

3472/1  
**Form Four**  
**Additional Mathematics**  
 Paper 1  
**2009**  
 2 hours

NO.KAD PENGENALAN/I.C NUMBER

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Nama Calon :.....  
 Tingkatan : .....

**PEPERIKSAAN SELARAS AKHIR TAHUN**  
**SEKOLAH-SEKOLAH MENENGAH NEGERI MELAKA**  
**Kelolaan**  
**PEJABAT PELAJARAN DAERAH**  
**JASIN \* ALOR GAJAH \* MELAKA TENGAH**  
 Dengan kerjasama :  
**JABATAN PELAJARAN NEGERI MELAKA**  
**TINGKATAN 4 2009**

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**ADDITIONAL MATHEMATICS**  
**Paper 1**  
**2 hours**

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**JANGAN BUKA KERTAS SOALAN INI**  
**SEHINGGA DIBERITAHU**

1. *Tuliskan nombor kad pengenalan, nama dan tingkatan anda pada ruang yang disediakan.*

Write your **I.C. number, name** and **class** in the space provided.

2. *Calon dikehendaki membaca arahan di halaman 2 dan halaman 3*

Candidates are required to read the instructions on page 2 and 3 .

<i>Examiner's Code</i>		
Question	Full Marks	Marks Acquired
1	2	
2	3	
3	3	
4	4	
5	3	
6	3	
7	3	
8	3	
9	3	
10	3	
11	3	
12	3	
13	4	
14	4	
15	3	
16	4	
17	3	
18	3	
19	3	
20	4	
21	3	
22	3	
23	4	
24	3	
25	3	
Total	80	

1. *Kertas soalan ini mengandungi 25 soalan.*
2. *Jawab **semua** soalan.*
3. *Bagi setiap soalan berikan **SATU** jawapan sahaja.*
4. *Jawapan hendaklah ditulis dengan jelas dalam ruang yang disediakan dalam kertas soalan.*
5. *Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.*
6. *Sekiranya anda hendak menukarkan jawapan, batalkan kerja mengira yang telah dibuat. Kemudian tuliskan jawapan yang baru.*
7. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan.*
8. *Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.*
9. *Satu senarai rumus disediakan di halaman 4 hingga 6.*
10. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*
11. *Kertas soalan ini hendaklah diserahkan di akhir peperiksaan.*

### **INFORMATIONS FOR CANDIDATES**

1. *This question paper consists of 25 questions.*
2. *Answer **ALL** questions.*
3. *Give only **ONE** answer for each question.*
4. *Write your answer clearly in the spaces provided in the question paper.*
5. *Show your working. It may help you to get marks.*
6. *If you wish to change your answer, cross out the work that you have done. Then write down the new answer.*
7. *The diagram in the questions provided are not drawn to scale unless stated.*
8. *The marks allocated for each question and sub-part of a question are shown in brackets.*
9. *A list of formulae is provided on pages 4 to 6.*
10. *You may use a non-programmable scientific calculator.*
11. *This question paper must be handed in at the end of the examination.*

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

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

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

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

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

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

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

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

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

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

### ALGEBRA

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

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

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

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

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

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

### CALCULUS

$$4 \quad \text{Area under a curve} = \int_a^b y \, dx \quad \text{or} \quad \int_a^b x \, dy$$

$$5 \quad \text{Volume generated} \\ = \int_a^b \pi y^2 \, dx \quad \text{or}$$

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

### STATISTICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### GEOMETRY

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

$$2 \quad \text{Midpoint} = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad \text{A point dividing a segment of a line} \\ (x, y) = \left( \frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$$

$$4 \quad \text{Area of a triangle} =$$

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

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

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

### TRIGONOMETRY

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

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

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

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

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

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

$$7 \quad \cos 2A = \cos^2 A - \sin^2 A \\ = 2\cos^2 A - 1 \\ = 1 - 2\sin^2 A$$

$$8 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

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

$$10 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$11 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

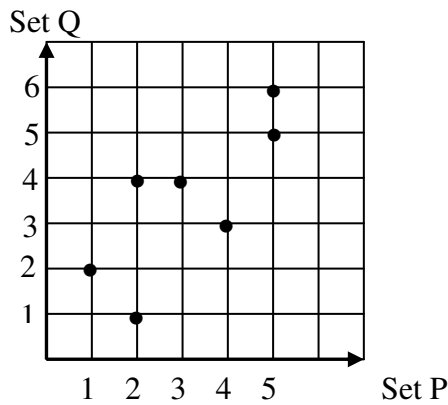
$$12 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** questions.  
Jawab **semua** soalan.

1.



The graph above shows the relation between set P and set Q.  
Graf di atas menunjukkan hubungan di antara set P dan set Q.

- (a) State the object of image 5.  
*Nyatakan objek bagi imej 5.*
- (b) State the type of relation.  
*Nyatakan jenis hubungan.*

[2 marks]

Answer : (a).....

(b).....

1
2

2. Given that  $f(x) = |3x - 8|$ , find the value of  
*Diberi bahawa  $f(x) = |3x - 8|$ , cari nilai*

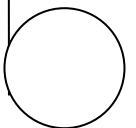
- (a)  $f(-2)$
- (b) the objects which mapped onto 4.  
*objek yang dipetakan kepada 4.*

[3 marks]

Answer : (a) .....

(b).....

2
3

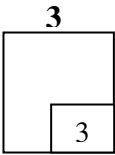


3. Given the function  $f: x \longrightarrow x + 1$  and  $g: x \longrightarrow 2x + 1$ , find  
 Diberi fungsi  $f: x \longrightarrow x + 1$  dan  $g: x \longrightarrow 2x + 1$ , cari

(a)  $gf(x)$

(b) the value of  $x$  if  $gf(x) = 7x - 2$   
 nilai  $x$  jika  $gf(x) = 7x - 2$

[3 marks]



Answer : (a).....

(b).....

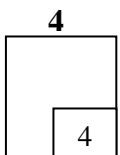
4. Given the function  $f: x \longrightarrow \frac{2x}{x - a}$ ,  $x \neq a$ . Find

Diberi fungsi  $f: x \longrightarrow \frac{2x}{x - a}$ ,  $x \neq a$ . Cari

(a) the value of  $a$  if  $f(8) = 4$ ,  
 nilai  $a$  jika  $f(8) = 4$ ,

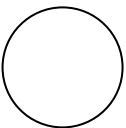
(b)  $f^{-1}(3)$

[4 marks]



Answer : (a).....

(b) .....



5. The roots of the equation  $ax^2 + bx - 6 = 0$  are  $-2$  and  $\frac{3}{4}$ . Find the values of  $a$  and  $b$ .

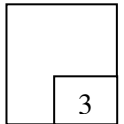
*Punca-punca persamaan  $ax^2 + bx - 6 = 0$  ialah  $-2$  and  $\frac{3}{4}$ . Cari nilai-nilai  $a$  dan  $b$ .*

[3 marks]

Answer :  $a = \dots\dots\dots$

$b = \dots\dots\dots$

5



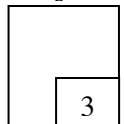
6. The quadratic equation  $x^2 - 2x + 1 = k(-x - 2)$  has two real and equal roots. Find the possible values of  $k$ .

*Persamaan kuadratik  $x^2 - 2x + 1 = k(-x - 2)$  mempunyai dua nilai nyata yang sama. Cari nilai-nilai  $k$  yang mungkin.*

[3 marks]

Answer :  $\dots\dots\dots$

6



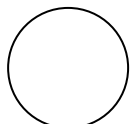
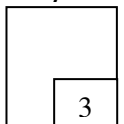
7. Given that  $\alpha$  and  $\beta$  are the roots of the quadratic equation  $x^2 - 6x + 5 = 0$ , form the

quadratic equation whose roots are  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$ . [3 marks]

*Diberi bahawa  $\alpha$  dan  $\beta$  adalah nilai-nilai punca bagi persamaan kuadratik  $x^2 - 6x + 5 = 0$ , bentukkan persamaan kuadratik yang mempunyai punca-punca  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$ .*

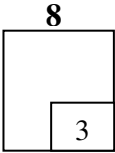
Answer :  $\dots\dots\dots$

7



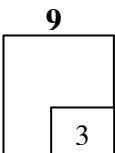
[See overleaf]  
**SULIT**

8. Solve the quadratic equation  $5x(1 - 2x) = (x - 1)(x + 4)$ . Give your answers correct to four significant figures. [3 marks]  
*Selesaikan persamaan kuadratik  $5x(1 - 2x) = (x - 1)(x + 4)$ . Beri jawapan anda kepada empat angka bererti.*

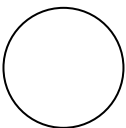


*Answer : .....*

9. By the method of completing the square, find the coordinates of the minimum point of  $y = x^2 - 6x + 7$ . [3 marks]  
*Dengan menggunakan kaedah penyempurnaan kuasa dua, tentukan koordinat titik minimum bagi  $y = x^2 - 6x + 7$ .*



*Answer : .....*





10.

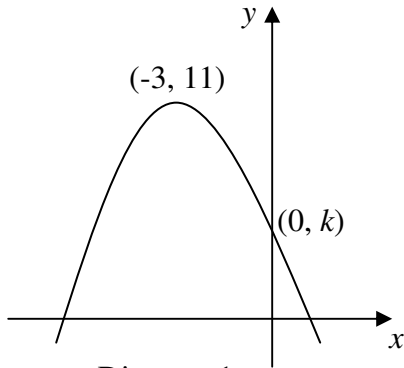


Diagram 1  
Rajah 1

Diagram 1 shows part of the graph of the function  $y = p - (x + n)^2$ , where  $p$  and  $n$  are constants. Find the value of

Rajah 1 menunjukkan sebahagian daripada graf fungsi  $y = p - (x + n)^2$ , di mana  $p$  dan  $n$  adalah pemalar. Cari nilai

- (a)  $p$ ,
- (b)  $n$
- (c)  $k$

[3 marks]

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

$n = \dots\dots\dots$

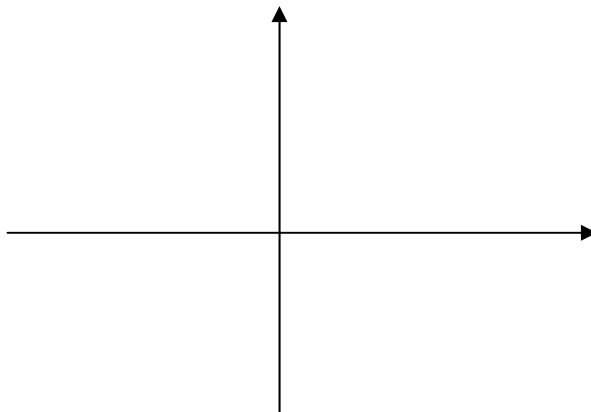
$k = \dots\dots\dots$

<b>10</b>
3

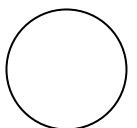
11. Given the function  $y = 3 - (x + 2)^2$ . Sketch the curve of the function. [ 3 marks ]

Diberi fungsi  $y = 3 - (x + 2)^2$ . Lakarkan garis lengkung fungsi itu.

Answer :



<b>11</b>
3



**12.** Solve  $4^{3x} - 16^{x+1} = 0$ .

[3 marks]

*Selesaikan*  $4^{3x} - 16^{x+1} = 0$ .

**12**

3

*Answer* : .....

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**13.** Solve  $2\log_5 2 + \log_5 (4x - 1) = 1 + \log_5 (x + 8)$ .

[4 marks]

*Selesaikan*  $2\log_5 2 + \log_5 (4x - 1) = 1 + \log_5 (x + 8)$ .

**13**

4

*Answer* : .....

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**14.** Solve  $\log_2 x - \log_4 x = -2$ .

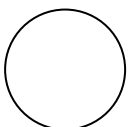
[4 marks]

*Selesaikan*  $\log_2 x - \log_4 x = -2$ .

**14**

4

*Answer* : .....



15. Express  $3^{n+2} - 3^n + 10(3^{n-1})$  in the simplest form. [3 marks]

Ungkapkan  $3^{n+2} - 3^n + 10(3^{n-1})$  dalam bentuk yang termudah.

Answer : .....

15
3

16.

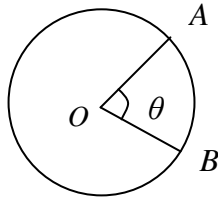


Diagram 2  
Rajah 2

Diagram 2 shows a circle with centre  $O$ . The length of the minor arc  $AB$  is 12.4 and the angle of the major sector  $AOB$  is  $330^\circ$ . Using  $\pi = 3.142$ , find

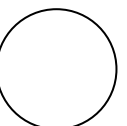
Rajah 2 menunjukkan sebuah bulatan yang berpusat  $O$ . Panjang lengkuk minor  $AB$  ialah 12.4 dan sudut sektor major  $AOB$  ialah  $330^\circ$ . Dengan menggunakan  $\pi = 3.142$ , cari

- a) the value of  $\theta$  in radians. (Give your answer correct to four significant figures)  
nilai  $\theta$  dalam radian. (Beri jawapan anda betul kepada empat angka bererti)
- b) the length, in cm, of the radius of the circle. [4 marks]  
panjang jejari bulatan dalam cm.

Answer : (a) .....

(b).....

16
4



17. Diagram 3 shows a sector  $OLM$  with centre  $O$ .

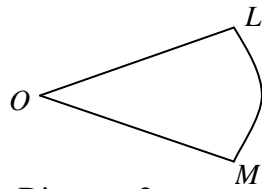


Diagram 3  
Rajah 3

Given  $OL = 12$  cm and the length of arc  $LM = 14.4$  cm. Find  $\angle LOM$ , in degree and minutes. (use  $\pi = 3.142$ ) [3 marks]

Diberi  $OL = 12$  cm dan panjang lengkok  $LM = 14.4$  cm. Cari  $\angle LOM$ , dalam darjah dan minit. (gunakan  $\pi = 3.142$ )

17
3

Answer : .....

18. The perimeter of a sector of a circle with radius 4 cm is 20 cm. Find the area of the sector. [3 marks]

Perimeter sektor suatu bulatan dengan jejari 4 cm ialah 20 cm. Cari luas sektor tersebut.

18
3

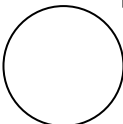
Answer : .....

19. Differentiate  $3x^5(2x - 7)^4$  with respect to  $x$ . [3 marks]

Bezakan  $3x^5(2x - 7)^4$  terhadap  $x$ .

19
3

Answer : .....



**20.** Given that  $y = 3x^2 - x + 4$ ,

*Diberi bahawa  $y = 3x^2 - x + 4$ ,*

(a) find the value of  $\frac{dy}{dx}$  when  $x = 2$ ,

*cari nilai  $\frac{dy}{dx}$  apabila  $x = 2$ ,*

(b) calculate the small change in  $y$  when  $x$  increases from 2 to 2.5. [4 marks]

*kirakan perubahan kecil  $y$  apabila  $x$  bertambah dari 2 kepada 2.5*

*Answer :* (a).....

(b).....

<b>20</b>
4

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**21.** A set of data consists of five numbers. The sum of the numbers is 175 and the sum of the squares of the numbers is 6845. Find,

*Satu set data mengandungi lima nombor. Hasil tambah nombor-nombor itu ialah 175 dan hasil tambah kuasa dua nombor-nombor ialah 6845. Cari,*

(a) the mean,  
*min*

(b) the standard deviation.  
*sisihan piawai.*

for the five numbers

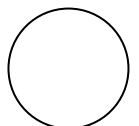
*bagi lima nombor itu*

[3 marks]

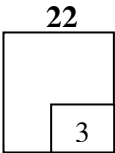
*Answer :* (a) .....

(b) .....

<b>21</b>
3

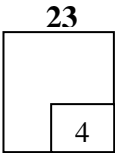


22. The curve  $y = -2x^2 + 8x - 3$  has a maximum point at  $x = p$ , where  $p$  is a constant.  
 Find the value of  $p$ . [3 marks]  
*Suatu lengkung  $y = -2x^2 + 8x - 3$  mempunyai titik maksimum di  $x = p$ , di mana  $p$  ialah pemalar.  
 Cari nilai  $p$ .*

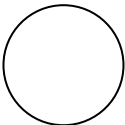


Answer :  $p = \dots\dots\dots$

23. The radius of a spherical balloon is increasing at the rate of  $x \text{ cms}^{-1}$ .  
 Given that the rate of change of the volume of the balloon is  $25\pi \text{ cm}^3 \text{ s}^{-1}$  when  
 its radius is 5 cm. Find the value of  $x$ . [ $V = \frac{4}{3}\pi r^3$ ] [4 marks]  
*Jejari untuk suatu belon sfera bertambah dengan kadar  $x \text{ cms}^{-1}$ . Diberi kadar perubahan isipadu bagi  
 belon ialah  $25\pi \text{ cm}^3 \text{ s}^{-1}$  apabila jejari nya ialah 5 cm.  
 Cari nilai  $x$ . [ $V = \frac{4}{3}\pi r^3$ ]*



Answer :  $x = \dots\dots\dots$



24. A set of 8 numbers has a mean of 16.8 and a standard deviation of 2.5.  
 If every number of the set of data is multiplied by 2 and then added by 3, find  
*Satu set lapan nombor mempunyai min 16.8 dan sisihan piawai 2.5. Jika setiap nombor dalam set data didarabkan dengan 2 dan kemudiannya ditambah dengan 3, cari*

- (a) the new mean,  
*min baru*
- (b) the new standard deviation of the set of data. [3 marks]  
*Sisihan piawai baru bagi set data itu.*

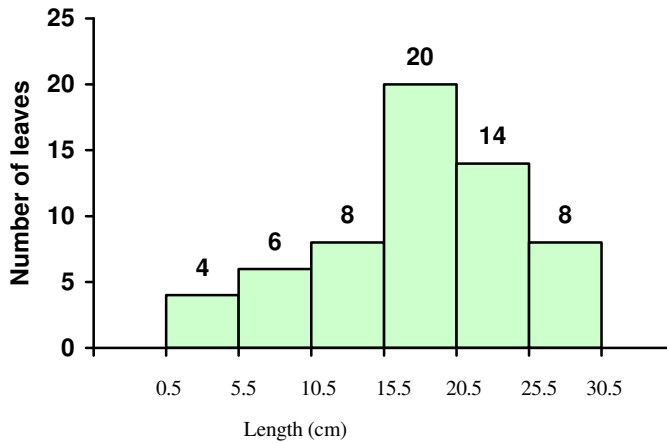
Answer : (a) .....

(b).....

24
3

25. The diagram belows shows a histogram which represent the distribution of the length of 60 leaves collected from a garden.

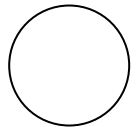
*Rajah di bawah menunjukkan satu histogram yang mewakili taburan panjang bagi 60 keping daun yang dikumpul dari taman.*



Without using an ogive, calculate the median. [3 marks]  
*Tanpa menggunakan ogif, hitungkan median panjang.*

Answer : .....

25
3



END OF QUESTION PAPER





**SULIT**  
**3472/1**  
**Additional**  
**Mathematics**  
**Paper 1**  
**2009**

**PEJABAT PENDIDIKAN DAERAH**  
**JASIN \* ALOR GAJAH \* MELAKA TENGAH**  
**JABATAN PENDIDIKAN MELAKA**  
**KEMENTERIAN PELAJARAN MALAYSIA**

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

**2009**

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**ADDITIONAL MATHEMATICS**

Paper 1

**MARKING SCHEME**

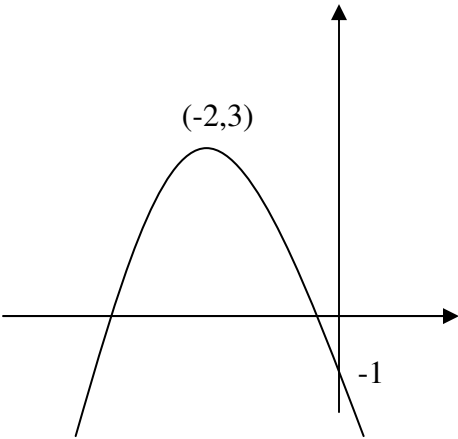
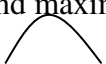
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This marking scheme consists of 6 printed pages

**PAPER 1 MARKING SCHEME FORM 4 2009 (PEP. AKHIR TAHUN)  
3472/1**

Number	Solution and marking scheme	Sub Marks	Full Marks
1			
(a)	5	<b>1</b>	<b>2</b>
(b)	Many-to-many	<b>1</b>	
2			
(a)	14	<b>1</b>	<b>3</b>
(b)	$x = 4$ or $x = \frac{4}{3}$ B1 : $4 = 3x - 8$	<b>2</b>	
3			
(a)	$2x + 3$ B1 : $2(x + 1) + 1$	<b>2</b>	<b>3</b>
(b)	$x = 1$	<b>1</b>	
4			
(a)	$a = 4$ B1 : $\frac{2(8)}{8 - a} = 4$	<b>2</b>	<b>4</b>
(b)	$x = 12$ $f^{-1}(3) = x$ $f(x) = 3$ B1: $\frac{2x}{x - 4} = 3$	<b>2</b>	
5			
	$a = 4, b = 5$ B1 : $x^2 - (-2 + \frac{3}{4})x + (-2)(\frac{3}{4}) = 0$ or $(x + 2)(4x - 3) = 0$	<b>3</b> <b>2</b>	<b>3</b>
6			
	$k = 0$ or $12$ B2 : $k^2 - 12k = 0$ B1: $(-2 + k)^2 - 4(1)(1 + 2k) = 0$	<b>3</b> <b>2</b> <b>1</b>	<b>3</b>

Number	Solution and marking scheme	Sub Marks	Full Marks
7	$5x^2 - 6x + 5 = 0$ or equivalent B2: $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{6}{7}, \left(\frac{1}{\alpha}\right)\left(\frac{1}{\beta}\right) = \frac{4}{7}$ B1: $\alpha + \beta = 6$ or $\alpha\beta = 5$	3 2 1	<b>3</b>
8	0.7007 and $-0.5189$ B2: $\frac{-(-2) \pm \sqrt{(-2)^2 - 4(11)(-4)}}{2(11)}$ B1: $11x^2 - 2x - 4 = 0$	3 2 1	<b>3</b>
9	Minimum point (3, -2) B2: $(x-3)^2 - 2$ B1: $x^2 - 6x + \left(-\frac{6}{2}\right)^2 - \left(-\frac{6}{2}\right)^2 + 7$	3 2 1	<b>3</b>
10	$p = 11,$ $n = 3,$ $k = 2$	1 1 1	<b>3</b>
11	 B2: Shape and maximum point or y-intercept B1: Shape 	3 2 1	<b>3</b>
12	$x = 2$ B2: $3x = 2x + 2$ B1: $4^{3x} = 4^{2x+2}$	3 2 1	<b>3</b>

Number	Solution and marking scheme	Sub Marks	Full Marks
13	$x = 4$ B3: $16x - 4 = 5x + 40$ B2 : $\log_5(2^2(4x - 1)) = \log_5 5(x + 8)$ B1 : $\log_5 2^2$ or $\log_5 5$	4 3 2 1	<b>4</b>
14	$x = \frac{1}{16}$ B3 : $x(x^{-\frac{1}{2}}) = \frac{1}{4}$ B2 : $\log_2 \frac{x}{\sqrt{x}} = \log_2 \frac{1}{4}$ B1: $\frac{\log_2 x}{\log_2 4}$ or $\log_2 2^{-2}$	4 3 2 1	<b>4</b>
15	$3^n \left( \frac{34}{3} \right)$ or $34 (3^{n-1})$ B2 : $3^n \left( 3^2 - 1 + \frac{10}{3} \right)$ B1 : $3^n (3^2) - 3^n + 10 \left( \frac{3^n}{3^1} \right)$	3 2 1	<b>3</b>
16	a) 0.5237 B1 : seen $30^\circ$ b) 23.68 B1: $\frac{12.4}{0.5237}$	2 1 2 1	<b>4</b>

Number	Solution and marking scheme	Sub Marks	Full Marks
17	$68.75^\circ$ or $68^\circ 45'$ B2: $1.2 \times \frac{180^\circ}{3.142}$ B1: 1.2	3 2 1	<b>3</b>
18	24 B2: $\frac{1}{2}(4)^2(3)$ B1: 12 @ 3	3 2 1	<b>3</b>
19	$3x^4(18x-35)(2x-7)^3$ B2: $3x^5 \cdot 8(2x-7)^3 + (2x-7)^4(15x^4)$ B1: $15x^4 @ 8(2x-7)^3$	3 2 1	<b>3</b>
20	a) 11 B1: $6x-1$ b) 5.5 B1: Seen : 0.5	2 1 2 1	<b>4</b>
21	(a) mean = 35 (b) 12 B1: $\sqrt{\frac{6845}{5} - (35)^2}$ or equivalent	1 2	<b>3</b>
22	$p = 2$ B2 : $x - 2 = 0$ or $-4p + 8 = 0$ B1 : $-2 \left[ (x-2)^2 - (-2)^2 + \frac{3}{2} \right]$ or $\frac{dy}{dx} = -4x + 8$	3 2 1	<b>3</b>

Number	Solution and marking scheme	Sub Marks	Full Marks
23	0.25 B3 : $\frac{dv}{dt} = \frac{25}{(4)(5^2)}$ or equivalent B2: $\frac{dr}{dt} = 4 \pi r^2$ B1 : $\frac{dr}{dt} = x \text{ cms}^{-1}$ or $\frac{dv}{dt} = 25 \pi \text{ cms}^{-1}$	4 3 2 1	<b>4</b>
24	(a) $(16.8 \times 2) + 3 = 36.6$ (a) $2.5 \times 2 = 5$	2 1	<b>3</b>
25	18.5 B2: $M = 15.5 + \left( \frac{\frac{1}{2}(60) - 18}{20} \right) 5$ $= 15.5 + 3$ B1: 15.5 or 18 or 20 substitute correctly	3 2 1	<b>3</b>

3472/2  
Form 4  
Additional Mathematics  
Paper 2  
2009



$2\frac{1}{2}$  hours

PEPERIKSAAN SELARAS AKHIR TAHUN  
SEKOLAH-SEKOLAH MENENGAH NEGERI MELAKA  
Kelolaan  
PEJABAT PELAJARAN DAERAH  
JASIN \* ALOR GAJAH \* MELAKA TENGAH  
Dengan kerjasama :  
JABATAN PELAJARAN NEGERI MELAKA  
TINGKATAN 4 2009

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**ADDITIONAL MATHEMATICS**

**Paper 2**

$2\frac{1}{2}$  hours

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**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 question 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.*

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Kertas soalan ini mengandungi 11 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

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

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

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

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

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

5 Volume generated

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

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

## GEOMETRY

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

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

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

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

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 =

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



## STATISTICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## TRIGONOMETRY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Section A**  
(40 marks)

*Answer all questions*

1. Solve the following simultaneous equations:

*Selesaikan persamaan serentak berikut:*

$$x^2 - 6y + y^2 = 2x + 2y = 16$$

[5 marks]

2. Given that  $f: x \rightarrow 2x - 1$  and  $g: x \rightarrow \frac{x}{3} + 1$ , find

Diberi  $f: x \rightarrow 2x - 1$  dan  $g: x \rightarrow \frac{x}{3} + 1$ , cari

(a)  $f^{-1}(x)$ ,

[1 mark]

(b)  $f^{-1}g(x)$ ,

[2 marks]

(c)  $h(x)$  such that  $hg(x) = 3x + 6$ .

[3 marks]

$h(x)$  di mana  $hg(x) = 3x + 6$ .

3. Solve the following equations.

*Selesaikan persamaan berikut.*

(a)  $2^{x+3} - 2^{x+2} = 2$

[3 marks]

(b)  $\log_9(x + 9) = 3 \log_9 5$

[3 marks]

- 4.) (a) A set of data consists of four numbers. Given that  $\sum x = 12k$  and  $\sum x^2 = 100$ .

Express the variance in terms of  $k$ .

Diberi satu kumpulan data mengandungi empat nombor. Diberi  $\sum x = 12k$  dan  $\sum x^2 = 100$ .

Ungkapkan varians dalam sebutan  $k$ .

[3 marks]

- (b) A set of positive integers 1,  $m - 1$ , 6 and 8 is arranged in ascending order.

Find the value of  $m$  if

*Satu set integer positif 1,  $m - 1$ , 6 dan 8 disusun dalam bentuk susunan menaik.*

*Cari nilai  $m$  jika*

(i) the mode is 1,

[3 marks]

*mod adalah 1,*

(ii) the mean is 4.

*min adalah 4.*

[3 marks]

5. It is given that the equation of a curve is  $y = x^2 - 8x + 4$ .

Find

*Diberi satu persamaan lengkung adalah  $y = x^2 - 8x + 4$ .*

*Cari*

- (a) the turning point of the curve. [3 marks]  
*Titik pertukaran lengkung tersebut*
- (b) the value of  $x$  if  $y \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 12 = 0$   
*nilai  $x$  jika  $y \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 12 = 0$*  [4 marks]
6. (a) If the line  $x - y = 4k + 2$  does not meet the curve  $y = k(x+1)(x-3)$ , find the range of values of  $k$ . [5 marks]  
*Jika garis lurus  $x - y = 4k + 2$  tidak bersilang dengan garis lengkung  $y = k(x+1)(x-3)$ , cari julat nilai  $k$*
- (b)  $f(x) = x^2 - 6hx + 8h^2 + 1$  has a minimum value of  $t + 2h^2$ , where  $t$  and  $h$  are constants. By completing the square, show that  $t = 1 - 3h^2$  [3 marks]  
 *$f(x) = x^2 - 6hx + 8h^2 + 1$  mempunyai nilai minimum  $t + 2h^2$ , di mana  $t$  dan  $h$  adalah malar. Menggunakan penyempurnaan kuasa dua, tunjukkan bahawa  $t = 1 - 3h^2$*

## Section B

(40 Marks)

Answer four questions from this Section.

7. A point  $P$  moves so that its distance from point  $R(4,3)$  is always 2 units. The point  $S$  moves such that it is always equidistant from point  $Q(6,5)$  and point  $R$ .  
*Satu titik  $P$  bergerak di mana jaraknya dari titik  $R(4,3)$  senantiasa 2 unit. Satu titik  $S$  pula bergerak senantiasa sama jarak dari titik  $Q(6,5)$  dan titik  $R$ .*

- (a) Find the equation of locus of point  $S$ . [3 marks ]  
*Cari persamaan lokus titik  $S$*
- (b) Show that the equation of locus of point  $P$  is  $x^2 + y^2 - 8x - 6y + 21 = 0$ . [2 marks ]  
*Tunjukkan bahawa persamaan titik  $P$  adalah  $x^2 + y^2 - 8x - 6y + 21 = 0$ .*
- (c) Find the point of intersections of the two loci. [3 marks ]  
*Cari titik persilangan dua lokus tersebut.*
- (d) Determine whether the midpoint of  $QR$  lies on the locus of point  $P$ . [2 marks ]  
*Tentukan sama ada titik tengah  $QR$  berada di atas titik  $P$*

8.

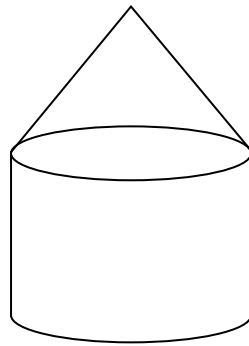


Diagram 1

Diagram 1 shows a composite solid such that a cone is placed on top of a cylinder. Given the radius of a cylinder is  $x$  cm, the slant height of cone is  $2x$  cm and the volume of a cylinder is  $24\pi$  cm<sup>3</sup>.  
*Rajah 1 menunjukkan gabungan bongkah padu di mana sebuah kon diletakkan ke atas sebuah silinder. Diberi juga jejari silinder tersebut adalah  $x$  cm, ketinggian condong kon adalah  $2x$  cm dan isi padu silinder adalah  $24\pi$  cm<sup>3</sup>.*

- (a) Show that the total surface area of the composite solid,  $A$  cm<sup>2</sup>, is given by  

$$A = 3\pi\left(x^2 + \frac{16}{x}\right).$$
 [3 marks ]  
*Tunjukkan bahawa jumlah luas permukaan bongkah padu tersebut,  $A$  cm<sup>2</sup>, adalah*  

$$A = 3\pi\left(x^2 + \frac{16}{x}\right).$$
- (b) Calculate the minimum value of total surface area of a solid. [3 marks ]  
*Hitung nilai minimum bagi luas permukaan bongkah tersebut.*
- (c) Given the total surface area of the solid increases at the rate of  $42\pi$  cm<sup>2</sup>s<sup>-1</sup>. Find the rate of change of its radius when the radius is 4 cm. [2 marks ]  
*Diberi bahawa luas permukaan menokok pada kadar  $42\pi$  cm<sup>2</sup>s<sup>-1</sup>, cari kadar perubahan jejari pada ketika jejaringnya 4 cm.*
- (d) Given the radius of cylinder increases from 4 cm to 4.003 cm. Calculate the small changes in total surface area of the solid. [2 marks ]  
*Diberi jejari silinder menokok dari 4 cm ke 4.003 cm, hitungkan tokokan kecil luas permukaan bongkah.*

9. The table 2 below shows the frequency distribution of scores obtained by a group of students.  
*Jadual 2 dibawah menunjukkan taburan kekerapan markah yang didapati oleh sekumpulan pelajar.*

Marks	Number of candidates
1 - 5	3
6 - 10	5
11 - 15	6
16 - 20	k
21 - 25	2
26 - 30	1

TABLE 2

Given the first quartile score of the distribution is 7.5.

*Diberi kuartil pertama bagi taburan markah tersebut adalah 7.5*

- (a) Find the value of k.

*Carikan nilai k*

[3 marks ]

- (b) Calculate the standard deviation of the distribution.

*Hitungkan sisihan piawai bagi taburan itu*

[3 marks ]

- (c) By drawing histogram, estimate the modal score.

*Dengan melukis histogram, anggarkan skor mod*

[4 marks ]

10.

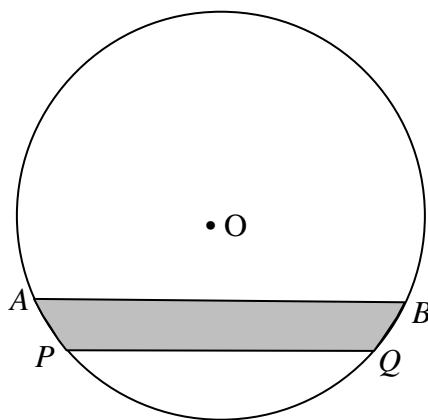


Diagram 2

Diagram 2 shows a circle, centre O, radius 8 cm, with point A, B, P and Q lies on its circumference. Given AB is parallel to PQ,  $PQ = 8$  cm and  $\angle AOB = 100^\circ$ .

*Rajah 2 menunjukkan sebuah bulatan berpusat O, berjari 8 cm dan titik-titik A, B, P dan Q berada di atas lilitan bulatan. Diberi AB adalah selari dengan PQ dan  $PQ = 8$  cm dan  $\angle AOB = 100^\circ$ .*

Find

*Cari*

- (a)  $\angle POQ$ .

[1 marks ]

- (b) length of arc AP

*panjang lengkung AP*

[2 marks ]

- (c) perimeter of shaded region.  
*perimeter rantau berlorek*
- (d) area of shaded region  
*luas rantau berlorek*

[3 marks ]

[4 marks ]

11. Diagram 4 shows three vertices of a parallelogram  $ABCD$ .

*Rajah 4 menunjukkan tiga bucu sebuah segiempat selari  $ABCD$ .*

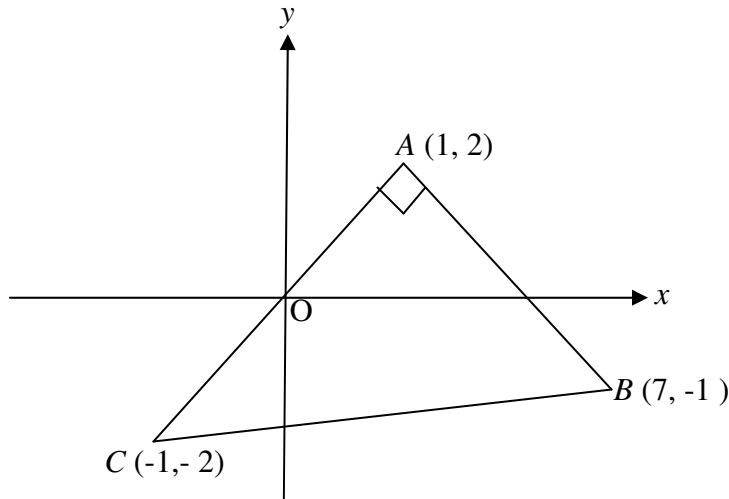


Diagram 4

- (a) Prove that  $\angle BAC = 90^\circ$ .  
*Buktikan  $\angle BAC = 90^\circ$ .* [2 marks ]
- (b) Find the coordinate of  $D$  and , hence find the area of the parallelogram.  
*Cari koordinat  $D$  dan seterusnya, cari luas segiempat selari ini.* [4 marks ]
- (c) The points  $A, B, C$  and  $Q(x,y)$  lie on the circumference of a circle. Find the coordinate of the circle and the equation of the locus  $Q$   
*Titik –titik  $A, B, C$  dan  $Q(x, y)$  terletak pada lilitan sebuah bulatan. Cari koordinat pusat bulatan tersebut dan persamaan lokus bagi titik  $Q$ .* [4 marks ]

## Section C

(20 Marks)

Answer **two** questions from this Section.

12. The diagram 4 shows a triangle  $PQR$ .  
Rajah 4 menunjukkan segi tiga  $PQR$

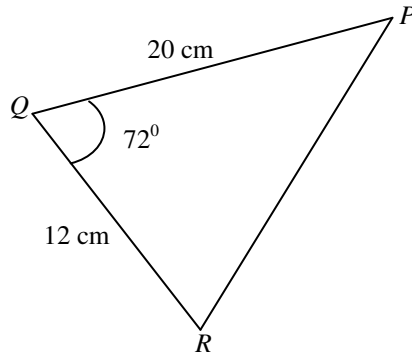


Diagram 4

- (a) Calculate the length, in cm, of  $PR$  [2 marks ]  
*Hitungkan, dalam cm, panjang  $PR$*
- (b) A quadrilateral  $PQRS$  is now formed so that  $PR$  is a diagonal,  $\angle PRS = 48^\circ$  and  $PS = 16$  cm. Calculate the two possible values of  $\angle PSR$ . [3 marks ]  
*Sebuah segi empat selari  $PQRS$  dibentuk dengan  $PR$  sebagai pepenjuru,  $\angle PRS = 48^\circ$  dan  $PS = 16$  cm. Hitungkan dua nilai  $\angle PSR$  yang mungkin.*
- (c) By using the acute  $\angle PSR$  from (b), calculate [5 marks ]  
*Dengan menggunakan sudut tirus  $\angle PSR$  dari (b), hitungkan*
- The length, in cm, of  $RS$   
*Panjang, dalam cm,  $RS$*
  - The area, in  $\text{cm}^2$ , of quadrilateral  $PQRS$ .  
*Luas, dalam  $\text{cm}^2$ , segi empat selari  $PQRS$*

13. The table 3 shows the price indices and percentage of usage of four items,  $P$ ,  $Q$ ,  $R$  and  $S$ , which are the main ingredients in the production of a type of biscuits.  
*Jadual 3 menunjukkan indeks harga dan peratus penggunaan empat barangan  $P$ ,  $Q$ ,  $R$  dan  $S$ , yang menjadi bahan utama dalam penghasilan sejenis biskut.*

Items	Price Index for the year 2008 based on the year 2006	Percentage of usage (%)
$P$	125	30
$Q$	120	10
$R$	$X$	20
$S$	115	40

Table 3

(a) Calculate

*Hitungkan*

- The price of item  $P$  in the year 2006 if the price in the year 2008 was RM 32.  
*Harga  $P$  pada tahun 2006 jika harganya pada tahun 2008 ialah RM 32*
- The price index of item  $S$  in the year 2008 based on the year 2004 if its price index in the year 2006 based on the year 2004 is 140. [5 marks]  
*Indeks harga  $S$  pada tahun 2008 berasaskan tahun 2004 jika indeks harganya pada tahun 2006 berasaskan tahun 2004 ialah 140*

(b) The composite index of the cost of biscuits production for the year 2008 based on the year 2006 is 124.5.

*Nombor indeks gubahan kos penghasilan biskut itu pada tahun 2008 berasaskan tahun 2006 ialah 124.5.*

Calculate

*Hitungkan*

- The value of  $x$ .  
*Nilai  $x$*
- The price of a box of biscuits in the year 2008 if the corresponding price in the year 2006 was RM 14. [5 marks]  
*Harga sekotak biskut itu pada tahun 2008 jika harga yang sepadan pada tahun 2006 ialah RM 14.*

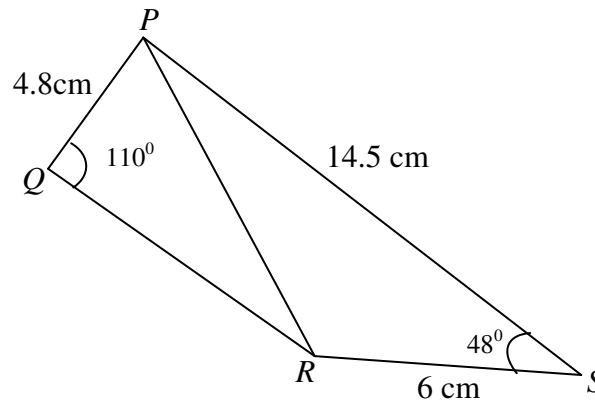
14. The diagram 5 shows a quadrilateral  $PQRS$ *Rajah 5 menunjukkan segi empat selari  $PQRS$* 

Diagram 5

(a) Calculate

*Hitungkan*

- The length, in cm, of  $PR$ .  
*Panjang, dalam cm,  $PR$*
- $\angle PRQ$ . [4 marks]

(b) Points  $P'$  lies on  $PR$  such that  $P'Q = PQ$ *Titik  $P'$  bergerak sepanjang  $PR$  dengan keadaan  $P'Q = PQ$* 

- Sketch  $\Delta P'QR$ .  
*Lakarkan  $\Delta P'QR$*
- Calculate the area, in  $\text{cm}^2$ , of  $\Delta P'QR$ . [6 marks]  
*Hitungkan luas, dalam  $\text{cm}^2$ ,  $\Delta P'QR$*



15. The table 4 shows the price indices for four ingredients,  $A$ ,  $B$ ,  $C$  and  $D$ , used in making biscuits of the particular kind. The diagram 6 shows a pie chart which represents the relative amount of the ingredients  $A$ ,  $B$ ,  $C$  and  $D$ , used in making these biscuits.

*Jadual 4 menunjukkan harga dan indeks harga empat bahan  $A$ ,  $B$ ,  $C$  dan  $D$ , yang digunakan untuk membuat sejenis biskut. Rajah 6 ialah carta pai yang mewakili kuantiti relatif bagi penggunaan bahan-bahan  $A$ ,  $B$ ,  $C$  dan  $D$  dalam pembuatan biskut itu.*

Ingredients	Price per kg (RM)		Price Index for the year 2004 based on the year 2000
	Year 2000	Year 2004	
$A$	0.80	1.00	$x$
$B$	1.60	$y$	130
$C$	0.75	1.20	160
$D$	$z$	0.90	125

Table 4

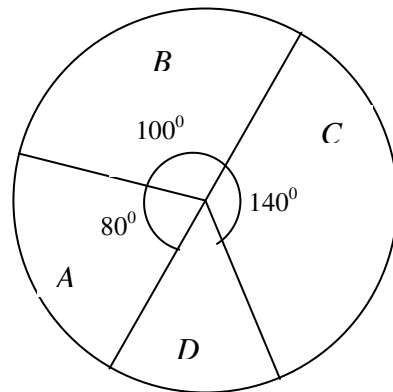


Diagram 6

- (a) Find the value of  $x$ ,  $y$  and  $z$ . [2 marks ]  
*Carikan nilai  $x$ ,  $y$  dan  $z$*
- (b) (i) Calculate the composite index for the cost of making these biscuits in the year 2004 based on the year 2000.  
*Hitungkan nombor indeks gubahan bagi kos membuat biskut itu pada tahun 2004 berasaskan tahun 2000.*
- (ii) Hence, calculate the corresponding cost of making these biscuits in the year 2000 if the cost in the year 2004 was RM 28.50. [5 marks ]  
*Seterusnya, hitungkan kos membuat biskut yang sepadan bagi tahun 2000 jika kos membuatnya pada tahun 2004 ialah RM 28.50*
- (c) The cost of making these biscuits is expected to increase by 30% from the year 2004 to the year 2008. Find the expected composite index for the year 2008 based on the year 2000. [3 marks ]  
*Kos membuat biskut itu dijangka meningkat sebanyak 30% dari tahun 2004 ke tahun 2008. Carikan nombor indeks gubahan bagi kos membuat biskut itu yang dijangkakan pada tahun 2008 berasaskan tahun 2000.*

**END OF QUESTIONS**

**SULIT**  
**3472/2**  
**Additional**  
**Mathematics**  
**Paper 2**  
**2009**

**PEJABAT PENDIDIKAN DAERAH**  
**JASIN \* ALOR GAJAH \* MELAKA TENGAH**  
**JABATAN PENDIDIKAN MELAKA**  
**KEMENTERIAN PELAJARAN MALAYSIA**

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

**2009**

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**ADDITIONAL MATHEMATICS**

Paper 2

**MARKING SCHEME**

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This marking scheme consists of 10 printed pages

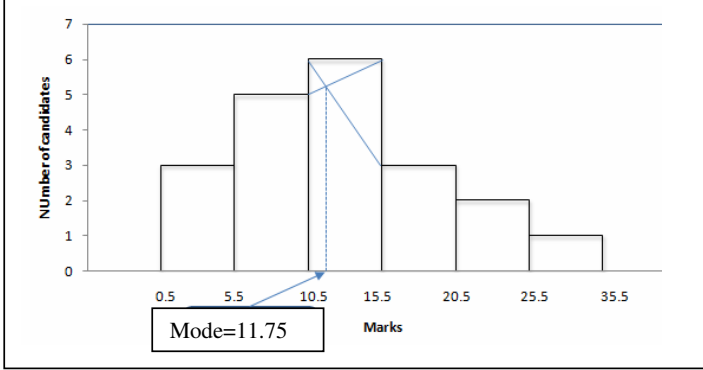
**ANSWER SCHEME PAPER 2**

<b>Number</b>	<b>Solutions</b>	<b>S M</b>	<b>F M</b>
1	$x = 8 - y$ $(8 - y)^2 - 6y + y^2 = 16$ $y^2 - 11y + 24 = 0$ $(y - 8)(y - 3) = 0$ $y = 3, y = 8$ when $y = 3, x = 5 : (5, 3)$ when $y = 8, x = 0 : (0, 8)$	1 1 1 1 1	5
2 (a)	Let $f^{-1}(x) = y$ $f(y) = x$ $2y - 1 = x$ $y = \frac{x+1}{2}$ $\therefore f^{-1}(x) = \frac{x+1}{2}$	1	1
(b)	$f^{-1}g(x) = f^{-1}\left(\frac{x}{3} + 1\right)$ $= \frac{\left(\frac{x}{3} + 1\right) + 1}{2}$ $= \frac{x}{6} + 1$	1	2
(c)	$h[g(x)] = 3x + 6$ $h\left(\frac{x}{3} + 1\right) = 3x + 6$ Let $z = \frac{x}{3} + 1$ $\therefore x = 3(z - 1)$ $\therefore h(z) = 3(3(z - 1)) + 6$ $\therefore h(x) = 9x - 3$	1 1 1	3
3 (a)	$2^x \cdot 2^3 - 2^x \cdot 2^2 = 2$ $2^x = 2^{-1}$ or $x + 2 = 1$ $x = -1$	1 1 1	3

(b)	$\log_9 (x + 9) = 3 \log_9 5$ $\log_9 (x + 9) = \log_9 5^3$ $\therefore (x + 9) = 5^3$ $x = 125 - 9$ $x = 116$	1 1 1	3
4(a)	$35\frac{1}{3} = 29.5 + \left(\frac{28+x-13}{x}\right)10$ $x = 12$	P1 (29.5) K1 N1	3
(b)	$\sum fx = 1390$ $\frac{-}{x} = \frac{1390}{40}$ $= 34.75$	P1 K1 N1	3
5(a)	$\frac{dy}{dx} = 2x - 8$ $2x - 8 = 0$ $(4, -12)$	K1 K1 N1	3
(b)	$\frac{d^2x}{dx^2} = 2$ $(x^2 - 8x + 4)(2) + x(2x - 8) + 12 = 0$ $(x - 1)(x - 5) = 0$ $x = 1, x = 5$	P1 K1 K1 N1	4
6(a)	$y = x - 4k - 2$ or $kx^2 - 2kx - 3k = 0$ $kx^2 - 2kx - 3k = x - 4k - 2$ $(-2k - 1)^2 - 4(k)(k + 2) < 0$ $-4k + 1 < 0$ $k > \frac{1}{4}$	P1 K1 K1 K1 N1	5
(b)	$(x - 3h)^2 - 9h^2 + 8h^2 + 1$ $-h^2 + 1 = t + 2h^2$ $t = 1 - 3h^2$	K1 K1 N1	3

Comment [U1]:

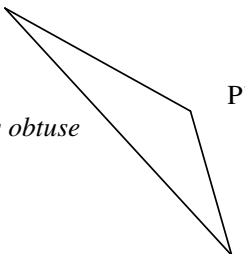


	<p>(d) <math>\delta A = (6\pi x - \frac{48\pi}{x^2})(0.003)</math>  <math>= 0.063\pi</math></p>	1 1	2
9	<p>(a) Identify <math>Q_1</math> class = 6 – 10 or <math>L = 5.5</math></p> $5.5 + \left[ \frac{\frac{1}{4}(17+k) - 3}{5} \right] (5) = 7.5$ <p><math>k = 3</math></p> <p>(b) <math>\bar{x} = \frac{255}{20}</math> or <math>\sum x^2 = 4175</math></p> $\delta = \sqrt{\frac{4175}{20} - \left(\frac{255}{20}\right)^2}$ $= 6.796$ <p>(c) Complete histogram  Using X to determine the mode  Mode = 11.75</p>  <p>The histogram shows the number of candidates for different marks. The x-axis is labeled 'Marks' and has values 0.5, 5.5, 10.5, 15.5, 20.5, 25.5, 35.5. The y-axis is labeled 'Number of candidates' and has values 0, 1, 2, 3, 4, 5, 6, 7. The bars have heights 3, 5, 6, 3, 2, 1. A mode is indicated at 11.75.</p>	1 1 1 1 1 1 2 1 1	3 3 4
10	<p>(a) <math>60^\circ</math></p> <p>(b) <math>s = 8(20 \times \frac{\pi}{180})</math>  <math>= 2.973 \text{ cm}</math></p> <p>(c) <math>AB^2 = 8^2 + 8^2 - 2(8)(8)\cos 100</math>  <math>AB = 12.26 \text{ cm}</math>  Perimeter = 26.21 cm</p>	1 1 1 1 1	1 2 3

	(d) Segment 1 = $\frac{1}{2} (8^2)(1.745) - \frac{1}{2} (8)(8) \sin 100$ Segment 2 = $\frac{1}{2} (8^2)(1.047) - \frac{1}{2} (8)(8) \sin 60$ Shaded region = $24.33 - 5.791$ = $18.54 \text{ cm}^2$	1 1 1 1	4
11	(a) $m_{AC} = 2$ or $m_{AB} = -\frac{1}{2}$ $m_{AC}^* \times m_{AB}^* = -1$	1 1	2
	(b) midpoint $AC = (0, 0)$ $D(x, y) = \left(\frac{x+7}{2}, \frac{y-1}{2}\right)$ $\frac{x+7}{2} = 0$ or $\frac{y-1}{2} = 0$ $x = -7$ or $y = 1$ $D = (-7, 1)$  Area of parallelogram = $\frac{1}{2} \begin{vmatrix} 1 & 7 & -1 & -7 \\ 2 & -1 & -2 & 1 \end{vmatrix}$ = $\frac{1}{2}  29 - 16 ^*$ = $\frac{13}{2} \text{ unit}^2$  (c) Centre = midpoint $BC$ = $E\left(3, -\frac{3}{2}\right)$  Distance $EC$ or Distance $EB$ or Distance $ED$ $\sqrt{(x-3)^2 + \left(y + \frac{3}{2}\right)^2} = \sqrt{(3+1)^2 + \left(-\frac{3}{2} + 2\right)^2}$ or  $\sqrt{(x-3)^2 + \left(y + \frac{3}{2}\right)^2} = \sqrt{(7-3)^2 + \left(-1 + \frac{3}{2}\right)^2}$ $x^2 + y^2 - 6x + 3y - 5 = 0$	1 1  1 1 1 1 1 1	2  2  4





	<p>i) <math>\sum IW = 9550 + 20x</math></p> <p>Use <math>\bar{I}_{08/06} = \frac{\sum IW}{100} *</math></p> $124.5 = \frac{9550 + 20x}{100}$ $x = 145$ <p>ii) Use <math>\bar{I}_{08/06} = \frac{\text{Cost}_{08}}{\text{Cost}_{06}} \times 100</math> or equivalent</p> <p>or <math>\text{Cost}_{08} = \frac{\text{RM}124.5 \times 14}{100}</math></p> $= \text{RM } 17.43$	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>5</p>
14	<p>(a) i) <math>PR^2 = 6^2 + 14.5^2 - 2(6)(14.5) \cos 48^\circ</math></p> <p><math>PR = 11.39</math> (at least 3 s.f, correct round off)</p> <p>ii) <math>\frac{\sin PRQ}{4.8} = \frac{\sin 110^\circ}{11.39} *</math> or equivalent</p> $S = 23.33^\circ$ <p>(must 2 d.p, correct round off, decimal form better than minutes form)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>4</p>
	<p>(b) i)</p> <div style="text-align: center;">  <p>Must correct labeled, angle P' is obtuse</p> </div> <p>ii) <math>P = 180 - 110^\circ - 23.33 *</math></p> $= 46.67^\circ$	<p>1</p> <p>1</p>	

	$\frac{QR}{\sin 46.67^\circ} = \frac{QR}{\sin 133.33^\circ} = \frac{4.8}{\sin 23.33^\circ}$ $QR = 8.817 / 8.82$ $\angle P'QR = 180^\circ - 133.33^\circ - 23.33^\circ$ $= 23.34^\circ$ $\text{Area } P'QR = \frac{1}{2} \times (4.8)(8.82) \times \sin 23.34^\circ$ $= 8.386$	1 1  1 1	6																								
15	<p>(a) Use <math>I_{04/00} = \frac{P_{04}}{P_{00}} \times 100</math></p> <p><math>x = 125, y = 2.08, z = 0.72</math></p> <p>(b) i)</p> <table border="1" data-bbox="467 730 976 1031"> <thead> <tr> <th>Item</th> <th>I</th> <th>W</th> <th>IW</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>125*</td> <td>80</td> <td>10000*</td> </tr> <tr> <td>B</td> <td>130</td> <td>100</td> <td>13000</td> </tr> <tr> <td>C</td> <td>160</td> <td>140</td> <td>22400</td> </tr> <tr> <td>D</td> <td>125</td> <td>40</td> <td>5000</td> </tr> <tr> <td></td> <td></td> <td><math>\sum W = 360</math></td> <td><math>\sum IW = 50400</math></td> </tr> </tbody> </table> <p><math>\sum IW = 50400</math></p> <p>Use <math>\bar{I}_{04/00} = \frac{\sum IW}{360}</math> or</p> $\bar{I}_{04/00} = \frac{50400^*}{360}$ $= 140$ <p>ii) Use <math>\bar{I}_{04/00} = \frac{\text{Cost}_{04}}{\text{Cost}_{00}} \times 100</math> or</p> $\text{Cost}_{00} = \frac{\text{RM}128.50 \times 100}{140}$ $= \text{RM}20.36$	Item	I	W	IW	A	125*	80	10000*	B	130	100	13000	C	160	140	22400	D	125	40	5000			$\sum W = 360$	$\sum IW = 50400$	1 1, 0     1 1  1  1 1	2           5
Item	I	W	IW																								
A	125*	80	10000*																								
B	130	100	13000																								
C	160	140	22400																								
D	125	40	5000																								
		$\sum W = 360$	$\sum IW = 50400$																								

	<p>(c) <math>\bar{I}_{08/04} = 130</math></p> <p>Use <math>I_{08/04} = \frac{I_{08/04} \times I_{04/00}}{100}</math> or</p> $= \frac{130 \times 140}{100}$ $= 182$	<p>1</p> <p>1</p> <p>1</p>	<p>3</p>
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