

3472/2  
Additional  
Mathematics  
Paper 2  
Oktober  
2007  
2 ½ hours

**JABATAN PELAJARAN TERENGGANU**  
*DENGAN KERJASAMA*  
PERSIDANGAN KEBANGSAAN PENGETUA  
SEKOLAH MENENGAH MALAYSIA  
CAWANGAN TERENGGANU

**PEPERIKSAAN AKHIR TAHUN 2007**  
**TINGKATAN 4**

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**ADDITIONAL MATHEMATICS**

Paper 2

Two hours thirty minutes

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

1. *This question paper consists of two sections : Section A and Section B*
2. *Answer all questions in Section A and six questions from Section B.*
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 3.*
8. *You may use a non-programmable scientific calculator and a four-figure mathematical table.*

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This question paper consists of 15 printed pages.

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

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

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

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

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

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

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

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

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

### STATISTIK (STATISTICS)

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

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

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

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

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

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

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

### GEOMETRI (GEOMETRY)

- Jarak (Distance)  

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

$$(x, y) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$
- Titik yang membahagi suatu tembereng garis  
 (A point dividing a segment of a line)  

$$(x, y) = \left( \frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n} \right)$$
- Luas segi tiga (Area of triangle) =  

$$\frac{1}{2} |(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)|$$

### TRIGONOMETRI (TRIGONOMETRY)

- Panjang lengkok,  $s = j\theta$   
 Arc length,  $s = r\theta$
- Luas sektor,  $L = \frac{1}{2} j^2 \theta$   
 Area of sector =  $\frac{1}{2} r^2 \theta$
- $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- $a^2 = b^2 + c^2 - 2bc \cos A$   
 $a^2 = b^2 + c^2 - 2bc \cos A$
- Luas segi tiga (Area of triangle)  

$$= \frac{1}{2} ab \sin C$$

### KALKULUS (CALCULUS)

- $y = uv$   

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

## SECTION A

[40 marks]

*Answer all questions in this section.*

1 Solve the simultaneous equations  $y + x = 4$  and  $x^2 + 2x + y = 10$ . [5 marks]

2 Given that  $g : x \rightarrow 4 - 2x$  and  $h : x \rightarrow 2 + x^2$ , find

(a)  $g^{-1}(x)$  [2 mark]

(b)  $g^{-1}h(x)$  [2 mark]

(c)  $f(x)$  such that  $fg(x) = \frac{2}{2-x}$  [2 mark]

3 Express  $f(x) = 2(4x - x^2) - 5$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are constants. [2 mark]

(a) Determine the maximum or minimum value of  $f(x)$  and state the corresponding value of  $x$ . [2 marks]

(b) Sketch a graph for  $f(x)$ . [3 marks]

Marks	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80
Number of Pupil	6	9	14	7	4

Table 1

4 Table 1 represents the distribution of the marks obtained by 40 pupils in a test. Calculate

(a) the median mark. [3 marks]

(b) the standard deviation of the distribution. [5 marks]

**BAHAGIAN A**

[40 markah]

*Jawab semua soalan dalam bahagian ini.*

1 Selesaikan persamaan serentak  $y + x = 4$  and  $x^2 + 2x + y = 10$ . [5 markah]

2 Diberi  $g : x \rightarrow 4 - 2x$  dan  $h : x \rightarrow 2 + x^2$ , cari

(a)  $g^{-1}(x)$  [2 markah]

(b)  $g^{-1}h(x)$  [2 markah]

(c)  $f(x)$  dengan keadaan  $fg(x) = \frac{2}{2 - x}$  [2 markah]

3 Ungkapkan  $f(x) = 2(4x - x^2) - 5$  dalam bentuk  $a(x + b)^2 + c$  di mana  $a$ ,  $b$  dan  $c$  adalah pemalar. [2 markah]

(a) Tentukan nilai maksimum atau minimum bagi  $f(x)$  dan nyatakan nilai  $x$  yang sepadan. [2 markah]

(b) Lakarkan graf  $f(x)$ . [3 markah]

Markah	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80
Bilangan Murid	6	9	14	7	4

Jadual 1

4 Jadual 1 mewakili taburan markah bagi 40 orang murid dalam satu ujian. Hitungkan

(a) markah median. [3 markah]

(b) sisihan piawai bagi taburan markah itu. [5 markah]

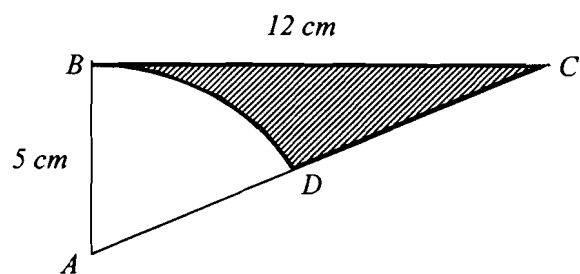


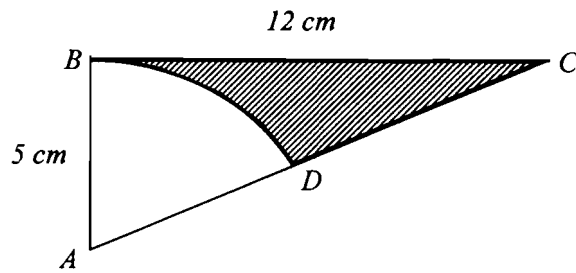
Diagram 1

- 5 Diagram 1 shows  $\triangle ABC$ , where  $AB = 5$  cm,  $BC = 12$  cm and  $\angle ABC = 90^\circ$ .  
A circular arc  $BD$  with the centre at  $A$ , is drawn to meet the hypotenuse  $AC$  at point  $D$ .  
Calculate

- (a) the angle  $BAD$ , in radian, [1 marks]  
 (b) the perimeter of the shaded region, [4 marks]  
 (c) the area of the shaded region [3 marks]

[Use  $\pi = 3.142$ ]

- 6 (a) Solve the equation  $16^{3x-2} = \frac{2}{\sqrt{4^x-4}}$  [3 marks]  
 (b) Given that  $\log_5 2 = r$  and  $\log_5 6 = s$ , express  $\log_5 3.6$  in terms of  $r$  and  $s$ . [3 marks]



Rajah 1

- 5 Rajah 1 menunjukkan  $\triangle ABC$ , dengan  $AB = 5$  cm,  $BC = 12$  cm dan  $\angle ABC = 90^\circ$ .  
Sebuah bulatan dengan lengkung  $BD$  berpusat di  $A$ , bertemu dengan hipotenus  $AC$  pada titik  $D$ .  
Hitungkan

- (a) sudut  $BAD$ , dalam radian, [1 markah]  
 (b) perimeter kawasan berlorek, [4 markah]  
 (c) luas kawasan berlorek [3 markah]  
 [Use  $\pi = 3.142$ ]

- 6 (a) Selesaikan persamaan  $16^{3x-2} = \frac{2}{\sqrt{4^x-4}}$  [3 markah]  
 (b) Diberi  $\log_5 2 = r$  dan  $\log_5 6 = s$ , ungkapkan  $\log_5 3.6$  dalam sebutan  $r$  dan  $s$ . [3 markah]

## SECTION B

[60 marks]

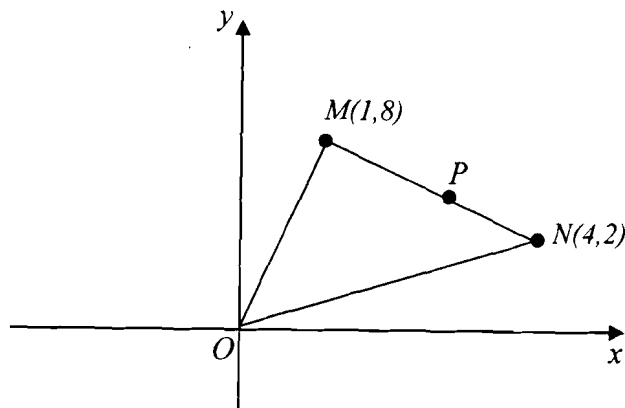
*Answer six questions from this section.*

Diagram 2

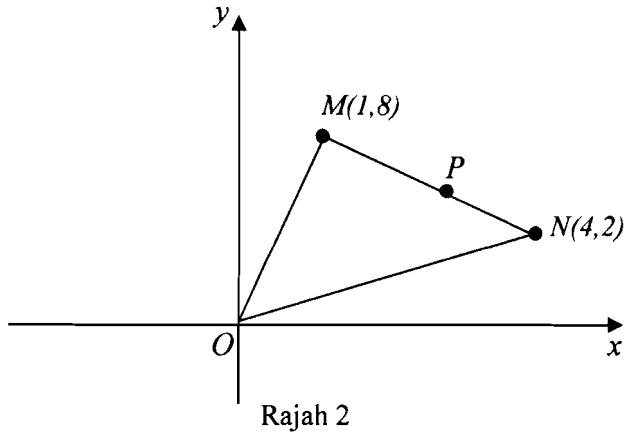
- 7 Diagram 2 shows a triangle  $MON$  where  $O$  is the origin. Point  $P$  lies on the straight line  $MN$ .
- Find the equation of  $MN$ . [2 marks]
  - Calculate the area, in  $\text{unit}^2$  of triangle  $MON$ . [2 marks]
  - Given that  $MP : PN = 2 : 1$ , find the coordinates of  $P$ . [3 marks]
  - A point  $S$  moves such that its distance from point  $N$  is always 6 unit, find the equation of the locus of  $S$ . [3 marks]
- 8 (a) Given the functions  $g : x \rightarrow \frac{2x + 3}{4 - x}, x \neq 4$  and  $g^{-1} : x \rightarrow \frac{px - 3}{x + q}, x \neq 4$ , where  $p$  and  $q$  are constants, find the value of  $p$  and  $q$ . [3 marks]
- (b) The straight line  $y = 4x + 1$  does not intersect the curve  $y = 2x^2 - x + k$ . Find the range of values of  $k$ . [3 marks]
- (c) Determine the coordinates of the turning point of the graph of the quadratic function  $f(x) = 5 - 2(x + 1)^2$ . Hence, sketch the graph of the function. [4 marks]



## BAHAGIAN B

[60 marks]

Jawab Enam Soalan Dari Bahagian ini.



7 Rajah 2 menunjukkan segitiga  $MON$  dengan  $O$  sebagai asalan. Titik  $P$  terletak pada garis lurus  $MN$ .

- (a) Cari persamaan  $MN$ . [2 marks]  
 (b) Hitung luas, dalam unit<sup>2</sup> segitiga  $MON$  [2 marks]  
 (c) Diberi  $MP : PN = 2 : 1$ , carikan koordinat bagi  $P$  [3 marks]  
 (d) Titik  $S$  bergerak sedemikian hingga jaraknya dari titik  $N$  sentiasa 6 unit, cari persamaan lokus bagi  $S$ . [3 marks]

- 8 (a) Diberi fungsi  $g : x \rightarrow \frac{2x + 3}{4 - x}$ ,  $x \neq 4$  dan  $g^{-1} : x \rightarrow \frac{px - 3}{x + q}$ ,  $x \neq 4$ ,  
 di mana  $p$  and  $q$  adalah pemalar, carikan nilai  $p$  dan nilai  $q$ . [3 markah]  
 (b) Garis lurus  $y = 4x + 1$  tidak menyilang kepada lengkung  $y = 2x^2 - x + k$ .  
 Cari julat nilai  $k$ . [3 markah]  
 (d) Tentukan titik pusingan bagi graf fungsi kuadratik  $f(x) = 5 - 2(x + 1)^2$ .  
 Seterusnya, lakarkan graf bagi fungsi tersebut. [4 markah]

- 9 Table 1 shows the distribution of marks of 120 students in mathematics test.

Marks	Number of students
31-40	3
41-50	14
51-60	34
61-70	50
71-80	15
81-90	4

**Table 1**

- (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 based on the data from the table.  
Subsequently, estimate the mode mark. [4 marks]
- (b) Calculate the mean mark. [3 marks]
- (c) Without drawing the ogive, calculate the third quartile mark. [3 marks]
- 10 (a) Given that  $y = 2x^2 - x + 1$ , use differentiation to find the small change in  $y$  when  $x$  increases from 5 to 5.01 [3 marks]
- (b) Given  $V = \frac{2}{2 - 3r}$ ,
- (i) find  $\frac{dV}{dr}$ ,
- (ii) when  $r = 1$  unit, it is increasing at a rate of 1.5 units per minute, find the corresponding rate of increase in  $V$ . [4 marks]
- (c) Differentiate  $2x^3(5 - 2x)^4$  with respect to  $x$ . [3 marks]

- 9 Jadual 1 menunjukkan taburan markah bagi 120 pelajar dalam satu ujian Matematik.

Markah	Bilangan pelajar
31-40	3
41-50	14
51-60	34
61-70	50
71-80	15
81-90	4

**Jadual 1**

- (a) Dengan menggunakan skala 2 cm kepada 10 markah pada paksi mengufuk dan 2 cm kepada 5 orang pelajar pada paksi mencancang, lukis sebuah histogram berdasarkan data dari jadual.  
Seterusnya, anggarkan markah mod. [4 markah]
- (b) Hitungkan markah min. [3 markah]
- (c) Tanpa melukis ogif, hitungkan markah kuartil ketiga. [3 markah]
- 10 (a) Diberi  $y = 2x^2 - x + 1$ , gunakan kaedah pembezaan untuk mencari perubahan kecil bagi  $y$  apabila  $x$  menokok daripada 5 kepada 5.01 [3 markah]
- (b) Diberi  $V = \frac{2}{2 - 3r}$ ,
- (i) carikan  $\frac{dV}{dr}$ ,
- (ii) jika  $r$  berubah dengan kadar 1.5 unit seminit, carikan kadar perubahan bagi  $V$  ketika  $r = 1$  unit. [4 marks]
- (c) Bezakan  $2x^3(5 - 2x)^4$  terhadap  $x$ . [3 marks]

- 11 Table 2 shows the price indices and percentage of usage of four items, A, B, C and D, which are the main ingredients in the production of a type of cake.

Item	Price index for the year 2006 Based on the year 2003	Percentage of usage ( % )
A	135	36
B	125	30
C	x	10
D	130	24

**Table 2**

(a) Calculate

- (i) the price of B in the year 2003 if its price in the year 2006 is RM35.40.
- (ii) the price index of D in the year 2006 based on the year 2000 if its price index in the year 2003 based on the year 2000 is 120.

[5 marks]

(b) The composite index number of the expenditure for the year 2006 based on the year 2003 is 129. Calculate

- (i) the value of  $x$ ,
- (ii) the price of a cake in year 2003 if the corresponding price in the year 2006 is RM25.80

[5 marks]

- 11 Jadual 2 menunjukkan indeks harga dan peratus penggunaan empat jenis bahan A, B, C and D, yang menjadi bahan utama dalam menghasilkan sejenis kek.

Bahan	Indeks harga tahun 2006 Berasaskan tahun 2003	Peratusan Penggunaan ( % )
A	135	36
B	125	30
C	x	10
D	130	24

**Table 2**

(a) Hitungkan

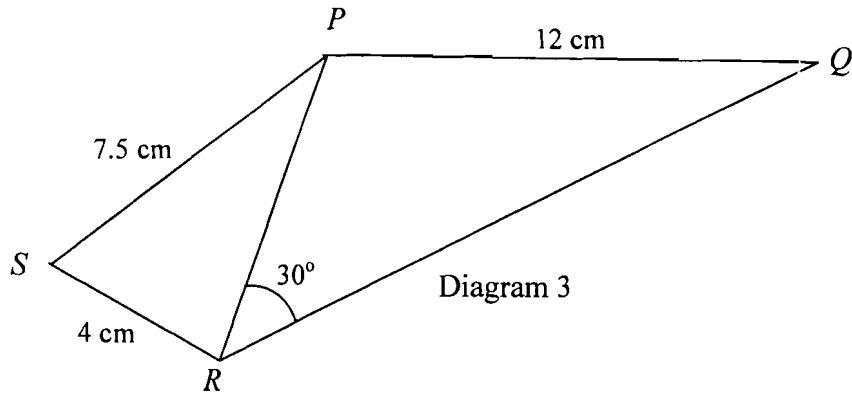
- (i) harga B dalam tahun 2003 jika harganya pada tahun 2006 ialah RM35.40
- (ii) indeks harga D pada tahun 2006 berasaskan tahun 2000 jika indeks harganya pada tahun 2003 berasaskan tahun 2000 ialah 120.

[5 marks]

(b) Nombor indeks gubahan penghasilan kek itu pada tahun 2006 berasaskan tahun 2003 ialah 129. Hitungkan

- (i) nilai  $x$ ,
- (ii) harga kek pada tahun 2003 jika harga yang sepadan pada tahun 2006 ialah RM25.80

[5 marks]



12 Diagram 3 shows a quadrilateral PQRS. The area of triangle PSR is  $12 \text{ cm}^2$  and  $\angle PSR$  is acute.

Calculate

- (a)  $\angle PSR$  [2 marks]
- (b) the length, in cm, of PR [2 marks]
- (c)  $\angle QPR$  [3 marks]
- (d) the area, in  $\text{cm}^2$ , quadrilateral PQRS [3 marks]

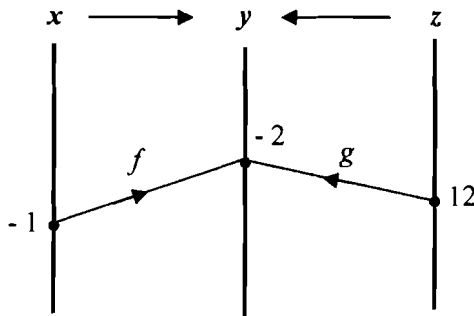


Diagram 4

13 Diagram 4 shows the mapping of x onto y by  $f(x) = kx + 1$  and the mapping of z onto y by

$g(z) = \frac{2 + mz}{5}$ . Find

- (a)  $f^{-1}(-2)$  [1 marks]
- (b)  $g^{-1}f(-1)$  [2 marks]
- (c) the value of k and m [3 marks]
- (d)  $g^{-1}(y)$  [2 marks]
- (e) the function that mapped x onto z [2 marks]

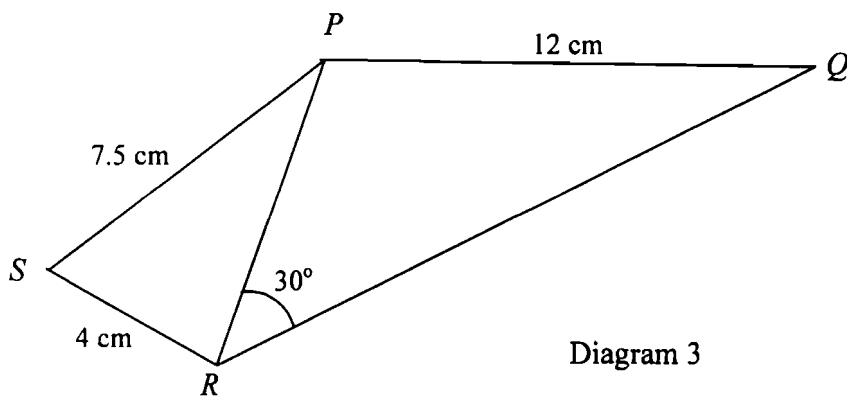


Diagram 3

12 Rajah 3 menunjukkan sebuah sisiempat  $PQRS$ . Luas segitiga  $PSR$  ialah  $12 \text{ cm}^2$  dan  $\angle PSR$  ialah tirus. Hitungkan

- (a)  $\angle PSR$  [2 markah]
- (b) panjang, dalam cm, bagi  $PR$  [2 markah]
- (c)  $\angle QPR$  [3 markah]
- (d) luas, dalam  $\text{cm}^2$ , sisiempat  $PQRS$  [3 markah]

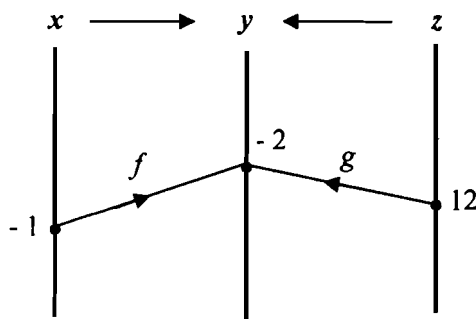


Diagram 4

13 Rajah 4 mewakili pemetaan dari  $x$  kepada  $y$  oleh fungsi  $f : x \rightarrow kx + 1$  dan pemetaan  $z$  kepada  $y$

oleh fungsi  $g : z \rightarrow \frac{2 + mz}{5}$ . Carikan

- (a)  $f^{-1}(-2)$  [1 marks]
- (b)  $g^{-1}f(-1)$  [2 marks]
- (c) nilai  $k$  dan nilai  $m$  [3 marks]
- (d)  $g^{-1}(y)$  [2 marks]
- (e) fungsi yang memetakan  $x$  kepada  $z$  [2 marks]

**KERTAS SOALAN TAMAT**