

SULIT

3472/2

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Additional
Mathematics

Kertas 2

Mei 2009

2 ½ jam



JABATAN PELAJARAN TERENGGANU

PEPERIKSAAN PERTENGAHAN TAHUN 2009 TINGKATAN 5

ADDITIONAL MATHEMATICS

Kertas 2

Dua jam tiga puluh minit

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

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 all questions from Section C.*
3. *Give only one answer to each question.*
4. *Show your working. It may help you to get marks.*
5. *The diagrams 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 4.*
8. *You may use a non-programmable scientific calculator and a four-figure mathematical table.*

This question paper consists of 16 printed pages.

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[Lihat sebelah
SULIT

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

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

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

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

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

$$4. (a^m)^n = a^{mn}$$

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

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

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

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

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

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

$$11. T_n = ar^{n-1}$$

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

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

CALCULUS / KALKULUS

$$1. y = uv$$

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

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

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

$$4. \text{Area under a curve} \\ \text{Luas di bawah lengkung} \\ = \int_a^b y \, dx \text{ or / atau}$$

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

$$5. \text{Volume generated} \\ \text{Isipadu janaan} \\ = \int_a^b \pi y^2 \, dx \text{ or / atau} \\ = \int_a^b \pi x^2 \, dy$$

STATISTICS / STATISTIK

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

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

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

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

5. $m = L + \left(\frac{\frac{1}{2}N - F}{f_m} \right) C$

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

7. $\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$

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

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

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

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

12. Mean / Min = np

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

14. $Z = \frac{X - \mu}{\sigma}$

GEOMETRI (GEOMETRY)

1. Distance / Jarak

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

2. Midpoint / Titik tengah

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

3. A point dividing a segment of a line

Titik yang membahagi suatu tembereng garis

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

4. Area of triangle / Luas segi tiga

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

5. $|r| = \sqrt{x^2 + y^2}$

6. $\hat{r} = \frac{x\mathbf{i} + y\mathbf{j}}{\sqrt{x^2 + y^2}}$

TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$
Panjang lengkok, $s = j\theta$
2. Area of sector = $\frac{1}{2} r^2 \theta$
Luas sektor, $L = \frac{1}{2} j^2 \theta$
3. $\sin^2 A + \cos^2 A = 1$
 $\sin^2 A + \text{kos}^2 A = 1$
4. $\sec^2 A = 1 + \tan^2 A$
 $\text{sek}^2 A = 1 + \tan^2 A$
5. $\text{cosec}^2 A = 1 + \cot^2 A$
 $\text{kosek}^2 A = 1 + \text{kot}^2 A$
6. $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \text{kos} A$
7. $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
 $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$
 $= 2 \text{kos}^2 A - 1$
 $= 1 - 2 \sin^2 A$
8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
 $\sin(A \pm B) = \sin A \text{kos} B \pm \text{kos} A \sin B$
9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
 $\text{kos}(A \pm B) = \text{kos} A \text{kos} B \mp \sin A \sin B$
10. $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$
11. $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$
12. $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
13. $a^2 = b^2 + c^2 - 2bc \cos A$
 $a^2 = b^2 + c^2 - 2bc \text{kos} A$
14. Area of triangle / Luas segi tiga
 $= \frac{1}{2} ab \sin C$

Section A / Bahagian A

[40 marks / 40 markah]

Answer all questions.

Jawab semua soalan.

- 1 Solve the simultaneous equation $x^2 + y^2 - 2x = 3x + y = 5$.
Give your answer correct to two decimal place. [5 marks]
*Selesaikan persamaan serentak $x^2 + y^2 - 2x = 3x + y = 5$.
Berikan jawapan anda betul kepada dua tempat perpuluhan.* [5 markah]
- 2 Given that $f(x) = 2x^2 - 12x + 13$.
Diberi $f(x) = 2x^2 - 12x + 13$.
- (a) Express $f(x)$ in the form $a(x + h)^2 + k$, where a , h and k are constants. [2 marks]
Ungkapkan $f(x)$ dalam bentuk $a(x + h)^2 + k$, di mana a , h dan k adalah pemalar. [2 markah]
- (b) Hence, state the minimum or maximum value of $f(x)$. [2 marks]
Seterusnya, nyatakan nilai minimum atau maksimum bagi $f(x)$. [2 markah]
- (c) Sketch the graph of $f(x)$. [2 marks]
Lakarkan graph $f(x)$. [2 markah]

- 3 Diagram 1 shows a sector OAB with centre O and a right-angled triangle OAN .

Rajah 1 menunjukkan sebuah sektor OAB yang berpusat O dan sebuah segi tiga bersudut tegak OAN .

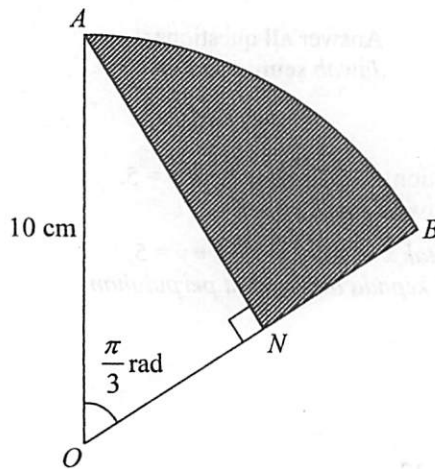


Diagram 1 / Rajah 1

Find,
Carikan,

- (a) the area of sector OAB ,
luas sektor OAB ,
- (b) the perimeter of the shaded region.
perimeter rantau berlorek.

[2 marks]

[2 markah]

[5 marks]

[5 markah]

- 4 (a) Sketch the graph of $y = \sin \frac{3}{2}x$ for $0 \leq x \leq 2\pi$. [3 marks]

Lakarkan graf $y = \sin \frac{3}{2}x$ bagi $0 \leq x \leq 2\pi$. [3 markah]

- (b) Hence, using the same axes, sketch a suitable straight line to solve the equation

$$2\left(\sin \frac{3}{2}x + \frac{x}{\pi}\right) = 2 \text{ for } 0 \leq x \leq 2\pi.$$

Seterusnya, menggunakan paksi yang sama, lakar garis lurus yang sesuai untuk

menyelesaikan persamaan $2\left(\sin \frac{3}{2}x + \frac{x}{\pi}\right) = 2$ bagi $0 \leq x \leq 2\pi$.

State the number of solutions.

Nyatakan bilangan penyelesaian itu.

[3 marks]

[3 markah]

- 5 A string 227.5 cm long is cut into 25 smaller pieces. The lengths of the 25 pieces form an arithmetic progression.

Seutas tali yang panjangnya 227.5 cm dipotong untuk membentuk 25 bahagian dengan panjang bahagian-bahagian yang dipotong itu membentuk satu janting aritmetik.

Given the total length of the first three shortest pieces is 4.2 cm, find

Diberi jumlah tiga bahagian terpendek yang pertama ialah 4.2 cm, cari

- (a) the difference in length of two adjacent pieces,
beza panjang antara dua bahagian yang bersebelahan,

[5 marks]

[5 markah]

- (b) the length of the tenth shortest piece.
panjang bahagian terpendek ke sepuluh.

[2 marks]

[2 markah]

6 In Diagram 2, $OABC$ and $OPQR$ are parallelograms.

Dalam Rajah 2, $OABC$ dan $OPQR$ adalah segi empat selari.

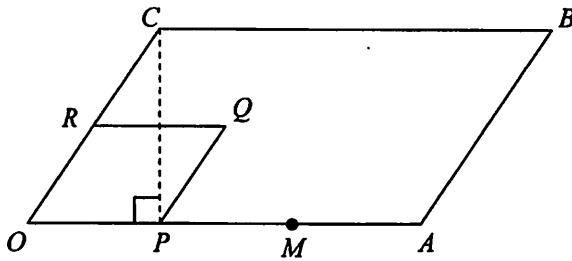


Diagram 2 / Rajah 2

It is given that $\vec{OA} = 6\mathbf{a}$, $\vec{OC} = 4\mathbf{c}$, $3OP = OA$, $3OM = 2OA$ and R is the midpoint of OC .

Diberi bahawa $\vec{OA} = 6\mathbf{a}$, $\vec{OC} = 4\mathbf{c}$, $3OP = OA$, $3OM = 2OA$ dan R adalah titik tengah OC .

(a) Express in terms of \mathbf{a} and \mathbf{c} ,
Ungkapkan dalam sebutan \mathbf{a} dan \mathbf{c} ,

- (i) \vec{OB} ,
- (ii) \vec{PR} ,
- (iii) \vec{MC} .

[3 marks]
[3 markah]

(b) Determine whether M , Q and C are collinear.
Tentukan sama ada M , Q dan C adalah segaris.

[3 marks]
[3 markah]

(c) If $|\mathbf{a}| = 10$, $|\mathbf{c}| = 13$, find $|\vec{PC}|$.

Jika $|\mathbf{a}| = 10$, $|\mathbf{c}| = 13$, cari $|\vec{PC}|$.

[3 marks]
[3 markah]

Section B / Bahagian B**[40 marks / 40 markah]**

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

- 7 It is given that the curve $y = x^2 - x - 6$ has a minimum point.
Diberi bahawa lengkung $y = x^2 - x - 6$ mempunyai titik minimum.

Find / Cari

- (a) the coordinates of the minimum point of the curve, [3 marks]
koordinat-koordinat titik minimum lengkung itu, [3 markah]
- (b) the equation of the normal to the curve at the point (4, 6), [4 marks]
persamaan normal kepada lengkung pada titik (4, 6), [4 markah]
- (c) the rate of change of y , in units s^{-1} , when $x = 2$, if x increases at the rate of 3 units s^{-1} . [3 marks]
kadar perubahan y , dalam units s^{-1} , apabila $x = 2$, jika x bertambah dengan kadar 3 unit s^{-1} . [3 markah]

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

Table 1 shows the values of two variables, x and y , obtained from an experiment. Variables x and y are related by the equation $py = qx + x^2$, where a and b are constants.

Jadual 1 menunjukkan nilai-nilai dua pembolehubah, x dan y , yang diperolehi daripada satu ujikaji. Pembolehubah x dan y dihubungkan oleh persamaan $py = qx + x^2$, dengan keadaan x dan y adalah pemalar.

x	1	3	4	5	6	8
y	3.8	18.0	28.0	40.7	54.1	88.5

Table 1 / Jadual 1

- (a) Plot $\frac{y}{x}$ against x by using a scale of 1 cm to 1 unit on both axes.

Plot $\frac{y}{x}$ melawan x , dengan menggunakan skala 1 cm kepada 1 unit pada kedua-dua paksi.

Hence, draw the line of best fit.

Seterusnya, lukis garis lurus penyuaian terbaik.

[4 marks]

[4 markah]

- (b) Use your graph from 8(a) to find the value of
Gunakan graf anda dari 8(a) untuk mencari nilai

(i) p ,

(ii) q ,

(iii) y when $x = 4.4$

y apabila $x = 4.4$

[6 marks]

[6 markah]

- 9 In Diagram 3, the straight line PR cuts y -axis at $Q(0, 4)$ such that $PQ : QR = 1 : 3$.
The equation of PS is $2y = x + 3$.

Dalam Rajah 3, garis lurus PR memotong paksi- y di $Q(0, 4)$ dengan keadaan $PQ : QR = 1 : 3$. Persamaan garis lurus PS ialah $2y = x + 3$.

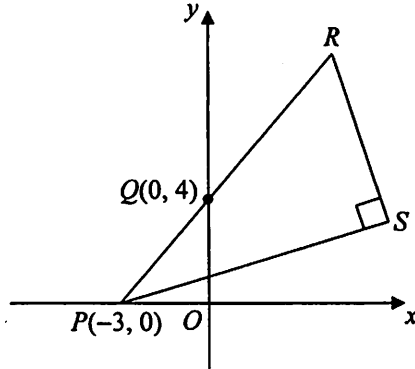


Diagram 3 / Rajah 3

Find / Cari

- | | |
|---|-------------------------|
| (a) the coordinates of R ,
<i>koordinat R,</i> | [3 marks]
[3 markah] |
| (b) the equation of the straight line RS ,
<i>persamaan garis lurus RS,</i> | [3 marks]
[3 markah] |
| (c) the area of triangle PRS .
<i>luas segitiga PRS.</i> | [4 marks]
[4 markah] |

- 10 Table 2 shows the cumulative frequency distribution of marks obtained by 100 students in an Additional Mathematics test.

Jadual 2 menunjukkan taburan kekerapan longgokan bagi markah yang diperolehi 100 orang pelajar dalam suatu ujian Matematik Tambahan.

Marks Markah	10-19	20-29	30-39	40-49	50-59	60-69
Cumulative Frequency Kekerapan Longgokan	3	17	39	80	95	100

Table 2 / Jadual 2

- (a) Using a scale of 2 cm to 10 marks on the horizontal axis and 2 cm to 5 students on the vertical axis, draw a histogram for the data in Table 2. Hence, find the mode mark.

Dengan menggunakan skala 2 cm kepada 10 markah pada paksi mengufuk dan 2 cm kepada 5 orang pelajar pada paksi mencancang, lukis sebuah histogram bagi data dalam Jadual 2. Seterusnya, cari markah mod.

[5 marks]
[5 markah]

- (b) What is the mode mark if the mark of each student is increased by 6 ?

[1 mark]

Apakah markah mod jika markah setiap pelajar ditambah sebanyak 6 ?

[1 markah]

- (c) Without using an ogive, calculate the median mark.

[4 marks]

Tanpa menggunakan ogif, hitungkan markah median.

[4 markah]

- 11 Diagram 4 shows the curve $y = \frac{x^2}{2} + 1$ and the straight line $x + 2y - 8 = 0$ which intersects at point $A(2, 3)$.

Rajah 4 menunjukkan lengkung $y = \frac{x^2}{2} + 1$ dan garis lurus $x + 2y - 8 = 0$ yang menyilang pada titik $A(2, 3)$.

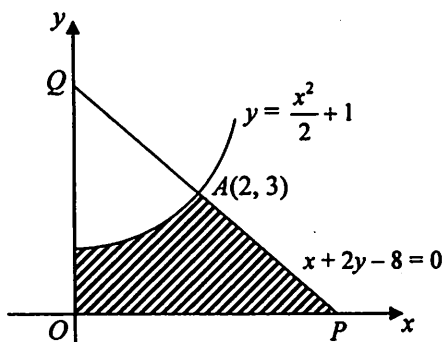


Diagram 4 / Rajah 4

Find / Cari

- (a) the area of the shaded region,
luas rantau berlorek, [5 marks]
[5 markah]
- (b) the volume generated when the region bounded by the curve, the straight line $x + 2y - 8 = 0$ and the y -axis is rotated through 360° about the y -axis. [5 marks]

isipadu yang dijanakan apabila rantau yang dibatasi oleh lengkung, garis lurus $x + 2y - 8 = 0$ dan paksi- y diputarakan 360° pada paksi- y .

[5 markah]

Section C / Bahagian C

[20 marks / 20 markah]

Answer all questions in this section.
 Jawab semua soalan dalam bahagian ini.

- 12 An electrical item consists of only four parts, *A*, *B*, *C* and *D*. Table 2 shows the prices of the parts in the years 2006 and 2008.

Satu item elektrik mengandungi hanya empat bahagian, A, B, C dan D. Jadual 2 menunjukkan harga setiap bahagian dalam tahun 2006 dan 2008.

Parts <i>Bahagian</i>	Price per unit (RM) <i>Harga seunit (RM)</i>	
	Year 2006 <i>Tahun 2006</i>	Year 2008 <i>Tahun 2008</i>
<i>A</i>	50.00	<i>x</i>
<i>B</i>	25.00	38.00
<i>C</i>	<i>y</i>	<i>z</i>
<i>D</i>	40.00	44.00

Table 2 / Jadual 2

- (a) The index number of part *A* in the year 2008 based on the year 2006 is 140. Calculate the value of *x*.

Nombor indeks bagi bahagian A dalam tahun 2008 berasaskan tahun 2006 ialah 140. Hitungkan nilai x.

[2 marks]

[2 markah]

- (b) The index number of part *C* in the year 2008 based on the year 2006 is 150. The price per unit of part *C* in the year 2006 is RM15.00 less than its corresponding price in the year 2008. Calculate the value of *y* and of *z*.

Nombor indeks bagi bahagian C dalam tahun 2008 berasaskan tahun 2006 ialah 150. Harga seunit bahagian C dalam tahun 2006 ialah RM15.00 kurang daripada harganya yang sepadan dalam tahun 2008. Hitungkan nilai y dan nilai z.

[3 marks]

[3 markah]

- (c) The composite index for the cost of producing the electrical item in the year 2008 based on the year 2006 is $133\frac{2}{3}$. Calculate

Nombor indeks gubahan kos mengeluarkan item elektrik itu dalam tahun 2008 berasaskan tahun 2006 ialah $133\frac{2}{3}$. Hitungkan

- (i) the price of an electrical item in the year 2006 if its corresponding price in the year 2008 is RM 2880.00.

harga satu item elektrik dalam tahun 2006 jika harganya yang sepadan dalam tahun 2008 ialah RM 2880.00.

- (ii) the value of k if the number of parts A , B , C and D used are in the ratio of $4 : 2 : k : 4$.

nilai k jika nombor setiap bahagian A , B , C dan D digunakan adalah mengikut nisbah $4 : 2 : k : 4$.

[5 marks]

[5 markah]

- 13 Diagram 5 shows a quadrilateral $PQRS$ such that $\angle PRS$ is obtuse.
Rajah 5 menunjukkan sebuah sisiempat PQRS dengan keadaan $\angle PRS$ adalah cakak.

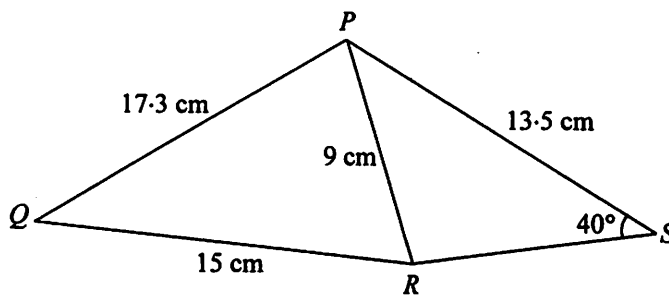


Diagram 5 / Rajah 5

- (a) Calculate
Hitung

- (i) $\angle PQR$,
 (ii) $\angle PRS$,
 (iii) the area, in cm^2 , of the quadrilateral $PQRS$.
luas, dalam cm^2 , sisiempat PQRS.

[8 marks]
 [8 markah]

- (b) (i) Sketch triangle $P'R'S'$, which has different shape from triangle PRS such that $P'R' = PR$, $R'S' = RS$ and $\angle R'P'S' = \angle RPS$,
Lakar segitiga $P'R'S'$, yang mempunyai bentuk yang berlainan daripada segitiga PRS dengan keadaan $P'R' = PR$, $R'S' = RS$ dan $\angle R'P'S' = \angle RPS$,

- (ii) State the value of angle $P'S'R'$.
Nyatakan nilai sudut $P'S'R'$.

[2 marks]
 [2 markah]

END OF QUESTION PAPER
 KERTAS SOALAN TAMAT