SULIT

3472/1
Matematik Tambahan
Kertas 1
Sept 2011
2 jam

Nama : .....

Tingkatan: .....

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN MELAKA
PEPERIKSAAN PERCUBAAN TINGKATAN LIMA 2011

MATEMATIK TAMBAHAN
Kertas 1
Dua Jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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 the answers clearly in the space provided in the question paper.*
   Jawapan hendaklah ditulis pada 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 diagram in the questions provided are not drawn to scale unles stated.*
   Rajah yang mengiringi soalan ini tidak dilukiskan mengikut skala kecuali dinyatakan.

8. *The marks allocated for each question and sub-part of a question a shown in brackets.*
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

9. *A list of formulae is provided on page* 2 to 3
   Satu senarai rumus disediakan di halaman 23 hingga 3

10. *You may use a non-programmable scientific calculator.*
    Buku sifir matematik empat angka boleh digunakan.

11 *This question paper must be handed in at the end of the examination*
   Kertas soalan ini hendaklah diserahkan pada akhirpeperiksaan .

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

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 digunakan untuk 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 $(a^m)^n = a^{nm}$

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

CALCULUS(*KALKULUS*)

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

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

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

4 Area under a curve (*Luas dibawah lengkung)*

$= \int_a^b y \, dx$ or

$= \int_a^b x \, dy$

5 Volume generated (*Isipadu Janaan)*

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

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

GEOMETRY

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

2 Midpoint (*Titik Tengah*)

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

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

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

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

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

6 Area of triangle (*Luas Segitiga*)

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

[Lihat sebelah

STATISTICS

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

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

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

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

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

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

7 $\bar{I} = \dfrac{\sum w_1 I_1}{\sum w_1}$

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

12 Mean $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $z = \dfrac{x - \mu}{\sigma}$

TRIGONOMETRY

1 Arc length, $s = r\theta$
(*Panjang lengkok*) $s = j\ \theta$

2 Area of sector , $L = \dfrac{1}{2}r^2\theta$
(*Luas sektor* $L = \dfrac{1}{2}j^2\theta$)

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

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

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

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

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

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

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

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

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

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

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

14 Area of triangle $= \dfrac{1}{2}ab \sin C$
(*Luas Segitiga*)

For examiner's use only

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

1 Diagram 1 shows the relation between two sets of numbers .
Rajah 1 menunjukkan hubungan antara dua set nombor.

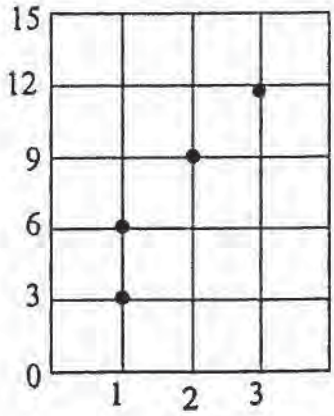


Diagram 1
Rajah 1

State,
Nyatakan,

(a) the images of 1,
imej bagi 1 ,

(b) the type of relation
jenis hubungan .

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

Answer / *Jawapan* :
(a)

(b)

1

3

For examiner's use only

2 Given $f : x \to \frac{5}{x}, x \neq 0$ and $g : x \to 3x + 6$. Find

Diberi $f : x \to \frac{5}{x}, x \neq 0$ *dan* $g : x \to 3x + 6$. *Cari*

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

(b) $fg^{-1}(3)$.

[4 marks]
[4 markah]

Answer / *Jawapan*:
(a)

(b)

2
4

3 It is given that -1 is one of the roots of the quadratic equation $mx^2 - 3x - k = 0$, where m and k are constants. Express m in terms of k.

Diberi bahawa -1 *ialah satu daripada punca persamaan kuadratik* $mx^2 - 3x - k = 0$ *dengan keadaan m dan k adalah pemalar. Ungkapkan m dalam sebutan k.*

[2 marks]
[2 markah]

Answer/ *Jawapan* :

3
2

[Lihat sebelah

For examiner's use only

4 Given that the roots of quadratic equation $2x^2+(h-1)x+k=0$ are -3 and 4.

Diberi bahawa punca persamaan kuadratik $2x^2+(h-1)x+k=0$ *ialah* -3 *dan 4.*

Find ,

Cari,

(a) the value of h

nilai bagi h

(b) the value of k .

nilai bagi k

[*3 marks*]

[*3 markah*]

Answer /*Jawapan:*

(a)

4

(b)

3

5 It is given that the quadratic function $f(x)=2[(x-3)^2+5]$.

Diberi persamaan kuadratik $f(x)=2[(x-3)^2+5]$

(a) Write the equation of the axis of symmetry,

Tulis persamaan paksi simetri

(b) State the coordinates of the minimum point,

Nyatakan koordinat titik minimum,

(c) Write the equations when the graph is reflected through y-axis.

Tulis persamaan apabila graf itu dipantulkan pada paksi –y.

[3 *marks*]

[*3 markah*]

Answer/*Jawapan*

(a)

5

(b)

3

(c)

[Lihat sebelah

6 Find the range of values of x for which $x(2x+5) \geq 12$.
Cari julat nilai- nilai x di mana $x(2x+5) \geq 12$

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

Answer / *Jawapan*:

For examiner's use only

6

3

7 Solve the equation $\frac{4^{x-1}}{2} = 16^{x+1}$.

Selesaikan persamaan $\frac{4^{x-1}}{2} = 16^{x+1}$.

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

Answer / *Jawapan*:

7

3

[Lihat sebelah

For examiner's use only

8 Solve the equation $\log_5(2x+3) = 1 + \log_5(x-1)$

Selesaikan $\log_5(2x+3) = 1 + \log_5(x-1)$

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

Answer / *Jawapan*:

8

3

9 Given that $\log_3 2 = m$ and $\log_3 5 = n$, express $\log_9 20$ in terms of m and n.

Diberi bahawa $\log_3 2 = m$ *dan* $\log_3 5 = n$, *nyatakan* $\log_9 20$ *dalam sebutan* m *dan* n

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

Answer / *Jawapan*:

9

4

For examiner's use only

10 The 5th term and the 7th term of an arithmetic progression are 45 and 5 respectively. Find

Sebutan kelima dan sebutan ketujuh suatu janjang arithmetik masing- masing ialah 45 dan 5. Cari

(a) the first term and the common difference
sebutan pertama dan beza sepunya

(b) the sum of the first six terms
jumlah enam sebutan pertama

[4 marks]
[4 markah]

Answer /*Jawapan*:

(a)

(b)

10

3

11 The nth term of a geometric progression can be determined by using the formula $T_n = 2^{3-2n}$. Calculate the sum to infinity.
Sebutan ke- n suatu janjang geometri boleh ditentukan dengan menggunakan formula $T_n = 2^{3-2n}$. *Kira hasil tambah ketakterhinggaan.*

[4 marks]
[4 markah]

Answer /*Jawapan*:

11

4

[Lihat sebelah

For examiner's use only

12 Diagram 12 shows a linear graph of xy against $\frac{1}{x}$.

Rajah 12 menunjukkan graf garis lurus xy melawan $\frac{1}{x}$.

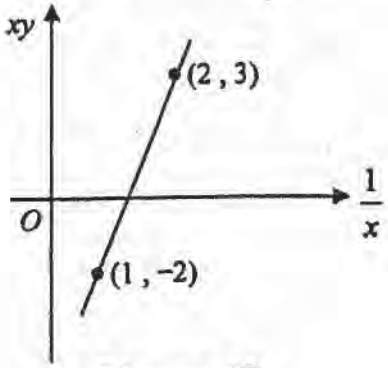


Diagram 12
Rajah 12

(a) Express y in terms of x.
Nyatakan y dalam sebutan x

(b) Find the value of y when $x = 4$
Cari nilai y apabila x = 4

[4 marks]
[4 markah]

Answer / *Jawapan*:

(a)

(b)

12

4

13 The points $A(2p, p)$, $B(h, k)$ and $C(2h, 5k)$ are on a straight line. B divides AC internally in the ratio 3 : 2. Express h in terms of k.
Titik-titik $A(2p, p)$, $B(h, k)$ dan $C(2h, 5k)$ terletak pada satu garis lurus. B membahagi dalam AC dengan nisbah 3 : 2. Ungkapkan h dalam sebutan k.

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

Answer / *Jawapan*:

For examiner's use only

13

3

[Lihat sebelah

For examiner's use only

14 Diagram 14 shows the straight line PQ which is perpendicular to the straight line QR and intersect each other at the point Q.

Rajah 14 menunjukkan garis lurus PQ yang berseranjang dengan garis lurus QR dan bersilang antara satu sama lain pada titik Q

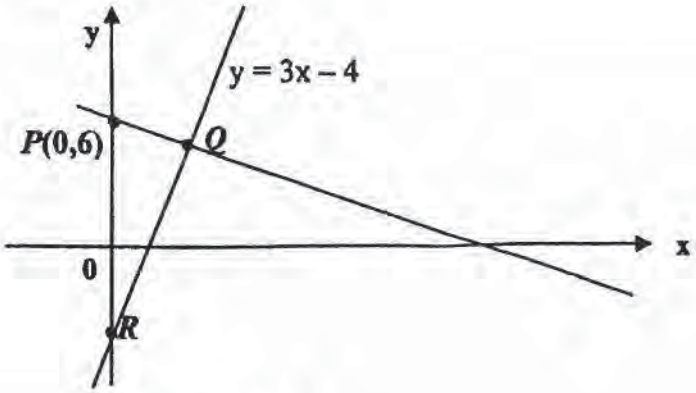


Diagram 14
Rajah 14

The equation of the straight line QR is $y = 3x - 4$. Find the coordinates of Q.
Persamaan garis lurus QR ialah $y = 3x - 4$. Cari koordinat titik Q.

[3 marks]
[3 markah]

Answer / *Jawapan*:

14

3

[Lihat sebelah

15 Given that $O(0, 0)$, $P(-1, 4)$ and $Q(4, -8)$, find in terms of the unit vectors, $\underline{i}$ and $\underline{j}$,

Diberi $O(0, 0)$, $P(-1, 4)$ dan $Q(4, -8)$, carikan dalam sebutan vector unit, $\underline{i}$ dan $\underline{j}$,

(a) $\overrightarrow{PQ}$,

(b) the unit vector in the direction of $\overrightarrow{PQ}$,

vektor unit dalam arah $\overrightarrow{PQ}$.

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

For examiner's use only

Answer / *Jawapan*:

(a)

(b)

15

4

[Lihat sebelah

For examiner's use only

16 Diagram 16 shows two vectors, $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

Rajah 16 menunjukkan dua vector, $\overrightarrow{OA}$ *and* $\overrightarrow{OB}$.

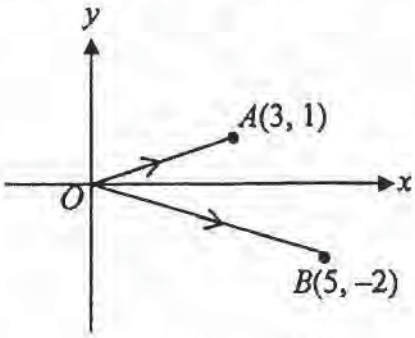


Diagram 16
Rajah 16

Express
Ungkapkan

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

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

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

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

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

Answer / *Jawapan*:

(a)

(b)

16

2

17 Solve the equation $3\cos 2x + 5\sin x = 4$ for $0° \le x \le 360°$.

Selesaikan persamaan $3\cos 2x + 5\sin x = 4$ *bagi* $0° \le x \le 360°$.

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

Answer / *Jawapan*:

For examiner's use only

17

3

For examiner's use only

18 Diagram 18 shows a semicircle PQR with centre O and sector RTQ with centre R.

Rajah 18 menunjukkan sebuah semibulatan PQR berpusat O dan sektor RTQ berpusat R.

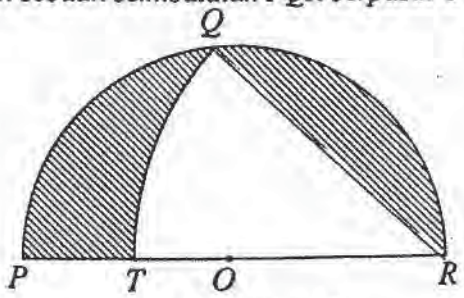


Diagram 18
Rajah 18

Given $OR = 8$ cm, $TR = 12$ cm and $\angle TRQ = 1.134$ radians. Find the perimeter, in cm, of the shaded region.

Diberi OR = 8 cm, TR = 12 cm dan $\angle TRQ = 1.134$ radian. *Cari perimeter, dalam cm, kawasan berlorek.*

[Use/ *Guna* $\pi = 3.142$]

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

Answer / *Jawapan*:

18

3

For examiner's use only

19 The curve $y = -3x^2 - 12x + 10$ has a maximum point at $x = k$, where k is a constant. Find the value of k.

Lengkung $y = -3x^2 - 12x + 10$ *mempunyai titik maksimum di* $x = k$, *dengan keadaan* k *ialah pemalar.*
Cari nilai k.

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

Answer / *Jawapan*:

19

3

20 A right circular cone has a radius of 3 cm and a height of 8 cm. If its radius changes to 2.98 cm, find the small change in its volume, in terms of π.

[Volume of cone, $V = \frac{1}{3}\pi r^2 h$]

Sebuah kon membulat tegak mempunyai jejari 3 cm *dan tinggi* 8 cm. *Jika jejarinya berubah kepada* 2.98 cm, *cari perubahan kecil bagi isipadunya, dalam sebutan* π.

[*Isipadu Kon,* $V = \frac{1}{3}\pi j^2 t$]

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

Answer / *Jawapan*:

20

3

[Lihat sebelah

For examiner's use only

21 Given that $\int_1^3 f(x)dx = 3$ and $\int_3^6 f(x)dx = 9$.

Find the value of m if $\int_1^6 [f(x) + 4m]dx = 32$, where m is a constant.

Diberi $\int_1^3 f(x)dx = 3$ *dan* $\int_3^6 f(x)dx = 9$.

Cari nilai m jika $\int_1^6 [f(x) + 4m]dx = 32$, *dengan keadaan m ialah pemalar.*

[3 marks]
[3 markah]

Answer / *Jawapan*:

21

3

22. A set of nine numbers has a mean of 8.

Satu set yang terdiri daripada sembilan nombor mempunyai min 8.

(a) Find Σx.

Cari Σx.

(b) When a number p is removed from the set, the new mean is 8.5. Find the value of p.

Apabila satu nombor p dikeluarkan daripada set itu, min baru ialah 8.5. *Cari nilai p.*

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

Answer / *Jawapan*:

(a)

(b)

For examiner's use only

22

3

[Lihat sebelah

For examiner's use only

23 A debate team consists of 5 students. The team will be chosen from a group of 6 boys and 4 girls. Find the number of teams can be formed such that each team consists of

Satu pasukan perbahasan terdiri daripada 5 orang pelajar. Pasukan itu akan dipilih daripada sekumpulan 6 pelajar lelaki dan 4 pelajar perempuan. Cari bilangan pasukan yang boleh dibentuk supaya pasukan itu mempunyai

(a) 3 boys,
3 pelajar lelaki,

(b) at least 2 girls.
sekurang-kurangnya 2 pelajar perempuan.

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

Answer / *Jawapan*:

(a)

(b)

23

4

24 The probability of Jackson chosen as a librarian is $\frac{2}{3}$ while the probability of Shima being chosen is $\frac{3}{4}$.

Kebarangkalian Jackson dipilih sebagai perpustakawan ialah $\frac{2}{3}$ *manakala kebarangkalian Shima dipilih ialah* $\frac{3}{4}$

Find the probability that
Cari kebarangkalian bahawa

(a) both of them are not chosen as a librarian,
kedua-duanya tidak dipilih sebagai perpustakawan,

(b) only one of them is chosen as a librarian.
hanya seorang daripada mereka dipilih sebagai perpustakawan,

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

Answer / *Jawapan*:

(a)

(b)

For examiner's use only

24

4

[Lihat sebelah

For examiner's use only

25 Diagram 25 shows a standard normal distribution graph.

Rajah 25 menunjukkan satu graf taburan normal piawai.

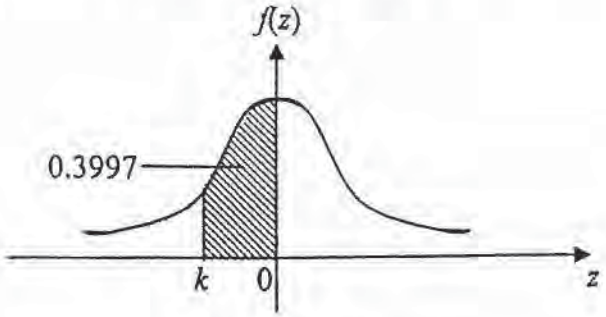


Diagram 25
Rajah 25

The probability represented by the area of the shaded region is 0.3997.

Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.3997.

(a) Find the value of k.
Cari nilai k.

(b) X is a continuous variable which is normally distributed with a mean of 75 and a standard deviation of 2.
Find the value of X when the z-score is k.
X ialah pembolehubah rawak selanjar bertaburan secara normal dengan min 75 dan sisihan piawai 2.
Cari nilai X apabila skor-z ialah k.

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

Answer / *Jawapan*:

(a)

(b)

25

4

END OF THE QUESTION PAPER
KERTAS SOALAN TAMAT

UPPER TAIL PROBABILITIES $Q(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											SUBTRACT								
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4	8	12	16	20	24	28	32	36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4	8	12	16	20	24	28	32	36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4	8	12	15	19	23	27	31	35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4	7	11	15	19	22	26	30	34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4	7	11	14	18	22	25	29	32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3	7	10	14	17	20	24	27	31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3	7	10	13	16	19	23	26	29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3	6	9	12	15	18	21	24	27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3	5	8	11	14	16	19	22	25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3	5	8	10	13	15	18	20	23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2	5	7	9	12	14	16	19	21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2	4	6	8	10	12	14	16	18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2	4	6	7	9	11	13	15	17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2	3	5	6	8	10	11	13	14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1	3	4	6	7	8	10	11	13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1	2	4	5	6	7	8	10	11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1	2	3	4	5	6	7	8	9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1	2	3	4	4	5	6	7	8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1	1	2	3	4	4	5	6	6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1	1	2	2	3	4	4	5	5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0	1	1	2	2	3	3	4	4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0	1	1	2	2	2	3	3	4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0	1	1	1	2	2	2	3	3
2.3	.0107	.0104	.0102	$.0^{2}990$	$.0^{2}964$	$.0^{2}939$	$.0^{2}914$	$.0^{2}889$	$.0^{2}866$	$.0^{2}842$	0	1	1	1	1	2	2	2	2
											3	5	8	10	13	15	18	20	23
											2	5	7	9	12	14	16	18	21
2.4	$.0^{2}820$	$.0^{2}798$	$.0^{2}776$	$.0^{2}755$	$.0^{2}734$	$.0^{2}714$	$.0^{2}695$	$.0^{2}676$	$.0^{2}657$	$.0^{2}639$	2	4	6	8	11	13	15	17	19
											2	4	6	7	9	11	13	15	17
2.5	$.0^{2}621$	$.0^{2}604$	$.0^{2}587$	$.0^{2}570$	$.0^{2}554$	$.0^{2}539$	$.0^{2}523$	$.0^{2}508$	$.0^{2}494$	$.0^{2}480$	2	3	5	6	8	9	11	12	14
2.6	$.0^{2}466$	$.0^{2}453$	$.0^{2}440$	$.0^{2}427$	$.0^{2}415$	$.0^{2}402$	$.0^{2}391$	$.0^{2}379$	$.0^{2}368$	$.0^{2}357$	1	2	3	5	6	7	8	9	10
2.7	$.0^{2}347$	$.0^{2}336$	$.0^{2}326$	$.0^{2}317$	$.0^{2}307$	$.0^{2}298$	$.0^{2}289$	$.0^{2}280$	$.0^{2}272$	$.0^{2}264$	1	2	3	4	5	6	7	8	9
2.8	$.0^{2}256$	$.0^{2}248$	$.0^{2}240$	$.0^{2}233$	$.0^{2}226$	$.0^{2}219$	$.0^{2}212$	$.0^{2}205$	$.0^{2}199$	$.0^{2}193$	1	1	2	3	4	4	5	6	6
2.9	$.0^{2}187$	$.0^{2}181$	$.0^{2}175$	$.0^{2}169$	$.0^{2}164$	$.0^{2}159$	$.0^{2}154$	$.0^{2}149$	$.0^{2}144$	$.0^{2}139$	0	1	1	2	2	3	3	4	4
3.0	$.0^{2}135$	$.0^{2}131$	$.0^{2}126$	$.0^{2}122$	$.0^{2}118$	$.0^{2}114$	$.0^{2}111$	$.0^{2}107$	$.0^{2}104$	$.0^{2}100$	0	1	1	2	2	2	3	3	4
3.1	$.0^{3}968$	$.0^{3}935$	$.0^{3}904$	$.0^{3}874$	$.0^{3}845$	$.0^{3}816$	$.0^{3}789$	$.0^{3}762$	$.0^{3}736$	$.0^{3}711$	3	6	9	13	16	19	22	25	28
											3	6	8	11	14	17	20	22	25
											2	5	7	10	12	15	17	20	22
3.2	$.0^{3}687$	$.0^{3}664$	$.0^{3}641$	$.0^{3}619$	$.0^{3}598$	$.0^{3}577$	$.0^{3}557$	$.0^{3}538$	$.0^{3}519$	$.0^{3}501$	2	4	7	9	11	13	15	18	20
											2	4	6	8	9	11	13	15	17
											2	3	5	6	8	10	11	13	14
3.3	$.0^{3}483$	$.0^{3}466$	$.0^{3}450$	$.0^{3}434$	$.0^{3}419$	$.0^{3}404$	$.0^{3}390$	$.0^{3}376$	$.0^{3}362$	$.0^{3}349$	1	3	4	5	7	8	9	10	12
											1	2	3	4	5	6	7	8	9
3.4	$.0^{3}337$	$.0^{3}325$	$.0^{3}313$	$.0^{3}302$	$.0^{3}291$	$.0^{3}280$	$.0^{3}270$	$.0^{3}260$	$.0^{3}251$	$.0^{3}242$	1	1	2	3	4	4	5	6	7
3.5	$.0^{3}233$	$.0^{3}224$	$.0^{3}216$	$.0^{3}208$	$.0^{3}200$	$.0^{3}193$	$.0^{3}185$	$.0^{3}178$	$.0^{3}172$	$.0^{3}165$	0	1	1	2	2	3	3	4	5
3.6	$.0^{3}159$	$.0^{3}153$	$.0^{3}147$	$.0^{3}142$	$.0^{3}136$	$.0^{3}131$	$.0^{3}126$	$.0^{3}121$	$.0^{3}117$	$.0^{3}112$									
3.7	$.0^{3}108$	$.0^{3}104$	$.0^{3}100$	$.0^{4}96$	$.0^{4}92$	$.0^{4}88$	$.0^{4}85$	$.0^{4}82$	$.0^{4}78$	$.0^{4}75$									
3.8	$.0^{4}72$	$.0^{4}69$	$.0^{4}67$	$.0^{4}64$	$.0^{4}62$	$.0^{4}59$	$.0^{4}57$	$.0^{4}54$	$.0^{4}52$	$.0^{4}50$									
3.9	$.0^{4}48$	$.0^{4}46$	$.0^{4}44$	$.0^{4}42$	$.0^{4}41$	$.0^{4}39$	$.0^{4}37$	$.0^{4}36$	$.0^{4}34$	$.0^{4}33$									

For negative z use the relation:

$$Q(z) = 1 - Q(-z) = P(-z)$$

Example: if $u \sim$ N (0,1), *find* (*a*) Prob $(u > 2)$, (*b*) Prob $(0 < u < 2)$, (*c*) Prob $(|u| > 2)$, (*d*) Prob $(|u| < 2)$. The desired probabilities are (*a*) $Q(2) = .0228$, (*b*) $Q(0) - Q(2) = .5000 - .0228 = .4772$, (*c*) $2Q(2) = .0456$, (*d*) $1 - 2Q(2) = .9544$.

If $v \sim N(\mu,\sigma^2)$, Prob $(v > x)$ is given by $Q(z)$ with $z = (x - \mu)/\sigma$.

UPPER QUANTILES $z_{[P]}$ OF THE NORMAL DISTRIBUTION N(0,1)

P	Q	z	P	Q	z	P	Q	z	P	Q	z	Q	z
.50	.50	0.000	.85	.15	1.036	.975	.025	1.960	.990	.010	2.326	$.0^{3}4$	3.353
.55	.45	0.126	.86	.14	1.080	.976	.024	1.977	.991	.009	2.366	$.0^{3}3$	3.432
.60	.40	0.253	.87	.13	1.126	.977	.023	1.995	.992	.008	2.409	$.0^{3}2$	3.540
.65	.35	0.385	.88	.12	1.175	.978	.022	2.014	.993	.007	2.457	$.0^{3}1$	3.719
.70	.30	0.524	.89	.11	1.227	.979	.021	2.034	.994	.006	2.512	$.0^{4}5$	3.891
.75	.25	0.674	.90	.10	1.282	.980	.020	2.054	.995	.005	2.576	$.0^{4}1$	4.265
.76	.24	0.706	.91	.09	1.341	.981	.019	2.075	.996	.004	2.652	$.0^{5}5$	4.417
.77	.23	0.739	.92	.08	1.405	.982	.018	2.097	.997	.003	2.748	$.0^{5}1$	4.753
.78	.22	0.772	.93	.07	1.476	.983	.017	2.120	.998	.002	2.878	$.0^{6}5$	4.892
.79	.21	0.806	.94	.06	1.555	.984	.016	2.144	.999	.001	3.090	$.0^{6}1$	5.199
.80	.20	0.842	.950	.050	1.645	.985	.015	2.170	.9991	$.0^{3}9$	3.121	$.0^{7}5$	5.327
.81	.19	0.878	.955	.045	1.695	.986	.014	2.197	.9992	$.0^{3}8$	3.156	$.0^{7}1$	5.612
.82	.18	0.915	.960	.040	1.751	.987	.013	2.226	.9993	$.0^{3}7$	3.195	$.0^{8}5$	5.731
.83	.17	0.954	.965	.035	1.812	.988	.012	2.257	.9994	$.0^{3}6$	3.239	$.0^{8}1$	5.998
.84	.16	0.994	.970	.030	1.881	.989	.011	2.290	.9995	$.0^{3}5$	3.291	$.0^{9}5$	6.109

The tabulated function is $z_{[P]}$: if $u \sim$ N(0,1), Prob $(u < z_{[P]}) = P$, Prob $(u > z_{[P]}) = 1 - P =$ (and (for $P > \frac{1}{2}$) Prob $(|u| > z_{[P]}) = 2Q$.

Lower quantiles ($P < \frac{1}{2}$) are given by:

$$z_{[P]} = -z_{[1-P]}$$

PROBABILITY DENSITY $\varphi(z)$ OF THE NORMAL DISTRIBUTION N(0,1)

z	0	1	2	3	4	5	6	7	8	9
0.	0.399	.397	.391	.381	.368	.352	.333	.312	.290	.266
1.	0.242	.218	.194	.171	.150	.130	.111	.094	.079	.066
2.	0.0540	.0440	.0355	.0283	.0224	.0175	.0136	.0104	.0079	.0060
3.	0.00443	.00327	.00238	.00172	.00123	.00087	.00061	.00042	.00029	.00020
4.	$0.0^{3}134$	$.0^{4}89$	$.0^{4}59$	$.0^{4}39$	$.0^{4}25$	$.0^{4}16$	$.0^{4}10$	$.0^{5}64$	$.0^{5}40$	$.0^{5}24$

For $z < 0$ use the relation:

$$\varphi(z) = \varphi(-z)$$

The tabulated functions are defined thus:

$$\varphi(z) = \sqrt{\left(\frac{1}{2\pi}\right)} \exp\left(-\tfrac{1}{2}z^2\right)$$

$$Q(z) = \int_z^{\infty} \varphi(u)\, du$$

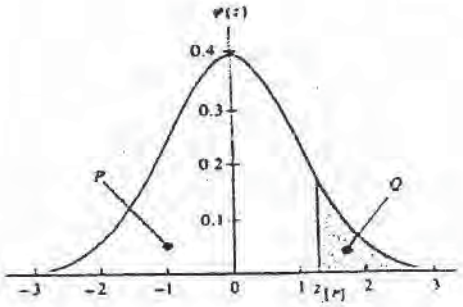
$$\int_{-\infty}^{z_{[P]}} \varphi(u)\, du = P$$

In the figure the probability density is represented by the ordinate of the graph, and the tail probabilities are represented by areas under the graph.

The probability density of the distribution $N(\mu, \sigma^2)$ is

$$f(x) = \frac{1}{\sigma}\varphi(z)$$

with $z = (x - \mu)/\sigma$.



MAJLIS PENGETUA SEKOLAH MALAYSIA

CAWANGAN MELAKA

PEPERIKSAAN PERCUBAAN TINGKATAN LIMA 2011

MATEMATIK TAMBAHAN

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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. ***Give only*** **one** ***answer/solution to each question.***
   Bagi setiap soalan, berikan **satu** *jawapan / penyelesaian sahaja.*

4. ***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.

5. ***The diagrams in the questions provided are not drawn to scale unless stated.***
   Rajah yang mengiringi soalan tidak dilukiskan 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 2 and 3.***
   Satu senarai rumus disediakan di halaman 2 dan 3.

8. ***A booklet of four-figure mathematical tables is provided.***
   Buku sifir matematik empat angka boleh digunakan.

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

Kertas soalan ini mengandungi 18 halaman bercetak

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

Rumus-rumus berikut boleh digunakan untuk 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 $(a^m)^n = a^{nm}$

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

CALCULUS (*Kalkulus*)

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

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

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

4 Area under a curve
(*Luas dibawah lengkung*)

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

$= \int_a^b x\, dy$

5 Volume generated
(*Isipadu janaan*)

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

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

GEOMETRY

1 Distance (*Jarak*)

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

2 Midpoint (*Titik tengah*)

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

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

4 $r = \dfrac{xi + yj}{\sqrt{x^2 + y^2}}$

5. A point dividing segment of a line
(*Titik yang membahagi suatu tembereng garis*)

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

6. Area of triangle (*Luas segitiga*) =

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

STATISTICS (*STATISTIK*)

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

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

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

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

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

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

7 $\bar{I} = \dfrac{\sum w_1 I_1}{\sum w_1}$

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

12 Mean, $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $z = \dfrac{x-\mu}{\sigma}$

TRIGONOMETRY

1 Arc length , $s = r\theta$
(*Panjang lengkok*, $s = j\theta$)

2 Area of sector , $A = \dfrac{1}{2}r^2\theta$
(*Luas sektor* , $L = \dfrac{1}{2}j^2\theta$)

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

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

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

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

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

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

9 $\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$
($\sin(A \pm B) = \sin A\,kos B \pm kos A\sin B$)

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

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

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

13 $a^2 = b^2 + c^2 - 2bc\cos A$
($a^2 = b^2 + c^2 - 2bc\,kos A$)

14 Area of triangle (*Luas segitiga*) $= \dfrac{1}{2}ab\sin C$

Section A
Bahagian A

[40 marks]
[40 *markah*]

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

1 Solve the following simultaneous equations:

Selesaikan persamaan serentak berikut:

$$3x + y = 2$$
$$x^2 + 2y^2 + xy = 4$$

Give your answers correct to three decimal places. [5 *marks*]
Beri jawapan anda betul kepada tiga tempat perpuluhan. [5 *markah*]

2. A quadratic function f is defined by $f(x) = -2x^2 + kx - 8$, where k is a constant.

Suatu fungsi kuadratik f ditakrifkan sebagai $f(x) = -2x^2 + kx - 8$, dengan keadaan k adalah pemalar.

(a) Express $f(x)$ in the form $a(x + p)^2 + q$, where a, p and q are constants. [2 *marks*]

Ungkapkan f(x) dalam bentuk $a(x + p)^2 + q$, dengan keadaan a, p dan q adalah pemalar. [2 *markah*]

(b) Find

Cari

(i) the value of k if the maximum value of $f(x)$ is 3 and $k > 0$. [2 *marks*]

nilai k jika nilai maksimum f(x) ialah 3 dan k>0. [2 *markah*]

(ii) the range of values of k if the graph of $f(x)$ does not meet the x-axis. [3 *marks*]

julat nilai k jika graf f(x) tidak bertemu dengan paksi-x. [3 *markah*]

3. Diagram 3 shows a particular sales team in a direct sales company.

Rajah 3 menunjukkan satu pasukan jualan tertentu dalam suatu syarikat jualan langsung.

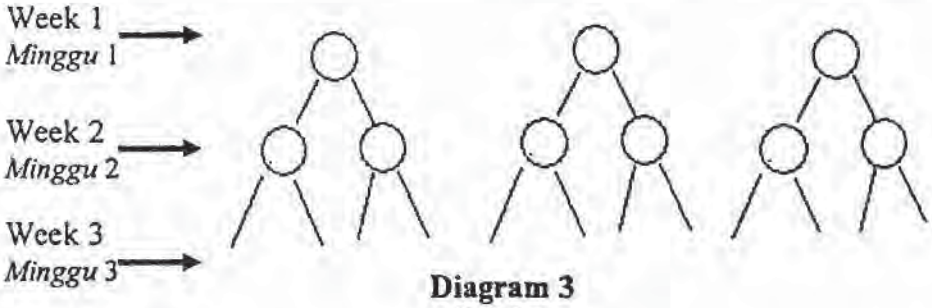


Diagram 3
Rajah 3

The team starts with three members. Each new member is compulsory to recruit another two new members in each subsequent week.

Pasukan itu bermula dengan tiga orang ahli. Setiap ahli baru adalah wajib mencari dua orang baru lagi pada setiap minggu yang berikut.

(a) Calculate the total number of members in the team in the tenth week. [3 *marks*]

Hitung jumlah bilangan ahli pasukan itu pada minggu ke sepuluh. [3 *markah*]

(b) Given the average sales of each member in a week amount to RM300. If the total sales in the nth week are RM57600, find the value of n. [4 *marks*]

Diberi purata jualan bagi setiap ahli dalam satu minggu adalah sejumlah RM 300. Jika jumlah jualan pada minggu ke-n ialah RM 57600, cari nilai n. [4 *markah*]

4. (a) Prove that $\sec x\,(\cos 2x + \sin^2 x) = \cos x$ [2 *marks*]

Buktikan $\sec x\,(\cos 2x + \sin^2 x) = \cos x$ [2 *markah*]

(b) (i) Sketch the graph of $y = |\cos x|$ for $0 \le x \le 2\pi$ [3 *marks*]

Lakarkan graf $y = |\cos x|$ *bagi* $0 \le x \le 2\pi$ [3 *markah*]

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\left|\sec x(\cos 2x + \sin^2 x)\right| - \frac{x}{2\pi} = 0$ for $0 \le x \le 2\pi$.
State the number of solutions [3 *marks*]

Seterusnya, gunakan paksi yang sama, lakarkan garislurus yang sesuai untuk mencari bilangan penyelesaian persamaan $\left|\sec x\,(\cos 2x + \sin^2 x)\right| - \frac{x}{2\pi} = 0$ *bagi* $0 \le x \le 2\pi$.
Nyatakan bilangan penyelesaian. [3 *markah*]

5 Table 5 shows the scores obtained by 32 students in a test.
Jadual 5 menunjukkan skor yang diperoleh oleh 32 orang murid dalam suatu ujian.

Score *Skor*	Number of students *Bilangan murid*
10 - 19	4
20 - 29	6
30 - 39	10
40 - 49	$2x$
50 - 59	4

Table 5
Jadual 5

(a) State
Nyatakan

(i) the value of x.
nilai x.

(ii) the modal class
kelas mod

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

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

Using a scale of 2 cm to 10 scores on the horizontal axis and 2 cm to 1 student on the vertical axis, draw a histogram to represent the frequency distribution of the scores.
Find the mode score. [3 *marks*]

Dengan menggunakan skala 2 cm kepada 10 skor pada paksi mengufuk dan 2 cm kepada 1 orang murid pada paksi mencancang, lukis sebuah histogram untuk mewakili taburan frekuensi bagi skor itu.
Cari skor mod. [3 *markah*]

(c) What is the mode score if the score of each student is multiplied by 3? [1 *mark*]
Apakah skor mod jika skor setiap murid didarabkan 3? [1 *markah*]

6 Diagram 6 shows a trapezium $ABCD$.
Rajah 6 menunjukkan sebuah trapezium ABCD.

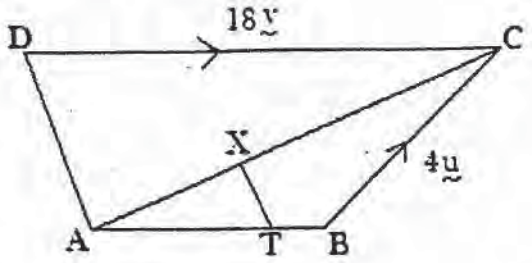


Diagram 6
Rajah 6

It is given that $\overrightarrow{BC} = 4\,\underline{u}$, $\overrightarrow{DC} = 18\,\underline{v}$, $AT = \frac{3}{4}AB$ and $AB = \frac{2}{3}DC$.

Diberi bahawa $\overrightarrow{BC} = 4\,\underline{u}$, $\overrightarrow{DC} = 18\,\underline{v}$, $AT = \frac{3}{4}AB$ *dan* $AB = \frac{2}{3}DC$.

(a) Express $\overrightarrow{AC}$ in terms of $\underline{u}$ and $\underline{v}$. [2 *marks*]

Ungkapkan $\overrightarrow{AC}$ *dalam sebutan* $\underline{u}$ *dan* $\underline{v}$. [2 *markah*]

(b) Point x lies inside the trapezium $ABCD$ such that $\overrightarrow{TX} = m\,\overrightarrow{AD}$ and m is a constant.

Titik x terletak di dalam trapezium dengan keadaan $\overrightarrow{TX} = m\,\overrightarrow{AD}$ *dan m adalah pemalar.*

(i) Express $\overrightarrow{TX}$ in terms of m, $\underline{u}$ and $\underline{v}$

Ungkapkan $\overrightarrow{TX}$ *dalam sebutan m,* $\underline{u}$ *dan* $\underline{v}$

(ii) Hence ,if the point A, X and C are collinear, find the value of m.
Seterusnya, jika titik-titik A, X dan C adalah segaris, cari nilai m.

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

Section B
Bahagian B
[40 marks]
[40 *markah*]
Answer **four** questions from this section.
Jawab ***empat*** *soalan dalam bahagian ini*

7 Diagram 7 shows the curve $y = x^2 + 2$ and the straight line $y = -x + 8$.
Rajah 7 menunjukkan lengkung $y = x^2 + 2$ *dan garis lurus* $y = -x + 8$.

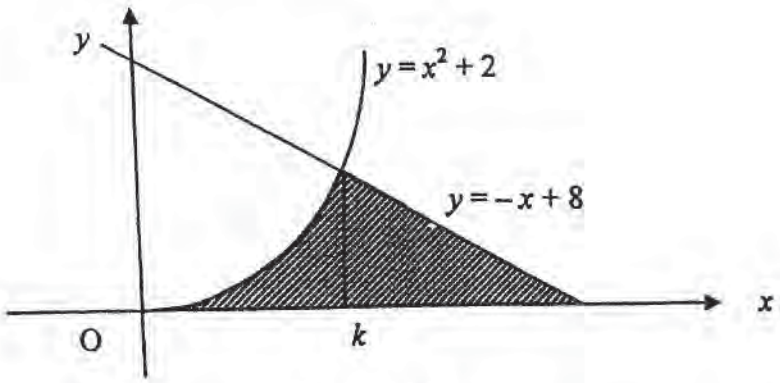


Diagram 7
Rajah 7

Find
Cari

(a) the value of k, [3 *marks*]
nilai bagi k, [3 *markah*]

(b) the area of the shaded region, [4 *marks*]
luas rantau berlorek, [4 *markah*]

(c) the volume generated in terms of π, when the region bounded by the curve, the y-axis and $y = 6$ is revolved 360° about the y-axis. [3 *marks*]

isipadu janaan, dalam sebutan π, *apabila rantau yang dibatasi oleh lengkung itu, paksi-y dan* $y = 6$ *dikisarkan melalui* 360° *pada paksi-y.* [3 *markah*]

8 Use 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. Variables x and y are related by the equation $y = h(x+1)^k$, where h and k 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 $y = h(x+1)^k$, di mana h dan k adalah pemalar.

x	1	2	3	4	5	6
y	5	6.5	7.8	8.9	10	10.9

Table 8
Jadual 8

(a) Based on the table, construct a table for the value of $\log_{10}y$ and $\log_{10}(x+1)$. [2 *marks*]
Berdasarkan jadual, bina satu jadual bagi nilai-nilai $\log_{10}y$ dan $\log_{10}(x+1)$. [2 *markah*]

(b) Plot $\log_{10}y$ against $\log_{10}(x+1)$ using a scale of 2cm to 0.1 unit on both axes. Hence, draw the line of best fit. [4 *marks*]

Plot $\log_{10}y$ melawan $\log_{10}(x+1)$ dengan menggunakan skala 2cm kepada0.1 unit pada kedua-dua paksi. Seterusnya, lukis garis penyuaian terbaik. [4 *markah*]

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

(i) h
(ii) k

[4 marks]
[4 *markah*]

9 Dia gram 9 shows the cross section of a cylindrical roller with centre O and radius 20 cm resting on a horizontal ground ST. OUV is a straight line that represents the handle of the roller and $OU:OV = 1:3$.

Rajah 9 menunjukkan keratin rentas sebuah penggelek berbentuk silinder dengan pusat O dan jejari 20 cm yang terletak di atas lantai mengufuk ST. OUV ialah garis lurus yang mewakili pemegang penggelek itu dan OU:OV = 1:3.

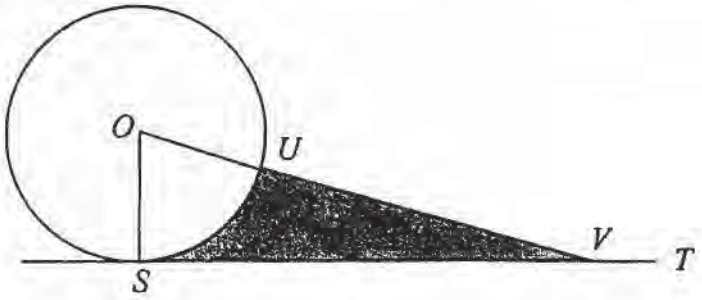


Diagram 9
Rajah 9

Calculate
Hitungkan

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

(b) the perimeter, in cm, of the shaded region [4 *marks*]
perimeter, dalam cm, kawasan berlorek [4 *markah*]

(c) the area, in cm^2, of the shaded region. [4 marks]
luas, dalam cm^2, kawasan berlorek. [4 *markah*]

10 Solutions to this question by scale drawing is not accepted.
Penyelesaian secara lukisan berskala tidak diterima.

Diagram 10 shows the triangle OAB where O is the origin. Point C lies on the straight line AB.
Rajah 10 menunjukkan segitiga OAB dengan O ialah titik asalan. Titik C terletak pada garis lurus AB.

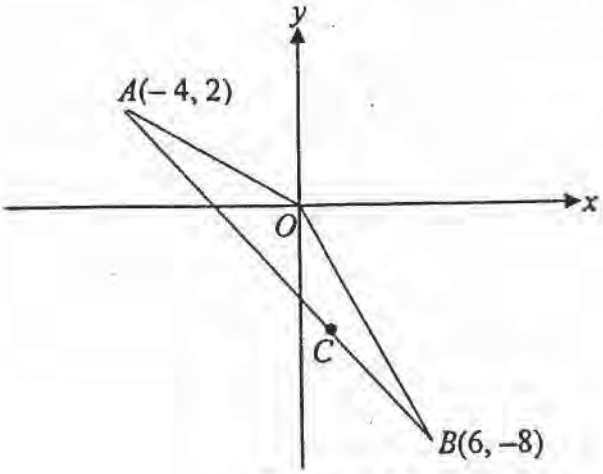


Diagram 10
Rajah 10

(a) Calculate the area, in unit^2, of triangle OAB. [2 *marks*]
Hitungkan luas, dalam unit^2, bagi segitiga OAB [2 *markah*]

(b) Find the equation of the perpendicular bisector of line segment AB. [3 marks]
Cari persamaan pembahagi dua sama serenjang bagi tembereng garis AB. [3 *markah*]

(c) Given that length BC is $\frac{2}{5}$ of the line segment AB, find the coordinates of point C.
[2 *marks*]

Diberi panjang BC ialah $\frac{2}{5}$ daripada tembereng garis AB, cari koordinat bagi titik C.
[2 *markah*]

(d) A point P moves such that its distance from point B is always twice its distance from point C.
Find the equation of the locus of P. [3 *marks*]
Satu titik P bergerak dengan keadaan jaraknya dari titik B adalah sentiasa dua kali jaraknya dari titik C. Cari persamaam lokus bagi P. [3 *markah*]

11 (a) I n a house to house check carried out in Taman Maju, termites were found in 3 out of every 5 houses. If 8 houses in Taman Maju are chosen at random, calculate the probability that

Dalam suatu pemeriksaan dari rumah ke rumah di Taman Maju, anai-anai telah dijumpai dalam 3 daripada setiap 5 buah rumah. Jika 8 buah rumah di Taman Maju dipilih secara rawak, hitung kebarangkalian bahawa

(i) exactly 2 houses are infested with termites,
tepat 2 buah rumah diserang anai-anai.

(ii) more than 2 houses are infested with termites.
lebih daripada 2 buah rumah diserang anai-anai.

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

(b) The masses of students in a school has a normal distribution with a mean μ kg and a standard deviation 12 kg.

Jisim bagi pelajar di sebuah sekolah adalah mengikut taburan normal dengan min μ kg dan sisihan piawai 12 kg.

(i) A stude nt is chosen at random from the school. The probability that the student has a mass less than 45 kg is 0.2266, find the value of μ.
Seorang pelajar dipilih secara rawak daripada sekolah itu. Kebarangkalian pelajar tersebut mempunyai jisim kurang daripada 45kg ialah 0.2266, cari nilai bagi μ.

(ii) Hence, calculate the probability that a student chosen at random will have a mass between 42 and 45 kg.
Seterusnya, hitungkan kebarangkalian bahaawa seorang pelajar yang dipilih secara rawak mempunyai jisim antara 42 kg dan 45 kg.

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

Section C
Bahagian C
[20 *marks*]
[20 *markah*]
Answer **two** questions from this section.
*Jawab **dua** soalan dalam bahagian ini*

12 A particle moves along a straight line and passes through a fixed point O. Its velocity, v m s^{-1}, is given by $v = 2pt^2 - qt - 5$, where p and q are constants, and t is the time, in seconds, after passing through O. When $t = 2$ s, the acceleration of the particle is zero and its velocity is -9 m s^{-1}.

Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap 0. Halajunya, v m s^{-1}, diberi oleh $v = 2pt^2 - qt - 5$, dengan keadaan p dan q adalah pemalar, dan t ialah masa, dalam saat, selepas melalui O. Pada ketika t = 2 s,zarah bergerak dengan pecutan sifar dan halajunya ialah 16 m s^{-1}.

[Assume motion to the right is positive.]
[*Anggapkan gerakan ke arah kanan sebagai positif*]

Find
Cari

(a) the value of p and of q. [5 *marks*]
nilai p dan nilai q. [5 *markah*]

(b) the time when the particle reverse its direction, [2 *marks*]
masa ketika zarah itu bertukar arah gerakan. [2 *markah*]

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

13 (a) The average monthly food expenses of Encik Hamid increases from RM 690 in the year 2004 to RM 966 in the year 2005.

Purata perbelanjaan bulanan bagi makanan En Hamid meningkat dari RM 690 pada tahun 2004 kepada RM 966 pada tahun 2005.

(i) Find the price index of food expenses for the year 2005 based on the year 2004. [2 *marks*]

Cari indeks harga bagi perbelanjaan makanan pada tahun 2005 berasaskan tahun 2004. [2 *markah*]

(ii) Calculate the average monthly food expenses of Encik Hamid in the year 2003, if the price index for the year 2005 based on the year 2003 is 161. [2 *marks*]

Hitung purata perbelanjaan food bulanan bagi Encik Hamid pada tahun 2003, jika indeks harga pada tahun 2005 berasaskan tahun 2003 ialah 161. [2 *markah*]

(b) A product is make up of three components, *A*, *B* and *C*. Table 13 shows the price indices of the three components in the year 2003 based on the year 2001 of the three components *A*, *B* and *C* as well as their respective weightages.

Suatu keluaran dihasilkan daripada gabungan empat komponen iaitu A, B dan C. Jadual 13 menunjukkan indeks harga pada tahun 2003 berasaskan tahun 2001 bagi tiga komponen, A, B sdan C serta pemberat masing-masing.

Component *Komponen*	Price index in the year 2003 based on the year 2001 *Indeks harga pada tahun 2003 berasaskan tahun 2001*	Weightage *Pemberat*
A	105	3
B	114	5
C	108.75	4

Table 13
Jadual 13

(i) Calculate the composite price index for all the components in the year 2003 based on the year 2001. [3 *marks*]
Hitungkan indeks gubahan bagi semua komponen itu pada tahun 2003 berasaskan tahun 2001. [3 *markah*]

(ii) Given that the prices of the components increased by *k*% from the year 2003 to 2005. If the composite price index for the 2005 based on the year 2001 is 128.7, find the value of *k*. [3 *marks*]
Diberi harga komponen itu bertambah k % dari tahun 2003 ke tahun 2005.Jika indeks Gubahan bagi tahun 2005 berasakan tahun 2001 ialah 128.7, cari nilai k. [3 *markah*]

14 Diagram 14 shows a quadrilateral $ABCD$.
Rajah14 menunjukkan sebuah segiempat ABCD.

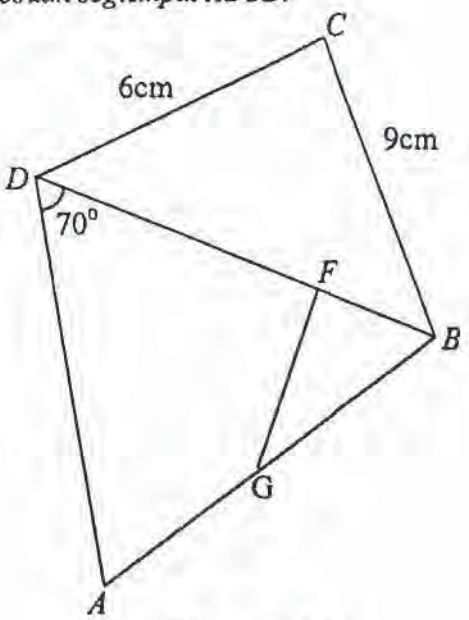


Diagram 14
Rajah 14

The area of the triangle BCD is 20 cm^2 and $\angle BCD$ is an acute angle. Given that $AG = GB = 7$ cm and $BF = \frac{1}{3}BD$.
Luas segitiga BCD is 20 cm^2 dan $\angle BCD$ ialah sudut tirus. Diberi bahawa AG=GB=7 cm dan $BF = \frac{1}{3}BD$

Calculate
Hitungkan

(a) $\angle BCD$ [2 *marks*] [2 *markah*]

(b) the length in cm of BD [2 *marks*]
panjang dalam cm bagi BD [2 *markah*]

(c) $\angle ABD$ [3 *marks*] [3 *markah*]

(d) the area in cm^2 of quadrilateral $ADFG$ [3 *marks*]
luas dalam cm^2 bagi segiempat ADFG [3 *markah*]

15. Use graph paper to answer this question.
Guna kertas graf untuk menjawab soalan ini.

A factory produces two types of calculator, P and Q. The factory produces x units of the calculator P and y units of the calculator Q daily. The profit from the sales of a unit of calculator P is RM15 and a unit of calculator Q is RM12. The production based on the following constraints:
Sebuah kilang menghasilkan dua jenis kalkulator, P dan Q. Pada setiap hari, kilang itu menghasilkan x unit kalkulator P dan y unit kalkulaotr Q. Keuntungan daripada penjualan seunit kalkulator P ialah RM15 dan seunit kalkulator Q ialah RM12.
Penghasilan adalah berdasarkan kekangan berikut:

I : The total number of calculators produced is at most 500.
Jumlah bilangan kalkulator yang dihasilkan dalah selebih-lebihnya 500.

II : The number of calculator P produced is not more than three times the number of calculator Q.
Bilangan kalkulator P yang dihasilkan tidak melebihi tiga kali bilangan kalkulator Q.

III : The minimum total profit for both types of calculators is RM 4500.
Jumlah keuntungan minimum bagi kedua-dua jenis kalkulator adalah RM4500.

(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 50 units on both axes, construct and shade the region R which satisfies all the above constraints. [3 *marks*]
Dengan menggunakan skala 2 cm *kepada* 50 *unit pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.* [3 *markah*]

(c) Use the graph constructed in **15**(b), to find
Gunakan graf yang dibina di **15*(b)***, *untuk mencari*

(i) the minimum number of calculator Q produced daily if the number of calculator P produced is 120
Bilangan minimum kakulator Q yang dihasilkan setiap hari jika bilang kalkulator P yang dihasilkan ialah 120 unit.

(ii) the maximum profit per day . [4 *marks*]
keuntungan maksimum dalam sehari. [4 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

UPPER TAIL PROBABILITIES $Q(z)$ OF THE NORMAL DISTRIBUTION $N(0,1)$

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											SUBTRACT								
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4	8	12	16	20	24	28	32	36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4	8	12	16	20	24	28	32	36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4	8	12	15	19	23	27	31	35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4	7	11	15	19	22	26	30	34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4	7	11	14	18	22	25	29	32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3	7	10	14	17	20	24	27	31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3	7	10	13	16	19	23	26	29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3	6	9	12	15	18	21	24	27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3	5	8	11	14	16	19	22	25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3	5	8	10	13	15	18	20	23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2	5	7	9	12	14	16	19	21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2	4	6	8	10	12	14	16	18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2	4	6	7	9	11	13	15	17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2	3	5	6	8	10	11	13	14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1	3	4	6	7	8	10	11	13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1	2	4	5	6	7	8	10	11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1	2	3	4	5	6	7	8	9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1	2	3	4	4	5	6	7	8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1	1	2	3	4	4	5	6	6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1	1	2	2	3	4	4	5	5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0	1	1	2	2	3	3	4	4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0	1	1	2	2	2	3	3	4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0	1	1	1	2	2	2	3	3
2.3	.0107	.0104	.0102								0	1	1	1	1	1	2	2	2
				$.0^2990$	$.0^2964$	$.0^2939$	$.0^2914$				3	5	8	10	13	15	18	20	23
								$.0^2889$	$.0^2866$	$.0^2842$	2	5	7	9	12	14	16	18	21
2.4	$.0^2820$	$.0^2798$	$.0^2776$	$.0^2755$	$.0^2734$						2	4	6	8	11	13	15	17	19
						$.0^2714$	$.0^2695$	$.0^2676$	$.0^2657$	$.0^2639$	2	4	6	7	9	11	13	15	17
2.5	$.0^2621$	$.0^2604$	$.0^2587$	$.0^2570$	$.0^2554$	$.0^2539$	$.0^2523$	$.0^2508$	$.0^2494$	$.0^2480$	2	3	5	6	8	9	11	12	14
2.6	$.0^2466$	$.0^2453$	$.0^2440$	$.0^2427$	$.0^2415$	$.0^2402$	$.0^2391$	$.0^2379$	$.0^2368$	$.0^2357$	1	2	3	5	6	7	8	9	10
2.7	$.0^2347$	$.0^2336$	$.0^2326$	$.0^2317$	$.0^2307$	$.0^2298$	$.0^2289$	$.0^2280$	$.0^2272$	$.0^2264$	1	2	3	4	5	6	7	8	9
2.8	$.0^2256$	$.0^2248$	$.0^2240$	$.0^2233$	$.0^2226$	$.0^2219$	$.0^2212$	$.0^2205$	$.0^2199$	$.0^2193$	1	1	2	3	4	4	5	6	6
2.9	$.0^2187$	$.0^2181$	$.0^2175$	$.0^2169$	$.0^2164$	$.0^2159$	$.0^2154$	$.0^2149$	$.0^2144$	$.0^2139$	0	1	1	2	2	3	3	4	4
3.0	$.0^2135$	$.0^2131$	$.0^2126$	$.0^2122$	$.0^2118$	$.0^2114$	$.0^2111$	$.0^2107$	$.0^2104$	$.0^2100$	0	1	1	2	2	2	3	3	4
3.1	$.0^3968$	$.0^3935$	$.0^3904$								3	6	9	13	16	19	22	25	28
				$.0^3874$	$.0^3845$	$.0^3816$	$.0^3789$				3	6	8	11	14	17	20	22	25
								$.0^3762$	$.0^3736$	$.0^3711$	2	5	7	10	12	15	17	20	22
3.2	$.0^3687$	$.0^3664$	$.0^3641$	$.0^3619$	$.0^3598$						2	4	7	9	11	13	15	18	20
						$.0^3577$	$.0^3557$	$.0^3538$	$.0^3519$	$.0^3501$	2	4	6	8	9	11	13	15	17
3.3	$.0^3483$	$.0^3466$	$.0^3450$	$.0^3434$	$.0^3419$						2	3	5	6	8	10	11	13	14
						$.0^3404$	$.0^3390$	$.0^3376$	$.0^3362$	$.0^3349$	1	3	4	5	7	8	9	10	12
3.4	$.0^3337$	$.0^3325$	$.0^3313$	$.0^3302$	$.0^3291$	$.0^3280$	$.0^3270$	$.0^3260$	$.0^3251$	$.0^3242$	1	2	3	4	5	6	7	8	9
3.5	$.0^3233$	$.0^3224$	$.0^3216$	$.0^3208$	$.0^3200$	$.0^3193$	$.0^3185$	$.0^3178$	$.0^3172$	$.0^3165$	1	1	2	3	4	4	5	6	7
3.6	$.0^3159$	$.0^3153$	$.0^3147$	$.0^3142$	$.0^3136$	$.0^3131$	$.0^3126$	$.0^3121$	$.0^3117$	$.0^3112$	0	1	1	2	2	3	3	4	5
3.7	$.0^3108$	$.0^3104$	$.0^3100$	$.0^496$	$.0^492$	$.0^488$	$.0^485$	$.0^482$	$.0^478$	$.0^475$									
3.8	$.0^472$	$.0^469$	$.0^467$	$.0^464$	$.0^462$	$.0^459$	$.0^457$	$.0^454$	$.0^452$	$.0^450$									
3.9	$.0^448$	$.0^446$	$.0^444$	$.0^442$	$.0^441$	$.0^439$	$.0^437$	$.0^436$	$.0^434$	$.0^433$									

For negative z use the relation:

$$Q(z) = 1 - Q(-z) = P(-z)$$

Example: if $u \sim N(0,1)$, *find* (*a*) Prob $(u > 2)$, (*b*) Prob $(0 < u < 2)$, (*c*) Prob $(|u| > 2)$, (*d*) Prob $(|u| < 2)$. The desired probabilities are (*a*) $Q(2) = .0228$, (*b*) $Q(0) - Q(2) = .5000 - .0228 = .4772$, (*c*) $2Q(2) = .0456$, (*d*) $1 - 2Q(2) = .9544$.

If $v \sim N(\mu,\sigma^2)$, Prob $(v > x)$ is given by $Q(z)$ with $z = (x - \mu)/\sigma$.

UPPER QUANTILES $z_{[P]}$ OF THE NORMAL DISTRIBUTION $N(0,1)$

P	Q	z	P	Q	z	P	Q	z	P	Q	z	Q	z
.50	.50	0.000	.85	.15	1.036	.975	.025	1.960	.990	.010	2.326	$.0^24$	3.353
.55	.45	0.126	.86	.14	1.080	.976	.024	1.977	.991	.009	2.366	$.0^23$	3.432
.60	.40	0.253	.87	.13	1.126	.977	.023	1.995	.992	.008	2.409	$.0^22$	3.540
.65	.35	0.385	.88	.12	1.175	.978	.022	2.014	.993	.007	2.457	$.0^31$	3.719
.70	.30	0.524	.89	.11	1.227	.979	.021	2.034	.994	.006	2.512	$.0^45$	3.891
.75	.25	0.674	.90	.10	1.282	.980	.020	2.054	.995	.005	2.576	$.0^41$	4.265
.76	.24	0.706	.91	.09	1.341	.981	.019	2.075	.996	.004	2.652	$.0^35$	4.417
.77	.23	0.739	.92	.08	1.405	.982	.018	2.097	.997	.003	2.748	$.0^31$	4.753
.78	.22	0.772	.93	.07	1.476	.983	.017	2.120	.998	.002	2.878	$.0^65$	4.892
.79	.21	0.806	.94	.06	1.555	.984	.016	2.144	.999	.001	3.090	$.0^81$	5.199
.80	.20	0.842	.950	.050	1.645	.985	.015	2.170	.9991	$.0^39$	3.121	$.0^75$	5.327
.81	.19	0.878	.955	.045	1.695	.986	.014	2.197	.9992	$.0^28$	3.156	$.0^71$	5.612
.82	.18	0.915	.960	.040	1.751	.987	.013	2.226	.9993	$.0^37$	3.195	$.0^85$	5.731
.83	.17	0.954	.965	.035	1.812	.988	.012	2.257	.9994	$.0^46$	3.239	$.0^81$	5.998
.84	.16	0.994	.970	.030	1.881	.989	.011	2.290	.9995	$.0^55$	3.291	$.0^95$	6.109

The tabulated function is $z_{[P]}$: if $u \sim N(0,1)$, Prob $(u < z_{[P]}) = P$, Prob $(u > z_{[P]}) = 1 - P = Q$, and (for $P > \frac{1}{2}$) Prob $(|u| > z_{[P]}) = 2Q$.

Lower quantiles ($P < \frac{1}{2}$) are given by:

$$z_{[P]} = -z_{[1-P]}$$

PROBABILITY DENSITY $\varphi(z)$ OF THE NORMAL DISTRIBUTION $N(0,1)$

z	0	1	2	3	4	5	6	7	8	9
0.	0.399	.397	.391	.381	.368	.352	.333	.312	.290	.266
1.	0.242	.218	.194	.171	.150	.130	.111	.094	.079	.066
2.	0.0540	.0440	.0355	.0283	.0224	.0175	.0136	.0104	.0079	.0060
3.	0.00443	.00327	.00238	.00172	.00123	.00087	.00061	.00042	.00029	.00020
4.	0.0^3134	$.0^489$	$.0^459$	$.0^439$	$.0^425$	$.0^416$	$.0^410$	$.0^564$	$.0^540$	$.0^324$

For $z < 0$ use the relation:

$$\varphi(z) = \varphi(-z)$$

The tabulated functions are defined thus:

$$\varphi(z) = \sqrt{\left(\frac{1}{2\pi}\right)} \exp\left(-\tfrac{1}{2}z^2\right)$$

$$Q(z) = \int_z^\infty \varphi(u)\, du$$

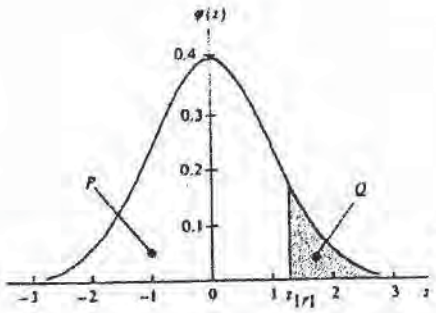
$$\int_{-\infty}^{z_{[P]}} \varphi(u)\, du = P$$

In the figure the probability density is represented by the ordinate of the graph, and the tail probabilities are represented by areas under the graph.

The probability density of the distribution $N(\mu, \sigma^2)$ is

$$f(x) = \frac{1}{\sigma}\varphi(z)$$

with $z = (x - \mu)/\sigma$.



SULIT

3472/2

SULIT
3472/1
Additional
Mathematics
Paper 1
Sept
2011

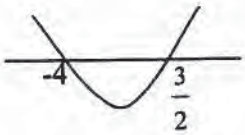
MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN MELAKA
PEPERIKSAAN PERCUBAAN TINGKATAN LIMA 2011

ADDITIONAL MATHEMATICS

Paper 1

MARKING SCHEME

This marking scheme consists of 6 printed pages

Number	Solution and marking scheme	Sub Marks	Full Marks
1	(a) 3, 6 (b) one to many relation	1 1	2
2	(a) $g^{-1}(x) = \frac{x-6}{3}$ $3y + 6 = x$ (b) -5 $g^{-1}(3) = -1$ or $fg^{-1} = \frac{5}{\frac{x-6}{3}}$	2 B1 2 B1	4
3	$m = k - 3$ $m(-1)^2 - 3(-1) - k = 0$	2 B1	2
4	$h = -1$ and $k = -24$ $h = -1$ or $k = -24$ $\frac{-h+1}{2} = 1$ or $\frac{k}{2} = -12$	3 B2 B1	3
5	(a) $x = 3$ (b) $(3, 10)$ (c) $2(x+3)^2 + 10$	1 1 1	3
6	$x \le -4, x \ge \frac{3}{2}$ $(2x-3)(x+4) \ge 0$ or  $2x^2 + 5x - 12 \ge 0$	3 B2 B1	3
7	$x = -\frac{7}{2}$ $2x - 2 - 1 = 4x + 4$ $2^{2(x-1)}$ or $2^{4(x+1)}$	3 B2 B1	3

Number	Solution and marking scheme	Sub Marks	Full Marks
8	$x = \frac{8}{3}$ $2x + 3 = 5(x - 1)$ $\log_5 5(x-1)$ or $\log_5 \frac{2x+3}{x-1}$	3 B2 B1	3
9	$m + \frac{n}{2}$ $2\frac{\log_3 2}{\log_3 9} + \frac{\log_3 5}{\log_3 9}$ $2\log_9 2 + \log_9 5$ $2\log_9 2$ or $\frac{\log_3 2}{\log_3 9}$ or $\frac{\log_3 5}{\log_3 9}$	4 B3 B2 B1	4
10	(a) $a = 125$ $d = -20$ (both) $a + 4d = 45$ or $a + 6d = 5$ (b) 450 $S6 = \frac{6}{2}[2(125) + 5(-20)]$	2 B1 2 B1	4
11	(a) $r = \frac{1}{4}$ $T_1 = 2$ or $T_2 = \frac{1}{2}$ (b) $\frac{8}{3}$ $\frac{2}{1-\frac{1}{4}}$	2 B1 2 B1	4
12	(a) $y = \frac{5}{x^2} - \frac{7}{x}$ $xy = \frac{5}{x} - 7$ $m = 5$ or $c = -7$ (b) $\frac{-23}{16}$	3 B2 B1 1	4

Number	Solution and marking scheme	Sub Marks	Full Marks
13	$h = 20\,k$	3	3
	$\dfrac{2\left(-\dfrac{h}{4}\right)+15k}{5} = k$	B2	
	$(h,k) = \left(\dfrac{3(2h)+2(2p)}{3+2}, \dfrac{3(5k)+2(p)}{3+2}\right)$	B1	
14	Q (3,5)	3	3
	$\dfrac{10}{3}x = 10$ $x = 3$	B2	
	$y = 3(3) - 4$ $= 5$		
	The equation of AB is $y = -\dfrac{1}{3}x + 6$	B1	
15	(a) $5\underline{i} - 12\underline{j}$	2	4
	$\begin{pmatrix} 4 \\ -8 \end{pmatrix} - \begin{pmatrix} -1 \\ 4 \end{pmatrix}$	B1	
	(b) $\dfrac{5\underline{i} - 12\underline{j}}{13}$	2	
	* $\sqrt{5^2 + (-12)^2}$	B1	
16	(a) $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$	1	2
	(b) $-5\mathbf{i} + 2\mathbf{j}$	1	

Number	Solution and marking scheme	Sub Marks	Full Marks
17	$19.47^\circ, 30^\circ, 150, 160.53^\circ$ or $19^\circ 28', 30^\circ, 150^\circ, 160^\circ 32'$	3	3
	$19.47^\circ, 160.53^\circ$ or $30^\circ, 150,$ or $(3\sin x - 1)(2\sin x - 1) = 0$	B2	
	$6\sin^2 x - 5\sin x + 1 = 0$ or $3(1 - 2\sin^2 x)$	B1	
18	54.74	3	3
	$1.134(12) + \frac{1}{2}(3.142)(16) + 12 + 4$	B2	
	1.134×12 or $\frac{1}{2}(3.142)(16)$ or $\frac{1}{2} \times 2 \times 3.142 \times 8$	B1	
19	-2	3	3
	$-6k - 12 = 0$	B2	
	$\left[\frac{dy}{dx}\right] = -6x - 12$	B1	
20	-0.32π	3	3
	$\frac{2}{3}\pi \times 3 \times 8 \times (-0.02)$ or $\frac{\delta V}{-0.02} = \frac{2}{3}\pi \times 3 \times 8$	B2	
	$\frac{2}{3}\pi r h$ or $\delta r = -0.02$	B1	
21	1	3	3
	$3 + 9 + [4mx]_1^6 = 32$	B2	
	$\int_1^3 f(x)dx + \int_3^6 f(x)dx + \int_1^6 4m dx$ or $[4mx]_1^6$	B1	

Number	Solution and marking scheme	Sub Marks	Full Marks
22	(a) 72	1	3
	(b) 4	2	
	$\frac{72-p}{8}=8.5$	B1	
23	(a) 120	2	4
	${}^{6}C_3\times{}^{4}C_2$	B1	
	(b) 186	2	
	${}^{4}C_2\times{}^{6}C_3+{}^{4}C_3\times{}^{6}C_2+{}^{4}C_4\times{}^{6}C_1$	B1	
24	(a) $\frac{1}{12}$	2	4
	$\frac{1}{3}\times\frac{1}{4}$	B1	
	(b) $\frac{5}{12}$	2	
	$\frac{2}{3}\times\frac{1}{4}+\frac{1}{3}\times\frac{3}{4}$	B1	
25	(a) -1.28	2	4
	$p(k\le z\le 0)=0.3997$ or $p(z\le k)=0.5-0.3997$	B1	
	(b) 72.44	2	
	$\frac{X-75}{2}=*-1.28$	B1	

END OF MARKING SCHEME

SULIT

3472/2

Additional
Mathematics
Paper 2
Sept
2011

MAJLIS PENGETUA SEKOLAH MALAYSIA
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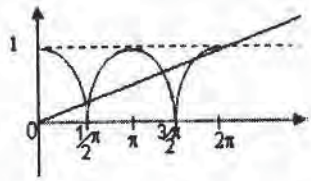
ADDITIONAL MATHEMATICS

Paper 2

MARKING SCHEME

This marking scheme consists of 12 printed pages

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
1	$y = 2 - 3x$	1	
	$x^2 + 2(2-3x)^2 + x(2-3x) = 4$	1	
	$8x^2 - 11x + 2 = 0$		
	$x = \dfrac{-(-11) \pm \sqrt{(-11)^2 - 4(8)(2)}}{2(8)}$	1	
	$x = 1.159$, $x = 0.216$	1	
	$y = -1.477 \quad y = 1.352$	1	5
2	(a) $f(x) = -2\left[(x - \frac{k}{4})^2 - (\frac{k}{4})^2 + 4\right]$	1	
	$= -2(x - \frac{k}{4})^2 + \frac{k^2}{8} - 8$	1	
	(b) (i) $\frac{k^2}{8} - 8 = 3$	1	
	$k = \sqrt{88}$	1	
	(ii) $k^2 - 4(-2)(-8) < 0$	1	
	$(k - 8)(k + 8) < 0$	1	
	$-8 < k < 8$	1	7
3	a) $r = 2$	1	
	$S_{10} = \dfrac{3[2^{10} - 1]}{2 - 1}$	1	
	$= 3069$	1	
	b) $T_n = 192$		
	$(3)(2)^{n-1} = 192$	1	
	$(2)^{n-1} = (2)^6$	1	
	$n - 1 = 6$	1	
	$n = 7$	1	7

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
4	a) LHS = sec x(1 – 2 sin ^{2} x + sin^2 x)	1	
	$= \frac{1}{\cos x}(1 - \sin^2 x)$		
	$= \frac{\cos^2 x}{\cos x} = \cos x = \text{RHS}$	1	
	b) Shape of graph of cos x	1	
	Graph of $\lvert\cos x\rvert$	1	
	Maximum value = 1	1	
			
	$y = \frac{x}{2\pi}$	1	
	Graph of the straight line	1	
	Number of solutions = 5	1	8
5	(a) (i) x =4	1	
	(ii) 30 – 39	1	
	(b) Draw histogram with scale given	1	
	Find the mode from histogram	1	
	Mode = 36	1	
	(c) Mode score = 36 x 3 = 108	1	6

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
6	(a) $\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$	1	
	$= 12\,\underline{v} + 4\,\underline{u}$	1	
	(b) (i) $\overrightarrow{AD} = 12\underline{v} + 4\underline{u} - 18\underline{v}$		
	$= -6\underline{v} + 4\underline{u}$	1	
	$\overrightarrow{TX} = m(-6\underline{v} + 4\underline{u})$ or $-6m\underline{v} + 4m\underline{u}$	1	
	(ii) $\overrightarrow{AX} = k\,\overrightarrow{AC}$		
	$\overrightarrow{AT} + \overrightarrow{TX} = k\,\overrightarrow{AC}$		
	$9\underline{v} - 6m\underline{v} + 4m\underline{u} = 12k\underline{v} + 4k\underline{u}$		
	$9 - 6m = 12k$, $4m = 4k$	1	
	$9 - 6m = 12m$	1	
	$m = \frac{1}{2}$	1	7
7	$x^2 + 2 = -x + 8$	1	
	$x^2 + x - 6 = 0$		
	$x = 2,\ x = -3$	1	
	$k = 2$	1	
	(b)		
	Area $= \int_0^2 (x^2 + 2)\,dx + \frac{1}{2} \times 6 \times 6$	1,1	
	$\left[\frac{x^3}{3} + 2x\right]_0^2$	1	
	$= \frac{74}{3}$ or 24.67	1	
	(c)		
	Volume $= \pi \int_0^6 (y - 2)\,dy$	1	
	$\left[\frac{y^2}{2} - 2y\right]_0^6$	1	
	$= 6\pi$	1	10

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
8.			

$log_{10}(x+1)$	0.3010	0.4771	0.6021	0.6990	0.7782	0.8451
$\log_{10} y$	0.6990	0.8129	0.8921	0.9494	1	1.037

1

1

Graph

uniform scale — 1

One point plotted wrongly and /All points plotted correctly — 1

Line of the best fit — 1

(c) $\log_{10}y = k \log_{10}(x+1) + \log_{10}h$ — 1

(i) $\log_{10}h = 0.515$ — 1

$h=3.273$ — 1

(ii) $k = \dfrac{0.95-0.7}{0.7-0.3}$ — 1

$= 0.625$ — 1 — **10**

9

(a)

$\cos\angle SOT = \dfrac{1}{3}$ — 1

$\angle SOT = 1.231 rad$ — 1

(b) Arc SU= 20(1.231) = 24.62 — 1

$ST^2=60^2 - 20^2$ — 1

$= 56.57$ — 1

Perimeter = 40+24.62+56.57 — 1

= 121.19 cm — 1

(c) Area Δ OST –Area sector SOU

$=\dfrac{1}{2}(20)(56.57)-\dfrac{1}{2}(20)^2(1.231)$ — 1, 1, 1

$= 319.5\ cm^2$ — 1 — **10**

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
10	(a) $\frac{1}{2}\begin{vmatrix} 0 & 6 & -4 & 0 \\ 0 & -8 & 2 & 0 \end{vmatrix}$ or equivalent	1	
		1	
	$= 10$ unit^2		
	(b) Midpoint of AB $= (1, -3)$ or gradient AB $= -1$ or	1	
	Gradient of normal to AB $= 1$	1	
	$y + 3 = 1(x - 1)$	1	
	$y = x - 4$		
	(c) $C = \left(\frac{-4(2)+6(3)}{5}, \frac{2(2)+(-8)(3)}{5}\right)$	1	
		1	
	$= (2, 4)$		
	(d) $PB = 2PC$		
	$\sqrt{(x-6)^2+(y+8)^2} = 2\sqrt{(x-2)^2+(y+4)^2}$	1,1	
	$3x^2+3y^2-4x+16y-36=0$	1	10
11	(a) (i) $p = \frac{3}{5}$, $q = \frac{2}{5}$, $n = 8$, $r = 2$	1	
	$P(x=2) = {}^8C_2\left(\frac{3}{5}\right)^2\left(\frac{2}{5}\right)^6$	1	
	$= 0.04129$	1	
	(ii) $1 - P(x=0) - P(x=1) - P(x=2)$ or $1 - p(x \le 2)$		
	$1 - {}^8C_0\left(\frac{3}{5}\right)^0\left(\frac{2}{5}\right)^8 - {}^8C_1\left(\frac{3}{5}\right)^1\left(\frac{2}{5}\right)^7 - {}^8C_2\left(\frac{3}{5}\right)^2\left(\frac{2}{5}\right)^6$	1	
	$= 0.9502$	1	
	(b) (i) $P(X \le 45) = 0.2266$		
	$P(Z < \frac{45-\mu}{12}) = 0.2266$	1	
	$\frac{45-\mu}{12} = -0.75$	1	
	$\mu = 54$	1	
	(ii) $P(42 \le X \le 45) = P(-1 \le Z \le -0.75)$ or $0.2266 - 0.1587$	1	
	$= 0.0679$	1	10

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
12	(a) $a = 4pt - q$	1	
	$4p(2) - q = 0$ or $q = 8p$	1	
	$2p(2)^2 - q(2) - 5 = 16$ and subt. $q = 8p$	1	
	$p = \frac{1}{2}$	1	
	$q = 4$	1	
	(b) $t^2 - 4t - 5 = 0$	1	
	$t = 5\text{s}$	1	
	(c) $S = \int_0^4 (t^2 - 4t - 5)dt$	1	
	$\left[\frac{t^3}{3} - \frac{4t^2}{2} - 5t\right]_0^4$	1	
	$\lvert S \rvert = 30\frac{2}{3}m$	1	10
13	(a) (i) $\text{I} = \frac{966}{690} \times 100$	1	
	$= 140$	1	
	(ii) $\frac{966}{P_{03}} \times 100 = 161$	1	
	$\text{P}_{03} = 600$	1	
	(b) (i) $\bar{I} = \frac{105(3) + 114(5) + 108.75(4)}{3 + 5 + 4}$	1, 1	
	$= 110$	1	
	(ii) $\frac{100 + k}{128.7} = \frac{100}{110}$	1, 1	
	$\text{k} = 17$	1	10

QUESTION NUMBERS	WORKING	MARKS	FULL MARKS
14	(a) $\frac{1}{2}\times 9\times 6\times \sin\angle BCD = 20$	1	
	$\angle BCD = 47.79^0$	1	
	(b) $BD^2 = BC^2 + DC^2 - 2(BC)(DC)\cos 47.79^0$		
	$BD^2 = 9^2 + 6^2 - 2(9)(6)\cos 47.79^2$	1	
	$BD = 6.666$ cm	1	
	(c) $\frac{\sin 70^o}{14} = \frac{\sin\angle BAD}{6.666}$	1	
	$\angle BAD = 26.58^0$	1	
	$\angle ABD = 180^0 - 70^0 - 26.58^0$	1	
	$= 83.42^0$		
	(d) Area ADFG		
	$= \frac{1}{2}(14)(6.666)\sin 83.42° - \frac{1}{2}(7)(2.222)\sin 83.42°$	1, 1	
	$= 38.62$ cm^2	1	10
15	(a) $x + y \leq 500$	1	
	$3y \geq x$	1	
	$5x + 4y \geq 1500$ or $15x + 12y \geq 4500$	1	
	(b) Draw correctly all the three straight lines/ Draw wrongly one straight line from the inequalities which involves x and y	2/1	
	Region shaded correctly	1	
	(c) (i) 225	1	
	(ii) Objective function = $15x + 12y$	1	
	Maximum profit = 15(375*) + 12(125*)	1	
	= RM 7125*	1	10