3472/2
Additional
Mathematics
Kertas 2
Okt 2008
2 ½ jam

JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN AKHIR TAHUN 2008
TINGKATAN 4

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* **two** *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 19 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. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \dfrac{\log_c b}{\log_c a}$

CALCULUS / KALKULUS

1. $y = uv$

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

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

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

4. Area under a curve
   Luas di bawah lengkung

   $= \int_a^b y\ dx$ or / *atau*

   $= \int_a^b x\ dy$

5. Volume generated
   Isipadu janaan

   $= \int_a^b \pi y^2\ dx$ 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. $\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$

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*

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

TRIGONOMETRY (TRIGONOMETRI)

Arc length, $s = r\theta$

Panjang lengkok, $s = j\theta$

Area of sector $= \frac{1}{2} r^2\theta$

Luas sektor, $L = \frac{1}{2} j^2\theta$

3. $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

4. $a^2 = b^2 + c^2 - 2bc\cos A$
$a^2 = b^2 + c^2 - 2bc\,\text{kos}A$

5. Area of triangle / *Luas segi tiga*
$= \frac{1}{2} ab \sin C$

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5. Area of triangle / *Luas segi tiga*
$= \frac{1}{2} ab \sin C$

SECTION A / *BAHAGIAN A*

[40 *marks* / 40 *markah*]

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

1 Solve the simultaneous equation $x + 2y = 2$ and $x^2 + x - y = 10$. Give your answer correct to two decimal place.

[5 *marks*]

Selesaikan persamaan serentak $x + 2y = 2$ *dan* $x^2 + x - y = 10$. *Berikan jawapan anda betul kepada dua tempat perpuluhan.*

[5 *markah*]

2 Function f and g are defined by $f : x \to mx + n$ and $g : x \to (x + 1)^2 - 6$.

Given that $fg : x \to 3(x + 1)^2 + 13$, find the value of

Fungsi f *dan* g *ditakrifkan oleh* $f : x \to mx + n$ *dan* $g : x \to (x + 1)^2 - 6$.

Diberi bahawa $fg : x \to 3(x + 1)^2 + 13$, *carikan nilai*

(*a*) $g^2(1)$, [2 *marks*] [2 *markah*]

(*b*) m and n, [3 *marks*]
m *dan* n, [3 *markah*]

(*c*) $gf^{-1}(4)$. [3 *marks*] [3 *markah*]

3 Given that $f(x) = 2x^2 - 6x + 1$.

Diberi bahawa $f(x) = 2x^2 - 6x + 1$.

(*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* $a(x + h)^2 + k$ *dengan keadaan* a, h *dan* k *adalah pemalar.* [2 *markah*]

(*b*) Determine the turning point of $f(x)$. [1 *mark*]

Tentukan titik pusingan bagi $f(x)$. [1 *markah*]

(*c*) Sketch the graph of $f(x) = 2x^2 - 6x + 1$. [2 *marks*]

Lakarkan graf $f(x) = 2x^2 - 6x + 1$. [2 *markah*]

(*d*) Find the range of values of p such that $2x^2 - 6x + 1 = p$ has two distinct real roots. [2 *marks*]

Cari julat nilai p *dengan keadaan* $2x^2 - 6x + 1 = p$ *mempunyai dua punca berbeza.* [2 *markah*]

4 Given that $p = 2^m$ and $q = 2^n$, express in terms of m and n.

Diberi bahawa $p = 2^m$ *dan* $q = 2^n$, *ungkapkan dalam sebutan* m *dan* n.

(*a*) $\log_2\left(\frac{p}{q}\right)$, [1 *mark*]

[1 *markah*]

(*b*) $\log_2\left(\frac{pq^2}{32}\right)$, [2 *marks*]

[2 *markah*]

(*c*) $\log_8 p - \log_4 q$. [3 *marks*]

[3 *markah*]

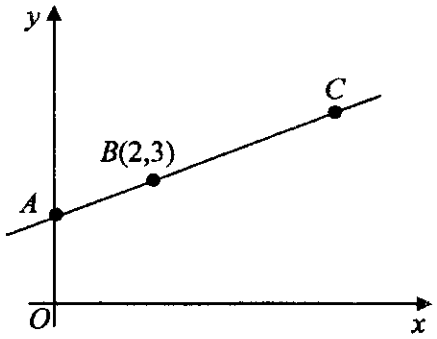

Diagram 1 / *Rajah* 1

5 Diagram 1 shows the points A, B and C which lie on the straight line $2y = x + 4$ such that $AB : BC = 1 : 2$.

Rajah 1 *menunjukkan titik-titik A, B dan C yang terletak pada garis lurus* $2y = x + 4$ *dengan keadaan* $AB : BC = 1 : 2$.

(*a*) Find
Cari

(i) the coordinates of A, [1 *mark*]
koordinat-koordinat A, [1 *markah*]

(ii) the coordinates of C, [3 *marks*]
koordinat-koordinat C, [3 *markah*]

(*b*) $Q(x, y)$ is a moving point such that its distance from C is always 10 units.
Find the equation of the locus of point Q. [3 *marks*]

$Q(x, y)$ *ialah suatu titik bergerak dengan keadaan jaraknya dari C ialah sentiasa* 10 *unit. Cari persamaan lokus bagi titik Q.* [3 *markah*]

6 (*a*) Differentiate $3x^2(1 + 5x)^4$ with respect to x. [3 *marks*]

Bezakan $3x^2(1 + 5x)^4$ *terhadap* x. [3 *markah*]

(*b*) Given that the normal gradient of the curve $y = x(1 - x)$ at point A is -2.
Find

Diberi bahawa kecerunan normal bagi lengkung $y = x(1 - x)$ *pada titik* A *ialah* -2.
Cari

(i) the coordinates of A,
koordinat-koordinat A,

(ii) the equation of tangen of the curve.
persamaan tangen bagi lengkung itu.

[4 *marks*]
[4 *markah*]

SECTION B / BAHAGIAN B

[40 *marks* / 40 *markah*]

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

Length in cm *Panjang dalam cm*	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30
Number of leaves *Bilangan daun*	8	10	12	20	18	12

Table 1 / *Jadual* 1

(*a*) Table 1 shows the length of the 80 pieces of leaves obtained by the students in a research.
Jadual 1 *menunjukkan panjang* 80 *helai daun yang diperoleh pelajar dalam satu kajian.*

(i) Use the graph paper provided to draw a histogram.
Gunakan kertas graf yang disediakan untuk melukis satu histogram.

(ii) Use your histogram to find the mode length of the leaves.
Gunakan histogram anda untuk mencari panjang mod daun.

(iii) Without drawing the ogive, calculate the first quartile length of the leaves.
Tanpa melukis ogif, hitungkan nilai kuartil pertama panjang daun.

[7 *marks*]
[7 *markah*]

(*b*) A set of 8 numbers has a mean of 16·8 and a standard deviation of 2·5. Find
Satu set data yang terdiri daripada 8 nombor mempunyai min 16·8 *dan sisihan piawai* 2·5. *Cari*

(i) the sum of the numbers,
jumlah nombor-nombor tersebut,

(ii) the sum of the squares of the numbers.
jumlah kuasa dua nombor-nombor tersebut.

[3 *marks*]
[3 *markah*]

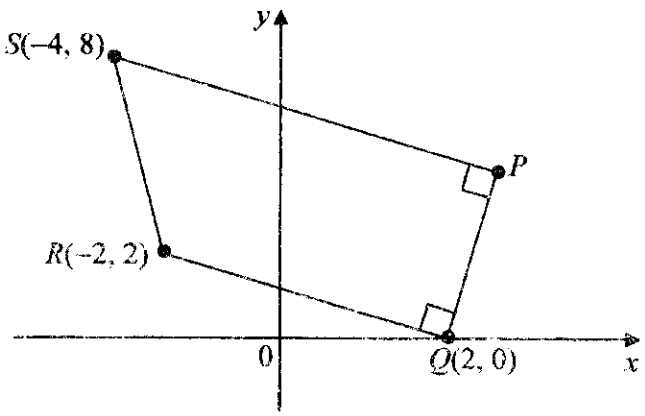

Diagram 2 / *Rajah* 2

8 Diagram 2 shows a trapezium $PQRS$ that has the vertices $Q(2, 0)$, $R(-2, 2)$, $S(-4, 8)$ and P. Given that PQ is perpendicular to PS and QR. Find

Rajah 2 menunjukkan sebuah trapezium PQRS yang mempunyai $Q(2, 0)$, $R(-2, 2)$, $S(-4, 8)$ *dan P. Diberi bahawa PQ adalah berserenjang dengan PS dan QR. Cari*

(*a*) the equation of the straight line PQ, [3 *marks*]
persamaan garis lurus PQ, [3 *markah*]

(*b*) the equation of the straight line PS, [2 *marks*]
persamaan garis lurus PS, [2 *markah*]

(*c*) the coordinates of P, [2 *marks*]
koordinat-koordinat P, [2 *markah*]

(*d*) the area of the trapezium $PQRS$. [3 *marks*]
luas trapezium PQRS. [3 *markah*]

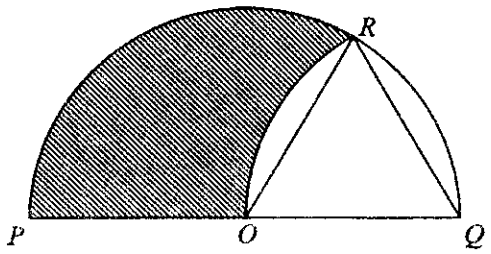

Diagram 3 / *Rajah* 3

9 Diagram 3 shows a semi circle *OQRP* with centre *O* and radius 12 cm and a sector *OQR* with centre *Q*. Calculate

Rajah 3 *menunjukkan semi bulatan OQRP berpusat O dengan jejari* 12 *cm dan sektor bulatan OQR berpusat Q. Hitungkan*

(*a*) $\angle POR$ in radian, [2 *marks*]
$\angle POR$ *dalam radian,* [2 *markah*]

(*b*) the area of sector *ORP*, [2 *marks*]
luas sektor ORP, [2 *markah*]

(*c*) the area of the shaded region. [6 *marks*]
luas kawasan berlorek. [6 *markah*]

[Use / *Guna* $\pi = 3{\cdot}142$]

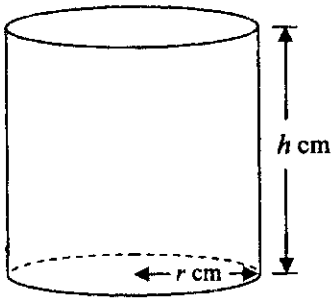

Diagram 4 / *Rajah* 4

10 Diagram 4 shows a cylindrical tank with one end opened which has the volume of $8\pi\ \text{cm}^3$. The radius of the base and its height are r cm and h cm respectively.

Rajah 4 *menunjukkan sebuah tangki berbentuk silinder yang terbuka di satu hujung yang mempunyai isipadu* $8\pi\ cm^3$. *Jejari tapak dan tinggi silinder itu masing-masing ialah r cm dan h cm.*

(*a*) Show that the surface area of the tank, A, is given by

Tunjukkan bahawa luas permukaan tangki itu, A, diberi oleh

$$A = \pi r^2 + \frac{16\pi}{r}$$

[4 *marks*]

[4 *markah*]

(*b*) Find the minimum value of A and its corresponding value of h. [6 *marks*]

Cari nilai minimum A dan nilai h yang sepadan dengannya. [6 *markah*]

11 (*a*) Given that $y = \frac{16}{x^4}$, find the value of $\frac{dy}{dx}$ when $x = 2$. Hence, by using differential method, find the approximate value of $\frac{16}{(1{\cdot}98)^4}$. [5 *marks*]

Diberi bahawa $y = \frac{16}{x^4}$, *cari nilai* $\frac{dy}{dx}$ *apabila* $x = 2$. *Seterusnya, dengan menggunakan kaedah pembezaan, carikan nilai hampir bagi* $\frac{16}{(1{\cdot}98)^4}$. [5 *markah*]

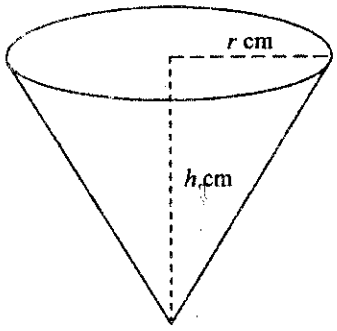

Diagram 5 / *Rajah* 5

(*b*) Diagram 5 shows a conic container with rounded surface radius of r cm and the height of h cm. Water is poured into the container at a rate of 15 $cm^3\ s^{-1}$. Given that $h = 3r$, find the rate of increase of water height when the height is 9 cm from its vertex.

Rajah 5 *menunjukkan bekas berbentuk kon dengan permukaan berbentuk bulatan berjejari r cm dan tinggi h cm. Air dituangkan ke dalam bekas itu pada kadar* 15 $cm^3\ s^{-1}$. *Diberi bahawa* $h = 3r$, *cari kadar peningkatan tinngi paras air apabila ketinggiannya dari bucu ialah* 9 *cm.*

(Volume of cone / *Isipadu kon* = $\frac{1}{3}\pi r^2 h$)

[5 *marks*]
[5 *markah*]

SECTION C / *BAHAGIAN C*

[20 *marks* / 20 *markah*]

Answer **two** *questions from this section.*
Jawab **dua** *soalan daripada bahagian ini.*

12 In Diagram 6, the pie chart shows the monthly expenditure of four items in the year 2004. Table 2 shows the price indices for the expenditure in the year 2006 and 2007 based on the year 2004.
Dalam Rajah 6 carta pai menunjukkan perbelanjaan bulanan bagi empat barangan pada tahun 2004. Jadual 2 menunjukkan indeks harga bagi perbelanjaan dalam tahun 2006 dan 2007 berasaskan tahun 2004.

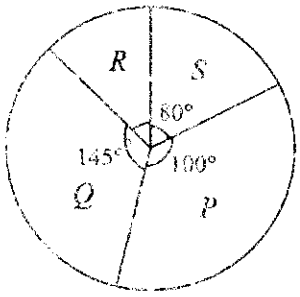

Diagram 6 / *Rajah 6*

Expenditure *Perbelanjaan*	Price index *Indeks harga*	
	2006	2007
P	105	100
Q	111	115
R	103	112
S	122	130

Table 2 / *Jadual 2*

(*a*) If the expenditure for item *P* in the year 2006 was RM 5250, calculate the expenditure for item *P* in the year 2004. [2 *marks*]
Jika perbelanjaan bagi barangan P dalam tahun 2006 ialah RM 5250, *hitung perbelanjaan bagi barangan P dalam tahun 2004.* [2 *markah*]

(*b*) If the expenditure for the item *R* in the year 2006 was RM 2163, calculate the expenditure for the item *R* in the year 2007. [4 *marks*]
Jika perbelanjaan bagi barangan R dalam tahun 2006 *ialah* RM 2163, *hitung perbelanjaan bagi barangan R dalam tahun* 2007. [4 *markah*]

(*c*) Calculate the composite index for the monthly expenditure in the year 2006 based on the year 2004. [4 *marks*]
Hitung indeks gubahan bagi perbelanjaan bulanan barangan itu pada tahun 2006 *berasaskan tahun* 2004. [4 *markah*]

13 Table 3 shows the price indices and the corresponding weightages of four ingredients in making cake.
Jadual 3 menunjukkan indeks harga dan pemberat yang sepadan bagi empat bahan untuk membuat kek.

Ingredient *Bahan*	Price in 2002 *Harga pada tahun* 2002 (RM/kg)	Price in 2006 *Harga pada tahun* 2006 (RM/kg)	Price indices in year 2006 based on the year 2002 *Indeks harga dalam tahun* 2006 *berasaskan tahun* 2002	Weightage *Pemberat*
Chocolate *Coklat*	6·00	7·50	125	2
Cheese *Keju*	q	21·00	150	4
Flour *Gandum*	2·50	r	140	3
Sugar *Gula*	1·00	1·20	p	1

Table 3 / *Jadual* 3

(*a*) Find the values of p, q and r. [4 *marks*]
Cari nilai-nilai bagi p, q dan r. [4 *markah*]

(*b*) If the price index of chocolate in the year 2007 based on the year 2006 is 110, find the price index of chocolate in the year 2007 based on the year 2002. [3 *marks*]
Jika indeks harga bagi coklat dalam tahun 2007 *berasaskan tahun* 2006 *ialah* 110, *cari indeks harga bagi coklat dalam tahun* 2007 *berasaskan tahun* 2002. [3 *markah*]

(*c*) Find the composite index for the cost of making the cake in the year 2006 based on the year 2002. [3 *marks*]
Cari indeks gubahan kos membuat kek itu dalam tahun 2006 *berasaskan tahun* 2002. [3 *markah*]

(*a*) In Diagram 7, *ADB* is a straight line.

Dalam Rajah 7, ADB ialah garis lurus.

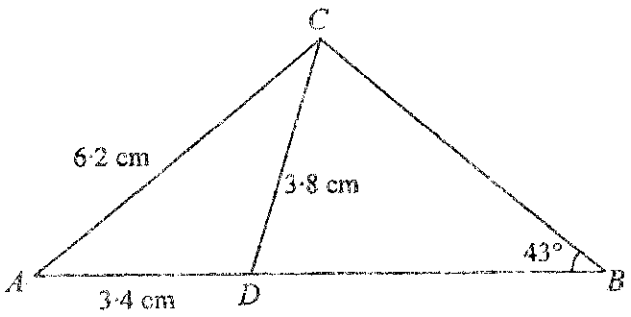

Diagram 7 / *Rajah 7*

Calculate
Hitungkan

(i) $\angle ADC$,
(ii) the length of *DB*.
panjang DB.

[5 *marks*]
[5 *markah*]

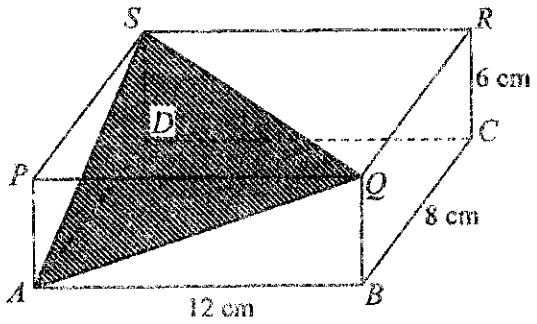

Diagram 8 / *Rajah 8*

(*b*) Diagram 8 shows a cuboid. Calculate
Rajah 8 menunjukkan sebuah kuboid. Hitungkan

(i) $\angle SAQ$,
(ii) the area of the plane *SAQ*.
luas satah SAQ.

[5 *marks*]
[5 *markah*]

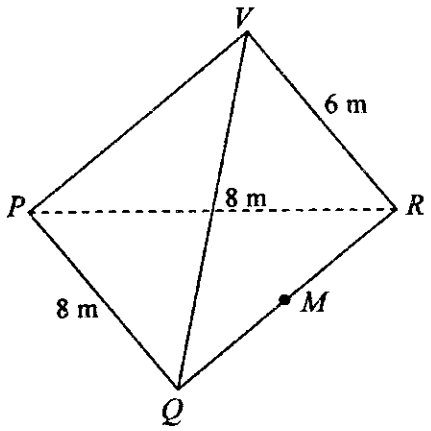

Diagram 9 / *Rajah* 9

15 Diagram 9 shows a tent in the shape of a pyramid. The tent has a horizontal base PQR which is an equilateral triangle of sides 8 m. M is the midpoint of QR. Given that $VQ = VR = 6$ m and the angle between the planes VQR and PQR is 70°.
Find

Rajah 9 *menunjukkan sebuah khemah berbentuk piramid. Khemah itu mempunyai tapak segi tiga sama sisi PQR yang mengufuk dengan sisi* 8 *m. M* adalah titik tengah QR.
Diberi bahawa $VQ = VR = 6$ *m dan sudut di antara satah VQR dan satah PQR ialah* 70°.
Cari

(*a*) (i) the length of PM,
panjang PM,

(ii) the length of VP.
panjang VP.

[5 *marks*]
[5 *markah*]

(*b*) the angle between the line VP and the plane PQR,
sudut di antara garis VP dan satah PQR,

[2 *marks*]
[2 *markah*]

(*c*) the area of ΔVPQ.
luas ΔVPQ.

[3 *marks*]
[3 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT