}, \quad p + q = 1$$

$$12 \quad \text{Mean, } \mu = np$$

$$13 \quad \sigma = \sqrt{npq}$$

$$14 \quad z = \frac{x - \mu}{\sigma}$$

TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

$$2 \quad \text{Area of sector, } A = \frac{1}{2} r^2 \theta$$

$$3 \quad \sin^2 A + \cos^2 A = 1$$

$$4 \quad \sec^2 A = 1 + \tan^2 A$$

$$5 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$6 \quad \sin 2A = 2 \sin A \cos A$$

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$8 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$9 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$10 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$11 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

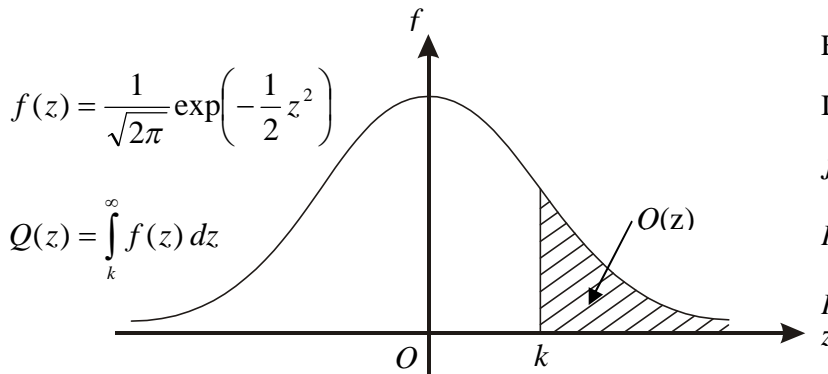
$$12 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$13 \quad a^2 = b^2 + c^2 - 2bc \cos A$$

$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0, 1)
KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

z	0	1	2	3	4	5	6	7	8	9	Minus / Tolak								
											1	2	3	4	5	6	7	8	9
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102		0.00990	0.00964	0.00939	0.00914			0	1	1	1	1	2	2	2	2
											3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4



Example / Contoh:

If $X \sim N(0, 1)$, then

Jika $X \sim N(0, 1)$, maka

$$P(X > k) = Q(k)$$

$$P(X > 2.1) = Q(2.1) = 0.0179$$

SECTION A

[40 marks]

[40 markah]

Answer all questions in this section .

- 1 Solve the simultaneous equations and give your answers correct to three decimal places.

Selesaikan persamaan serentak dan beri jawapan anda betul kepada tiga tempat perpuluhan.

$$2x + y = 3$$

$$xy - 2y + 5 = 0$$

[5 marks]

[5markah]

- 2 It is given that the quadratic function $f(x) = 2x^2 - 4x + 7$.

Diberi bahawa fungsi kuadratik $f(x) = 2x^2 - 4x + 7$.

- (a) Using completing the square, express $f(x)$ in the form of $f(x) = a(x + p)^2 + q$.

Ungkapkan $f(x)$ dalam bentuk $f(x) = a(x + p)^2 + q$.

[2 marks]

[2 markah]

- (b) Find the maximum or minimum value of the function $f(x)$.

Cari nilai maksimum atau minimum bagi fungsi $f(x)$.

[1 mark]

[1 markah]

- (c) Sketch the graph of $f(x) = 2x^2 - 4x + 7$ for $-2 \leq x \leq 3$.

Lakarkan graf bagi $f(x) = 2x^2 - 4x + 7$ untuk $-2 \leq x \leq 3$.

[3 marks]

[3 markah]

- (d) State the equation of the curve when the graph is reflected in the x - axis .

Nyatakan persamaan lengkung apabila graf tersebut dipantulkan pada paksi- x .

[1 mark]

[1 markah]

- 3 A pump is used to extract certain type of liquid from a container. The first extraction draws a volume of 36 cm^3 of liquid, and the subsequent extractions follow a geometric progression. The third draws a volume of 20.25 cm^3 of liquid.

Sebuah pam digunakan untuk menyedut sejenis cecair daripada sebuah bekas. Sedutan pertama mengeluarkan 36 cm^3 isipadu cecair. Sedutan berikutnya adalah mengikuti jangjang geometri. Sebutan ketiga mengeluarkan 20.25 cm^3 cecair.

- (a) Determine the common ratio of the geometric progression. [2 marks]
Tentukan nisbah sepunya jangjang geometri. [2 markah]
- (b) Calculate the volume of liquid extracted in the tenth extraction. [2 marks]
Kirakan isipadu yang dikeluarkan pada sedutan yang kesepuluh. [2 markah]
- (c) If a container contains 140 cm^3 of liquid, find the number of extractions needed to empty the container. [3 marks]
Jika bekas itu mengandungi 140 cm^3 cecair tersebut, cari bilangan sedutan yang diperlukan untuk mengosongkan bekas tersebut. [3 markah]

4. (a) Prove that $\frac{2}{\tan x + \cot x} = \sin 2x$. [2 marks]

Buktikan $\frac{2}{\tan x + \cot x} = \sin 2x$. [2 markah]

- (b) (i) Sketch the graph of $y = -\sin 2x$ for $0 \leq x \leq \pi$.
Lakarkan graf bagi $y = -\sin 2x$ untuk $0 \leq x \leq \pi$.

- (ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{4}{\tan x + \cot x} + \frac{x}{2\pi} = 0$ for $0 \leq x \leq \pi$.

State the number of solutions. [6 marks]

Seterusnya, dengan menggunakan paksi yang sama, lakarkan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$$\frac{4}{\tan x + \cot x} + \frac{x}{2\pi} = 0 \text{ for } 0 \leq x \leq \pi.$$

Nyatakan bilangan penyelesaian itu. [6 markah]

- 5 Table 5 shows the frequency distribution of the age of a group of tourists who visited a National Museum.
Jadual 5 menunjukkan taburan kekerapan umur sekumpulan pelancong yang melawat Muzium Negara.

Age/ <i>Umur</i>	Frequency/ <i>Kekerapan</i>
5 – 9	3
10 – 14	6
15 – 19	8
20 – 24	15
25 - 29	<i>m</i>
30 - 34	1

Table 5
Jadual 5

- (a) It is given that the first quartile age of the distribution is 15.125.
Calculate the value of *m*. [3 marks]
Diberi bahawa kuartil pertama umur bagi taburan itu ialah 15.125.
Kira nilai m. [3 markah]
- (b) By using a scale of 1 cm to 5 units on the *x*-axis and 1 cm to 2 units on the *y*-axis , draw the histogram. Hence, find the modal age. [3 marks]
Dengan menggunakan skala 1 cm kepada 5 unit pada paksi-x dan 1 cm kepada 2 unit pada paksi- y, lukiskan sebuah histogram. Seterusnya, tentukan mod umur. [3 markah]

- 6 Diagram 6 shows two triangles, OAB and OMW . Point M lies on AO . Line AB and line MW intersect at point T .

Rajah 6 menunjukkan dua segitiga OAB dan OMW . Titik M terletak di atas AO . Garis AB dan MW bersilang pada titik T .

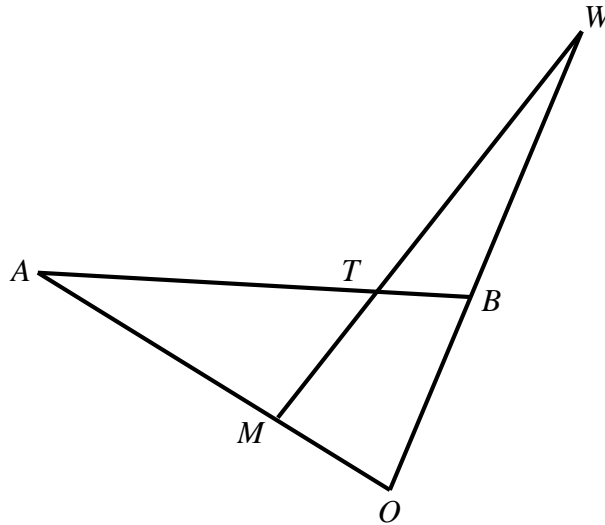


Diagram 6
Rajah 6

It is given that $OM = \frac{1}{3}OA$, $AT = \frac{3}{4}AB$, $\vec{OA} = 12\vec{a}$ and $\vec{OB} = 4\vec{b}$

Diberi bahawa $OM = \frac{1}{3}OA$, $AT = \frac{3}{4}AB$, $\vec{OA} = 12\vec{a}$ dan $\vec{OB} = 4\vec{b}$

- (a) Express in terms of \vec{a} and \vec{b}

Ungkapkan dalam sebutan \vec{a} dan \vec{b}

(i) \vec{AT} ,

(ii) \vec{MT} .

[3 marks]
[3 markah]

- (b) Given that $\vec{MW} = h\vec{MT}$ and $\vec{OW} = k\vec{OB}$ where h and k are constants.
Find the value of h and of k .

[4 marks]

Diberi $\vec{MW} = h\vec{MT}$ dan $\vec{OW} = k\vec{OB}$ dengan keadaan h dan k ialah pemalar.

Cari nilai h dan nilai k .

[4markah]

Section B
 [40 marks]
 [40 markah]

Answer **four** questions from this section.
 Jawab **empat** soalan dalam bahagian ini

- 7 Diagram 7 shows the curve $y = x^2 + 3$ intersects the straight line AC at point B .
 Rajah 7 menunjukkan lengkung $y = x^2 + 3$ bersilang dengan gari lurus AC di titik B .

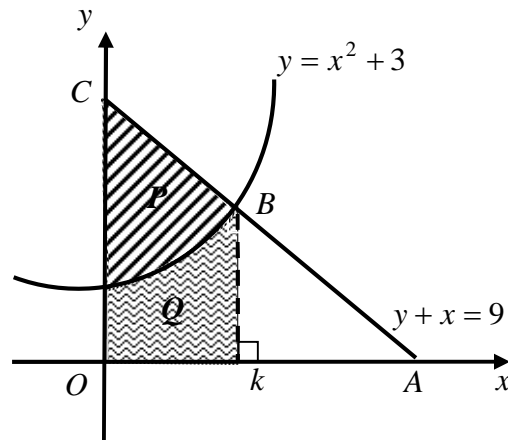


Diagram 7
 Rajah 7

It is given that the equation of straight line AC is $y + x = 9$ and the gradient of the curve at point B is 4.

Diberi bahawa persamaan garislurus AC ialah $y + x = 9$ dan kecerunan lengkung pada titik B ialah 4.

Find
 Cari

- (a) the value of k , [2 marks]
 nilai k , [2 markah]
- (b) the area of the shaded region P , [5 marks]
 luas rantau berlorek P , [5 markah]
- (c) the volume of revolution, in terms of π , when the shaded region Q is rotated through 360° about the x -axis. [3 marks]
 Isipadu kisanan, dalam sebutan π , bila rantau berlorek diputar melalui 360° pada paksi- x . [3 markah]

[Lihat sebelah
SULIT

- 8 Use graph paper to answer this question.
Gunakan kertas graf bagi menjawab soalan ini.

Table 8 shows the values of two variables, x and y obtained from an experiment. Variables x and y are related by the equation $y = h(1 + x)^k$, where h and k are constants.

Jadual 8 menunjukkan nilai-nilai bagi dua pembolehubah x dan y , yang diperolehi daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = h(1 + x)^k$, di mana h dan k adalah pemalar.

x	1	2	3	4	5	6
y	5	6.5	7.8	8.9	10	10.9

Table 8
Jadual 8

- (a) Based on table 8, construct a table for the values of $\log_{10} y$ and $\log_{10}(x + 1)$. [2 marks]
Berdasarkan jadual 8, bina satu jadual bagi nilai-nilai $\log_{10} y$ dan $\log_{10}(x + 1)$. [2 markah]
- (b) Plot $\log_{10} y$ against $\log_{10}(x + 1)$ by using a scale of 2 cm to 0.1 unit on both axes. Hence, draw the line of best fit. [4 marks]

Plot $\log_{10} y$ melawan $\log_{10}(x + 1)$ dengan menggunakan skala 2 cm to 0.1 unit pada kedua-dua paksi.

Seterusnya, lukis garis lurus penyuaian terbaik. [4 markah]

- (c) Use the graph in 8 (b) to find the value of
Gunakan graf di 8 (b) untuk mencari nilai

(i) h

(ii) k

[4 marks]
[4 markah]

9 Diagram 9 shows a semicircle $OABCD$ with centre O and a right angled triangle ADE .

Rajah 9 menunjukkan sebuah semibulatan $OABCD$ berpusat O dan segitiga bersudut tegak ADE .

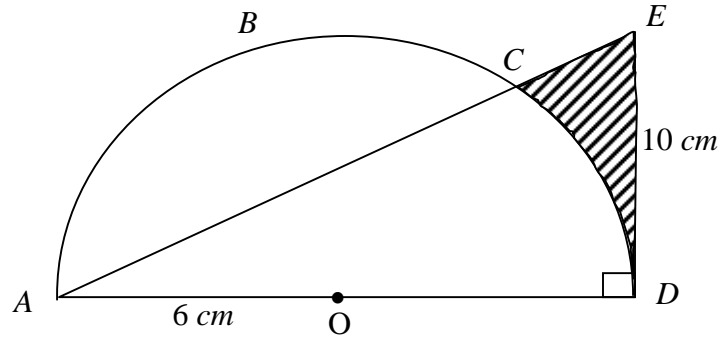


Diagram 9
Rajah 9

It is given that the length of $ED = 10 \text{ cm}$ and the radius of the semicircle $OABCD$ is 6 cm .

Diberi bahawa panjang $ED = 10 \text{ cm}$ dan jejari semibulatan $OABCD$ ialah 6 cm .

[Use/Guna $\pi = 3.142$]

Calculate

Kira

- (a) $\angle EAD$ in radian, [2 marks]
 $\angle EAD$ dalam radian, [2 markah]
- (b) (i) the length, in cm, of the arc CD , [2 marks]
panjang, dalam cm, lengkok CD , [2 markah]
- (ii) the perimeter, in cm, of the shaded region, [3 marks]
perimeter, dalam cm, rantau berlorek [3 markah]
- (c) the area, in cm^2 , of the segment ABC . [3 marks]
luas, dalam, cm^2 , tembereng ABC . [3 markah]

- 10 Solution by scale drawing is not accepted.
Penyelesaian secara lukisan berskala tidak diterima.

Diagram 10 shows a triangle RST . The equation of the straight line RQT is $y - 3x + 4 = 0$.
Rajah 10 menunjukkan sebuah segitiga RST . Persamaan garis lurus RQT ialah $y - 3x + 4 = 0$.

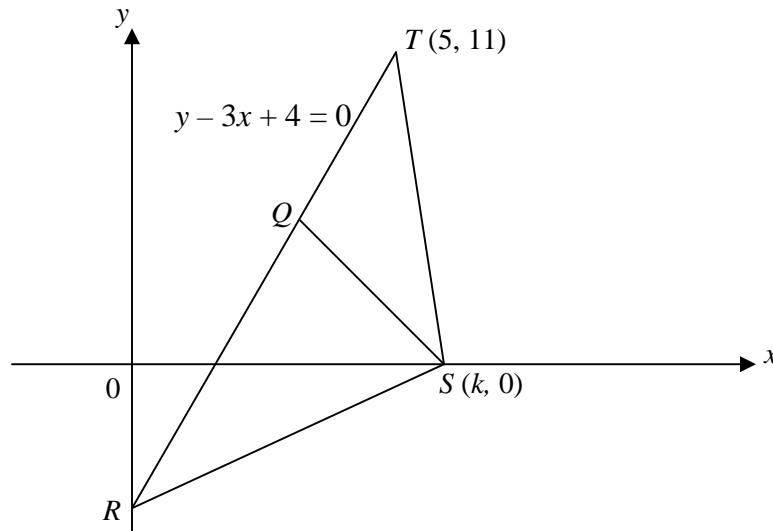


Diagram 10
Rajah 10

- (a) Find
Cari
- (i) the coordinates of R ,
koordinat R ,
 - (ii) the coordinates of Q if $RQ : QT = 3 : 2$.
koordinat Q jika $RQ : QT = 3 : 2$. [3 marks]
 [3 markah]
- (b) Given that the area of ΔQST is 14 units², find the positive value of k . [3 marks]
Diberi luas ΔQST ialah 14 unit², cari nilai positif k . [3 markah]
- (c) Find the equation of the straight line RS . [1 mark]
Cari persamaan garis lurus RS . [1 markah]
- (d) A point $P(x, y)$ moves such that $PS = 2PQ$. [3 marks]
 Find the equation of the locus for P .
*Suatu titik $P(x, y)$ bergerak dengan keadaan $PS = 2PQ$.
 Cari persamaan lokus bagi P . [3 markah]*

11 (a) In a certain school, 80% of the students have computers at home.
Dalam sebuah sekolah tertentu, 80% daripada murid-muridnya memiliki komputer di rumah.

(i) If 6 students from that school are chosen at random, calculate the probability that at least 2 students have computers at home.

Jika 6 orang murid daripada sekolah itu dipilih secara rawak, hitungkan kebarangkalian bahawa sekurang-kurangnya 2 orang murid memiliki komputer di rumah.

(ii) If the standard deviation of the distribution is 14, find the number of students in that school.

Jika sisihan piawai bagi taburan ini ialah 14, cari bilangan murid di sekolah itu.

[5 marks]

[5 markah]

(b) The masses of students in a school has a normal distribution with a mean μ kg and a standard deviation 12kg.

Jisim bagi pelajar di sebuah sekolah adalah mengikut satu taburan normal dengan min μ kg dan sisihan piawai 12 kg.

(i) A student is chosen at random from the school. The probability that the student has a mass less than 45kg is 0.2266, find the value of μ .

Seorang pelajar dipilih secara rawak daripada sekolah itu. Kebarangkalian pelajar tersebut mempunyai jisim kurang daripada 45kg ialah 0.2266, cari nilai bagi μ .

(ii) Hence, calculate the probability that a student chosen at random will have a mass between 42 kg and 45 kg.

Seterusnya, hitung kebarangkalian bahawa seorang pelajar yang dipilih secara rawak mempunyai jisim antara 42 kg dan 45 kg.

[5 marks]

[5 markah]

SECTION C

[20 marks]

[20 markah]

*Answer two questions in this section .**Jawab dua soalan dalam bahagian ini*

12. A particle P moves along a straight line and passes through a fixed point O . Its velocity, $v \text{ ms}^{-1}$, is given by $v = 8 + 2t - t^2$, where t is the time in seconds, after passing through O .

*Suatu zarah bergerak di sepanjang satu garis lurus dan melalui satu titik tetap O .**Halajunya, $v \text{ ms}^{-1}$, diberi oleh $v = 8 + 2t - t^2$, dengan keadaan t ialah masa, dalam saat, selepas melalui O .*

[Assume motion to right is positif]

[Anggapkan gerakan ke arah kanan sebagai positif]

Find

Cari

- (a) the initial velocity, in ms^{-1} , of the particle, [1 mark]
halaju awal, dalam ms^{-1} , bagi zarah itu, [1 markah]
- (b) the maximum velocity, in ms^{-1} , of the particle, [3 marks]
halaju maksimum, dalam ms^{-1} , bagi zarah itu, [3 markah]
- (c) the value of t at which the particle P is at instantaneous rest, [2 marks]
nilai t apabila zarah P berehat seketika, [2 markah]
- (d) the total distance, in m, travelled by particle P in the first 6 seconds after passing through O . [4 marks]
jumlah jarak, dalam m, yang dilalui oleh zarah P dalam 6 saat pertama, selepas melalui O . [4 markah]

13 Table 13 shows the price indices of four commodities A, B, C and D used in the manufacturing of a certain product.

Diagram 13 shows a bar chart which represents the relative quantity of usage of four commodities A, B, C and D.

Jadual 13 menunjukkan indeks harga bagi empat komoditi A, B, C dan D yang digunakan bagi menghasilkan sesuatu produk.

Rajah 13 menunjukkan carta bar yang mewakili kuantiti relatif bagi penggunaan bahan-bahan itu.

Commodity <i>Komoditi</i>	Price Index for the year 2008 based on the year 2005 <i>Indeks harga pada tahun 2008 berasaskan tahun 2005</i>
A	115
B	150
C	x
D	130

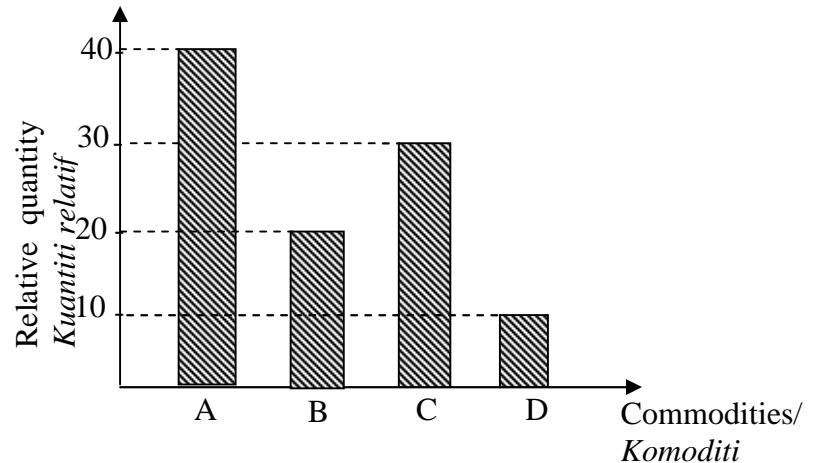


Table 13
Jadual 13

Diagram 13
Rajah 13

(a) Calculate
Kira

(i) the price of commodity B in the year 2008 if its price in the year 2005 is RM32,
harga komoditi B pada tahun 2008 jika harganya pada tahun 2005 ialah RM 32,

(ii) the price index of commodity D in the year 2008 based on the year 2003 if its price index in the year 2005 based on the year 2003 is 110.

Indeks harga komoditi D pada tahun 2008 berasaskan tahun 2003 jika indeks harga pada tahun 2005 berasaskan tahun 2003 ialah 110.

[5 marks]
[5 markah]

(b) The composite index for the cost of manufacture of the product for the year 2008 based on the year 2005 is 122.
Indeks gubahan bagi kos membuat produk ini pada tahun 2008 berasaskan tahun 2005 ialah 122.

Calculate
Hitung

(i) the value of x ,
nilai x ,

(ii) the price of the product in the year 2005 if the corresponding price in the year 2008 is RM305.

harga produk ini pada tahun 2005 jika harganya yang sepadan pada tahun 2008 ialah RM 305.

[Lihat sebelah
SULIT

- 14 Diagram 14 shows a triangle ABC such that ADC and AEB are straight lines.
Rajah 14 menunjukkan sebuah segitiga ABC dengan keadaan ADC and AEB ialah garis lurus.

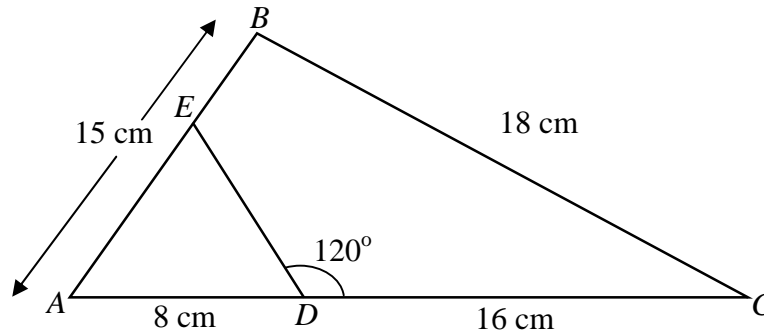


Diagram 14
Rajah 14

It is given that $AB = 15$ cm, $AD = 8$ cm, $DC = 16$ cm, $BC = 18$ cm and $\angle CDE = 120^\circ$.
Diberi bahawa $AB = 15$ cm, $AD = 8$ cm, $DC = 16$ cm, $BC = 18$ cm dan $\angle CDE = 120^\circ$

Calculate
Kira

- (a) $\angle BAC$, [3marks]
[3markah]
- (b) the length, in cm, of DE ,
panjang, in cm, bagi DE , [3 marks]
[3markah]
- (c) the area, in cm^2 , of triangle ABC .
Hence, find the length, in cm, of the perpendicular line from B to AC .
*luas, dalam cm^2 , segitiga ABC .
Seterusnya, cari panjang, dalam cm, garis yang berserenjang dari B ke AC .* [4 marks]
[4markah]

- 15 A Mathematics Club intends to sell two types of souvenirs , type P and type Q. The Mathematics Club sells x units of souvenirs of type P and y units of souvenirs of type Q, based on the following constraints:
Kelab Matematik bercadang untuk menjual dua jenis cenderamata ,jenis P dan jenis Q. Kelab itu menjual x unit cenderamata P dan y unit cenderamata Q, berdasarkan kekangan berikut:

I: The total number of souvenirs to be sold is not more than 150.
Jumlah cenderamata yang hendak dijual tidak melebihi 150.

II: The number of souvenirs of type Q is at least half the number of souvenirs of type P .
Bilangan cenderamata jenis Q adalah sekurang-kurangnya separuh daripada bilangan cenderamata jenis P.

III: The number of souvenirs of type Q exceeds the number of souvenirs of type P by at most 80.
Bilangan cenderamata jenis Q melebihi bilangan cenderamata jenis P selebih-lebihnya 80.

(a) Write three inequalities , other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints.
Tulis tiga ketaksamaan selain $x \geq 0$ dan $y \geq 0$, yang memenuhi semua kekangan diatas.

[3 marks]

[3 markah]

(b) Using a scale of 2 cm to 20 souvenirs on both axes, construct and shade the region R which satisfies all the above constraints.

Menggunakan skala 2 cm kepada 20 cenderamata pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.

[3 marks]

[3 markah]

(c) Use the graph constructed in 15 (b), to find
Gunakan graf yang dibina di 15(b), untuk mencari

(i) the maximum number of souvenirs of type P sold if 50 souvenirs of type Q are sold.

Bilangan maksimum cenderamata jenis P yang dijual jika 50 bilangan cenderamata jenis Q dapat dijual

(ii) the maximum profit obtained if the profit from the sale of one souvenir of type P is RM3 and the profit from the sale of one souvenir of type Q is RM5.

Keuntungan maksimum yang diperoleh jika keuntungan daripada penjualan sebuah cenderamata jenis P ialah RM 3 dan keuntungan daripada penjualan sebuah cenderamata jenis Q ialah RM 5.

[4 marks]

[4 markah]

END OF QUESTION PAPER

**INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON**

- 1 This question paper consists of three sections : **Section A**, **Section B** and **Section C**.
Kertas soalan ini mengandungi tiga bahagian Bahagian A, Bahagian B dan Bahagian C.
- 2 Answer **all** questions in **Section A**, **four** questions from **Section B** and **two** questions from **Section C**.
Jawab semua soalan dalam Bahagian A, mana-mana empat soalan daripada Bahagian B dan mana-mana dua soalan daripada Bahagian C
- 3 Write your answer on the ‘buku jawapan’ provided. If the buku jawapan is insufficient, you may ask for ‘helaian tambahan’ from the invigilator.
Jawapan anda hendaklah ditulis di dalam buku jawapan yang disediakan. Sekiranya buku jawapan tidak mencukupi, sila dapatkan helaian tambahan daripada pengawas peperiksaan.
- 4 *Show your working. It may help you to get marks.*
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.
- 5 *The diagrams in the questions provided are not drawn to scale unless stated.*
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
- 6 *The marks allocated for each question and sub-part of a question are shown in brackets.*
Markah yang diperuntukan bagi setiap soalan dan cerian soalan are shown in brackets.
- 7 *A list of formulae is provided on pages 2 and 3.*
Satu senarai rumus disediakan di halaman 3 hingga 5
8. *Graph paper and booklet of four – figure mathematical tables is provided.*
Kertas graf dan sebuah buku sifir matematik empat angka disediakan.
9. *You may use a non-programmable scientific calculator*
Anda dibenarkan menggunakan kalkulator scientific calculator yang tidak boleh diprogramkan.
10. *Tie the ‘helaian tambahan’ and the graph papers together with the ‘buku jawapan’ and hand in to the invigilator at the end of the examination.*

Ikat helaian tambahan dan kertas graf bersama-sama dengan buku jawapan dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

NO.KAD PENGENALAN

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ANGKA GILIRAN

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Arahan Kepada Calon

- 1 Tulis nombor kad penganalan dan angka giliran anda pada petak yang disediakan.
- 2 Tandakan (/) untuk soalan yang dijawab.
- 3 Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan buku jawapan.

Kod Pemeriksa				
Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh (Untuk Kegunaan Pemeriksa)
A	1		5	
	2		7	
	3		7	
	4		8	
	5		6	
	6		7	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	

SULIT

20

3472/2

	15		10	
JUMLAH				

3472/2
Matematik
Tambahan
Kertas 2
2 ½ jam
Ogos 2009



SEKOLAH BERASRAMA PENUH
BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN KLUSTER
KEMENTERIAN PELAJARAN MALAYSIA

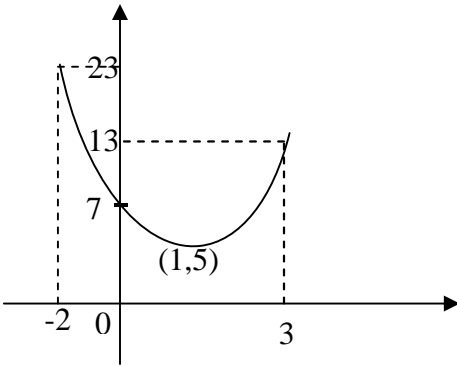
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009

ADDITIONAL MATHEMATICS

Kertas 2

Dua jam tiga puluh minit

MARKING SCHEME

QUESTION NO.	SOLUTION	MARKS
1	$y = 3 - 2x$ $x(3 - 2x) - 2(3 - 2x) + 5 = 0$ $2x^2 - 7x + 1 = 0$ $\frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(1)}}{2(2)}$ $x = 3.351 \text{ or } 0.149$ $y = -3.702 \text{ or } 2.702$	<p>P1 K1 K1 N1 N1</p> <p style="text-align: right; border: 1px solid black; padding: 5px;">5</p>
2 a)	$f(x) = 2\left[x^2 - 2x + \frac{7}{2}\right]$ $= 2\left[x^2 - 2x + \left(\frac{1}{2}(-2)\right)^2 - \left(\frac{1}{2}(-2)\right) + \frac{7}{2}\right] \quad K1$ $= 2\left[(x - 1)^2 + \frac{5}{2}\right]$ $= 2(x - 1)^2 + 5 \quad N1$	<p>2</p>
b)	<p>Minimum value = 5 N1</p>	<p>1</p>
c)	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Shape – P1 Max point – P1 Other 2 points – P1</p> </div> </div>	<p>3</p>
d)	$f(x) = -2(x - 1)^2 - 5 \quad N1$	<p>1</p>
		7

<p>3 a)</p>	<p>36 , x , 20.25</p> $\frac{x}{36} = \frac{20.25}{x}$ <p>K1</p> $x = \frac{3}{4}$ <p>N1</p>	<p>2</p>
<p>(b)</p>	$T_{10} = 36\left(\frac{3}{4}\right)^9$ $= 2.703$ <p>K1</p> <p>N1</p>	<p>2</p>
<p>(c)</p>	$36\left[\frac{1-(0.75)^n}{1-0.75}\right] > 140$ <p>K1</p> $n \log 0.75 < \log 0.02778$ <p>N1</p> $n > 12.46$ <p>N1</p> $n = 13$	<p>3</p>
<p>7</p>		
<p>4</p>	<p>(a)</p> $= \frac{2}{\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}}$ $= \frac{2 \sin x \cos x}{\sin^2 x + \cos^2 x}$ $= \sin 2x$ <p>K1</p> <p>N1</p>	<p>2</p>
<p>(b)</p>	<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Sine curve.....P1 1 period.....P1 Max/min value 2/-2.....P1 Sketcht straight line.....K1</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>$y = \frac{x}{4\pi}$N1 No. of solutions = 3.....N1</p> </div>	<p>6</p>
<p>8</p>		

<p>5(a)</p> <p>b)</p>	<p>14.5 or 8 or 9 $33+m$</p> <p>P1</p> $\left[\frac{\frac{1}{4}(33+m) - 9}{8} \right] 5 = 15.125$ <p>$m = 7$</p> <p>Refer the graph paper</p> <p>Uniform scale, correct frequency and upper boundary K1</p> <p>Method to find the mode K1</p> <p>Mode = 22 N1</p>	<p>3</p> <p>3</p> <div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin-left: auto; margin-right: auto;">6</div>
<p>6 (a)</p> <p>(b)</p>	<p>(i) $\vec{AT} = \frac{3}{4}(\vec{AO} + \vec{OB})$ or $\vec{MT} = \vec{MA} + \vec{AT}$ K1</p> <p>$\vec{AT} = \frac{3}{4}(-12\vec{a} + 4\vec{b})$ N1</p> <p>$= -9\vec{a} + 3\vec{b}$</p> <p>(ii) $\vec{MT} = \frac{2}{3}(12\vec{a}) + 3\vec{b} - 9\vec{a}$ N1</p> <p>$= -\vec{a} + 3\vec{b}$</p> <p>$\vec{MW} = h\vec{MT}$</p> <p>$\vec{MO} + \vec{OW} = h(-\vec{a} + 3\vec{b})$</p> <p>$-\frac{1}{3}(12\vec{a}) + k\vec{OB} = h(-\vec{a} + 3\vec{b})$ K1</p> <p>$-4\vec{a} + k(4\vec{b}) = -h\vec{a} + 3h\vec{b}$</p> <p>$-4 = -h$ or $4k = 12$ K1</p> <p>$h = 4$, $k = 3$ N1</p>	<p>3</p> <p>3</p> <div style="border: 1px solid black; width: 30px; height: 30px; text-align: center; margin-left: auto; margin-right: auto;">7</div>
<p>7 (a)</p>	<p>$\frac{dy}{dx} = 2x$</p> <p>$2x = 4$ K1</p> <p>$x = 2$ N1</p>	

(c)	$\log_{10} y = k \log_{10} (x + 1) + \log_{10} h$ <p>P1</p> <p>(i) $\log_{10} h = 0.515$ $h = 3.27$ K1 NI</p> <p>(ii) $k = \frac{1.04 - 0.7}{0.85 - 0.3}$ K1 NI $= 0.6$</p>	<p>5</p> <div style="border: 1px solid black; width: 40px; text-align: center; margin-left: auto; margin-right: auto;">10</div>
<p>9</p> <p>(a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(c)</p>	<p>$\angle EAD = \tan^{-1}\left(\frac{10}{12}\right)$ $= 0.6948 \text{ rad}$ K1 NI</p> <p>$\angle COD = 1.3896 \text{ rad}$ $\text{arc length} = 6(1.3896)$ K1 $= 8.3376$ NI</p> <p>$AC^2 = 6^2 + 6^2 - 2(6)(6) \cos 100.39^\circ$ K1 $= 9.2187$</p> <p>$\text{Perimeter of shaded region} = 10 + 8.3376 + 2.4432$ K1 $= 20.7808$ NI</p> <p>$\frac{1}{2}(6)^2(1.7524)$ or $\frac{1}{2}(6)(6) \sin 100.39^\circ$ K1</p> <p>$\text{Area of segment } ABC = \frac{1}{2}(6)^2(1.7524) - \frac{1}{2}(6)(6) \sin 100.39^\circ$ K1 $= 31.5432 - 17.7049$ $= 13.8383$ NI</p>	<p>2</p> <p>5</p> <p>3</p> <div style="border: 1px solid black; width: 40px; text-align: center; margin-left: auto; margin-right: auto;">10</div>

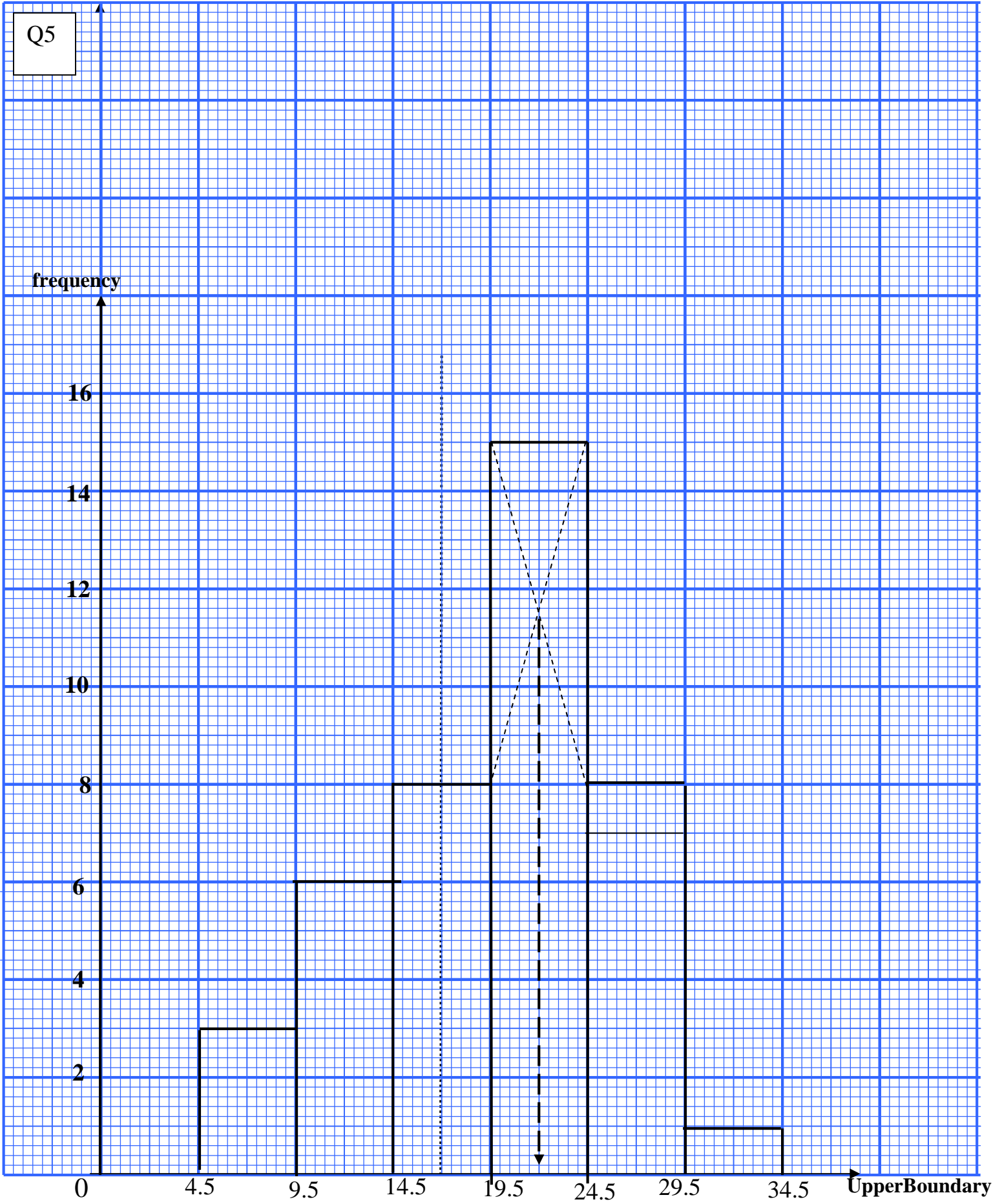
<p>10</p>	<p>(a)(i) R(0, -4) P1</p> <p>(ii) $x = \frac{2(0)+5(3)}{2+3}$ and $y = \frac{2(-4)+3(11)}{2+3}$ K1</p> <p>Q(3, 5) N1</p> <p>(b) $14 = \frac{1}{2} \begin{vmatrix} k & 5 & 3 & k \\ 0 & 11 & 5 & 0 \end{vmatrix}$</p> <p>$14 = \frac{1}{2} 11k + 25 - 5k - 33$ K1</p> <p>$6k - 8 = 28$ or $8 - 6k = -28$ K1</p> <p>$k = 6$ N1</p> <p>(c) $y = \frac{2}{3}x - 4$ or $\frac{x}{6} - \frac{y}{4} = 1$ N1</p> <p>(d) $PS = \sqrt{(x-6)^2 + y^2}$ or $PQ = \sqrt{(x-3)^2 + (y-5)^2}$ K1</p> <p>$\sqrt{(x-6)^2 + y^2} = 2\sqrt{(x-3)^2 + (y-5)^2}$ K1</p> <p>$3x^2 + 3y^2 - 12x - 40y + 100 = 0$ N1</p>	<p>3</p> <p>3</p> <p>4</p> <table border="1" data-bbox="1417 1220 1539 1304"> <tr> <td>10</td> </tr> </table>	10
10			
<p>11</p>	<p>(a) (i) $p = 0.8, q = 0.2$</p> <p>$P(X = 0) = {}^6C_0(0.8)^0(0.2)^6$ or $P(X = 1) = {}^6C_1(0.8)^1(0.2)^5$ K1</p> <p>$P(X \geq 2) = 1 - [P(X = 0) + P(X = 1)]$</p> <p>$= 1 - {}^6C_0(0.8)^0(0.2)^6 - {}^6C_1(0.8)^1(0.2)^5$ K1</p> <p>$= 1 - 0.000064 - 0.001536$</p> <p>$= 0.9984$ N1</p> <p>(ii) $14 = \sqrt{n(0.8)(0.2)}$ K1</p> <p>$n = 1225$ N1</p> <p>(b)(i) $P(X \leq 45) = 0.2266$</p> <p>$Z = -0.75$ P1</p>	<p>5</p>	

	$-0.75 = \frac{45 - \mu}{12} \quad \text{or} \quad Z = \frac{42 - 54}{12} \quad (\text{in b(ii)})$ $\mu = 54$	<p>K1 N1</p>		
	<p>(ii)</p> $Z = \frac{42 - 54}{12}$ $P(42 \leq X \leq 45) = P(-1 \leq Z \leq -0.75)$ $= 0.2266 - 0.1587$ $= 0.0679$	<p>K1 N1</p>	<p>5</p> <table border="1" style="float: right;"> <tr> <td>10</td> </tr> </table>	10
10				
12(a)	$v = 8$	N1	1	
(b)	$a = 2 - 2t = 0$ $2t = 2$ $t = 1$ $v = 8 + 2(1) - (1)^2$ $= 9$	<p>K1 K1 N1</p>	3	
(c)	$v = 8 + 2t - t^2 = 0$ $t^2 - 2t - 8 = 0$ $(t - 4)(t + 2) = 0$ $t = 4$	<p>K1 N1</p>	2	
(d)	$s = \int (8 + 2t - t^2) dt$ $s = 8t + t^2 - \frac{t^3}{3} + c$ $t = 0, s = 0 \Rightarrow c = 0$ $s = 8t + t^2 - \frac{t^3}{3}$ $t = 4, s = 8(4) + (4)^2 - \frac{4^3}{3} = \frac{80}{3}$ $t = 6, s = 8(6) + (6)^2 - \frac{6^3}{3} = 12$ $\left. \begin{array}{l} s = \frac{80}{3} \\ s = 12 \end{array} \right\} \text{or}$ $\text{Total distance} = \frac{80}{3} + \left(\frac{80}{3} - 12 \right)$ $= \frac{124}{3}$	<p>K1 K1 N1</p>	4	
			<table border="1" style="float: right;"> <tr> <td>10</td> </tr> </table>	10
10				

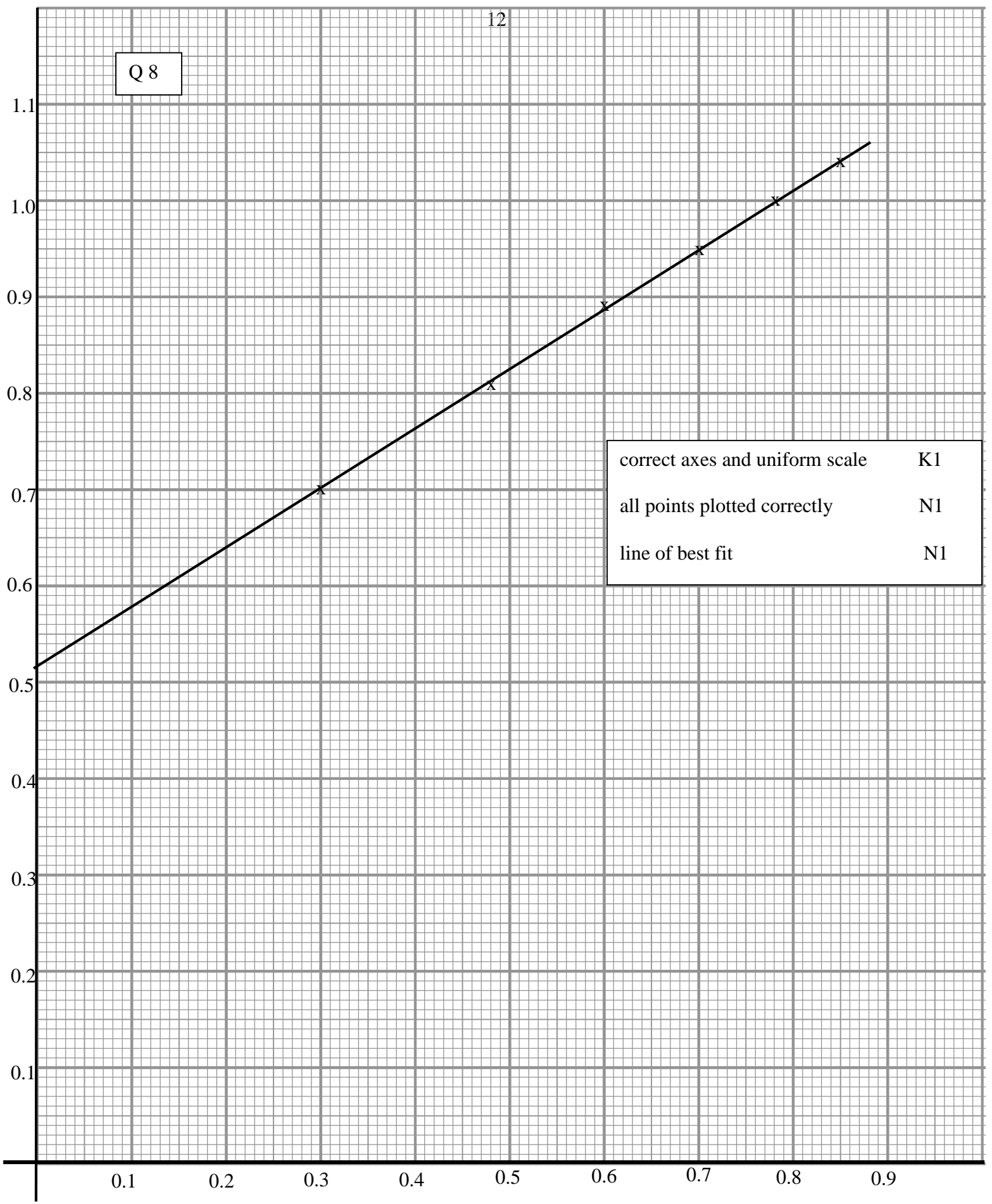
13	<p>(a) (i) $\frac{P_{08}}{32} \times 100 = 150$ K1</p> <p>$P_{08} = \text{RM } 48$ K1</p> <p>(ii) $\left. \begin{array}{l} \frac{P_{05}}{P_{03}} \times 100 = 110 \\ \frac{P_{08}}{P_{05}} \times 100 = 130 \end{array} \right\} \text{or}$ K1</p> <p>$I_{\frac{08}{03}} = \frac{P_{08}}{P_{05}} \times \frac{P_{05}}{P_{03}} \times 100$</p> <p>$= \frac{130}{100} \times \frac{110}{100} \times 100$ K1</p> <p>$= 143$ N1</p> <p>(b) (i) $115(40) + 150(20) + 30x + 130(10)$ P1</p> <p>$\frac{115(40) + 150(20 + 30x + 130(10))}{100} = 122$ K1</p> <p>$x = 110$ N1</p> <p>(ii) $122 = \frac{305}{P_{05}} \times 100$ K1</p> <p>$P_{05} = \text{RM } 250.00$ N1</p>	5
14	<p>(a) $\cos \angle BAC = \frac{15^2 + 24^2 - 18^2}{2 \times 15 \times 24}$ K1</p> <p>$= 0.6625$</p> <p>$\angle BAC = 48.51^\circ$ N1</p> <p>(b) $\angle AED = 180^\circ - 48.51^\circ - 60^\circ$ K1</p>	2

10

	$= 71.49^\circ \quad \text{N1}$ $\frac{DE}{\sin 48.51^\circ} = \frac{8}{\sin 71.49^\circ} \quad \text{K1}$ $DE = 6.319 \quad \text{N1}$ <p>(c) area of $\triangle ABC = \frac{1}{2} \times 15 \times 24 \sin 48.51^\circ \quad \text{K1}$</p> $= 134.83 \quad \text{N1}$ $\frac{1}{2} \times 24 \times h = 134.83 \quad \text{K1}$ $h = 11.24 \quad \text{N1}$	<p>4</p> <p>4</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto;">10</div>
15	<p>(a) I: $x + y \leq 150$</p> <p>II: $y \geq \frac{1}{2}x$ N1</p> <p>III: $y - x \leq 80$ N1</p> <p>(b) refer the graph paper</p> <p>(c) (i) $x = 100$ N1</p> <p>(ii) maximum point (35, 115) N1</p> <p>Profit = $3(35) + 5(115)$ K1</p> <p> = RM 680 N1</p>	<p>3</p> <p>3</p> <p>4</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto;">10</div>



Q 8



correct axes and uniform scale	K1
all points plotted correctly	N1
line of best fit	N1

Q 15

correct axes with uniform scale and one line correct(equation involved x and y) .	K1
all straight lines correct	N1
correct shaded region	N1

