NAMA : .....

TINGKATAN : .....

JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2010
ADDITIONAL MATHEMATICS
Kertas 1
Ogos 2010
2 jam

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

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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

Disediakan oleh:
AKRAM NEGERI TERENGGANU

Dibiayai oleh:
KERAJAAN NEGERI TERENGGANU

TERENGGANU ANJUNG ILMU

Dicetak oleh:
Percetakan Yayasan Islam Terengganu Sdn. Bhd.
Tel: 609-666 8611/6652/8601 Faks: 609-666 0611/0063

Kertas soalan ini mengandungi 24 halaman bercetak

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. $\log_a b = \dfrac{\log_c b}{\log_c a}$

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

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

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

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

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

CALCULUS / KALKULUS

1. $y = uv$

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

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

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

4. Area under a curve
Luas di bawah lengkung

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

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

5. Volume generated
Isipadu janaan

$= \displaystyle\int_a^b \pi y^2 \, dx$ or / *atau*

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

STATISTICS / STATISTIK

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

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

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

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

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

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

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

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

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

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

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

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*

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

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

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

[Lihat sebelah

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. $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

11. $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

12. $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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*

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

Answer **all** questions.

Jawab ***semua*** *soalan.*

For Examiner's Use

1 Diagram 1 shows the relation between set *P* and set *Q*.

Rajah 1 *menunjukkan hubungan antara set P dan set Q.*

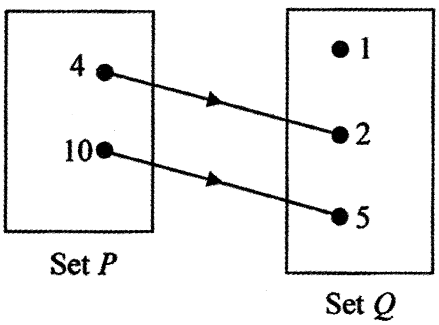


Diagram 1 / *Rajah* 1

(*a*) State the range of the relation.
Nyatakan julat hubungan itu.

(*b*) Using the function notation, write a relation between set *P* and set *Q*.
Dengan menggunakan tatatanda fungsi, tulis satu hubungan antara set P dan set Q.

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

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

(*b*) .....

1

2

For Examiner's Use

2 Diagram 2 shows the functions f and g.
Rajah 2 menunjukkan fungsi f dan g.

$$f : x \rightarrow 2x + 1$$
$$g : x \rightarrow 3x - 2$$

Diagram 2 / *Rajah* 2

Find / *Cari*

(*a*) $f^{-1}(5)$,

(*b*) $gf^{-1}(5)$.

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

2
3

Answer / *Jawapan* : (*a*) $f^{-1}(5) =$ .....

(*b*) $gf^{-1}(5) =$ .....

---

3 Write the equation $(3x + 1)(x - 1) = x(x + 2)$ in general form.
Tulis persamaan $(3x + 1)(x - 1) = x(x + 2)$ *dalam bentuk am.*

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

3
2

Answer / *Jawapan* : .....

4 Find the range of values of p if the quadratic equation $18x^2 + 12x + 7 = p$ has two different roots. [3 *marks*]

Cari julat nilai p jika persamaan kuadratik $18x^2 + 12x + 7 = p$ *mempunyai dua punca berbeza.* [3 *markah*]

For Examiner's Use

Answer / *Jawapan* : .....

4
3

5 Solve the quadratic inequality $x^2 - 2x < 3$. [3 *marks*]
Selesaikan ketaksamaan kuadratik $x^2 - 2x < 3$. [3 *markah*]

Answer / *Jawapan* : .....

5
3

For Examiner's Use

6 Diagram 6 shows a quadratic function graph $f(x) = h - 2(x + k)^2$ where h and k are constants.

Rajah 6 menunjukkan graf fungsi kuadratik $f(x) = h - 2(x + k)^2$ *dengan keadaan h dan k adalah pemalar.*

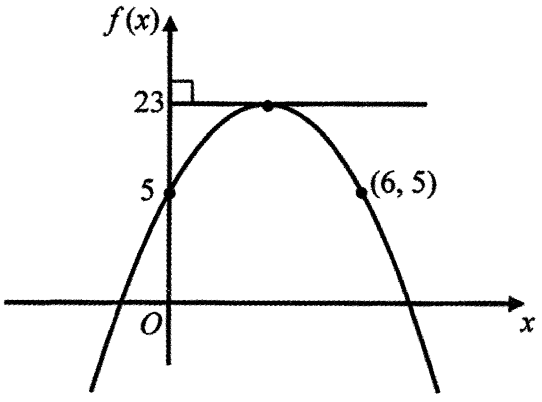


Diagram 6 / *Rajah* 6

Determine / *Tentukan*

(*a*) the value of h,
nilai h,
(*b*) the value of k,
nilai k,
(*c*) the new equation when the curve is reflected through x-axis.
persamaan baru apabila lengkung itu dipantul pada paksi-x.

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

6
3

Answer / *Jawapan* : (*a*) h = ...

(*b*) k = ...

(*c*) .....

7 A point R moves from two fixed points $P(1, 0)$ and $Q(-2, 3)$ such that $RP : RQ = 1 : 2$. Find the equation of the locus of R.

[3 *marks*]

Suatu titik R bergerak dari dua titik tetap $P(1, 0)$ *dan* $Q(-2, 3)$ *dengan keadaan* $RP : RQ = 1 : 2$. *Cari persamaan lokus bagi R.*

[3 *markah*]

For Examiner's Use

Answer / *Jawapan* : .....

7
3

For Examiner's Use

8 Diagram 8 shows a piece of wire which formed a sector OPQ, with centre O. The length of the wire is 200 cm.

Rajah 8 *menunjukkan seutas dawai yang membentuk sebuah sektor* OPQ, *berpusat* O. *Panjang dawai itu ialah* 200 cm.

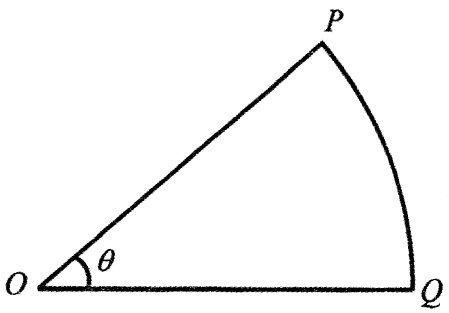


Diagram 8 / *Rajah* 8

Given that the arc length PQ is 60 cm, find the value of θ in radians.

Diberi panjang lengkok PQ *ialah* 60 cm, *cari nilai* θ *dalam radian.*

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

8

3

Answer / *Jawapan* : $\theta =$ .....

9 The first three terms of an arithmetic progression are p, $2p - 2$ and $2p + 1$.
Tiga sebutan pertama suatu janjang aritmetik ialah p, $2p - 2$ *dan* $2p + 1$.
Find / *Cari*
(*a*) the value of p,
nilai p,
(*b*) the sum of the next 12 terms.
hasil tambah 12 *sebutan berikutnya.*
[4 *marks*]
[4 *markah*]

For Examiner's Use

Answer / *Jawapan* : (*a*) p = ...
(*b*) .....

9
4

10 The first three terms of a geometric progression are 27, 18, 12.
Find the sum to infinity of the geometric progression. [3 *marks*]
Tiga sebutan pertama suatu janjang geometri ialah 27, 18, 12.
Cari hasil tambah hingga sebutan ketakterhinggaan bagi janjang itu. [3 *markah*]

Answer / *Jawapan* : .....

10
3

For Examiner's Use

11 Solve the equation $2 \times 4^{x-1} = 16^{2x}$. [4 *marks*]

Selesaikan persamaan $2 \times 4^{x-1} = 16^{2x}$. [4 *markah*]

11 4

Answer / *Jawapan* : .....

---

12 Given that $\log_3 m = p$, express in terms of p

Diberi bahawa $\log_3 m = p$, *ungkapkan dalam sebutan* p

(*a*) $\log_3 m^3$,

(*b*) $\log_9 m$.

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

12 3

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

(*b*) .....

13 Given that $5 \log_k 6 - \log_k 96 = 4$, find the value of k. [3 *marks*]

Diberi bahawa $5 \log_k 6 - \log_k 96 = 4$, *cari nilai* k. [3 *markah*]

For Examiner's Use

13

3

Answer / *Jawapan* : $k =$ .....

---

14 A set of eight scores $x_1, x_2, x_3, \ldots\ldots x_8$ has mean 7 and standard deviation 2.

Satu set yang terdiri daripada lapan skor $x_1, x_2, x_3, \ldots\ldots x_8$ *mempunyai min* 7 *dan sisihan piawai* 2.

Find / *Cari*

(*a*) Σx,

(*b*) Σx^2.

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

Answer / *Jawapan* : (*a*) $\Sigma x =$ .....

(*b*) $\Sigma x^2 =$ .....

14

3

For Examiner's Use

15 Find the coordinates of the point on the curve $y = (3x - 1)^2$ such that the normal gradient to the curve at that point is $\frac{1}{6}$. [3 *marks*]

Cari koordinat titik pada lengkung $y = (3x - 1)^2$ *dengan keadaan kecerunan normal lengkung pada titik itu ialah* $\frac{1}{6}$. [3 *markah*]

15

3

Answer / *Jawapan* : .....

---

16 Given that $f(x) = \frac{4x^2}{3x-2}$, evaluate $f'(2)$. [4 *marks*]

Diberi bahawa $f(x) = \frac{4x^2}{3x-2}$, *nilaikan* $f'(2)$. [4 *markah*]

16

4

Answer / *Jawapan* : $f'(2)$ = ...

17 Diagram 17 shows the shaded region bounded by the curve $y = x^2 + 2$, the straight line $y = k$ and the y-axis.

Rajah 17 *menunjukkan rantau berlorek yang dibatasi oleh lengkung* $y = x^2 + 2$, *garis lurus* $y = k$ *dan paksi-y.*

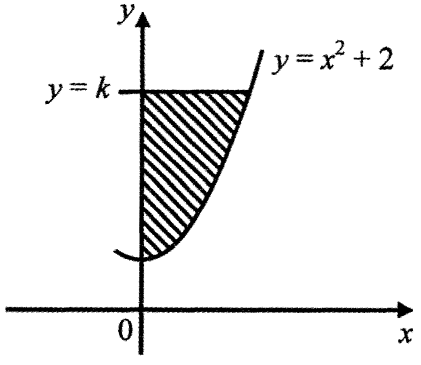


Diagram 17 / *Rajah* 17

When the shaded region is rotated through 360° about the y-axis, the volume generated is $\frac{25}{2}\pi$ unit^3. Find the value of k.

Apabila rantau berlorek dikisar melalui 360° *pada paksi-y, isipadu yang dijanakan ialah* $\frac{25}{2}\pi$ unit^3. *Cari nilai k.*

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

Answer / *Jawapan* : $k =$ .....

For Examiner's Use

17

3

For Examiner's Use

18 Given that $\int_2^6 f(x)\,dx = 24$, find

Diberi $\int_2^6 f(x)\,dx = 24$, *cari*

(*a*) $\int_2^6 2f(x)\,dx$

(*b*) the value of *k* where $\int_2^6 [f(x)-k]\,dx = 28$.

nilai k dengan keadaan $\int_2^6 [f(x)-k]\,dx = 28$.

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

18

4

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

(*b*) k = ...

19 Solve the trigonometric equation $\cos 2x + \cos x = -1$ for $0° \leq x \leq 180°$.

[3 *marks*]

Selesaikan persamaan trigonometri kos $2x$ + kos $x = -1$ *untuk* $0° \leq x \leq 180°$.

[3 *markah*]

For Examiner's Use

Answer / *Jawapan* : .....

19

3

For Examiner's Use

20 The variables x and y are related by the equation $y = \frac{2}{x}(3 - x^2)$.

A straight line graph is obtained by plotting xy against x^2, as shown in Diagram 20.

Pembolehubah x dan y dihubungkan oleh persamaan $y = \frac{2}{x}(3 - x^2)$.

Graf garis lurus diperoleh dengan memplotkan xy melawan x^2, *seperti ditunjukkan dalam Rajah* 20.

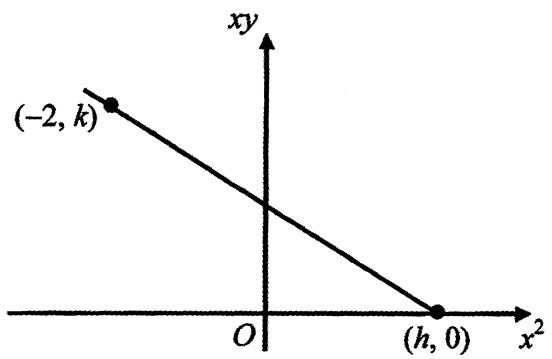


Diagram 20 / *Rajah* 20

Find the value of h and of k.
Cari nilai h dan nilai k.

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

20

3

Answer / *Jawapan* : h = ...

k = ...

21 Diagram 21 shows two vectors, $\overrightarrow{OA}$ and $\overrightarrow{BO}$.

Rajah 21 *menunjukkan dua vektor,* $\overrightarrow{OA}$ *dan* $\overrightarrow{BO}$.

For Examiner's Use

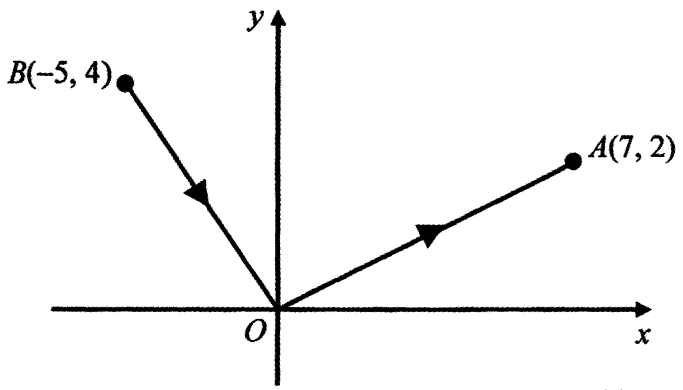


Diagram 21 / *Rajah* 21

(*a*) $\overrightarrow{OA}$ in the form $\begin{pmatrix} x \\ y \end{pmatrix}$,

$\overrightarrow{OA}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$,

(*b*) $\overrightarrow{BA}$ in the form $x\mathbf{i} + y\mathbf{j}$.

$\overrightarrow{BA}$ *dalam bentuk* $x\mathbf{i} + y\mathbf{j}$.

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

Answer / *Jawapan* : (*a*) $\overrightarrow{OA}$ = ...

(*b*) $\overrightarrow{BA}$ = ...

21

3

For Examiner's Use

22 Kafi, Yujing and Husna will sit for Chemistry paper in an examination. The probabilities that Kafi, Yujing and Husna will get distinction for the paper are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{2}{5}$ respectively.

Kafi, Yujing dan Husna akan menduduki kertas Kimia dalam suatu peperiksaan. Kebarangkalian bahawa Kafi, Yujing dan Husna akan mendapat cemerlang untuk kertas itu adalah masing-masing $\frac{1}{3}$, $\frac{1}{4}$ *dan* $\frac{2}{5}$.

Find the probability that

Cari kebarangkalian bahawa

(*a*) all of them will get distinction,

kesemua mereka mendapat cemerlang,

(*b*) only one of them will get distinction.

hanya seorang daripada mereka mendapat cemerlang.

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

22

4

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

(*b*) .....

23 A Physics project team from SMK Megat Panji Alam consists of 7 students. The team will be chosen from a group of 8 boys and 4 girls. Calculate the number of ways the team can be formed if

Satu pasukan projek Fizik dari SMK Megat Panji Alam terdiri daripada 7 orang pelajar. Pasukan itu akan dipilih daripada sekumpulan 8 pelajar lelaki dan 4 perempuan. Hitung bilangan cara yang berlainan pasukan itu boleh dibentuk jika

(*a*) there is no restriction,
tiada syarat dikenakan,

(*b*) the team consists of not more than 2 girls.
pasukan itu diwakili tidak lebih daripada 2 pelajar perempuan.

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

For Examiner's Use

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

(*b*) .....

23
4

For Examiner's Use

24 Diagram 24 shows six cards of different letters.

Rajah 24 *menunjukkan enam keping kad dengan huruf yang berlainan.*

Diagram 24 / *Rajah* 24

If four letters are to be chosen, find

Jika empat huruf hendak dipilih, cari

(*a*) the number of possible arrangements, in a row, of the cards,

bilangan cara susunan yang mungkin, dalam satu baris, bagi kad-kad itu,

(*b*) the number of these arrangements in which it ends with a vowel.

bilangan cara susunan itu dengan keadaan ia berakhir dengan huruf vokal.

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

24

4

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

(*b*) .....

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

For Examiner's Use

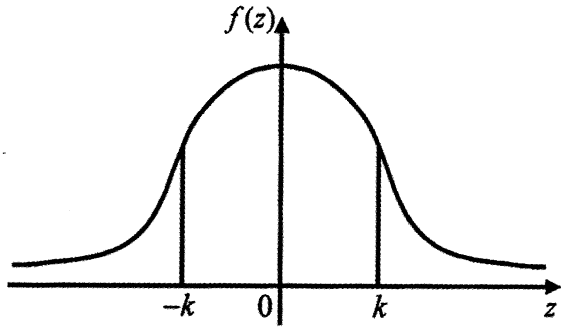


Diagram 25 / *Rajah* 25

If $P(-k < z < k) = 0{\cdot}646$, find
Jika $P(-k < z < k) = 0{\cdot}646$, *cari*

(*a*) $P(z > k)$,

(*b*) the value of k.
nilai bagi k.

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

Answer/*Jawapan* : (*a*) $P(z > k)$ = ...

(*b*) k = ...

25

3

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions.
   Kertas soalan ini mengandungi 25 soalan.

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

3. Write your answers in the spaces provided in the question paper.
   Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.

4. Show your working. It may help you to get marks.
   Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ia boleh membantu anda untuk mendapatkan markah.

5. If you wish to change your answer, cross out the answer work that you have done. Then write down the new answer.
   Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

6. The diagrams in the questions provided are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. The marks allocated for each question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.

8. A list of formulae is provided on pages 2 to 4.
   Satu senarai rumus disediakan di halaman 2 hingga 4.

9. Graph paper and a booklet of four-figure mathematical tables are provided.
   Kertas graf dan buku sifir matematik empat angka disediakan.

10. You may use a non-programmable scientific calculator.
    Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

11. Hand in this question paper to the invigilator at the end of the examination.
    Serahkan kertas soalan ini kepada pengawas peperiksaan di akhir peperiksaan.

JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2010
ADDITIONAL MATHEMATICS
Kertas 2
Ogos 2010
$2\frac{1}{2}$ jam Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*
4. *Calon dikehendaki menceraikan halaman 23 dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.*

Disediakan oleh:
AKRAM NEGERI TERENGGANU

Dibiayai oleh:
KERAJAAN NEGERI TERENGGANU

TERENGGANU ANJUNG ILMU

Dicetak oleh:
Percetakan Yayasan Islam Terengganu Sdn. Bhd.
Tel: 609-666 8611/6652/8601 Faks: 609-666 0611/0063

Kertas soalan ini mengandungi 23 halaman bercetak

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. $\log_a b = \dfrac{\log_c b}{\log_c a}$

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

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

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

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

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

CALCULUS / KALKULUS

1. $y = uv$

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

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

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

4. Area under a curve
Luas di bawah lengkung

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

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

5. Volume generated
Isipadu janaan

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

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

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

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

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

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

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*

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

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

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. $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

11. $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

12. $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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 equations

Selesaikan persamaan serentak

$x - 4y + 5 = 0$

$2x^2 + 3xy - 5 = 0$

Give your answers correct to 3 decimal places.

Beri jawapan anda betul sehingga 3 *tempat perpuluhan.*

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

2 (*a*) Prove that $\sin 2x (\cot x - \operatorname{cosec} 2x) = \cos 2x$. [2 *marks*]

Buktikan bahawa $\sin 2x (\text{kot } x - \text{kosek } 2x) = \text{kos } 2x$. [2 *markah*]

(*b*) (i) Sketch the graph of $y = \cos 2x$ for $0 \le x \le \frac{3}{2}\pi$.

Lakar graf $y = \text{kos } 2x$ *untuk* $0 \le x \le \frac{3}{2}\pi$.

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\sin 2x (\cot x - \operatorname{cosec} 2x) = 1 - \frac{3}{4\pi}x$ for $0 \le x \le \frac{3}{2}\pi$.
State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan
$\sin 2x (\text{kot } x - \text{kosek } 2x) = 1 - \frac{3}{4\pi}x$ *untuk* $0 \le x \le \frac{3}{2}\pi$.
Nyatakan bilangan penyelesaian itu.

[6 *marks*]
[6 *markah*]

3 Diagram 3 shows three consecutive squares arranged in ascending order.
Rajah 3 *menunjukkan tiga segiempat sama berturutan yang disusun secara menaik.*

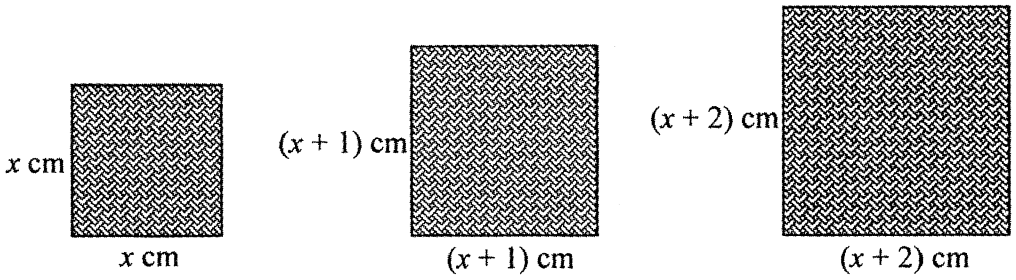


Diagram 3 / *Rajah* 3

(*a*) Show that the perimeter of the squares form an arithmetic progression.
Hence, state the value of the common difference. [2 *marks*]
Tunjukkan bahawa perimeter segiempat sama membentuk janjang arithmetik.
Seterusnya, nyatakan nilai beza sepunya. [2 *markah*]

(*b*) Given that $x = 12$ cm, find
Diberi bahawa $x = 12$ cm, *cari*
(i) the sum of the perimeters of the first 15 squares,
hasil tambah perimeter bagi 15 *segiempat sama yang pertama,*
(ii) the first square that has the perimeter of more than 170 cm.
segiempat sama yang pertama mempunyai perimeter lebih dari 170 cm.
[4 *marks*]
[4 *markah*]

4 Sands are poured at the rate of 2 cm^3s^{-1} to form a vertical cone shape as shown in Diagram 4. The radius is x cm and the height is y cm.

Pasir dituang pada kadar 2 cm^3s^{-1} *untuk membentuk sebuah kon tegak seperti ditunjukkan dalam Rajah* 4. *Jejarinya adalah* x cm *dan tinggi adalah* y cm.

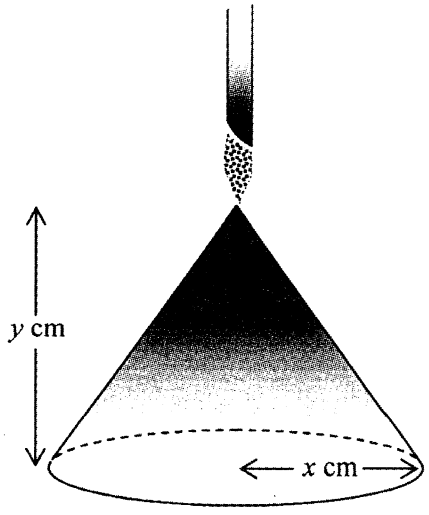


Diagram 4 / *Rajah* 4

Given that $x = \frac{3}{2}y$ and volume of cone $= \frac{1}{3}\pi r^2 h$,

Diberi $x = \frac{3}{2}y$ *dan isipadu kon* $= \frac{1}{3}\pi r^2 h$,

(*a*) (i) express the volume of the cone, V in terms of x.
ungkapkan isipadu kon, V *dalam sebutan* x.

(ii) Write an expression for $\frac{dV}{dx}$.
Tulis satu ungkapan bagi $\frac{dV}{dx}$.

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

(*b*) Hence, calculate
Seterusnya, hitung

(i) the small change in V when x increases from 6 cm to 6·02 cm,
perubahan kecil bagi V *apabila* x *menokok dari* 6 *kepada* 6·02 cm,

(ii) the rate of change of x when $y = 4$.
kadar perubahan x *apabila* $y = 4$.

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

5 Table 5 shows the distribution of marks of a monthly test for a group of students.
Jadual 5 menunjukkan taburan markah ujian bulanan bagi sekumpulan pelajar.

Marks *Markah*	1 - 9	10 - 19	20 - 29	30 - 39	40 - 49
Number of students *Bilangan* pelajar	2	5	10	k	7

Table 5 / *Jadual* 5

(*a*) Determine the minimum value of k such that the modal class is 30 - 39. [1 *mark*]
Tentukan nilai minimum bagi k supaya kelas mod adalah 30 - 39. [1 *markah*]

(*b*) Given that $k = 16$, find
Diberi $k = 16$, *cari*
(i) the mean,
min,
(ii) the variance,
varians,
mark of the students.
markah pelajar.

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

6 In Diagram 6, *PQRS* is a quadrilateral plane where *PR* intersects *ST* at *V*.

Dalam Rajah 6, PQRS adalah sebuah sisiempat sesatah dengan keadaan garis PR bersilang dengan garis ST di V.

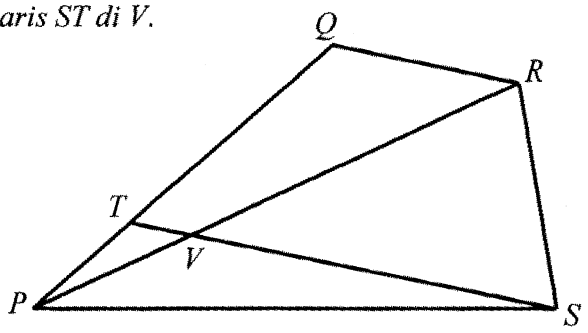


Diagram 6 / *Rajah 6*

Given that $\overrightarrow{PQ} = 5\mathbf{x}$, $\overrightarrow{PS} = 5\mathbf{y}$, $\overrightarrow{PT} = \frac{2}{5}\overrightarrow{PQ}$, $\overrightarrow{QR} = \frac{1}{2}\overrightarrow{TS}$.

Diberi bahawa $\overrightarrow{PQ} = 5\mathbf{x}$, $\overrightarrow{PS} = 5\mathbf{y}$, $\overrightarrow{PT} = \frac{2}{5}\overrightarrow{PQ}$, $\overrightarrow{QR} = \frac{1}{2}\overrightarrow{TS}$.

(*a*) Express in terms of **x** and **y**

Ungkapkan dalam sebutan **x** *dan* **y**

(i) $\overrightarrow{QS}$

(ii) $\overrightarrow{QR}$

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

(*b*) Given that $\overrightarrow{PV} = h\overrightarrow{PR}$ and $\overrightarrow{PV} = \overrightarrow{PT} + k\overrightarrow{TS}$.

Diberi bahawa $\overrightarrow{PV} = h\overrightarrow{PR}$ *dan* $\overrightarrow{PV} = \overrightarrow{PT} + k\overrightarrow{TS}$.

Express / *Ungkapkan*

(i) $\overrightarrow{PV}$ in terms of *h*, **x** and **y**,
$\overrightarrow{PV}$ *dalam sebutan h*, **x** *dan* **y**,

(ii) $\overrightarrow{PV}$ in terms of *k*, **x** and **y**.
$\overrightarrow{PV}$ *dalam sebutan k*, **x** *dan* **y**.

Hence, find the value of *h* and of *k*.

Seterusnya, cari nilai h dan nilai k.

[6 *marks*]
[6 *markah*]

Section *B* / *Bahagian B*

[40 *marks* / 40 *markah*]

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

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

Diagram 7 shows a triangle PQR, where P lies on the y-axis. Given that the equation of PR is $x + 2y = 12$.

Rajah 7 menunjukkan segitiga PQR, dengan keadaan P terletak pada paksi-y. Diberi bahawa persamaan PR ialah $x + 2y = 12$.

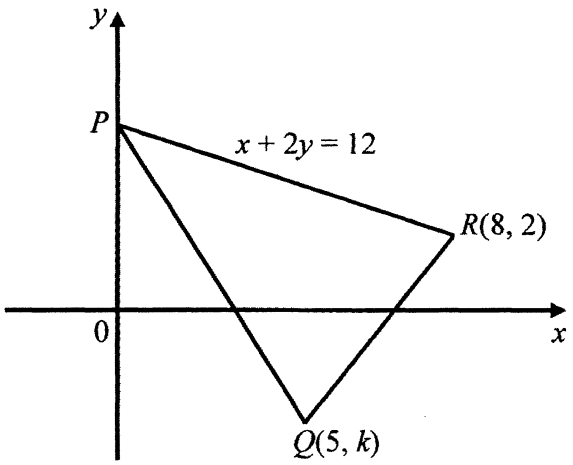


Diagram 7 / *Rajah 7*

(*a*) Find / *Cari*

(i) the coordinates of P.
koordinat P.

(ii) the equation of the straight line that passes through P and perpendicular to PR.
persamaan garis lurus yang melalui P dan berserenjang dengan PR.

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

(*b*) Given that the area of triangle PQR is 64 unit^2, find the value of k, where $k < 0$.
[3 *marks*]

Diberi bahawa luas segitiga PQR ialah 64 unit^2, *cari nilai k, dengan keadaan* $k < 0$.
[3 *markah*]

(*c*) The straight line QR is extended to a point S such that $QR : RS = 3 : 2$.
Find the coordinates of S. [3 *marks*]

Garis lurus QR diperpanjangkan ke suatu titik S dengan keadaan $QR : RS = 3 : 2$.
Cari koordinat S. [3 *markah*]

8 Diagram 8 shows the curve $y = x^2 + 4$ with the tangent $y = -4x$ at point R.

Rajah 8 menunjukkan lengkung $y = x^2 + 4$ *dengan garis tangen* $y = -4x$ *pada titik* R.

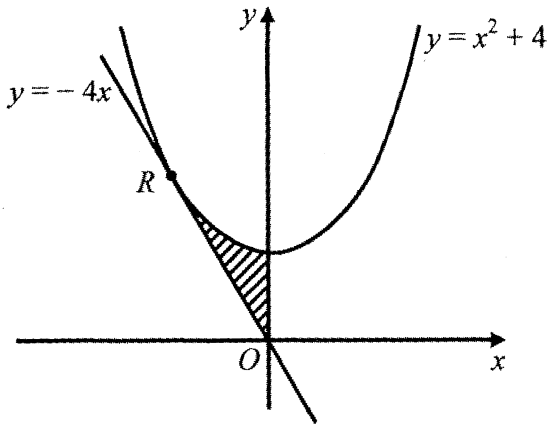


Diagram 8 / *Rajah 8*

Calculate

Hitung

(*a*) the coordinates of R, [2 *marks*]

koordinat R, [2 *markah*]

(*b*) the area of the shaded region, [4 *marks*]

luas rantau berlorek, [4 *markah*]

(*c*) the volume of revolution, in terms of π, when the region bounded by the curve $y = x^2 + 4$, the y-axis and the line that is parallel to the x-axis and passing through point R is revolved through 360° about the y-axis. [4 *marks*]

isipadu yang terjana, dalam sebutan π, *apabila rantau yang dibatasi oleh lengkung* $y = x^2 + 4$, *paksi-y dan garis lurus yang selari dengan paksi-x dan melalui titik R diputarkan melalui* 360° *pada paksi-y.* [4 *markah*]

9 Use the graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Table 9 shows the values of two variables, x and y, obtained from an experiment.

Variables x and y are related by the equation $y = pq^{-x}$, where p and q are constants.

Jadual 9 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = pq^{-x}$, *dengan keadaan p dan q ialah pemalar.*

x	1·0	2·0	3·0	4·0	5·0	6·0
y	286·5	82·10	23·52	6·74	1·93	0·55

Table 9 / *Jadual* 9

(*a*) Based on Table 9, construct a table for the values of $\log_{10} y$. [1 *mark*]
Berdasarkan Jadual 9, bina satu jadual bagi nilai-nilai $\log_{10} y$. [1 *markah*]

(*b*) Plot $\log_{10} y$ against x, by using the scale of 2 cm to 1 unit on the x-axis and 2 cm to 0·5 unit on the y-axis.
Hence, draw the line of best fit. [3 *marks*]
Plot $\log_{10} y$ *melawan x, dengan menggunakan skala* 2 cm *kepada* 1 unit *pada paksi-x dan* 2 cm *kepada* 0·5 unit *pada* paksi-*y*.
Seterusnya, lukis garis lurus penyuaian terbaik. [3 *markah*]

(*c*) Use your graph in **9**(*b*) to find the value of
Gunakan graf di **9**(*b*) *untuk mencari nilai*
(i) p,
(ii) q,
(iii) x when $y = 500$.
x *apabila* $y = 500$.
[6 *marks*]
[6 *markah*]

10 Diagram 10 shows a semicircle *OPQR* with centre *O*. *OQ* is an arc with centre *R*.
Rajah 10 *menunjukkan semibulatan OPQR berpusat O. OQ adalah lengkok bulatan berpusat R.*

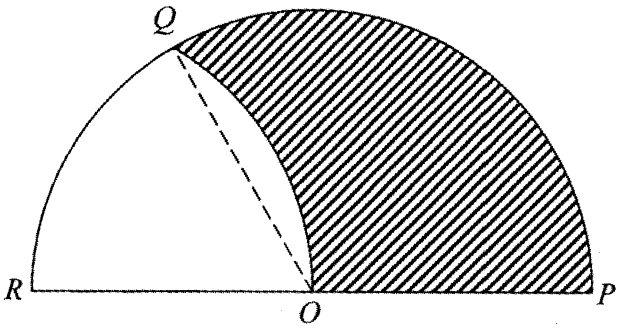


Diagram 10 / *Rajah* 10

Given that the radius of the semicircle, *OP* is 6 cm, find
Diberi jejari semibulatan, OP ialah 6 cm, *cari*

(*a*) $\angle QOR$ in radian, [1 *mark*]
$\angle QOR$ *dalam* radian, [1 *markah*]

(*b*) the arc length *QR*, [2 *marks*]
panjang lengkok QR, [2 *markah*]

(*c*) the area of sector *OPQ*, [2 *marks*]
luas sektor OPQ, [2 *markah*]

(*d*) the area of the shaded region. [5 *marks*]
luas kawasan berlorek. [5 *markah*]

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

11 (*a*) In a survey carried out in a school, it is found that 25% of students owns a laptop.
Dalam suatu kajian yang dibuat di sebuah sekolah, didapati 25% pelajar mempunyai komputer riba sendiri.

(i) If 8 students are chosen at random from the school, find the probability that at least 2 students own a laptop.
Jika 8 pelajar dipilih secara rawak dari sekolah itu, cari kebarangkalian sekurang-kurangnya 2 pelajar mempunyai komputer riba sendiri.

(ii) If the variance of students who own a laptop is 675, calculate the total number of students in the school.
Jika varians bagi pelajar yang mempunyai komputer riba ialah 675, hitung jumlah pelajar dalam sekolah itu.

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

(*b*) The diameter of the pumpkins produced from an orchard is normally distributed with mean diameter 8·0 cm and a variance of 5·76 cm^2.
Diameter labu yang dihasilkan dari sebuah kebun tertabur secara normal dengan diameter min 8·0 cm *dan varians* 5·76 cm^2.
Find / *Cari*

(i) the probability that a pumpkin chosen randomly from this orchard has a diameter less than 6·5 cm.
kebarangkalian sebiji labu yang dipilih secara rawak dari kebun itu berdiameter kurang daripada 6·5 cm.

(ii) the value of *d*, if 75% of the pumpkins from the orchard have diameters greater than *d* cm.
nilai d, jika 75% labu dari kebun itu mempunyai diameter melebihi d cm.

[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 A particle moves along a straight line and passes through a fixed point O. The velocity of the particle, v ms^{-1}, is given by $v = 6t - kt^2$, where k is a constant and t is the time, in seconds after passing through O. Its velocity is maximum when $t = 1$.
Suatu zarah bergerak di sepanjang suatu garis lurus melalui satu titik tetap O. Halaju zarah itu, v ms^{-1}, *diberi oleh* $v = 6t - kt^2$, *dengan keadaan k ialah pemalar dan t ialah masa, dalam saat selepas melalui O.*

Find / *Cari*

(*a*) the value of k, [2 *marks*]
nilai k, [2 *markah*]

(*b*) the time when the particle comes to instantaneous rest, [2 *marks*]
masa ketika zarah berhenti seketika, [2 *markah*]

(*c*) the range of values of t during which the particle moves to the left, [3 *marks*]
julat nilai t ketika zarah bergerak ke kiri, [3 *markah*]

(*d*) the total distance, in m, travelled by the particle in the first 4 seconds. [3 *marks*]
jumlah jarak, dalam m, *yang dilalui zarah dalam* 4 saat *yang pertama.* [3 *markah*]

13 A particular kind of cake is made by using five ingredients, *A*, *B*, *C*, *D* and *E*.
Table 13 shows the prices and price indices of the ingredients.
Sejenis kek diperbuat dengan menggunakan lima bahan, A, B, C, D dan E.
Jadual 13 *menunjukkan harga dan indeks harga bahan-bahan tersebut.*

Ingredients *Bahan-bahan*	**Price per kilogram (RM)** *Harga per kilogram* **(RM)**		**Price index for the year 2009 based on the year 2008** *Indeks harga pada tahun* **2009** *berasaskan tahun* **2008**
	Year 2008 *Tahun* **2008**	**Year 2009** *Tahun* **2009**	
A	5·00	*x*	120
B	2·50	4·00	160
C	3·00	4·50	150
D	4·00	4·40	110
E	*y*	*z*	125

Table 13 / *Jadual* 13

Diagram 13 shows a pie chart which represents the relative quantity of the ingredients used
Rajah 13 *menunjukkan carta pai yang mewakili kuantiti relatif bagi penggunaan bahan-bahan itu.*

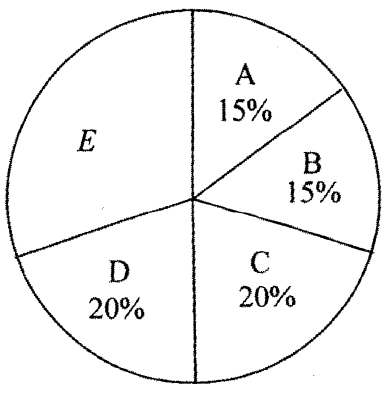


Diagram 13 / *Rajah* 13

(*a*) Based on Table 13, calculate

Berdasarkan Jadual 13, *hitung*

(i) the value of x.

nilai x.

(ii) Given the price per kilogram of ingredient E in the year 2009 is RM1·00 more than its corresponding price in the year 2008.

Calculate the value of y and of z.

Diberi harga per kilogram bahan E pada tahun 2009 *adalah* RM 1·00 *lebih daripada harga sepadan pada tahun* 2008.

Hitung nilai y dan nilai z.

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

(*b*) Calculate the composite index for the cost of making these cakes in the year 2009 based on the year 2008. [2 *marks*]

Hitung indeks gubahan bagi kos membuat kek pada tahun 2009 *berasaskan tahun* 2008. [2 *markah*]

(*c*) The cost of making these cake is expected to increase by 30% from the year 2009 to the year 2010. Calculate

Kos membuat kek dijangka meningkat sebanyak 30% *dari tahun* 2009 *ke* 2010. *Hitung*

(i) the composite index for the cost of making this cake in the year 2010 based on the year 2008,

indeks gubahan kos membuat kek pada tahun 2010 *berasaskan tahun* 2008,

(ii) the price of a cake in the year 2008 if its corresponding price in the year 2010 is RM39·00.

harga kek pada tahun 2008 *jika harga sepadan pada tahun* 2010 *ialah* RM39·00.

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

14 Use the graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

A sport club offers two fitness activities, swimming and aerobic. The rate imposed per hour for swimming is RM20 and aerobic is RM10. A participant wishes to join x hours of swimming and y hours of aerobic based on the following constraints:
Sebuah kelab sukan menawarkan dua aktiviti kecergasan, renang dan senamrobik. Kadar dikenakan setiap jam untuk renang ialah RM20 *dan senamrobik* RM10. *Seorang peserta ingin menyertai x* jam *renang dan y* jam *senamrobik berdasarkan kekangan berikut:*

I : The maximum total time for both activities is 14 hours.
Jumlah maksimum masa untuk kedua-dua aktiviti ialah 14 jam.

II : The total payment for both activities does not exceed RM180.
Jumlah bayaran untuk kedua-dua aktiviti tidak melebihi RM180.

III : The time for aerobic must exceed the time for swimming by at most 2 hours.
Masa untuk senamrobik melebihi masa renang selebih-lebihnya 2 jam.

(*a*) Write three inequalities other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints [3 *marks*]
Tulis tiga ketaksamaan, selain $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.* [3 *markah*]

(*b*) Using a scale of 2 cm to represent 2 hours for both axes, construct and shade the region R that satisfies all the above constraints. [3 *marks*]
Dengan menggunakan skala 2 cm *kepada* 2 jam *pada kedua-dua paksi, bina dan lorekkan rantau R yang memenuhi semua kekangan di atas.* [3 *markah*]

(*c*) Use the graph constructed in **14**(*b*) to find
Gunakan graf yang dibina di **14**(*b*) *untuk mencari*

(i) the maximum time for swimming, if the time for aerobic is 6 hours
masa maksimum untuk renang, jika masa untuk senamrobik ialah 6 jam.

(ii) the maximum total energy used for both activities per month, if the average amount of energy used for swimming is 6000 calories per hour and aerobic is 4000 calories per hour.
jumlah tenaga maksimum yang digunakan untuk kedua-dua aktiviti sebulan, jika purata jumlah tenaga yang digunakan untuk renang ialah 6000 kalori sejam *dan senamrobik* 4000 kalori sejam. [4 *marks*]
[4 *markah*]

15 In Diagram 15, *P*, *Q*, *R*, *S* and *T* lie on the horizontal plane. Given that *QRS* is a straight line, $\angle PRQ$ is an obtuse angle and the area of $\Delta PST = 25\ cm^2$.

Dalam Rajah 15 *P*, *Q*, *R*, *S dan T terletak di atas satah ufuk. Diberi QRS adalah garis lurus,* $\angle PRQ$ *adalah sudut cakah dan luas* $\Delta PST = 25\ cm^2$.

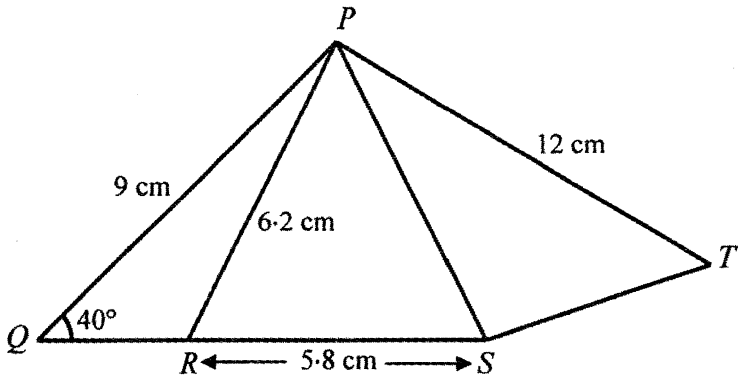


Diagram 15 / *Rajah* 15

Calculate / *Hitungkan*

(*a*) the length, in cm, of *PS*, [5 *marks*]
panjang, dalam cm, *bagi PS*, [5 *markah*]

(*b*) $\angle SPT$, [2 *marks*]
[2 *markah*]

(*c*) the area, in cm^2, of the whole diagram. [3 *marks*]
luas, dalam cm^2, *bagi seluruh rajah.* [3 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

BLANK PAGE
HALAMAN KOSONG

NAMA : .....

TINGKATAN : .....

Arahan Kepada Calon

1. Tulis Nama dan Tingkatan anda.
2. Tandakan (✓) untuk soalan yang dijawab.
3. Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.

Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh (*Untuk Kegunaan Pemeriksa*)
A	1		5	
	2		8	
	3		6	
	4		7	
	5		6	
	6		8	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
Jumlah				

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections : **Section A**, **Section B** and **Section C**.

   Kertas soalan ini mengandungi tiga bahagian : ***Bahagian A***, ***Bahagian B*** *dan* ***bahagian C***.

2. Answer **all** questions in **Section A**, any **four** questions from **Section B** and any **two** questions from **Section C**.

   Jawab **semua** *soalan dalam* ***Bahagian A***, mana-mana **empat** *soalan daripada* ***Bahagian B*** *dan* mana-mana **dua** *soalan daripada* ***Bahagian C***.

3. Write your answers on the foolscap papers provided.

   Tulis jawapan anda pada kertas jawapan yang disediakan.

4. Show your working. It may help you to get marks.

   Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ia boleh membantu anda untuk mendapatkan markah.

5. The diagrams in the questions provided are not drawn to scale unless stated.

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. The marks allocated for each question and sub-part of a question are shown in brackets.

   Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

7. A list of formulae is provided on pages 3 to 5.

   Satu senarai rumus disediakan di halaman 3 *hingga* 5.

8. Graph paper and a booklet of four-figure mathematical tables is provided.

   Kertas graf dan buku sifir matematik empat angka disediakan.

9. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

10. Tie the 'helaian tambahan' and the graph papers together with the answer sheets and hand in to the invigilator at the end of the examination.

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

JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2010 3472/1

ADDITIONAL MATHEMATICS

Kertas 1

Peraturan Pemarkahan

Ogos 2010

Peraturan pemarkahan ini mengandungi 7 halaman bercetak.

INSTRUCTIONS FOR EXAMINERS

1. MARKING GUIDE

1.1 Mark all the answers.

1.2 Do not mark working / answer that has been cancelled.

1.3 Answer written in the answer space or at the end of the working is considered the final answer.

1.4 Full mark is given for the correct answer without referring to the working.

1.5 If the final answer is wrong, award the corresponding maximum mark as stated in the marking scheme.

1.6 If more then one final answer is given, choose the answer with the highest mark unless stated otherwise in the marking scheme.

1.7 If the final answer is correct, but stated wrongly in the answer space, full mark is not awarded.

2. NOTATION

2.1 Full mark for each question in this paper is either 2, 3 or 4.

2.2 If full mark is not awarded, the following system is used :

B3 – 3 marks is awarded if the answer at this stage is correct.

B2 – 2 marks is awarded if the answer at this stage is correct.

B1 – 1 mark is awarded if the answer at this stage is correct.

2.3 Only one out of B3, B2 or B1 is awarded for each question or part of a question.

3. Accept answers correct to 4 significant figures unless stated otherwise in the marking scheme.

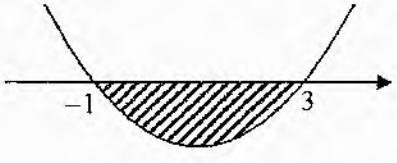
4. Accept other correct methods which are not given in the marking scheme.

5. Accept answers in Bahasa Melayu.

6. Calculating total marks.

$$\frac{\sum \text{Score for Paper 1} + \sum \text{Score for Paper 2}}{180} \times 100\%$$

TRIAL SPM EXAM 2010
MARK SCHEME FOR ADDITIONAL MATHS. PAPER 1

No.	Mark Scheme	Σ Marks
1	(*a*) {2, 5} [1] accept without bracket (*b*) $f: x \to \frac{x}{2}$ or $f(x) = \frac{x}{2}$ [1] (accept $\frac{x}{2}$ only)	2
2	(*a*) 2 [2] $\frac{x-1}{2}$ B1 or $2x+1=5$ (accept any letter) (*b*) 4 [1]	3
3	$2x^2 - 4x - 1 = 0$ [2] $3x^2 - 3x + x - 1 = x^2 + 2x$ or equivalent B1	2
4	$p > 5$ [3] $12^2 - 4(18)(7-p) > 0$ B2 $a = 18, b = 12, c = 7 - p$ B1	3
5	$-1 < x < 3$ [3]  B2 (including shaded part) −1, 3 B1	3
6	(*a*) $h = 23$ [1] (*b*) $k = -3$ [1] (*c*) $f(x) = 2(x-3)^2 - 23$ or equivalent [1] ignore $f(x)$	3

No.	Mark Scheme	Σ Marks
7	$x^2+y^2-4x+2y-3=0$ [3] $\sqrt{[(x-(-2)]^2+(y-3)^2}=2\sqrt{(x-1)^2+(y-0)^2}$ **or** equivalent B2 $\sqrt{[(x-(-2)]^2+(y-3)^2}$ **or** $\sqrt{(x-1)^2+(y-0)^2}$ B1	3
8	$\theta=\frac{6}{7}$ **or** 0·8571 [3] $70\theta=60$ B2 $r+r+60=200$ **or** 70 B1	3
9	(*a*) $p=5$ [2] $2p-2-p=2p+1-(2p-2)$ B1 (*b*) 366 [2] $\frac{15}{2}[2(5)+14(3)]-\frac{3}{2}[2(5)+2(3)]$ **or** $\frac{12}{2}[2(14)+11(3)]$ **or** $d=3$ and 390 (both) **or** $d=3$ and 24 (both) B1	4
10	81 **or** 81·01 [3] $S_\infty=\frac{27}{1-\frac{2}{3}}$ B2 $a=27, r=\frac{2}{3}$ (both) B1	3
11	$x=-\frac{1}{6}$ [4] $1+2(x-1)=4(2x)$ B3 $2^{1+2(x-1)}=2^{4(2x)}$ B2 (use law of indices – addition) $2\times 2^{2(x-1)}=2^{4(2x)}$ B1 (same base)	4

No.	Mark Scheme	Σ Marks
12	(*a*) $3p$ [1] (*b*) $\frac{p}{2}$ **or** $\frac{1}{2}p$ [2] $\frac{\log_3 m}{\log_3 9}$ **B1**	3
13	$k = 3$ [3] $k^4 = \frac{6^5}{96}$ **B2** $\log_k\left(\frac{6^5}{96}\right)$ **B1** (use law of logarithms – division) (ignore index 5 for **B1**)	3
14	(*a*) 56 [1] (*b*) 424 [2] $\sqrt{\frac{\sum x^2}{8} - 7^2} = 2$ **or** $\frac{\sum x^2}{8} - 7^2 = 2^2$ **B1**	3
15	(0, 1) [3] $2(3x-1)(3) = -6$ **B2** $\frac{dy}{dx} = 2(3x-1)(3)$ **B1**	3
16	1 [4] $\frac{12(2)^2 - 16(2)}{[3(2)-2]^2}$ **B3** $\frac{(3x-2)(8x) - 4x^2(3)}{(3x-2)^2}$ **or** $\frac{12x^2 - 16x}{(3x-2)^2}$ **B2** $(3x-2)(8x)$ **or** $4x^2(3)$ **B1**	4

No.	Mark Scheme	Σ Marks
17	7 [3] $\pi\left[\frac{y^2}{2}-2y\right]_2^k = \frac{25}{2}\pi$ **or** $\pi\left[\frac{(y-2)^2}{2}\right]_2^k = \frac{25}{2}\pi$ **B2** $\pi\int_2^k (y-2)dy$ **B1** (ignore limits for **B1**)	3
18	*(a)* 48 [1] *(b)* −1 [3] $24-[kx]_2^6 = 28$ **B2** $\int_2^6 f(x)dx - \int_2^6 k\,dx$ **or** $\int_2^6 f(x)dx + \int_2^6 -k\,dx$ **B1** for separation **or** $[kx]_2^6$ (ignore limits)	4
19	90°, 120° [3] Give **B2** if more answers given (other than 90°, 120°). $\cos x = 0, -\frac{1}{2}$ **B2** (both) $2\cos^2 x - 1 + \cos x = -1$ **B1**	3
20	$h = 3, k = 10$ (both) [3] $h = 3$ **or** $k = 10$ (either one) **B2** $xy = 6 - 2x^2$ **or** $m = -2, c = 6$ (both) **or** $0 = -2(h) + 6$ **or** $k = -2(-2) + 6$ **B1**	3
21	*(a)* $\begin{pmatrix}7\\2\end{pmatrix}$ [1] *(b)* 12i − 2j [2] $\begin{pmatrix}5\\-4\end{pmatrix}+\begin{pmatrix}7\\2\end{pmatrix}$ **or** 5i − 4j + 7i + 2j **B1**	3

No.	Mark Scheme	Σ Marks
22	(*a*) $\frac{1}{30}$ [1] (*b*) $\frac{9}{20}$ **or** 0·45 [3] $\frac{1}{3}\times\frac{3}{4}\times\frac{3}{5} + \frac{1}{4}\times\frac{2}{3}\times\frac{3}{5} + \frac{2}{5}\times\frac{2}{3}\times\frac{3}{4}$ B2 $\frac{1}{3}\times\frac{3}{4}\times\frac{3}{5}$ **or** $\frac{1}{4}\times\frac{2}{3}\times\frac{3}{5}$ **or** $\frac{2}{5}\times\frac{2}{3}\times\frac{3}{4}$ B1	4
23	(*a*) 792 [1] (*b*) 456 [3] ${}^4C_2 \times {}^8C_5 + {}^4C_1 \times {}^8C_6 + {}^4C_0 \times {}^8C_7$ B2 ${}^4C_2 \times {}^8C_5$ **or** ${}^4C_1 \times {}^8C_6$ **or** ${}^4C_0 \times {}^8C_7$ B1	4
24	(*a*) 360 [1] (*b*) 180 [3] ${}^5P_3 \times 3$ **or** $5 \times 4 \times 3 \times 3$ B2 ${}^5P_3$ **or** $5 \times 4 \times 3$ **or** 3 (only) B1	4
25	(*a*) 0·177 [2] $0{\cdot}5 - 0{\cdot}323$ **or** $1 - (0{\cdot}5 + 0{\cdot}323)$ **or** $\frac{1 - 0{\cdot}646}{2}$ B1 (*b*) 0·927 [1]	3

END OF MARK SCHEME

JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2010 3472/2
ADDITIONAL MATHEMATICS
Kertas 2
Peraturan Pemarkahan
Ogos 2010

Peraturan pemarkahan ini mengandungi 15 halaman bercetak.

INSTRUCTIONS FOR EXAMINERS

1. MARKING GUIDE

1.1 Mark all the answers.

1.2 Do not mark working / answer that has been cancelled.

1.3 Give the mark P / K / N in line with steps of calculation given by the students.

1.4 Give the mark P0 / K0 / N0 for the incorrect working / answer.

1.5 If more than one final answer is given, mark all the solution and choose the answer with the highest mark.

1.6 Accept other corect methods which are not given in the marking scheme.

2. NOTATION

P – The mark is given if the working / answer in accordance with the **Knowledge** assessed as stated in the marking scheme.

K – The mark is given if the working / answer in accordance with the **Skills** assessed as stated in the marking scheme.

N – The mark is given if the working / answer in accordance with the **Values** assessed as stated in the marking scheme.

PA – Subtract 1 mark (only once) from the **N** mark when students make an early rounding of numbers.

KP – Subtract 1 mark (only once) from the **P** mark or **N** mark when students do not write the important steps of the calculations.

3. Accept answers correct to 4 significant figures unless stated otherwise in the marking scheme.

4. Accept other correct methods which are not given in the marking scheme.

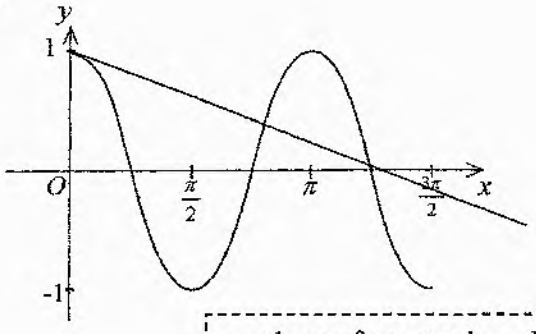
5. Accept answers in Bahasa Melayu.

6. Calculating total marks.

$$\frac{\sum \text{Score for Paper 1} + \sum \text{Score for Paper 2}}{180} \times 100\%$$

SPM TRIAL EXAM 2010
MARK SCHEME ADDITIONAL MATHEMATICS 2

SECTION *A* [40 MARKS]		
No.	**MARK SCHEME**	**Σ MARKS**
1	$x = 4y - 5$ **OR** $y = \frac{x+5}{4}$ **P1** $2(4y-5)^2 + 3(4y-5)y - 5 = 0$ **OR** $2x^2 + 3x\left(\frac{x+5}{4}\right) - 5 = 0$ **K1** $44y^2 - 95y + 45 = 0$ **OR** $11x^2 + 15x - 20 = 0$ $y = \frac{-(-95) \pm \sqrt{(-95)^2 - 4(44)(45)}}{2(44)}$ **OR** $x = \frac{-15 \pm \sqrt{15^2 - 4(11)(-20)}}{2(11)}$ **K1** y = 1·457, 0·702 (both) **N1** x = 0·828 **or** 0·829, −2·193 (both) **N1** *Note* : If the formula not used, give **K1N1N1** but **OW −1**.	**5**

No.	MARK SCHEME	Σ MARKS
2	(a) $2\sin x\cos x\left(\frac{\cos x}{\sin x}-\frac{1}{2\sin x\cos x}\right)$ **K1** for one of the identities $= 2\cos^2 x - 1$ **N1** $= \cos 2x$ (b) (i)  - shape of cos graph **N1** - amplitude (max = 1 **and** min = −1) **N1** - periodic/cycle in $0 \le x \le \frac{3}{2}\pi$ **N1** (ignore range more than $\frac{3}{2}\pi$) (ii) $y = 1 - \frac{3x}{4\pi}$ **K1** (equation of straight line) **K1** (any straight line with negative gradient **or** y-intercept) No. of solutions = 3 **N1** (without any mistake done)	8

No.	MARK SCHEME	Σ MARKS
3	(a) $4(x+1)-4x=4(x+2)-4(x+1)$ **K1** $d=4$ **N1** (b) (i) $S_{15}=\frac{15}{2}[2(48)+(14)(4)]$ **K1** $=1140$ **N1** (ii) $48+(n-1)(4) > 170$ **K1** for using T_n (ignore > 170) $n > 31\frac{2}{3}$ $n=32$ **N1**	6
4	(a) (i) $V=\frac{1}{3}\pi r^2 h$ $=\frac{1}{3}\pi x^2\left(\frac{2}{3}x\right)$ **or** $\frac{1}{3}\pi\left(\frac{3}{2}y\right)^2 y$ **K1** $=\frac{2}{9}\pi x^3$ **N1** (ii) $\frac{dV}{dx}=\frac{2}{3}\pi x^2$ **N1** (b) (i) $\delta V=\frac{2}{3}\pi x^2 \times \delta x$ **K1** for using $\delta V=\frac{dV}{dx}\times\delta x$ $=\frac{2}{3}\pi(6)^2\times 0{\cdot}02$ $=0{\cdot}48\pi$ **N1** (ii) $2=\frac{2}{3}\pi x^2\times\frac{dx}{dt}$ **K1** for using $\frac{dV}{dt}=\frac{dV}{dx}\times\frac{dx}{dt}$ $2=\frac{2}{3}\pi x^2\times\frac{dx}{dt}$ $=\frac{1}{12\pi}$ **N1**	7

No.	MARK SCHEME	Σ MARKS
5	(*a*) 11 **N1** (*b*) (i) $\bar{x} = \frac{1210}{40}$ **K1** for using $\bar{x} = \frac{\Sigma fx}{\Sigma f}$ $= 30{\cdot}25$ **N1** (ii) $\sigma^2 = \frac{41200}{40} - 30{\cdot}25^2$ **K1** for using $\sigma^2 = \frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2$ **P1** for 41200 $= 114{\cdot}9$ **N1**	6
6	(*a*) (i) $\overrightarrow{QS} = 5\mathbf{y} - 5\mathbf{x}$ **N1** (ii) $\overrightarrow{QR} = \frac{1}{2}\overrightarrow{TS}$ $= \frac{1}{2}(5\mathbf{y} - 2\mathbf{x})$ **N1** (*b*) (i) $\overrightarrow{PV} = h\overrightarrow{PR}$ $= h(5\mathbf{x} + 5\mathbf{y} - \mathbf{x})$ **K1** Give once for using $\overrightarrow{PV} = h\overrightarrow{PR}$ <u>or</u> $\overrightarrow{PV} = \overrightarrow{PT} + k\overrightarrow{TS}$ $= 4h\mathbf{x} + \frac{5}{2}h\mathbf{y}$ **N1** $\overrightarrow{PV} = \overrightarrow{PT} + k\overrightarrow{TS}$ $= 2\mathbf{x} + k(5\mathbf{y} - 2\mathbf{x})$ $= (2 - 2k)\mathbf{x} + 5k\mathbf{y}$ **N1** Compare either coefficient of **x** <u>or</u> **y** **K1** $4h = 2 - 2k$ $\frac{5}{2}h = 5k$ Try to solve (until any one variable left) $8k = 2 - 2k$ **K1** $k = \frac{1}{5}$, $h = \frac{2}{5}$ **N1** (both)	8

SECTION *B* [40 MARKS]		
No.	**MARK SCHEME**	**Σ MARKS**
7		

(*a*) (i) (0, 6) **N1**

(ii) $y - 6 = 2(x - 0)$ **K1**
P1 for $m = 2$

$y = 2x + 6$ **or** equivalent **N1**

(*b*) $\frac{1}{2}\,|\,0(k) + 5(2) + 8(6) - [6(5) + 8(k) + 0(2)]\,|$ **K1**

$28 - 8k = 128$ **or** $28 - 8k = -128$ **or** equivalent **K1**

$k = -12\frac{1}{2}$ **N1**

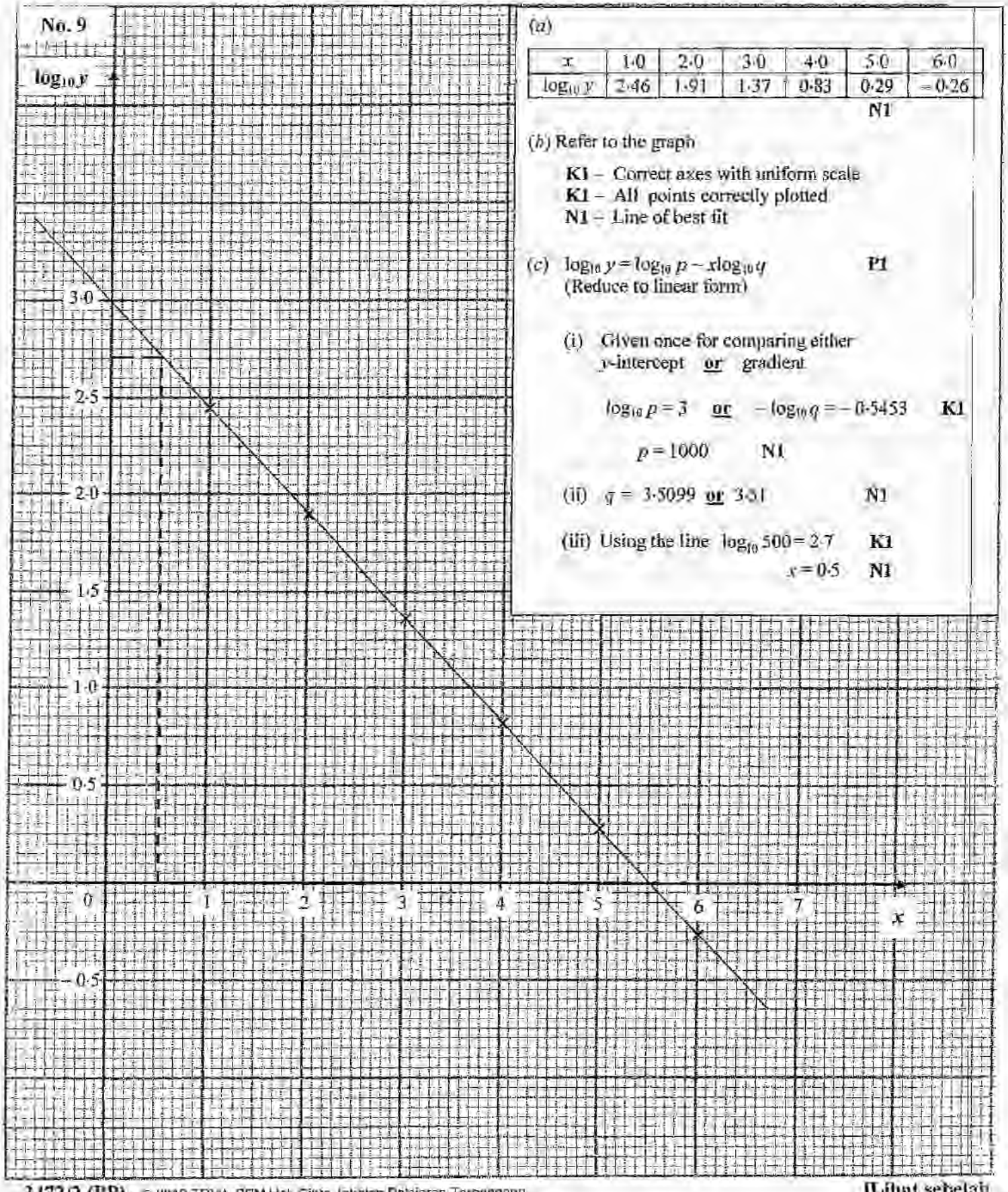
(*c*) $\frac{2(5) + 3x}{3 + 2} = 8$ **or** $\frac{2\left(-\frac{25}{2}\right) + 3y}{3 + 2} = 2$ **K1** **10**

$x = 10,\ y = \frac{35}{3}$ (both) **N1**

$\left(10, \frac{35}{3}\right)$ **N1**

No.	MARK SCHEME	Σ MARKS
8	(a) $x^2+4=-4x$ **K1** $R(-2, 8)$ **N1**	
	(b) $A_1=\int_{-2}^{0}(x^2+4)\,dx$ $=\left[\frac{x^3}{3}+4x\right]_{-2}^{0}$ **K1**(for integration) Area $\Delta=\frac{1}{2}\times 2\times 8$ **OR** $\int_{-2}^{0}-4x\,dx$ **K1** Area of shaded region $\left[\frac{x^3}{3}+4x\right]_{-2}^{0}-\frac{1}{2}\times 2\times 8$ **OR** $\left[\frac{x^3}{3}+4x\right]_{-2}^{0}-\left[-\frac{4x^2}{2}\right]_{-2}^{0}$ **K1** (for subtract) $\frac{8}{3}$ **or** $2\frac{2}{3}$ **or** 2·667 **N1**	**10**
	(c) $V=\int_{4}^{8}\pi(y-4)\,dy$ **K1** **P1** (for limit $\int_{4}^{8}$) $\pi\left[\frac{y^2}{2}-4y\right]_{4}^{8}$ **K1** (integration) 8π unit^3 **N1**	

No. 9



(a)

x	1·0	2·0	3·0	4·0	5·0	6·0
$\log_{10} y$	2·46	1·91	1·37	0·83	0·29	– 0·26

N1

(b) Refer to the graph

K1 – Correct axes with uniform scale
K1 – All points correctly plotted
N1 – Line of best fit

(c) $\log_{10} y = \log_{10} p - x\log_{10} q$ P1
(Reduce to linear form)

(i) Given once for comparing either y-intercept **or** gradient

$\log_{10} p = 3$ **or** $-\log_{10} q = -0.5453$ K1

$p = 1000$ N1

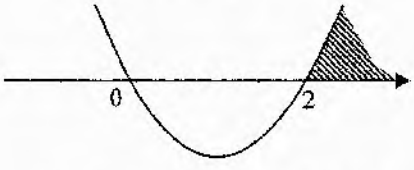
(ii) $q = 3.5099$ **or** 3.51 N1

(iii) Using the line $\log_{10} 500 = 2.7$ K1

$x = 0.5$ N1

No.	MARK SCHEME	Σ MARKS
10	(*a*) 1·047 rad **N1** (*b*) $s = 6(1{\cdot}047)$ **K1** $= 6{\cdot}282$ cm **N1** (*c*) $A = \frac{1}{2}(6)^2(2{\cdot}095)$ **K1** $= 37{\cdot}71$ cm^2 **N1** (*d*) Area of sector $OQR = \frac{1}{2}(6)^2(1{\cdot}047)$ **K1** Area of $\Delta ROQ = \frac{1}{2}(6)(6)\sin 60$ **K1** Area of sector OQR – Area of ΔROQ **K1** $\frac{1}{2}(6)^2(1{\cdot}047) - \frac{1}{2}(6)(6)\sin 60$ $= 3{\cdot}258$ **(Area of segment)** Area of the shaded region = Area of sector OPQ – **Area of segment** **K1** $= 37{\cdot}71 - 3{\cdot}258$ $= 34{\cdot}46$ **N1**	**10**

No.	MARK SCHEME	Σ MARKS
11	(a) (i) $P(X \geq 2)$ **K1** use $P(X=r) = {}^nC_r(0{\cdot}25)^r(0{\cdot}75)^{n-r}$ $= 1 - {}^8C_0(0{\cdot}25)^0(0{\cdot}75)^8 - {}^8C_1(0{\cdot}25)^1(0{\cdot}75)^7$ **K1** for $1-P(X=0)-P(X=1)$ $= 0{\cdot}6329$ **N1** (accept 0·63292) (ii) $675 = n \times 0{\cdot}25 \times 0{\cdot}75$ **K1** use $\sigma^2 = npq$ $n = 3600$ **N1** (b) (i) $P(X < 6{\cdot}5)$ $= P\left(Z < \frac{6{\cdot}5 - 8{\cdot}0}{2{\cdot}4}\right)$ **K1** used $z = \frac{X-8{\cdot}0}{2{\cdot}4}$ **or** $P(Z < -0{\cdot}625)$ $= 0{\cdot}26599$ **N1** (Accept 0·2660 **or** 0·266) (ii) $P(X > d) = 0{\cdot}75$ $P\left(Z < \frac{d-8{\cdot}0}{2{\cdot}4}\right) = 0{\cdot}75$ $\frac{d-8{\cdot}0}{2{\cdot}4} = -0{\cdot}674$ **K1** for the equation **P1** for $-0{\cdot}674$ $d = 6{\cdot}3824$ **N1** (accept 6·382)	**10**

SECTION C [20 MARKS]		
No.	**MARK SCHEME**	**Σ MARKS**
12	(a) $6-2k(1)=0$ **K1** $k=3$ **N1** (b) $3t(2-t)=0$ **K1** $t=2$ **N1** (c) $3t(2-t)<0$ **K1**  **K1** **OR** any other method **OR** $3t(t-2)>0$  $t>2$ **N1** (Give **K1N1** if correct answer without method) (d) $s=3t^2-t^3$ **K1** $v=0, t=2, \ s=4$ **or** $t=4; \ s=-16$ **K1** $\sum s = 16+2(4)$ $=24$ **N1** **OR** Use $\int_0^2 v\,dt + \int_2^4 v\,dt$ $\int_0^2 (6t-3t^2)\,dt + \left\lvert \int_2^4 (6t-3t^2)\,dt \right\rvert$ **K1** for limit $\int_0^2$ **or** $\int_2^4$ correct $\left[3t^2-t^3\right]_0^2 + \left\lvert \left[3t^2-t^3\right]_2^4 \right\rvert$ **K1** (for integrate) $4+\lvert -16-4 \rvert$ $=24$ **N1**	**10**

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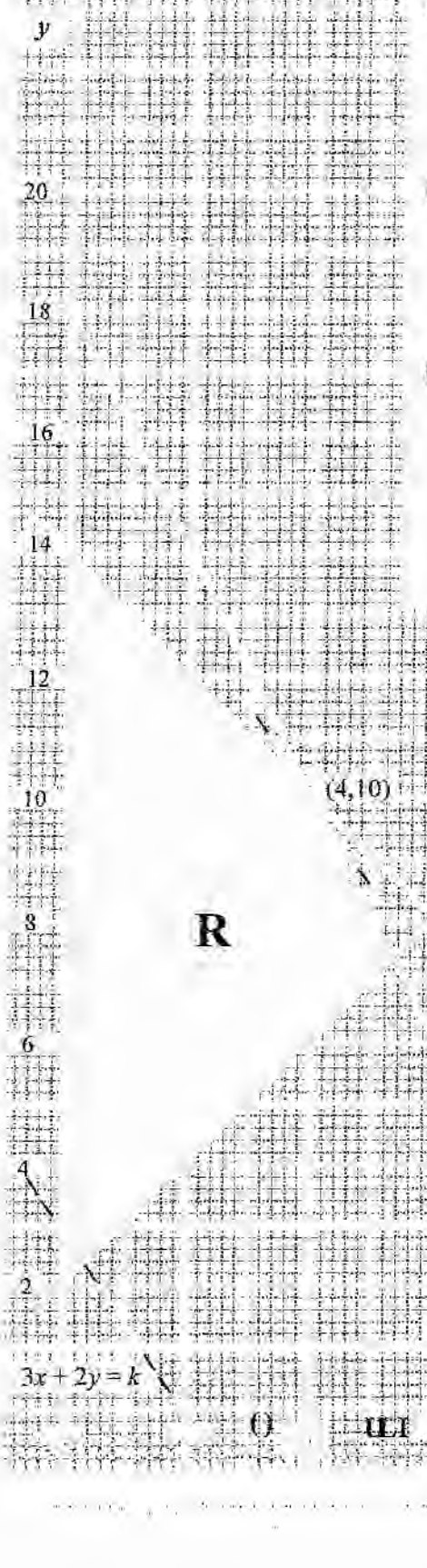
No.	MARK SCHEME	Σ MARKS
13	(a) (i) Use $I_{09/08} = \frac{P_{09}}{P_{08}} \times 100$ $\frac{x}{5\cdot00} \times 100 = 120$ **K1** once only for (a)(i) **or** (ii) x = RM 6·00 **N1** (ii) $z = y + 1$ **or** $y = z - 1$ **P1** $\frac{y+1}{y} \times 100 = 125$ **or** $\frac{z}{z-1} \times 100 = 125$ $y = 4$, $z = 5$ (both) **N1** (b) Use $\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$ $\bar{I} = \frac{120(15) + 160(15) + 150(20) + 110(20) + 125(30)}{100}$ **K1** = 131·5 **N1** (c) (i) $\frac{130}{100} \times 131\cdot5$ **K1** 170·95 **N1** (accept 171) (ii) $\frac{39}{P_{08}} \times 100 = 170\cdot95$ **K1** RM 22·81 **N1**	10

No. 14



(a) $x + y \leq 14$ **or** equivalent **N1**

$20x + 10y \leq 180$ **or** equivalent **N1**

$y - x \leq 2$ **or** equivalent **N1**

(b) Draw correctly at least one straight line **K1**

Draw correctly three straight lines **K1**

Region R shaded **N1**

(c) (i) Using straight line $y = 6$ **K1**

x maximum = 8 **N1**

(ii) $k = 6000(4) + 4000(10)$ **K1**

$= 64000$ **N1**

No.	MARK SCHEME	Σ MARKS
15	(a) $\frac{9}{\sin R} = \frac{6\cdot2}{\sin 40}$ **K1** Use sine rule $\sin R = 0\cdot9331$ $\angle PRQ = 111\cdot08°$ **or** $111°4'$ **N1** (answer must be in 2 decimal place) $PS^2 = 6\cdot2^2 + 5\cdot8^2 - 2(6\cdot2)(5\cdot8)\cos 68\cdot92°$ **K1** Use cos rule **P1** for $68\cdot92°$ $PS = 6\cdot798$ cm **N1** (b) $\frac{1}{2}(12)(6\cdot798)\sin \angle SPT = 25$ **K1** $\sin \angle SPT = 0\cdot6129$ $\angle SPT = 37\cdot8°$ **or** $37°\,48'$ **N1** (c) Area of $\Delta PQR = \frac{1}{2}(9)(6\cdot2)\sin \angle QPR$ **or** Area of $\Delta PRS = \frac{1}{2}(6\cdot2)(5\cdot8)\sin \angle PRS$ **K1** Total area = Area of ΔPQR + Area of ΔPRS + 25 **K1** $= 55\cdot27$ cm^2 **N1**	**10**

END OF MARK SCHEME

