Nama : ……..

Tingkatan :……

3472/1
Matematik Tambahan
Kertas 1,
Sept. 2010

2 Jam
Percubaan SPM

Pejabat Pelajaran Wilayah Persekutuan Putrajaya
Bersama
Majlis Pengetua-pengetua
Sekolah Menengah Malaysia (MPSM)
Wilayah Persekutuan Putrajaya

PEPERIKSAAN PERCUBAAN SPM 2010

MATEMATIK TAMBAHAN
Kertas 1
Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan **nama** dan **tingkatan** anda 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 bahasa Melayu.*

5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
1	2	
2	3	
3	3	
4	3	
5	3	
6	3	
7	3	
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16	3	
17	4	
18	3	
19	3	
20	3	
21	3	
22	3	
23	3	
24	4	
25	3	
Jumlah	80	

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HALAMAN KOSONG

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

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

CALCULUS / *KALKULUS*

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

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

$= \int_a^b y \, dx$ or (*atau*)

$= \int_a^b x \, dy$

5 Volume of revolution
Isipadu janaan

$= \int_a^b \pi y^2 \, dx$ or (*atau*)

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

  [Lihat sebelah SULIT

STATISTIC / *STATISTIK*

1 $\bar{x} = \dfrac{\Sigma x}{N}$

2 $\bar{x} = \dfrac{\Sigma fx}{\Sigma f}$

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

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

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

6 $I = \dfrac{Q_1}{Q_0} \times 100$

7 $\bar{I} = \dfrac{\Sigma W_i I_i}{\Sigma W_i}$

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

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

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

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

12 Mean /Min, $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $Z = \dfrac{X - \mu}{\sigma}$

GEOMETRY / *GEOMETRI*

1 Distance / *Jarak*

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

2 Midpoint / *Titik tengah*

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

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

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

4 Area of triangle / *Luas segitiga*

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

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

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

TRIGONOMETRY / *TRIGONOMETRI*

1 Arc length, $s = r\theta$

Panjang lengkok, $s = j\ \theta$

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

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

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

$\sin^2 A + \text{kos}^2 A = 1$

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

$\text{sek}^2 A = 1 + \tan^2 A$

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

$\text{kosek}^2 A = 1 + \text{kot}^2 A$

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

$\sin 2A = 2 \sin A \text{ kos } A$

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

$= 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

$\text{kos } 2A = \text{kos}^2 A - \sin^2 A$

$= 2\,\text{kos}^2 A - 1$

$= 1 - 2\sin^2 A$

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

$\sin (A \pm B) = \sin A \text{ kos} B \pm \text{kos } A \sin B$

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

$\text{kos } (A \pm B) = \text{kos } A \text{ kos B} \mp \sin A \sin B$

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

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

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

13 $a^2 = b^2 + c^2 - 2bc\ cosA$

$a^2 = b^2 + c^2 - 2bc\ kosA$

14 Area of triangle / *Luas segitiga*

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

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

1. In Diagram 1, the function f maps x to y and the function h maps y to z.
Dalam Rajah 1, *fungsi* f *memetakan* x *kepada* y *dan fungsi* h *memetakan* y *kepada* z.

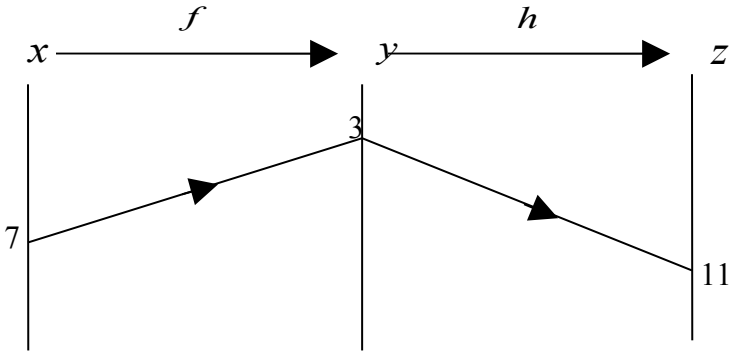

Diagram 1
Rajah 1

State
Nyatakan

(a) $f^{-1}(3)$,

(b) $hf(7)$. [2 *marks*]

[2 *markah*]

1
2

Answer / Jawapan : (a) ……..

(b) ……..

For examiner's use only

2. The function $g^{-1}(x) = \frac{4}{2x+1}$, $x \neq k$.

Fungsi $g^{-1}(x) = \frac{4}{2x+1}$, $x \neq k$.

(a) State the value of k.
Nyatakan nilai bagi k

(b) Find g*(x)*.
Cari g*(x)*.

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

Answer / Jawapan : (a) $k =$……..……..

(b) $g(x) =$

……..

2

3

---

3. The following information is about the function h and the inverse function h^{-1}.
Maklumat berikut adalah berkaitan dengan fungsi h dan fungsi songsang h^{-1}.

$h : x \to 4 + ax$ and $h^{-1} : x \to \frac{2}{3} + 2bx$
where a and b are constant
dengan keadaan a *dan* b *ialah pemalar*

Find the values of a and b.
Cari nilai bagi a *dan* b.

[3 *marks*]

[3 *markah*]

Answer / Jawapan : (a) $a =$ ……..……..

(b) $b =$....

……..

3

3

4. Given the quadratic equation $3x-(x+2)=3x(x+2)$, find
Diberi persamaan kuadratik $3x-(x+2)=3x(x+2)$, *cari*

(a) the sum of roots,
hasil tambah punca-punca

(b) the product of roots.
hasil darab punca-punca. [3 *marks*]
[3 *markah*]

4

3

Answer / Jawapan : (a) ……..……..

(b) ……..……..

---

5 If the quadratic equation $x^2-2x+3=-k$ has no roots, find the range of values of k .
Jika persamaan kuadratik $x^2-2x+3=-k$ *tidak mempunyai punca-punca yang nyata.*
Cari julat bagi nilai k .

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

5

3

Answer / Jawapan :.....…..……..

For examiner's use only

6 The diagram 6 shows the graph of a quadratic function $g(x) = -2(x - m)^2 - 3$, where m is a constant.
Rajah 6 menunjukkan graf fungsi kuadratik $g(x) = -2(x - m)^2 - 3$, dengan keadaan m ialah pemalar.

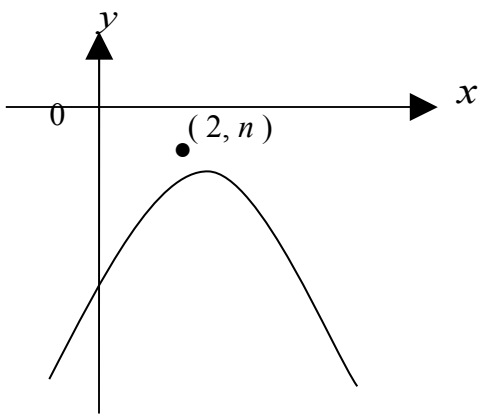

Diagram 6
Rajah 6

The curve y = g(x) has the maximum point (2, n), where n is a constant.
Lengkung y = g(x) mempunyai titik maksimum (2, n), dengan keadaan n ialah pemalar.

State
Nyatakan

(a) the value of m,
nilai m,

(b) the value of n,
nilai n,

(c) The equation of the axis of symmetry.
Persamaan paksi simetri.

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

Answer / Jawapan : (a) $m =$ ……..……..

(b) $n =$ ……..……..

(c) ….....…..……..

6

3

7 Find the range of values of x if $x(x-4)+5<2x$.

Cari julat nilai x jika $x(x-4)+5<2x$.

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

7

3

Answer / Jawapan : …….

---

8 Solve the equation $2^{3x-5}=\frac{1}{4^{x+1}}$

Selesaikan persamaan $2^{3x-5}=\frac{1}{4^{x+1}}$

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

8

3

Answer / Jawapan : $x=$ …….

For examiner's use only

9 Given that $\log_2 pq = 6 + 7\log_2 p - \log_2 q$, express q in terms of p.
Diberi bahawa $\log_2 pq = 6 + 7\log_2 p - \log_2 q$, *ungkapkan* q *dalam sebutan p.*

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

Answer / Jawapan : ……

9

4

---

10 The sum of the first n term of an arithmetic progression is given by $S_n = 2n^2 - 5n$
Jumlah n sebutan pertama dalam janjang aritmetik diberi oleh $S_n = 2n^2 - 5n$.

Find
Cari

(a) the first term,
sebutan pertama,

(b) the common difference.
beza sepunya.

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

Answer / Jawapan : (a) ……

(b) ……

10

4

11 Fifth term of a geometric progression is 20. The sum of the fifth term and the sixth term is 10.
Sebutan kelima bagi janjang geometri ialah 20. *Jumlah sebutan kelima dan sebutan keenam ialah* 10.

Find
Cari

(a) the first term and the common ratio of the progression,
sebutan pertama dan nisbah sepunya

(b) the sum to infinity of the progression.
hasil tambah hingga ketakterhinggaan

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

11
4

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

(b) .....

For examiner's use only

12 The variables x and y are related by the equation $\frac{y}{x^2} = px + \frac{q}{x}$. , where p and q are constants.

Diagram 12 shows the straight line obtained by plotting $\frac{y}{x}$ against x^2

Pemboleh ubah x *dan* y *dihubungkan oleh persamaan* $\frac{y}{x^2} = px + \frac{q}{x}$, dengan keadaan p *dan* q *adalah pemalar.*

Rajah 12 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $\frac{y}{x}$ *melawan* x^2

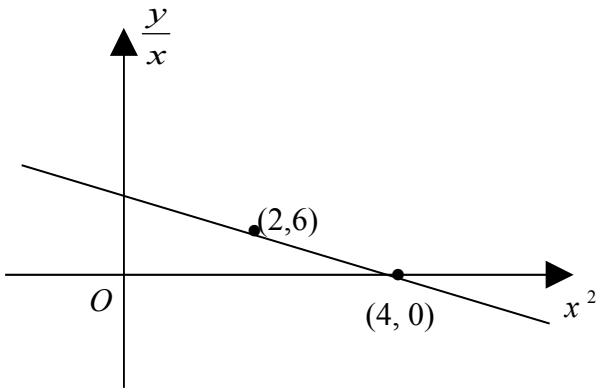

Diagram 12
Rajah 12

(a) Express the equation $\frac{y}{x^2} = px + \frac{q}{x}$ to the linear form.

Ungkapkan persamaan $\frac{y}{x^2} = px + \frac{q}{x}$ *dalam bentuk linear .*

(b) Find the value of p and of q .
Cari nilai p *dan nilai* q .

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

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

(b) $p =$ ..... $q =$ .....

12

4

13 Diagram 13 shows a straight line passing through $P(0,-6)$ and $Q(3,0)$.
Rajah 13 *menunjukkan garis lurus melalui* $P(0,-6)$ *dan* $Q(3,0)$.

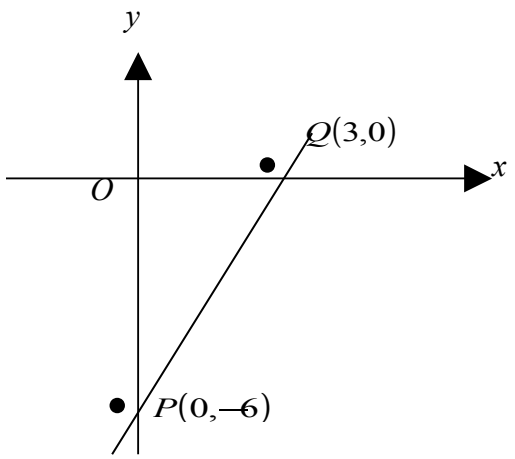

Diagram 13
Rajah 13

(a) Write down the equation of the straight line PQ in the form $\frac{x}{a}+\frac{y}{b}=1$.

Tulis persamaan garis lurus PQ *dalam bentuk* $\frac{x}{a}+\frac{y}{b}=1$.

(b) A point $S(x,y)$ moves such that $SQ=2SP$.
Find the equation of the locus of S.

Suatu titik $S(x,y)$ *bergerak dengan keadaan* $SQ=2SP$.
Cari persamaan lokus bagi S.

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

13

4

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

(b) .....

For examiner's use only

14 The following information refers to the equation of two straight lines, EF and GH which are perpendicular to each other.
Maklumat di bawah merujuk kepada dua persamaan garis lurus EF dan GH, yang berserenjang antara satu sama lain.

EF : $y = 2tx + k$ GH: $y = (k-3)x + t$, where k and t are constants *dengan keadaan k dan t ialah pemalar.*

Express t in terms of k.
Ungkapkan t dalam sebutan k. [3 *marks*]

[3 *markah*]

Answer / Jawapan : $t =$.....

14

3

15 Diagram 15 show two vector $\overrightarrow{OP}$ and $\overrightarrow{PR}$.
Rajah 15 menunjukkan dua vektor $\overrightarrow{OP}$ *dan* $\overrightarrow{PR}$.

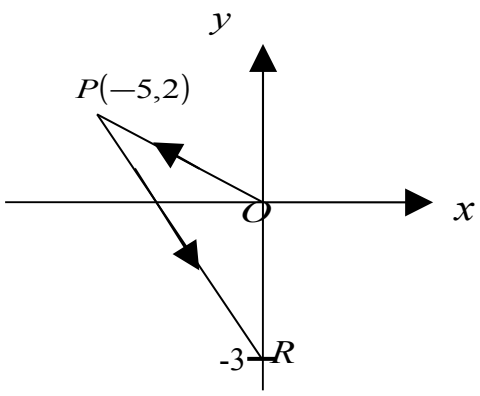

Diagram 15
Rajah 15

Express
Ungkapkan

(a) $\overrightarrow{OP}$ in the form $x\underline{i} + y\underline{j}$,
$\overrightarrow{OP}$ *dalam bentuk* $x\underline{i} + y\underline{j}$,

(b) $\overrightarrow{PR}$ in the form $\begin{pmatrix} x \\ y \end{pmatrix}$.
$\overrightarrow{PR}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$.

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

15

2

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

(b) $\overrightarrow{PR}$ =.....

For examiner's use only

16 Diagram 16 shows a quadrilateral $PQRS$.
Rajah 16 *menunjukkan sebuah kuadrilateral* $PQRS$.

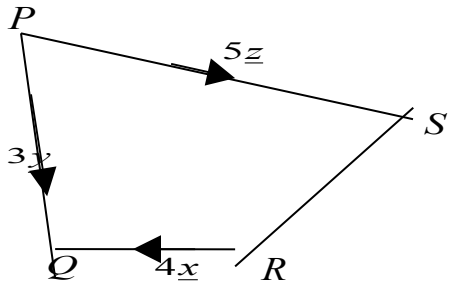

Diagram 16
Rajah 16

Express $\overrightarrow{RS}$ in terms of $\underline{x}$, $\underline{y}$ and $\underline{z}$.
Ungkapkan $\overrightarrow{RS}$ *dalam sebutan* $\underline{x}$, $\underline{y}$ *dan* $\underline{z}$.

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

16 / 3

Answer / Jawapan : $\overrightarrow{RS}$ =.....

---

17 Solve the equation $2\tan x - \cot x = 1$ for $0^\circ \le x \le 360^\circ$
Selesaikan persamaan $2\tan x - \cot x = 1$ *untuk* $0^\circ \le x \le 360^\circ$

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

17 / 4

Answer / Jawapan : (a) $x =$ .....

18 Diagram 18 shows two sectors MON and POQ of two concentric circles with centre O ,
where MOQ and PON are straight lines.

Rajah 18 menunjukkan dua sektor MON dan POQ dua bulatan berpusat sama di O. dengan keadaan MOQ dan PON adalah garis lurus.

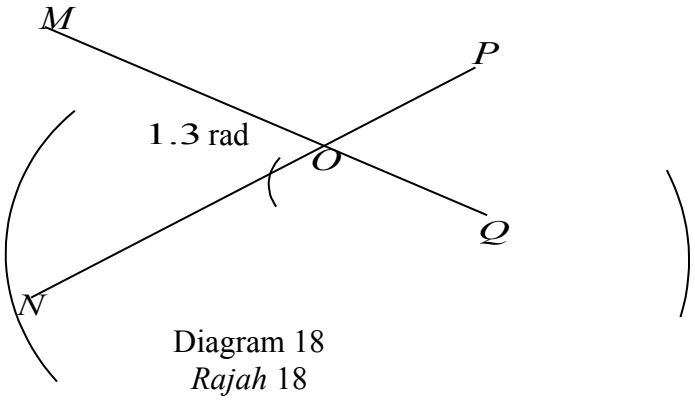

Diagram 18
Rajah 18

Given $ON = r$ cm , $OP = (r-3)$ cm and perimeter of the diagram is 42.9.
Diberi $ON = r$ cm , $OP = (r-3)$ cm *dan perimeter bagi rajah itu ialah* 42.9

Find the value of r , in cm.

Cari nilai bagi r *, dalam* cm.

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

18

3

Answer / Jawapan : $r =$ ……..…….....…….....…….

For examiner's use only

19 Given the curve $y=(2x+1)^5$, find the gradient of the curve at $x=-1$.
Diberi suatu lengkung $y=(2x+1)^5$, *Cari kecerunan bagi lengkung itu di* $x=-1$.

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

19
3

Answer / Jawapan : .....

---

20 Two variables, x and y, are related by the equation $y=\frac{6}{x^2}$.
Express, in terms of p, the approximate change in y, when x changes from 3 to $3-p$, where p is a small value.
Dua pemboleh ubah, x *dan* y, *dihubungkan oleh persamaan* $y=\frac{6}{x^2}$.
Ungkapkan, dalam p ,*perubahan kecil bagi* y, *apabila* x *berubah daripada* 3 *kepada* $3-p$, *dengan keadaan* p *ialah satu nilai kecil*.

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

20
3

Answer / Jawapan : .....

21 Given that $\int_1^3 h(x)\ dx = 5$, find the value of k if $\int_1^3 [2x - kh(x)]\ dx = 10$
Diberi $\int_1^3 h(x)\ dx = 5$, *cari nilai* k *jika* $\int_1^3 [2x - kh(x)]\ dx = 10$

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

21
3

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

---

22 A set of five numbers has a mean of 8.
Satu set yang terdiri daripada lima nombor mempunyai min 8.

(a) Find Σx.
Cari Σx.

(b) When a number m is taken out of this set, the new mean is 7.5.
Apabila satu nombor m *dikeluarkan dari set ini, min baru ialah 7.5*

Find the value of m.
Cari nilai m.

[3 *marks*]
[3 *markah*

.

22
3

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

For examiner's use only

(b) $m =$ .....

23 A bag contains x red marbles, 5 blue marbles and 4 green marbles.

When a marble is drawn at random from the bag, the probability that it is red marble is 25%.

Sebuah beg mengandungi x *guli berwarna merah*, 5 *guli berwarna biru dan* 4 *guli berwarna hijau* .
Apabila satu biji guli dikeluarkan secara rawak daripada beg itu,kebarangkalian bahawa guli itu adalah berwarna merah ialah 25%.

Find the value of x .

Carikan nilai x

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

23

Answer / Jawapan : $x =$ ....…..…….....

3

24 There are 4 cars, that is, A , B , C and D and 3 vans, that is, X , Y and Z in a used car shop.

Diagram 24 shows a parking area.

Dalam sebuah kedai kereta terpakai terdapat 4 *buah kereta*, *iaitu*, A , B , C *dan* D *dan* 3 *buah van iaitu*, X , Y *dan* Z .

Rajah 24 *menunjukkan tempat letak kenderaan* .

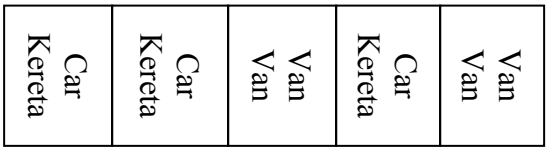

Diagram 24
Rajah 24

Find
Cari

(a) the number of ways a man has if he wants to buy two cars and a van from the shop.
Bilangan cara jika seorang lelaki ingin membeli 2 buah kereta dan sebuah van daripada kedai itu.

(b) the number of ways of arranging the vehicles if the 3 cars and 2 vans have to be arranged in the parking area as shown.
Bilangan cara menyusun kenderaan jika 3 buah kereta dan 2 buah van akan disusun di tempat letak kenderaan seperti yang ditunjukkan.

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

24

4

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

(b).....

For examiner's use only

25 X is a continuous random variable of a normal distribution with a mean of 45 and a standard deviation of σ.

Find the value of σ when $P(X > 50) = 0.2061$.

X ialah pemboleh ubah rawak selanjar bagi suatu taburan normal dengan min 45 dan sisihan piawai σ.

Cari nilai σ apabila $P(X > 50) = 0.2061$.

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

Answer / Jawapan: .....

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. Give only **one** answer for each question.
   Bagi setiap soalan berikan **satu** *jawapan sahaja..*

4. Write your answers clearly in the spaces provided in the question paper.
   Jawapan hendaklah ditulis dengan jelas dalam ruang yang disediakan dalam kertas soalan.

5. Show your working. It may help you to get marks.
   Tunjukkan langkah–langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah .

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

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

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

9. A list of formulae is provided on pages 3 to 5.
   Satu senarai rumus disediakan di halaman 3 hingga 5.

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.
    Kertas soalan ini hendaklah diserahkan di akhir peperiksaan.

Nama : ……..

Tingkatan :……

3472/2
Matematik Tambahan
Kertas 2,
Sept. 2010

2 Jam 30 Minit
Percubaan SPM

Pejabat Pelajaran Wilayah Persekutuan Putrajaya
Bersama
Majlis Pengetua-pengetua
Sekolah Menengah Malaysia (MPSM)
Wilayah Persekutuan Putrajaya

PEPERIKSAAN PERCUBAAN SPM 2010

MATEMATIK TAMBAHAN
Kertas 2
Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini 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* 18 *dan ikat sebagai muka hadapan bersama-sama dengan jawapan anda.*

Kertas soalan ini mengandungi 19 halaman bercetak.

  [Lihat halaman sebelah
SULIT

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HALAMAN KOSONG

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

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

ALGEBRA

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

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

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

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

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

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

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

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

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

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

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

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

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

CALCULUS
KALKULUS

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

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

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

4 Area under a curve
Luas di bawah lengkung

$= \int_a^b y \, dx$ or (*atau*)

$= \int_a^b x \, dy$

5 Volume of revolution
Isi padu kisaran

$= \int_a^b \pi y^2 \, dx$ or (*atau*)

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

STATISTIC
STATISTIK

1 $\bar{x} = \dfrac{\Sigma x}{N}$

2 $\bar{x} = \dfrac{\Sigma fx}{\Sigma f}$

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

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

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

6 $I = \dfrac{Q_1}{Q_0} \times 100$

7 $\bar{I} = \dfrac{\Sigma W_i I_i}{\Sigma W_i}$

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

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

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

11

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

12 Mean /Min, $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $Z = \dfrac{X - \mu}{\sigma}$

GEOMETRY
GEOMETRI

1 Distance / *Jarak*

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

2 Midpoint / *Titik tengah*

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

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

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

4 Area of triangle / *Luas segitiga*

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

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

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

TRIGONOMETRY
TRIGONOMETRI

1 Arc length, $s = r\theta$

Panjang lengkok, $s = j\ \theta$

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

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

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

$sin^2 A + kos^2 A = 1$

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

$sek^2 A = 1 + tan^2 A$

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

$kosek^2 A = 1 + kot^2 A$

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

$sin\ 2A = 2 \sin A\ kos\ A$

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

$= 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

$kos\ 2A = kos^2 A - sin^2 A$

$= 2\ kos^2 A - 1$

$= 1 - 2sin^2 A$

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

$sin\ (A \pm B) = sin\ A\ kos B \pm kos\ A\ sin\ B$

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

$kos\ (A \pm B) = kos\ A\ kos\ B \mp sin\ A\ sin\ B$

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

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

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

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

$a^2 = b^2 + c^2 - 2bc\ kos\ A$

14 Area of triangle / *Luas segitiga*

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

  [Lihat halaman sebelah SULIT

Section A
Bahagian A

[40 *marks*]
[40 *markah*]

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

1 Solve the simultaneous equations $h + 2k = 3$ and $h(h-k) = 2h - 1$ [5 *marks*]
Selesaikan persamaan serentak $h + 2k = 3$ *dan* $h(h-k) = 2h - 1$ [5 *markah*]

2 Given a function $y = 4 - 3x - 2x^2$.
Diberi fungsi $y = 4 - 3x - 2x^2$.

(a) By using the completing the square method, determine the turning point of the function *y*. [2 *marks*]
Dengan menggunakan kaedah penyempurnaan kuasa dua, tentukan titik pusingan bagi fungsi y. [2 *markah*]

(b) If $x = 1 - 4k$, where *k* is a constant, is the axis of symmetry, calculate the value of *k* [2 *marks*]
Jika $x = 1 - 4k$, *dimana k ialah pemalar, adalah paksi simetri, hitungkan nilai k* [2 *markah*]

(c) Hence sketch the graph of $y = 4 - 3x - 2x^2$ for $-1 \le x \le 4$ [2 *marks*]
Seterusnya, lakarkan graf $y = 4 - 3x - 2x^2$ *untuk* $-1 \le x \le 4$ [2 *markah*]

3 Encik Ali and Encik Tan start to save money at the same time.
Encik Ali dan Encik Tan mula menyimpan duit dalam masa yang sama.

(a) Encik Ali saves RM *x* in the first month and his saving increases constantly by RM *y* every subsequent month.He saves RM 200 in the 6 th month and the total saving for 12 month is RM 2 520. Find the values of *x* and *y*. [4 *marks*]
Encik Ali menyimpan RM *x dalam bulan pertama dan simpanannya meningkat secara malar sebanyak* RM *y setiap bulan berikutnya .Dia menyimpan* RM *200 pada bulan ke-6 dan jumlah simpanan untuk 12 bulan ialah sebanyak* RM *2 520.Cari nilai x dan y .* [4 *markah*]

(b) Encik Tan saves RM 200 in the first month and his savings increases constantly by RM 10 every subsequent month.Find the value of *n* when both of them save the same amount of money in n^{th} month. [3 *marks*]

Encik Tan menyimpan RM *200 dalam bulan pertama dan simpanannya meningkat secara malar* RM *10 setiap bulan.Cari nilai bagi n bila kedua-duanya menyimpan jumlah duit yang sama pada bulan yang ke-n.* [3 *markah*]

4 (*a*) Prove that $\text{९} + \tan^{\text{९}} x = \sec^{\text{९}} x$. [2 *marks*]
Buktikan bahawa $\text{९} + \tan^{\text{९}} x = \sec^{\text{९}} x$. [2 *markah*]

(*b*) Sketch the graph of $y = \text{९} \sin x + \text{९}$ for $\text{०} \le x \le \text{९}\pi$. [3 *marks*]
Lakarkan graf $y = \text{९} \sin x + \text{९}$ *untuk* $\text{०} \le x \le \text{९}\pi$. [3 *markah*]

(c) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\sin x = \frac{x}{\text{९}\pi} - \text{९}$ for $\text{०} \le x \le \text{९}\pi$.
State the number of solutions. [3 *marks*]

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\sin x = \frac{x}{\text{९}\pi} - \text{९}$ *untuk* $\text{०} \le x \le \text{९}\pi$.
Nyatakan bilangan penyelesaian itu. [3 *markah*]

5

weight/*jisim* (kg)	Number of students/ *Bilangan pelajar*
30 – 34	3
35 – 39	5
40 – 44	8
45 – 49	4

Table 5
Jadual 5

Table 5 shows the frequency distribution of weight for 20 students.
Jadual 5 menunjukkan taburan kekerapan bagi jisim untuk 20 orang pelajar.

Find
Cari

(a) the mean, [2 *marks*]
min, [2 *markah*]
(b) the interquartile range. [5 *marks*]
julat antara kuartil. [5 *markah*]

6 Diagram 6 shows a trapezium $PQRS$.
Rajah 6 menunjukkan trapezium PQRS.

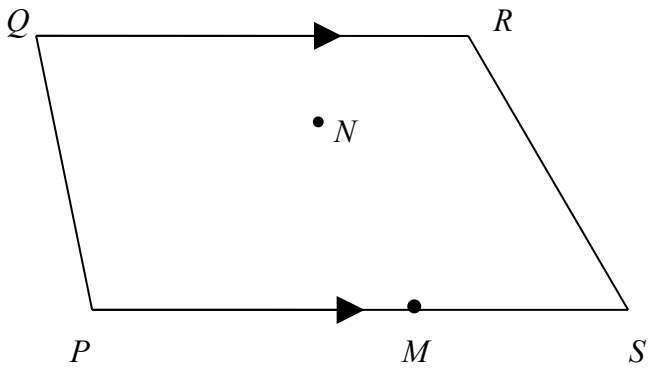


Diagram 6
Rajah 6

It is given that $\overrightarrow{PQ} = 4\underline{y}$, $\overrightarrow{PS} = 8\underline{x}$, $\overrightarrow{PM} = \frac{3}{4}\overrightarrow{PS}$ and $\overrightarrow{QR} = \frac{7}{8}\overrightarrow{PS}$.
Diberi bahawa $\overrightarrow{PQ} = 4\underline{y}$, $\overrightarrow{PS} = 8\underline{x}$, $\overrightarrow{PM} = \frac{3}{4}\overrightarrow{PS}$ *dan* $\overrightarrow{QR} = \frac{7}{8}\overrightarrow{PS}$.

(a) Express $\overrightarrow{PR}$ in terms of $\underline{x}$ and $\underline{y}$. [2 *marks*]
Ungkapkan $\overrightarrow{PR}$ *dalam sebutan* $\underline{x}$ *dan* $\underline{y}$. [2 *markah*]

(b) Point N lies inside the trapezium $PQRS$ such that $\overrightarrow{MN} = k\overrightarrow{PQ}$ and k is a constant.
Titik N terletak di dalam trapezium PQRS dengan keadaan $\overrightarrow{MN} = k\overrightarrow{PQ}$ *dan* k *ialah pemalar.*

(i) Express $\overrightarrow{PN}$ in terms of k, $\underline{x}$ and $\underline{y}$,
Ungkapkan $\overrightarrow{PN}$ *dalam sebutan* k, $\underline{x}$ dan $\underline{y}$.

(ii) Hence, if the points P, N and R are collinear, find the value of k.
Seterusnya, jika titik P, N dan R *adalah segaris, cari nilai* k.

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

Section B
Bahagian B

[40 *marks*]
[40 *markah*]

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

7

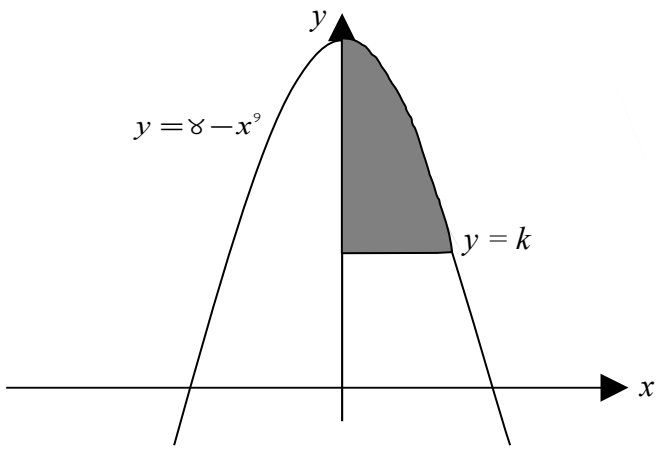


Diagram 7
Rajah 7

(a) Diagram 7 shows a shaded region bounded by the curve $y = 8 - x^3$, the y-axis and the line $y=k$. Given that the volume of the solid generated when the shaded region is revolved 360^o about the y-axis is 9π unit^3, find the value of k. [5 marks]

Rajah 7 menunjukkan rantau berlorek yang dibatasi oleh lengkok $y = 8 - x^3$, *paksi-y dan garis* $y = k$. *Diberi isipadu pepejal yang dijanakan apabila rantau berlorek itu diputarkan* 360^o *pada paksi y ialah* 2π *unit*^{3}, *cari nilai k.* [5 *markah*]

(b) A curve with minimum point $(\frac{8}{3}, -8\frac{2}{3})$ has a gradient function $mx - 5$.

Suatu lengkok dengan titik minimum $(\frac{8}{3}, -8\frac{2}{3})$ *mempunyai fungsi kecerunan* $mx - 5$.

Find
Cari

(i) the value of m,
nilai m,

(ii) the equation of the curve .
persamaan lengkok tersebut .

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

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

Table 8 shows the values of two variables, x and y obtained from an experiment. Variable x and y are related by the equation $y = ?^{-k}c^{x}$, where k and c are constants.
Jadual 8 *menunjukkan nilai-nilai bagi dua pembolehubah , x dan y , yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan* $y = ?^{-k}c^{x}$, *dengan keadaan k dan c adalah pemalar.*

x	15	20	25	30	35	40
y	0.15	0.38	0.95	2.32	5.90	14.80

Table 8
Jadual 8

(*a*) Based on Table 8, construct a table for the value of $\log_{?} y$ [1 *mark*]
Berdasarkan Jadual 8*, bina satu jadual bagi nilai* $\log_{?} y$ [1 markah]

(b) Plot $\log_{?} y$ against x, using a scale of 2 cm to 5 unit on the x-axis and 2 cm to 0.5 unit on the $\log_{?} y$-axis.
Hence, draw the line of best fit. [3 *marks*]
Plot $\log_{?} y$ *melawan x , dengan menggunakan skala* 2 *cm kepada* 5 *unit pada paksi* - *x dan* 2 *cm kepada* 0.5 *unit pada paksi* - $\log_{?} y$.
Seterusnya, lukis garis lurus penyuaian terbaik. [3 *markah*]

(c) Use the graph in **8** (*b*) to find the value of
Gunakan graf di **8** (*b*) *untuk mencari nilai*

(*i*) k
(*ii*) c
(*iii*) x when $y = 10$ [6 *marks*]
x *apabila* $y = 10$ [6 *markah*]

9

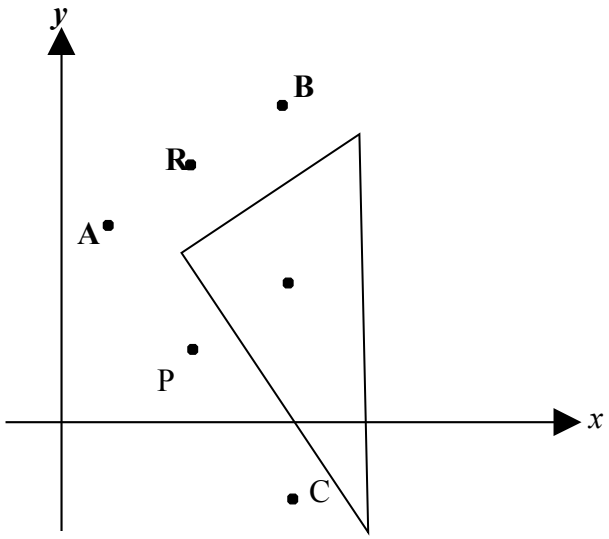


Diagram 9
Rajah 9

Diagram 9 shows $P(4, 2)$, $Q(8, 4)$ and $R(5, 9)$ are the midpoints of the sides of the triangle ABC.
Rajah 9 menunjukkan $P(4, 2)$, $Q(8, 4)$ dan $R(5, 9)$ adalah titik tengah bagi sisi segitiga ABC.

Find
Cari

(a) the gradient of PQ [1 *mark*]
kecerunan PQ [1 *markah*]

(b) the equation of the straight line AC [3 *marks*]
persamaan garis lurus AC [3 *markah*]

(c) the equation of the perpendicular bisector of the line AC, [3 *marks*]
persamaan garis pembahagi dua sama serenjang bagi garis AC [3 *markah*]

(d) a point k moves such that its distance from Q is always 6 units. Find the equation of the locus of k. [3 *marks*]
suatu titik k yang bergerak di mana jaraknya dari Q sentiasa 6 unit. Cari persamaan lokus
bagi k [3 *markah*]

10

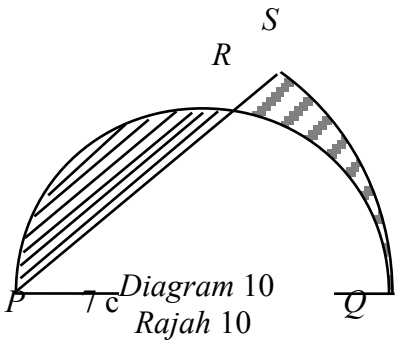


Diagram 10
Rajah 10

Diagram 10 shows a semicircle with centre *O* and radius 7 cm. The chord *PR* is extended to *S* such that *PQ* = *PS* and sector *SPQ* is drawn with *P* as a centre and *PQ* as its radius. Given that arc *PR* is 14 cm.
Rajah 10 *menunjukkan satu semibulatan dengan pusat O dan jejari 7 cm. Perentas PR telah dipanjangkan ke titik S sehingga PS = PQ dan sector SPQ telah dilukis dengan pusat P dan jejari PQ. Diberi panjang lengkok PR ialah 14 cm.*

Find
Cari

(a) the angle of *SPQ* in radians, [2 *marks*]
sudut SPQ dalam radian, [2 *markah*]

(b) the area , in cm^2 ,of ΔPRO [3 *marks*]
luas, dalam cm^2, ΔPRO [3 *markah*]

(c) the area , in cm^2 , of the shaded region . [5 *marks*]
luas, dalam cm^2 *, kawasan berlorek.* [5*markah*]

11 (*a*) In a survey carried out in a college, it is found that 90% of the students like to read newspapers. 6 are chosen at random from the college.
Dalam suatu kajian yang telah dibuat di sebuah kolej, telah didapati 90% pelajarnya suka membaca surat khabar . 6 orang pelajar telah dipilih secara rawak dari kolej tersebut.

Find the probability that
Cari kebarangkalian bahawa

(i) exactly 2 students like to read newspapers.
2 orang pelajar suka membaca surat khabar.

(ii) more than half of the students like to read newspapers.
lebih daripada separuh pelajar suka membaca surat khabar.

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

(b) A survey on body-mass is done on a group of students. The mass of a student is normally distributed with a mean of 45 kg and a standard deviation of 12 kg.
Penyelidikan terhadap jisim badan telah dilakukan oleh sekumpulan pelajar. Jisim seorang pelajar adalah bertaburan secara normal dengan min 45 kg dan sisihan piawai 12 kg.

i) If a student is chosen at random, calculate the probability that his mass is more than 54 kg.
Jika pelajar tersebut terpilih secara rawak, kira kebarangkalian bahawa jisimnya adalah lebih daripada 54 kg.

ii) Given that 8% of the students have a mass of less than *m* kg, find the value of *m*.
Diberi bahawa 8% *daripada pelajar mempunyai jisim kurang daripada m kg, dapatkan nilai m.*

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

Section C
***Bahagian* C**

[20 *marks*]
[20 *markah*]

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

12 An object moves along a straight line from a fixed point A. Its velocity, v m s^{-1}, is given by $v = 16t - 4t^2$, where t is the time, in seconds, after leaving the point A.
(Assume motion to the right is positive).
Satu objek bergerak sepanjang satu garis lurus daripada satu titik tetap A. Halajunya, v m s^{-1}, diberi oleh $v = 16t - 4t^2$, di mana t ialah masa, dalam saat, selepas meninggalkan titik A. (Anggapkan gerakan ke kanan sebagai positif).

Find
Cari

(*a*) the initial velocity, in m s^{-1}, of the object, [2 *marks*]
halaju awal, dalam m s^{-1} bagi objek itu, [2 *markah*]

(*b*) the distance , in m , travelled during the third second, [5 *marks*]
jarak, dalam m , *yang dilalui semasa saat yang ketiga,* [5 *markah*]

(*c*) the time intervals during which the objects moves towards the left. [3 *marks*]
selang masa apabila objek tersebut bergerak ke kiri. [3 *markah*]

13

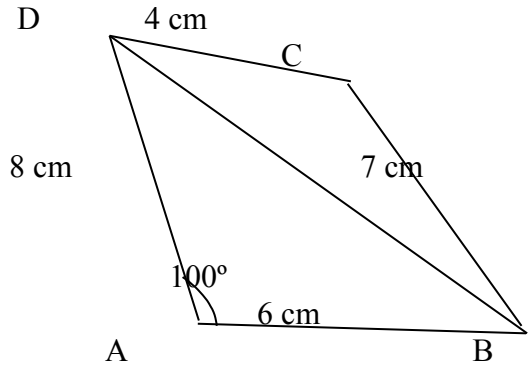


Diagram 13
Rajah 13

Diagram 13 shows a quadrilateral ABCD.
Rajah 13 *menunjukkan satu sisiempat ABCD.*

(a) Calculate
Hitung

(i) the length , in cm , of BD,
panjang , dalam cm , BD,

(ii) $\angle$ BCD,

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

(b) Point D' lies on BD such that CD' = CD.
Titik D' terletak di atas BD supaya CD' = CD.

(i) sketch ΔBCD' ,
lakarkan ΔBCD'

(ii) hence, find the area, in cm^2 , of *Δ BCD'.*
seterusnya, cari luas, dalam cm^2 *, bagi Δ BCD'.*

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

14 A computer company offers two types of computer courses 'Internet for Beginners' and 'Introduction to Excel' , with a monthly tuition fee of RM 120 and RM 80 respectively.
The number of participants for course 'Internet for Beginners' is x and for course 'Introduction to Excel' is y.
The enrolment of the participants is based on the following constraints:
Sebuah syarikat menawarkan dua kursus komputer, 'Internet for Beginners' dan 'Introduction to Excel',dengan yuran tusyen bulanan adalah RM 120 dan RM 80 masing-masing.
Bilangan peserta bagi kursus 'Internet for Beginners' adalah x *orang dan bilangan peserta bagi kursus 'Introduction to Excel' ialah* y *orang.*
Pengambilan peserta adalah berdasarkan kekangan berikut:

I : There are at least 30 participants registered for the course 'Introduction to Excel'.
Sekurang-kurangnya 30 peserta mendaftar bagi kursus 'Introduction to Excel'.

II : There are at most 100 participants registered for both courses.
Selebih-lebihnya 100 peserta mendaftar bagi kedua-dua kursus.

III : The number of participants registered for 'Introduction to Excel' is at least two times

the number of participants registered for 'Internet for Beginners'.
Bilangan peserta mendaftar bagi 'Introduction to Excel' *adalah sekurang-kurangnya 2 kali bilangan peserta mendaftar bagi 'Internet for Beginners'.*

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

(b) By using a scale of 2 cm to 10 participants on both axes, construct and shade the region R that satisfies all the above constraints. [3 *marks*]
Dengan menggunakan skala 2 cm kepada 10 orang peserta pada kedua-dua paksi, bina dan lorekkan rantau R *yang memenuhi semua kekangan di atas.* [3 *markah*]

(c) By using your graph from **(b)**, find
Dengan menggunakan graf anda dari ***(b)****, carikan*
(i) the range of the number of participants for course 'Introduction to Excel' if the number of participants for course 'Internet for Beginners' is 25.
julat bilangan peserta bagi kursus 'Introduction to Excel' jika bilangan peserta bagi kursus 'Internet for Beginners' ialah 25 orang.

(ii) the maximum total fees per month that can be collected by the company.
jumlah yuran maksimum sebulan yang boleh dikutip oleh syarikat tersebut .

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

15 Table 15 shows the prices and the prices indices for the four ingredients, P, Q, R and S, used in making a type of drink. Diagram 15 is a pie chart which represents the relative amount of the ingredients P, Q, R and S, used in making these drink.
Jadual 15 *menunjukkan harga dan indeks harga empat bahan* P, Q, R *dan* S, *yang digunakan membuat sejenis minuman. Rajah* 15 *ialah carta pai yang mewakili kuantiti relative bagi penggunaan bahan-bahan* P, Q, R *dan* S itu.

Ingredient ***Bahan***	**Price per litre (RM)** ***Harga seliter(RM)***		**Price index in the year 2006 based on the year 2004.** ***Indeks harga pada tahun 2006 berasaskan tahun 2004***
	Year 2004 ***Tahun* 2004**	**Year 2006** ***Tahun* 2006**	
P	55	66	a
Q	50	70	140
R	40	60	150
S	20	b	125

Table 15

Jadual 15

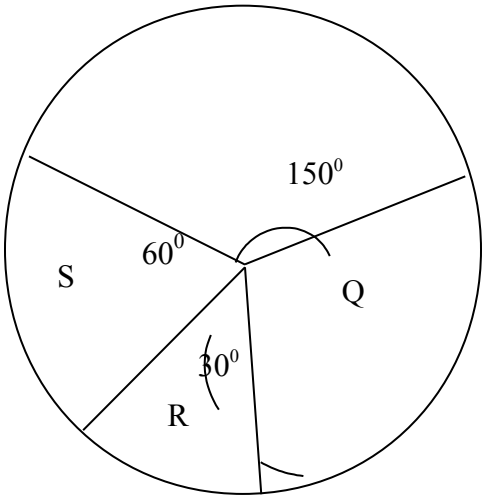


Diagram 15
Rajah 15

(a) Find the values of a and of b . [3 *marks*]
Carikan nilai-nilai a dan *b* . [3 *markah*]

(b) Calculate the composite index for the cost of making the drink in the year 2006 based on the year 2004. [3 *marks*]
Hitung indeks gubahan bagi kos membuat minuman itu pada tahun 2006 berasaskan tahun 2004 [3 *markah*]

(c) The composite index for the cost of making the drink increased by 10% from the year 2006 to the year 2008.
Indeks gubahan bagi kos membuat minuman meningkat sebanyak 10% dari tahun 2006 *ke tahun* 2008.

Calculate

Hitung

(i) the expected composite index for year 2008 based on the year 2004,
indeks gubahan yang dijangkakan pada tahun 2008 berasaskan tahun 2004 ,

(ii) hence, calculate the corresponding cost of a bottle of the drink in the year 2008 if the cost in the year 2004 is RM 20.
Seterusnya, hitung kos membuat minuman itu yang sepadan bagi tahun 2008 *jika kos membuatnya pada tahun* 2004 *ialah* RM 20

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

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Nama:……..

Kelas:…….....

Arahan Kepada Calon

1 Tulis nama dan kelas anda pada ruang yang disediakan.
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 Diperolehi (*Untuk Kegunaan Pemeriksa)*
A	1		5	
	2		6	
	3		7	
	4		8	
	5		7	
	6		7	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
Jumlah			100	

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**, **four** questions from **Section B** and **two** questions from **Section C**.
   Jawab ***semua*** *soalan dalam* ***Bahagian A****,* ***empat*** *soalan daripada* ***Bahagian B*** *dan* ***dua*** *soalan daripada* ***Bahagian C****.*

3. Show your working. It may help you to get marks.
   Tunjukkan langkah–langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah .

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

5. 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.

6. A list of formulae is provided on pages 3 to 5.
   Satu senarai rumus disediakan di halaman 3 *hingga 5 .*

7. Graph papers are provided.
   Kertas graf disediakan.

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

SULIT
3472/1
Additional Mathematics
Paper 1
Sept 2010

PEJABAT PELAJARAN WILAYAH PERSEKUTUAN PUTRAJAYA
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM
TINGKATAN 5

2010

ADDITIONAL MATHEMATICS

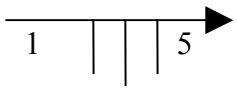
Paper 1

MARKING SCHEME

This marking scheme consists of 7 printed pages

PAPER 1 : MARKING SCHEME **3472/1**

Number	Solution and marking scheme	Sub Marks	Full Marks
1	(a) 7 (b) 11	1 1	**2**
2	(a) $k = -\frac{1}{2}$ (b) g(x) = $\frac{4-x}{2x}$, $x \neq 0$ **B1** : $y = \frac{4}{2x+1}$	1 2	**3**
3	$a = -6$ and $b = -\frac{1}{12}$ **B2 :** $-\frac{4}{a} = \frac{2}{3}$ or $\frac{1}{a} = 2b$ **B1 :** $\frac{x-4}{a}$ **or** $\frac{3x-2}{6b}$	3	**3**
4	(a) $-\frac{4}{3}$ (b) $\frac{2}{3}$ **B2 :** $-\frac{4}{3}$ or $\frac{2}{3}$ **B1 :** $3x^2 + 4x + 2 = 0$	3	**3**
5	$k > -2$ **B2 :** $(-2)^2 - 4(1)(3+k) < 0$ **B1 :** $x^2 - 2x + 3 + k = 0$	3	**3**

Number	Solution and marking scheme	Sub Marks	Full Marks
6	(a) m = 2 (b) n = - 3 (c) x = 2	1 1 1	**3**
7	$1 < x < 5$ **B2** : $(x-1)(x-5) < 0$ or  **B1** : $x^2 - 6x + 5 < 0$	3	**3**
8	$x = \frac{1}{5}$ **B2** : $3x - 5 = -2(x + 2)$ **B1** : $2^{-2(x+2)}$	3	**3**
9	$q = 8p^3$ **B3** : $\log_2 \frac{2^6 \times p^7}{q}$ **B2** : $\log_2 \frac{p^7}{q}$ or $\log_2 \frac{2^6}{q}$ or $\log_2 2^6 \times p^7$ **B1** : $\log_2 p^7$ or $6 \log_2 2$	4	**4**
10	(a) -3 **B1** : $S_1 = 2(1)^2 - 5(1)$ (b) 4 **B1** : $T_2 = S_2 - S_1 = -2 - (-3)$	2 2	**4**

Number	Solution and marking scheme	Sub Marks	Full Marks
11	$(a) r = -\frac{1}{2}$, $a = 320$ (kedua-duanya) **B1 :** $ar^4 = 20$ or $ar^4 + ar^5 = 10$ or $20 + 20r = 10$ (b) $213\frac{1}{3}$ or $\frac{640}{3}$ or 21.33 **B1 :** $\frac{320}{1-\left(-\frac{1}{2}\right)}$	2 2	**4**
12	(a) $\frac{y}{x} = px^2 + q$ (b) $p = -3$, $q = 12$ (both) **B2 :** $0 = -3(4) + q$ or $6 = -3(2) + q$ or $p = -3$ **B1 :** $p = \frac{6-0}{2-4}$	1 3	**4**
13	(a) $\frac{x}{3} - \frac{y}{6} = 1$ (b) $x^2 + y^2 + 2x + 16y + 45 = 0$ **B2 :** $\sqrt{(x-3)^2 + y^2} = 2\sqrt{x^2 + (y-(-6))^2}$ **B1 :** $\sqrt{(x-3)^2 + y^2}$ or $\sqrt{x^2 + (y-(-6))^2}$	1 3	**4**

Number	Solution and marking scheme	Sub Marks	Full Marks
14	$t = -\frac{1}{2(k-3)}$ **B2 :** $2t \times (k-3) = -1$ **B1 :** $2t$, $k-3$ (both)	3	**3**
15	(a) $-5i + 2j$	1	
	(b) $\begin{pmatrix} 5 \\ -5 \end{pmatrix}$	1	**2**
16	$4\underline{x} - 3\underline{y} + 5\underline{z}$ **B2 :** use Polygon Law , $4\underline{x} + (-3\underline{y}) + 5\underline{z}$ **B1 :** $-3\underline{y}$	3	**3**
17	$45°, 153.43°, 225°, 333.43°$ // $153° 26'$, $333° 26'$ **B3 :** $45°$, $153.43°$ (both) **B2 :** $(2\tan x + 1)(\tan x - 1) = 0$ **B1 :** $2\tan x - \frac{1}{\tan x} = 1$	4	**4**
18	8 **B2 :** $1.3r + r + r + 1.3(r-3) + r - 3 + r - 3 = 42.9$ **B1 :** $1.3r$ or $1.3(r-3)$	3	**3**

Number	Solution and marking scheme	Sub Marks	Full Marks
19	**10** **B2 :** $5(2)[2(-1) + 1]^4$ **B1 :** $5(2x + 1)^4(2)$ or $5(2x + 1)^4$	3	**3**
20	$\frac{4}{9}p$ **B2 :** $\delta y = -\frac{12}{3^3} \times -p$ **B1 :** $\frac{-12}{x^3}$ or $-p$	3	**3**
21	$-\frac{2}{5}$ **B2 :** $[3^2 - 1^2] - 5k = 10$ **B1 :** $\int_1^3 2x - \int_1^3 kh(x)$ or $\frac{2x^2}{2}$ or $5k$	3	**3**
22	(a) 40 (b) 10 **B1 :** $\frac{40^\circ - m}{4}$	1 2	**3**
23	3 **B2 :** $\frac{x}{x + 5 + 4} = \frac{1}{4}$ **B1 :** $\frac{x}{x + 5 + 4}$ or $\frac{1}{4}$	3	**3**

Number	Solution and marking scheme	Sub Marks	Full Marks
24	(a) 18 **B1 :** ${}^4C_2 \times {}^3C_1$ (b) 144 **B1 :** ${}^4P_3 \times {}^3P_2$ **or** $4 \times 3 \times 3 \times 2 \times 2$	2 2	**4**
25	6.098 **B2 :** $\frac{50 - 45}{\sigma} = 0.82$ **B1 :** $\frac{50 - 45}{\sigma}$ or 0.82	3	**3**

SULIT
3472/2
Additional Mathematics
Paper 2
Sept / Okt
2010

PEJABAT PELAJARAN WILAYAH PERSEKUTUAN PUTRAJAYA
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM
TINGKATAN 5

2010

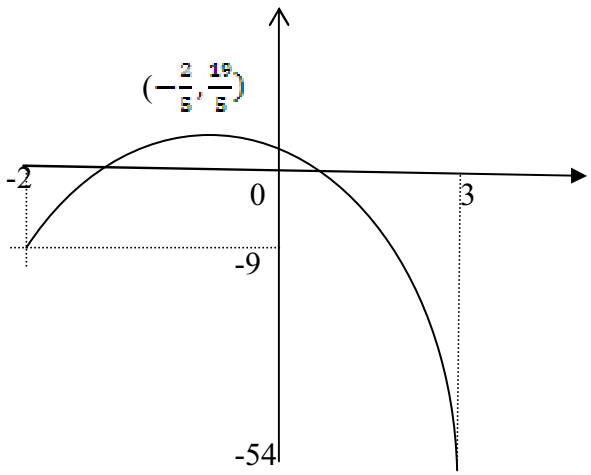
ADDITIONAL MATHEMATICS

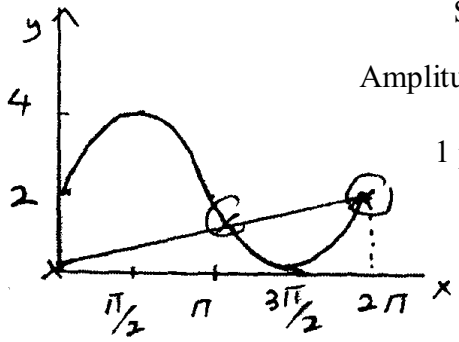
Paper 2

MARKING SCHEME

This marking scheme consists of **11** printed pages

SKEMA PERMARKAHAN ADDITIONAL MATHEMATICS KERTAS 2
PEPERIKSAAN PERCUBAAN SPM 2010

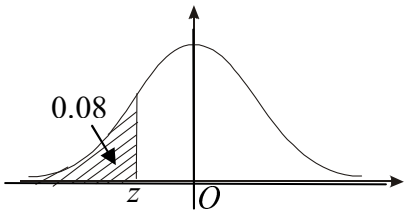
Number	Solution and marking scheme	Sub Marks	Full Marks
1	$h = 3 - 2k$ @ $k = \frac{3-h}{2}$	**P1**	**5**
	$(3-2k)^2 - (3-2k)k -$ @ $h^2 - h\left(\frac{3-h}{2}\right) - 2h + 1 = 0$ $2(3-2k) + 1 = 0$	**K1**	
	$(2k-1)(3k-4) = 0$ @ $(h-2)(3h-1) = 0$	**K1**	
	$k = \frac{1}{2}$ and $k = \frac{4}{3}$ $\quad$ $h = 2$ and $h = \frac{1}{3}$	**N1**	
	$h = 2$ and $h = \frac{1}{3}$ $\quad$ $k = \frac{1}{2}$ and $k = \frac{4}{3}$	**N1**	
2 (a)	$y=-5(x^2 + \frac{4}{5}x - \frac{3}{5})$	**K1**	**6**
	Turning point = $(-\frac{2}{5}, \frac{19}{5})$	**N1**	
(b)	$-\frac{2}{5} = 2 - 3k$	**K1**	
	$k = \frac{4}{5}$	**N1**	
(c)		**N1 shape** **All correct** **N1**	

Number	Solution and marking scheme	Sub Marks	Full Marks
3 (a)	x, x + y , x+2y, a = x , d = y given $T_6 = 200$ $x + 5y = 200$ ……(1) and $S_{12} = 2520$ $\frac{12}{2}(2x+11y) = 2520$ ……(2) Solve (1) and (2) $y = 20$, $x = 100$	**K1 (either (1) or (2)** **K1** **N1N1**	
(b)	T_n of Encik Ali = T_n of Encik Tan $100 + (n\text{-}1)20 = 200 + (n-1)10$ $100 + 20n - 20 = 200 + 10n - 10$ $10n = 110$ $n = 11$.	**K1K1** **N1**	**7**
4 (a)	$1 + \tan^2 x = \sec^2 x$. $1 + \tan^2 x = 1 + \frac{\sin^2 x}{\cos^2 x}$ $= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$ $= \frac{1}{\cos^2 x}$ $= \sec^2 x$	**K1** **N1**	
(b)	 Shape of sin graph Amplitude (max=4, min=0) 1 periodic /cycle	**P1** **P1** **P1**	
(c)	$y = \frac{x}{\pi}$ Sketch straight line No of solution = 2 *to get N1 for no. of solution all marks for graph must 5 marks	**N1** **K1** **N1**	**8**

Number	Solution and marking scheme	Sub Marks	Full Marks
5 (a)	The mean $=\frac{805}{20}$ $= 40.25$ kg	**K1** **N1**	
(b)	$\frac{1}{4}(20) = 5$th observation First quartile's class = 35 – 39 $\text{First quartile} = 34.5 + \left(\frac{5-3}{5}\right)5$ $= 36.5$	**P1 (34.5 or 39.5)** **K1**	
	$\frac{3}{4}(20) = 15$th observation Third quartile's class = 40 – 44 $\text{Third quartile} = 39.5 + \left(\frac{15-8}{8}\right)5$ $= 43.875$	**K1**	**7**
	The interquartile range = 43.875 – 36.5 = 7.375 kg	**K1** **N1**	
6 (a)	Gunakan $\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$ $\overrightarrow{PR} = 7\underline{x} + 4\underline{y}$	**K1** **N1**	
(b) (i)	Gunakan $\overrightarrow{PN} = \overrightarrow{PM} + \overrightarrow{MN}$ $\overrightarrow{PN} = 6\underline{x} + 4k\underline{y}$	**K1** **N1**	
(ii)	$7\underline{x} + 4\underline{y} = \gamma(6\underline{x} + 4k\underline{y})$ $\gamma = \frac{7}{6}$ $k = \frac{6}{7}$	**K1** **K1** **N1**	**7**
7 (a)	$\int_k^4 (4-y)dy = 2$	**K1**	
	$\left[4y - \frac{1}{2}y^2\right]_k^4 = 2$	**K1**	
	$4(4) - \frac{1}{2}(4)^2 - \left[4k - \frac{1}{2}k^2\right] = 2$	**K1**	
	$(k-2)(k-6) = 0$ $k = 2 (k < 4)$	**K1** **N1**	
b (i)	$0 = \frac{5}{6}m - 5$ m = 6	**K1** **N1**	

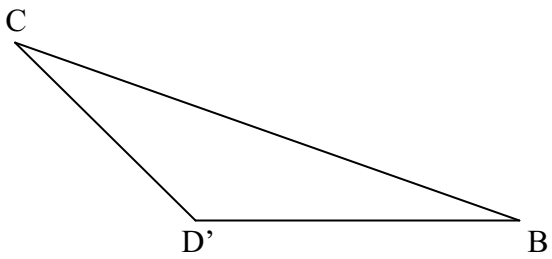
Number	Solution and marking scheme	Sub Marks	Full Marks
(ii)	equation of the curve, $y = \int (6x - 5)dx$ $-4\frac{1}{4} = 3(\frac{5}{6})^2 - 5\frac{5}{6} + c$ $y = 3x^2 - 5x - \frac{13}{6}$	**K1** **K1** **N1**	**10**
8 a) **b) Lihat graf** **c) i)** **ii)** **iii)**	x: 15, 20, 25, 30, 35, 40 lg y: -0.82, -0.42, -0.022, 0.37, 0.77, 1.17 Using the correct axes and uniform scale 6 points plotted correctly * Line of best fit $\log_{10} y = x \log_{10} c - k$ or $-k \log_{10} 10$ y-intercept, $c = -k$ or $c = -k \log_{10} 10$ $-2.00 = -k$ $k = 2.00$ $m = \log_{10} c$ $c = 1.2$ $x = 37.5$	**N1** **N1** **N1** **N1** **P1** **K1** **N1** **K1** **N1** **N1**	**10**
9 (a) **(b)** **(c)** **(d)**	$m_{PQ} = \frac{1}{2}$ $m_{AC} = m_{PC} = -\frac{5}{3}$ $y - 2 = -\frac{5}{3}(x - 4)$ $3y = -5x + 26$ or equivalent *m for perpendicular bisector of AC* $= \frac{3}{5}$ $y - 2 = \frac{3}{5}(x - 4)$ $5y = 3x - 2$ KQ = 6 $\sqrt{(x-8)^2 + (y-4)^2} = 6$	**K1** **K1** **K1** **N1** **K1** **K1** **N1** **K1** **K1**	**10**

Number	Solution and marking scheme	Sub Marks	Full Marks
	$x^2 + y^2 - 16x - 8y + 44 = 0$	**N1**	
10. **(a)**	$\angle POR = \frac{14}{7} = 2\ rad$	**N1**	
	$\angle SPQ = \frac{\pi - 2}{2}\ rad$	**N1**	
(b)	$\sin 114.59^o$	**K1**	
	Area of $= \frac{1}{2} \times 7 \times 7 \times \sin 114.59^o$	**K1**	
	$= 22.28 cm^2$	**N1**	
(c)	$= \frac{1}{2} \times 7 \times 7 \times 2 - 22.28$	**K1**	
	$= 26.72$	**N1**	
	$\frac{1}{2} \times 14 \times 14 \times \angle SPQ - 22.28 - \frac{1}{2} \times 7 \times 7 \times \angle ROQ$	**K1 (either one)**	**10**
	$= \frac{1}{2} \times 14 \times 14 \times \frac{\pi - 2}{2} - 22.28 - \frac{1}{2} \times 7 \times 7 \times (\pi - 2)$		
	$= 55.94 - 22.28 - 27.97$		
	$= 5.69$		
	$Area = 26.72 + 5.69 = 32.41 cm^2$	**K1 N1**	
11 a) (i)	$p = 0.9, q = 0.1$	**P1**	
	$P(X = 2) = {}^6C_2 (0.9)^2 (0.1)^4$	**K1**	
	$= 0.001215$	**N1**	
(ii)	$P(X>3) = P(X=4) + P(X=5) + P(X=6)$		
	${}^6C_4 (0.9)^4 (0.1)^2 + {}^6C_5 (0.9)^5 (0.1) + {}^6C_6 (0.9)^6 (0.1)^0$	**K1**	
	$=0.98415$	**N1**	
(b) i)	$P(X>54) \rightarrow P(Z>\frac{54-45}{12})$	**K1**	
	$= 0.2266$	**N1**	
ii)	$P(X<m) = 0.08$		
	$Z = \frac{m-45}{12}$	**K1**	
	$P(Z<\frac{m-45}{12}) = 0.08$		
	$P(Z<-1.406) = 0.08$		
	Therefore, $\frac{m-45}{12} = -1.406$	**K1**	**10**

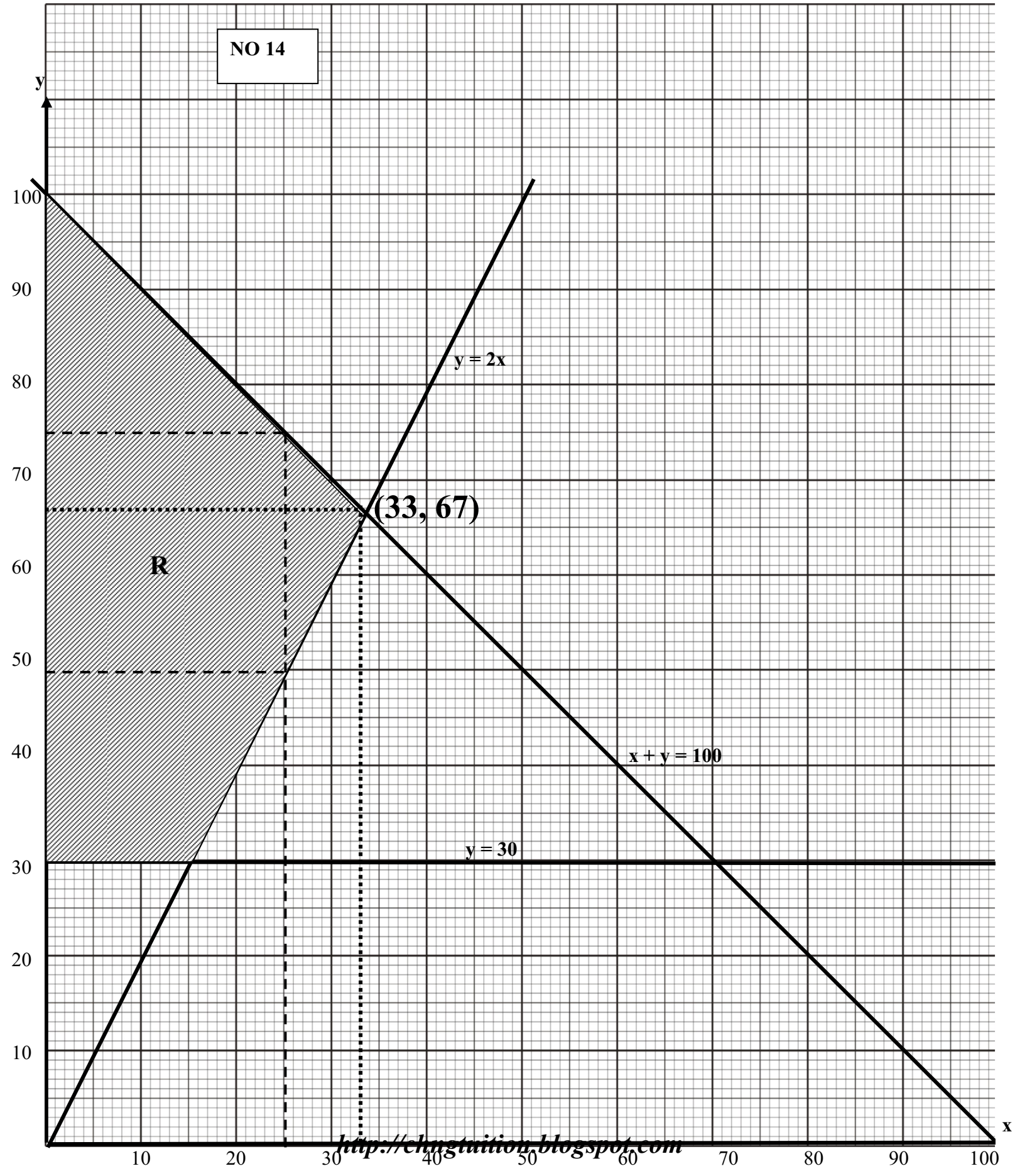


From standard normal table,

Number	Solution and marking scheme	Sub Marks	Full Marks
	$m = 28.13$	**N1**	
12 (a)	$v = 16t - 4t^2$		
	$v = 16(0) - 4(0)^2$	**K1**	
	The initial velocity = 0 ms^{-1}	**N1**	
		Limit K1	
(b)	Distance travelled = $\int_2^3 v\,dt$	**K1**	
	$= \int_2^3 (16t - 4t^2)dt$	**K1**	
	$= [\frac{16t^2}{2} - \frac{4t^3}{3}]_2^3$		
	$= [8t^2 - \frac{4t^3}{3}]_2^3$	**K1**	
	$= 8(3)^2 - \frac{4(3)^3}{3} - 8(2)^2 + \frac{4(2)^3}{3}$		
	= 14.67 m	**N1**	
(c)	Distance travelled during the third second = 14.67 m		**10**
	When v < 0,	**K1**	
	$16t - 4t^2 < 0$		
	$4t(4 - t) < 0$	**K1**	
	$t(4 - t) < 0$	**N1**	
	The object moves to the left when t > 4		
13			
(a) i)	$BD^2 = 6^2 + 8^2 - 2(6)(8)\cos/kos\ 100^c$	**K1**	
	= 116.670		
	BD = 10.80 cm	**N1**	
(ii)	$\cos \angle BCD = \frac{4^2 + 7^2 - 10.80^2}{2(4)(7)}$	**K1**	
	= -0.9221		
	$\angle BCD$ = 157°14'	**N1**	

Number	Solution and marking scheme	Sub Marks	Full Marks
(b)			**10**
i)		**N1**	
ii)	$\frac{7}{\sin \angle BDC} = \frac{BD}{\sin 157°14'}$		
	$\angle$ BDC = 14º31'	**K1**	
	$\angle$ DBC = 180º - 157º14' - 14º31' = 8º15'	**K1**	
	$\angle$BD'C = 180º - 14º31' = 165º29'		
	$\angle$ BCD'= 180º - 165º29' - 8º15' = 6º16'	**K1**	
	The area of ΔBCD' $= \frac{1}{2}(4)(7)\sin 6°16'$	**K1**	
	= 1.528 cm^2	**N1**	
14.		**N1**	
(a)	$y \geq 30$	**N1**	
	$x + y \leq 100$	**N1**	
	$y \geq 2x$		**10**
(b) **Lihat graf**	Draw correctly at least one straight line from the *inequalities which involves x and y	**K1**	
	Draw correctly all the three *straight lines Note : Accept dotted lines	**K1**	
	Region shaded correctly	**N1**	
(c) i)	$50 \leq y \leq 75$	**N1**	
ii)	Use $120x + 80y$ for point in the shaded region	**K1**	
	Maximum point (33, 67)	**N1**	
	RM 9 320	**N1**	

Number	Solution and marking scheme	Sub Marks	Full Marks
15 **(a)**	Use $a = \frac{66}{55} \times 100$ or b/20 x 100 = 125	**K1**	**10**
	$a = 120$, $b = RM25$	**N1 N1**	
(b)	$\bar{I} = \frac{120(150)+140(120)+150(30)+125(60)}{360}$ b = 130	**P1** **K1** **N1**	
(c) (i)	$(\bar{I})^{*} = 130 \times \frac{110}{100}$: 143	**K1 N1**	
(ii)	Cost = $\frac{143 \times 20}{100}$; RM28.60	**K1 N1**	



No.8(b)