3472/2
Matematik
Tambahan
Kertas 2
2 ½ jam
Ogos 2011

BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011

ADDITIONAL MATHEMATICS

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.**
2. *Answer* **all** *questions in* **Section A , four** *questions from* **Section B** *and* **two** *questions from* **Section C.**
3. *Give only* **one** *answer / solution to each question.*
4. *Show your working. It may help you to get marks.*
5. *The diagram in the questions provided are not drawn to scale unless stated.*
6. *The marks allocated for each question and sub-part of a question are shown in brackets.*
7. *A list of formulae and normal distribution table is provided on pages 2 to 4.*
8. *A booklet of four-figure mathematical tables is provided.*
9. *You may use a non-programmable scientific calculator.*

Kertas soalan ini mengandungi **20** halaman bercetak

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

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

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

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

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

4 Area under a curve

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

$= \int_a^b x \, dy$

5 Volume generated

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

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

GEOM ETRY

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

2 Midpoint

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

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

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

6. Area of triangle =

$$\frac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_{1_1}) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$$

STATISTIC

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 $I = \dfrac{P_1}{P_0} \times 100$

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, $s = r\theta$

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

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

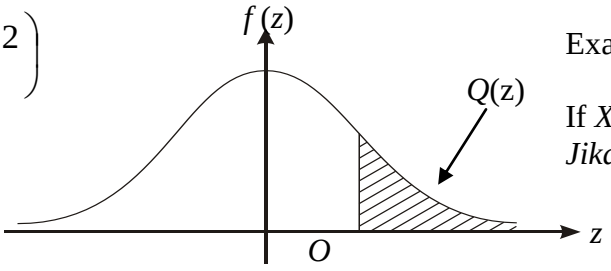
[Lihat halaman sebelah

THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0,1)
***KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL* N(0, 1)**

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0..0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

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

$$Q(z) = \int_k^\infty f(z)\, dz$$



Example / *Contoh*:

If $X \sim N(0, 1)$, then $P(X > k) = Q(k)$
Jika $X \sim N(0, 1)$, *maka* $P(X > k) = Q(k)$

Section A
Bahagian A

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

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

1 Solve the following simultaneous equations:
Selesaikan persamaan serentak berikut:

$4x + 3y = x^2 - xy = 8$

Give your answer correct to 3 significant figures.
Beri jawapan betul kepada 3 angka bererti.

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

2 (a) Prove that $\sin(2\theta + 90^0) = \cos 2\theta$

[2 *marks*]

Buktikan $\sin(2\theta + 90^0) = \cos 2\theta$

[2 *markah*]

(b) i. Sketch the graph of $y = 2\cos 2\theta$ for $0 \le \theta \le 2\pi$.

[3 *marks*]

Lakar graf bagi of $y = 2\cos 2\theta$ *untuk* $0 \le \theta \le 2\pi$.

[3 *markah*]

ii. Hence, using the same axes, sketch a suitable straight line to find the number of solution for the equation $\sin(2\theta + 90^0) = 1 - \frac{\theta}{\pi}$.
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 $\sin(2\theta + 90^0) = 1 - \frac{\theta}{\pi}$.
Nyatakan bilangan penyelesaian itu.

[3 *markah*]

3 Ravi and Hamid were given a piece of wire each, it is to be bend into several parts successively as shown in Diagram 3.

Ravi dan Hamid diberi seutas dawai seorang untuk dibengkokkan kepada beberapa bahagian berturut-turut seperti yang ditunjukkan dalam Rajah 3.

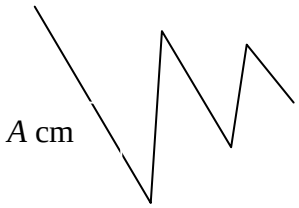


Diagram 3
Rajah 3

The first part must be measured *A* cm and every part should be shortened by *D* cm respectively.
Ravi's wire which is 720 cm was bent exactly into 10 parts and Hamid's which is 1040 cm was bent exactly 20 parts.

Bahagian pertama mesti berukuran A cm and setiap bahagian seterusnya dipendekkan sebanyak D cm masing-masing.
Dawai Ravi, yang panjangnya 720 cm dibengkokkan tepat kepada 10 bahagian dan Dawai Hamid, yang panjangnya 1040 cm dibengkokkan tepat kepada 20 bahagian.

Calculate,
Hitung,

(a) the value of *A* and of *D*,

[4 *marks*]

nilai bagi A dan nilai bagi D.

[4 *markah*]

(b) the difference of the length of the last part of the both wire.

[2 *marks*]

beza di antara panjang bahagian terakhir bagi kedua-dua dawai tesebut.

[*2 markah*]

4. Diagram 4 shows the straight line $y = x + 9$ intersecting the curve $y = (x - 3)^2$ at points *M* and *N* (7,16).

Rajah 4 menunjukkan garis lurus $y = x + 9$ *bersilang dengan lengkung* $y = (x - 3)^2$ *pada titik-titik M dan N(7,16).*

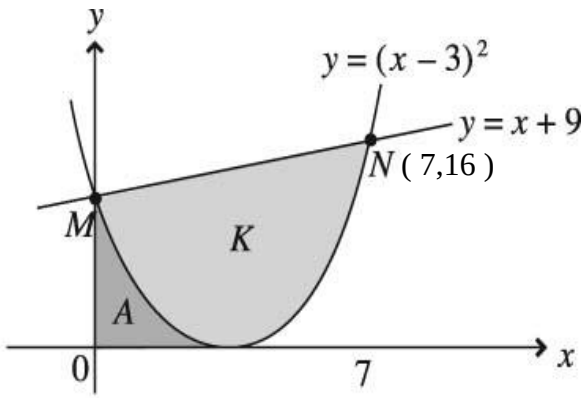


Diagram 4
Rajah 4

Find
Cari

(a) the area of the shaded region *K*,

[4 *marks*]

luas rantau berlorek K,

[4 *markah*]

(b) the volume generated when the shaded region *A* is rotated through 360° about *x*-axis.

[3 *marks*]

isipadu janaan apabila rantau berlorek A diputarkan 360^0 *pada paksi-x.*

[*3 markah*]

5. Solution by scale drawing will **not** be accepted.
*Penyelesaian secara lukisan berskala **tidak** akan diterima.*

Diagram 5 shows quadrilateral *PQRS.*
Rajah 5 menunjukkan sisi empat PQRS.

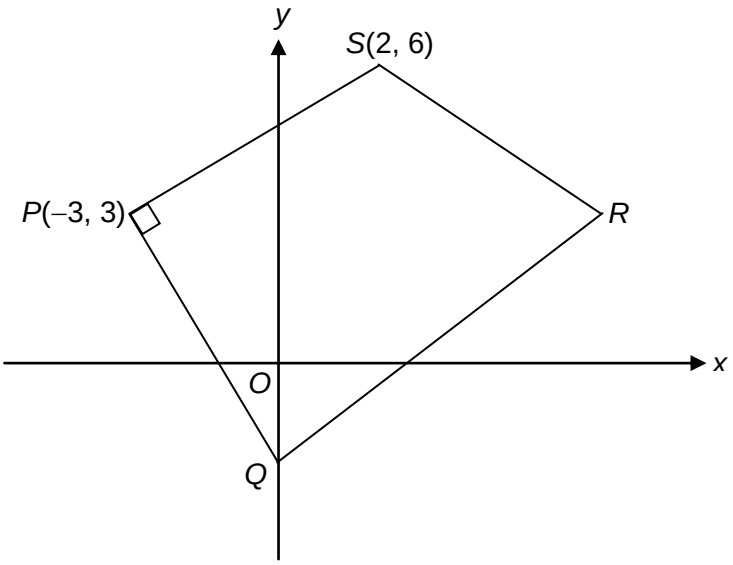


Diagram 5
Rajah 5

Given that the coordinates of point *P*(–3, 3) and point *S*(2, 6).
Diberi bahawa koordnat bagi titik P(–3, 3) *dan titik S*(2, 6).

(a) Find the equation of *PQ*,

[3 *marks*]

Cari persamaan garis lurus PQ,

[3 *markah*]

(b) A point W moves such that its distance from point *Q* is always twice its distance from point *S*. Find the equation of the locus of point W.

[4 *marks*]

Titik W bergerak dengan keadaan jaraknya dari titik Q adalah sentiasa dua kali jaraknya dari titik S. Cari persamaan lokus bagi W.

[4 *markah*]

6. Table 6 shows the marks obtained by a group of students in a class.

Marks	Number of students
25 – 39	10
40 – 54	15
55 – 69	*k*
70 – 84	16
85 – 99	6

Table 6
Jadual 6

(a) Given that the median mark of a student is $60\frac{7}{26}$, find the value of k

[3 *marks*]

Diberi markah median pelajar ialah $60\frac{7}{26}$, cari nilai bagi k

[*3 marks*]

(b) Calculate the standard deviation of the distribution.

[3 *marks*]

Kira sisihan piawai taburan tersebut.

[*3 marks*]

(c) If each marks of the students in the class is multiplied by 2 and then subtracted by 3. For the new set of marks, find the standard deviation.

Jika setiap markah pelajar dalam kelas didarab dengan 2 dan kemudian di tolak dengan 3. Bagi set baru markah, cari sisihan piawai.

[1 *mark*]
[1 *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 Use graph paper to answer this questions.
Gunakan kertas graf untuk menjawab soalan ini.

Table 7 shows the values of two variables x and y obtained from an experiment. Variable x and y are related by equation $y = pk^{x^2}$, where *k* and *p* are constants.

Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x and y dihubungkan oleh persamaan $y = pk^{x^2}$ *, dengan keadaan k dan p adalah pemalar.*

x	0.5	0.7	0.9	1.0	1.2
y	4	7	13	20	50

Table 7

***Jadual* 7**

(a) Plot $\log_{10} y$ against x^2, using a scale of 2 cm to 0.2 unit on both axes. Hence, draw the line of best fit.

[6 *marks*]

Plot $\log_{10} y$ *melawan x, dengan menggunakan skala 2 cm mewakili 0.2 unit pada kedua-dua paksi.*
Seterusnya, lukis garis lurus penyuaian terbaik.

[*6 markah*]

(b) Use your graph in 7(a) to find the value of
Gunakan graf anda di 7(a) untuk mencari nilai

(i) k
(ii) p
(iii) *x* when *y* = 10
x apabila y = 10

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

8. (a) Given that the equation of the curve $y = 3x^2 + 4x - 2$ is passing through point $(-1, 3)$.

Diberi bahawa persamaan lengkung $y = 3x^2 + 4x - 2$ *melalui titik* $(-1, 3)$.

Find
Cari

(i) the equation of normal to the curve at point (-1,3).

[3 *marks*]

persamaan normal kepada lengkung pada titik (-1,3).

[3 *markah*]

(ii) the approximate value in *y*, when *x* decrease from 2 to 1.99.

[3 *marks*]

nilai hampir bagi y, apabila x menyusut dari 2 kepada 1.99.

[3 *markah*]

(b) Given that the gradient function of a curve $\frac{8 - x^3}{2x^5}$ which has a turning point at $(p, 3)$.

Diberi bahawa fungsi kecerunan kepada lengkung $\frac{8 - x^3}{2x^5}$ *yang mempunyai titik pusingan pada titik* $(p, 3)$.

Find
Cari

(i) the value of *p*
nilai p.

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

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

9 Diagram 10 shows triangles *OAB* and *APR*.
Rajah 10 menunjukkan segi tiga OAB dan APR.

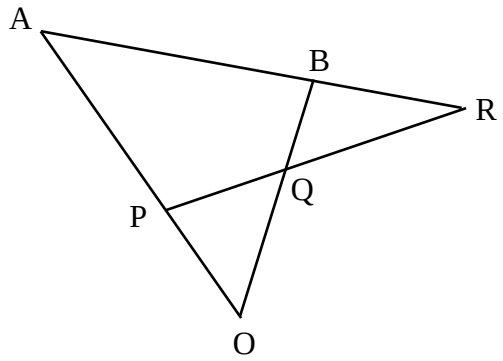


Diagram 10
Rajah 10

OPA, OQB, PQR and ABR are straight lines.
Given $\overrightarrow{OA} = \underset{\sim}{a}$, $\overrightarrow{OB} = 2\underset{\sim}{b}$, $3\overrightarrow{OP} = \overrightarrow{OA}$ and $2\overrightarrow{OQ} = \overrightarrow{OB}$.
OPA, OQB, PQR dan ABR ialah garislurus.
Diberi $\overrightarrow{OA} = \underset{\sim}{a}$, $\overrightarrow{OB} = 2\underset{\sim}{b}$, $3\overrightarrow{OP} = \overrightarrow{OA}$ *dan* $2\overrightarrow{OQ} = \overrightarrow{OB}$

(a) Express each of the following vectors in terms of $\underset{\sim}{a}$ and/ or $\underset{\sim}{b}$.
Ungkapkan dalam sebutan $\underset{\sim}{a}$ *dan/ atau* $\underset{\sim}{b}$.

(i) $\overrightarrow{AB}$
(ii) $\overrightarrow{PQ}$

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

(b) Given $\overrightarrow{AR} = m\overrightarrow{AB}$ and $\overrightarrow{QR} = n\overrightarrow{PQ}$, where *m* and *n* are constants.
Diberi $\overrightarrow{AR} = m\overrightarrow{AB}$ *dan* $\overrightarrow{QR} = n\overrightarrow{PQ}$ *, dengan keadaan m dan n ialah pemalar.*
Express $\overrightarrow{OR}$ in terms of
Ungkapkan $\overrightarrow{OR}$ *dalam sebutan*

(i) m, $\underset{\sim}{a}$ and $\underset{\sim}{b}$,
m, $\underset{\sim}{a}$ *dan* $\underset{\sim}{b}$,

(ii) n, $\underset{\sim}{a}$ and $\underset{\sim}{b}$.
n, $\underset{\sim}{a}$ dan $\underset{\sim}{b}$.

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

(c) Hence, find the value of *m* and of *n*.
Seterusnya, cari nilai m dan nilai n.

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

10 (a) At SMK Bandar Baru, 30 out of 120 form 4 students cycle to school. If 10 students are chosen at random, calculate the probability that

Di SMK Bandar Baru, 30 *daripada* 120 *orang pelajar tingkatan 4 mengayuh basikal ke sekolah. Jika* 10 *orang pelajar dipilih secara rawak, hitung kebarangkalian bahawa*

(i) exactly 2 of them cycle to school
tepat 2 *orang pelajar mengayuh basikal ke sekolah*.

(ii) more than 2 students cycle to school
lebih daripada 2 orang pelajar mengayuh basikal ke sekolah.

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

(b) In a fresh water fish pond, the weight of one type of fish is normally distributed with a mean of 1.0 kg and a standard deviation of 0.3 kg.
Dalam sebuah kolam ikan air tawar, berat sejenis ikan adalah tertabur secara normal dengan min 1.0 kg dan sisihan piawai 0.3 kg.

(i) Find the probability of a fish chosen randomly which is less than 0.8 kg.
Cari kebarangkalian bahawa seekor ikan yang dipilih secara rawak mempunyai berat kurang daripada 0.8 *kg.*

(ii) If there are 100 fish which has weight less than 0.8 kg, find the total number of fish in the pond.
Jika terdapat 100 *ekor ikan yang mempunyai berat kurang daripada* 0.8 *kg, cari jumlah ikan di dalam kolam itu.*

(iii) Given that 20% of the fish has the weight more than *m* kg. Find the value of *m* .
Diberi bahawa 20% *daripada ikan tersebut mempunyai berat lebih daripada m kg. Cari nilai bagi m* .

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

11 Diagram 11 shows a semicircle *ABE* and a sector *OCD*, with centre *O*.
Rajah 11 *menunjukkan semibulatan ABE dan sektor OCD, yang berpusatkan O*.

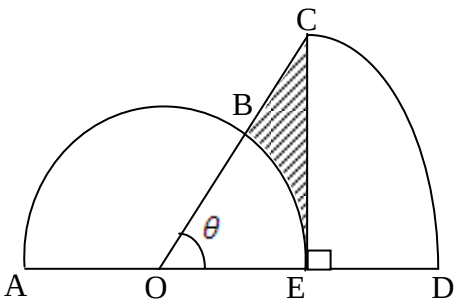


Diagram 11
Rajah 11

Given that the length of *AE* = 16 cm and *OB* : *BC* = 2 : 1 .
Diberi bahawa panjang AE = 16 *cm dan OB : BC* = 2 : 1 .
[Use $\pi = 3.142$]
[*Guna* $\pi = 3.142$]

Calculate
Hitung

(a) θ , in radian.
θ, *dalam radian.*

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

(b) the area, in cm^2 , of the shaded region,
luas, dalam cm^2 *, bagi kawasan berlorek*,.

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

(c) perimeter, in cm, for the whole diagram.
perimeter, dalam cm, untuk seluruh rajah.

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

Section C
Bahagian C

[20 marks]
[20 markah]

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

12. A particle moves along a straight line from a fixed point *O*, which situated 3 meter on the right of point *O*. Its velocity,*V ms*$^{-1}$ is given by $v = t^2 - 8t + 12$, where *t* is the time in seconds, after leaving *O*.

Suatu zarah bergerak disepanjang suatu garis lurus daripada satu titik tetap O yang berada 3 meter di kanan O. Halajunya.V ms$^{-1,}$ *diberi oleh* $v = t^2 - 8t + 12$, *dengan keadaan t ialah masa dalam saat.selepas melalui O.*

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

Find
Cari

(a) (i) the minimum velocity,

[2 *marks*]

halaju minimum,

[2 *markah*]

(ii) the range of values of *t* when the particle moving to the left,

[3 *marks*]

julat nilai t apabila zarah bergerak ke kiri,

[*3 markah*]

(b) Sketch the velocity-time graph for $0 \le t \le 5$.
Hence or otherwise calculate the total distance travelled during the first 5 seconds after leaving O.

[5 *marks*]

Lakarkan graf halaju-masa untuk $0 \le t \le 5$.
Seterusnya atau dengan cara lain hitung jumlah jarak yang dilalui dalam 5 saat yang pertama selepas melalui O.

[5 *markah*]

13 Diagram 13 shows two triangles *ACD* and *DBC*, where *AEC* and *BED* are straight lines.

Rajah 13 menunjukkan segitiga ACD dan DBC di mana AEC dan BED adalah garis lurus.

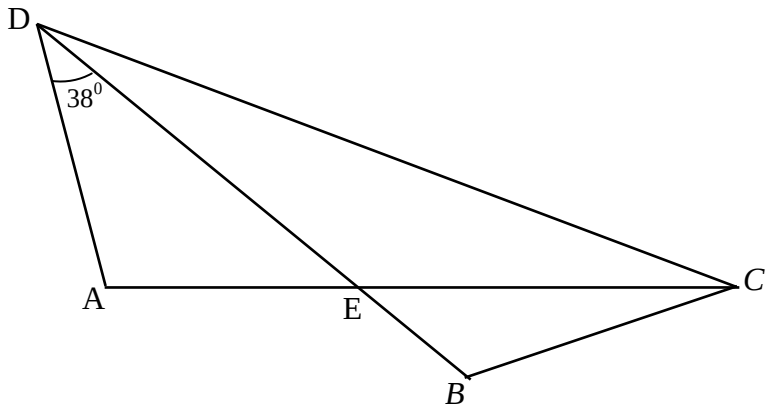


Diagram 13
Rajah 13

Given that *AE* = 5 cm, AD = 4 cm, *EC* = 8 cm, $\angle ADE = 38^0$, and $\angle DEC$ is an obtuse angle.

Diberi bahawa AE = 5 cm, AD = 4 cm, EC = 8 cm, $\angle ADE = 38^0$, *dan* $\angle DEC$ *ialah sudut cakah.*

Calculate
Kira

(a) (i) $\angle DEC$ [3 *marks*]
[*3 markah*]

(ii) the length of *DC* [3 marks]
panjang DC [*3 markah*]

(iii) the area of the triangle *ADC*. [2 *marks*]
luas segitiga ADC. [2 markah]

(b) Sketch triangle *C' B' D'* which has a different shape from triangle *CBD* such that *D'C'* = *DC* , *B'C'* = *BC* and $\angle C'D'B' = \angle CDB$.

[2 *marks*]

Lakar segitiga C'B'D' yang mempunyai bentuk yang berlainan dengan segitiga CBD dengan keadaan D'C' = *DC* , *B'C'* = *BC dan* $\angle C'D'B' = \angle CDB$.

[2 *markah*]

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

Mr. Ridhuan intends to plant banana trees and papaya trees on a piece of 80 hectares land. He employed 360 labours and allocated a capital of at least RM 24 000. Mr. Ridhuan used x hectares of land to plant banana trees and y hectares to plant papaya trees. Each hectare of banana trees farm is supervised by 3 labours while each hectare of papaya trees farm is supervised by 6 labours. The cost of consumption for a hectare of banana trees farm are RM 800 and a hectare of papaya trees farm are RM 300.

En. Ridhuan ingin menanam pokok pisang dan pokok betik di atas sebidang tanah seluas 80 *hektar*. *Dia mempunyai* 360 *orang tenaga pekerja dan modal sekurang-kurangnya* RM 24 000. *En. Ridhuan menggunakan x hektar tanah untuk menanam pokok pisang dan y hektar tanah untuk menanam pokok betik. Setiap hektar ladang pokok pisang diselia oleh tiga orang pekerja sementara enam orang pekerja untuk setiap hektar ladang pokok betik. Kos perbelanjaan untuk sehektar ladang pokok pisang ialah* RM 800 *dan sehektar ladang pokok betik ialah* RM 300.

(*a*) State three inequalities, other than $x \geq 0$ and $y \geq 0$ which satisfy the above conditions.
Nyatakan tiga ketaksamaan selain $x \geq 0$ *dan* $y \geq 0$ *yang memuaskan syarat-syarat di atas.*

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

(*b*) Using the scale of 2 cm to 10 hectares on both axes, draw and shade a region R which satisfies all of the above conditions.
Dengan menggunakan skala 2 cm *kepada* 10 *hektar pada kedua-dua paksi*, *lukis dan lorekkan rantau R yang memuaskan semua syarat-syarat di atas*.

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

(*c*) Based on your graph, answer the following questions:
Berdasarkan graf anda, *jawab soalan-soalan berikut* :

(i) If the area of land allocated for planting banana trees is twice the land for papaya trees, find the maximum area of land for each type of fruit.
Jika luas kawasan tanah untuk menanam pokok pisang adalah 2 *kali luas kawasan tanah untuk menanam pokok betik*, *cari keluasan maksimum tanah yang digunakan untuk menanam setiap tanaman*.

(ii) The profit gained by selling bananas are RM 700 and by selling papayas are RM 250 for each hectare. Find the minimum profit gained.
Keuntungan hasil jualan pisang ialah RM 700 dan hasil jualan betik ialah RM 250 bagi setiap hektar. Cari keuntungan minimum yang diperolehi.

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

15. Table 15 shows the price indices of the monthly expenditures for Muhammad's family in the year 2000 based on the year 1996, the change in price index from the year 2000 to the year 2004 and the percentage of expenditure respectively.

Jadual 15 *menunjukkan indeks harga bagi perbelanjaan bulanan keluarga Muhammad pada tahun* 2000 *berasaskan tahun* 1996, *perubahan indeks harga dari tahun 2000 ke tahun* 2004 *dan peratus perbelanjaan masing-masing*.

Expenditure *Perbelanjaan*	Price index in the year 2000 *Indeks harga pada tahun* 2000	Change of price index from the year 2000 to the year 2004 *Perubahan indeks harga dari tahun* 2000 *ke tahun* 2004	Percentage of expenditure (%) *Peratus perbelanjaan* (%)
P	110	Increased 15 %	*x*
Q	120	Decreased 10 %	30
R	125	Unchanged	*y*
S	150	Unchanged	15

Table 15
Jadual 15

(*a*) Calculate the expenditure of item *P* in the year 1996 if its expenditure in the year 2000 is RM 150.65.
Hitungkan perelanjaan bagi item P pada tahun 1996 *jika perbelanjaannya pada tahun* 2000 *ialah* RM 150.65.

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

(*b*) The composite index number in the year 2000 based on the year 1996 is 121.25.
Nombor indeks gubahan pada tahun 2000 *berasaskan tahun* 1996 *ialah* 121.25.

Calculate
Hitungkan

(i) the value of *x* and of *y*,
nilai *x* dan nilai *y*,

(ii) the total monthly expenditure in the year 2000 if the total monthly expenditure for Muhammad's family in the year 1996 is RM 260.
jumlah perbelanjaan pada tahun 2000 *jika perbelanjaan keluarga Muhammad pada tahun* 1996 *ialah* RM 260.

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

(*c*) Find the composite index number in the year 2004 based on the year 1996.
Cari nombor indeks gubahan pada tahun 2004 *berasaskan tahun* 1996.

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

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

3472/2

Matematik
Tambahan
Kertas 2
Ogos 2011
2 ½ jam

BAHAGIAN PENGURUSAN
SEKOLAH BERASRAMA PENUH DAN SEKOLAH KECEMERLANGAN
KEMENTERIAN PELAJARAN MALAYSIA

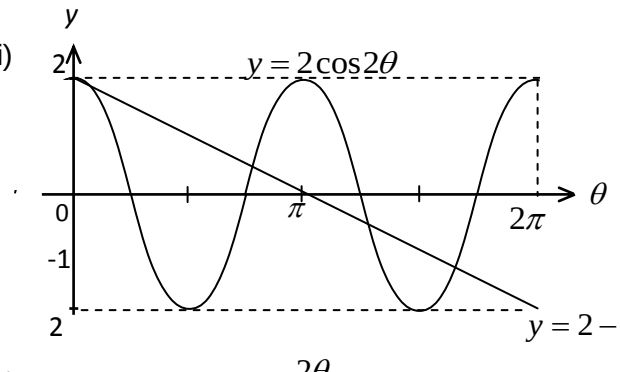
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2011
TINGKATAN 5

ADDITIONAL MATHEMATICS

Paper 2

MARKING SCHEME

Skema Pemarkahan ini mengandungi **9** halaman bercetak

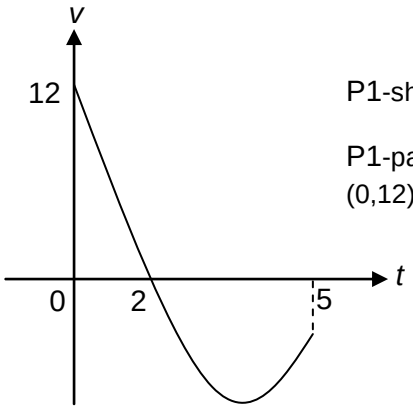
No	Solution and Mark Scheme	Sub Marks	Total Marks
1	$y = \frac{8-4x}{3}$ or $x = \frac{8-3y}{4}$ P1 $x^2 - x\left(\frac{8-4x}{3}\right) = 8$ or $\left(\frac{8-3y}{4}\right)^2 - \left(\frac{8-3y}{4}\right)y = 8$ K1 $7x^2 - 8x - 24 = 0$ or $21y^2 - 80y - 64 = 0$ $x = \frac{(-8) \pm \sqrt{(-8)^2 - 4(7)(-24)}}{2(7)}$ or $y = \frac{(-80) \pm \sqrt{(-80)^2 - 4(21)(-64)}}{2(21)}$ K1 x = 2.51 , -1.37 OR y = 4.49 , -0.679 N1 y = -0.680 , 4.49 x = -1.37 , 2.51 N1	5	5
2	(a) $(\sin 2\theta \cos 90^0 + \cos 2\theta \sin 90^0)$ K1 $\cos 2\theta$ N1 (b) i)  N1-cosine curve N1-amplitude N1- 2 cycle K1-straight line ii) $y = 2 - \frac{2\theta}{\pi}$ K1-for equation Number of solutions = 4 N1	2 6	8

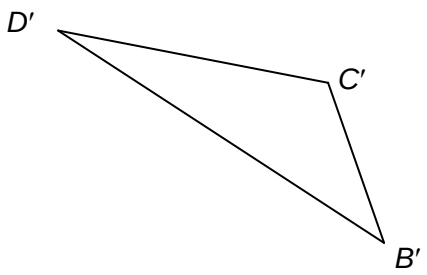
3	(a) a = A , d = -D $S_{10} = \frac{10}{2}[2A+99(-D)] = 720$ or $S_{20} = \frac{20}{2}[2A+19(-D)] = 1040$ K1 Solving the simultaneous in linear equation K1 $A = 90$ or $D = 4$ N1 $A = 90$ and $D = 4$ N1 (b) T_{10} = 90 + 9(-4) or T_{20} = 90 + 19(-4) K1 Difference = 40 N1	4 2	6
4(a)	Area of trapezium – area under curve $\int_0^7 (x+9)\,dx$ or $\frac{1}{2}(16+9)(7)$ OR $\int_0^7 (x-3)^2\,dx$ K1 $\left[\frac{x^2}{2}+9x\right]_0^7$ OR $\left[\frac{(x-3)^3}{3}\right]_0^7$ K1 = $\frac{175}{2}$ - $\frac{91}{3}$ K1 = $\frac{343}{6}/57\frac{1}{6}\ unit^2$ N1	4	7
(b)	y = 0 , x = 3 OR $\pi\int_0^3 \left[\left((x-3)^2\right)^2\right]dx$ K1 $\pi\left[\frac{(x-3)^5}{5}\right]_0^3$ K1 $\frac{243}{5}\pi\ unit^3$ N1	3	

5(a)	$m_{PQ} = -\frac{5}{3}$	K1	3	7
	$y - 3 = -\frac{5}{3}(x + 3)$	K1		
	$3y = -5x - 6$	N1		
(b)	$Q(0, -2)$	P1	4	
	$\sqrt{(x-0)^2 + (y+2)^2}$ *or* $\sqrt{(x-2)^2 + (y-6)^2}$	K1		
	$\sqrt{(x-0)^2 + (y+2)^2} = 2\sqrt{(x-2)^2 + (y-6)^2}$	K1		
	$3x^2 + 3y^2 - 16x - 52y + 156 = 0$	N1		
6(a)	L = 54.5 OR 25 and k	P1	3	7
	$60\frac{7}{26} = 54.5 + \left(\frac{\frac{47+k}{2} - 25}{k}\right)15$	K1		
	k = 13	N1		
(b)	Mean, $\bar{x} = \frac{3563}{60}$	P1	3	
	$\sigma = \sqrt{\frac{232\ 755}{60} - (*\frac{3563}{60})^2}$	K1		
	$= 18.79$	N1		
(c)	37.58	N1	1	

8(a)	$(i)\ \frac{dy}{dx} = 6x + 4$	K1	6	10
	$m_{normal} = \frac{1}{2}$	K1		
	$2y = x + 7$ *or equivalent*	N1		
	$(ii)\ \delta y = (16)(-0.01)$	K1		
	$y_{new} = \left(3(2)^2 + 4(2) - 2\right) + \left(\delta y\right)$	K1		
	17.84	N1		
(b)	$(i)\ \frac{8 - x^3}{2x^5} = 0$	K1	4	
	$p = 2$	N1		
	$(ii)\ y = -\frac{1}{x^4} + \frac{1}{2x} + c$	K1		
	$y = -\frac{1}{x^4} + \frac{1}{2x} + \frac{45}{16}$	N1		
9(a)	(i) $-\underline{a} + 2\underline{b}$	N1	3	10
	(ii) $-\frac{1}{3}\vec{OA} + \frac{1}{2}\vec{OB}$	K1		
	$-\frac{1}{3}\underline{a} + \underline{b}$	N1		
(b)	$(i)\ \underline{a} + m(-\underline{a} + 2\underline{b})$	K1	4	
	$(1-m)\underline{a} + 2m\underline{b}$	N1		
	$(ii)\ \underline{b} + n(-\frac{1}{3}\underline{a} + \underline{b})$	K1		
	$-\frac{1}{3}n\underline{a} + (1+n)\underline{b}$	N1	3	

(c)	$2m = 1 + m \quad or \quad 1 - m = -\frac{1}{3}n$	K1		
	Solve the simultaneous linear equation	K1		
	m = 2, n = 3 (Both correct)	N1		
10(a)	(i) $P(x = 2) = {}^{10}C_2(0.25)^2(0.75)^8$	K1	4	10
	= 0.2186	N1		
	(ii) $P(x > 2) = 1 - P(x = 0) - P(x = 1) - P(x = 2)$			
	$= 1 - {}^{10}C_0(0.25)^0(0.75)^{10} - {}^{10}C_1(0.25)^1(0.75)^9 - 0.2186$	K1		
	= 0.4744	N1		
(b)	(i) $P(x < 0.8) = P(z < \frac{0.8-1}{0.3})$	K1	6	
	$= P(z < -0.667)$			
	= 0.2524	N1		
	(ii) Total $= \frac{100}{0.2524}$			
	= 396	N1		
	(iii) $P(x > m) = 0.2$	P1		
	Z = 0.842			
	$0.842 = \frac{m - 1.0}{0.3}$	K1		
	m = 1.253 kg	N1		
11(a)	BC = 4 , OC = 12	P1	3	10
	$\cos\theta = \frac{8}{12}$	K1		
	$\theta = 0.8411$ rad	N1		
(b)	Area shaded = Area triangle OCE – Area sector OBE			
	$= \frac{1}{2}(8)(12)\sin 0.8411 - \frac{1}{2}(8)^2(0.8411)$	K1K1		
	= 8.863 cm^2	N1	3	

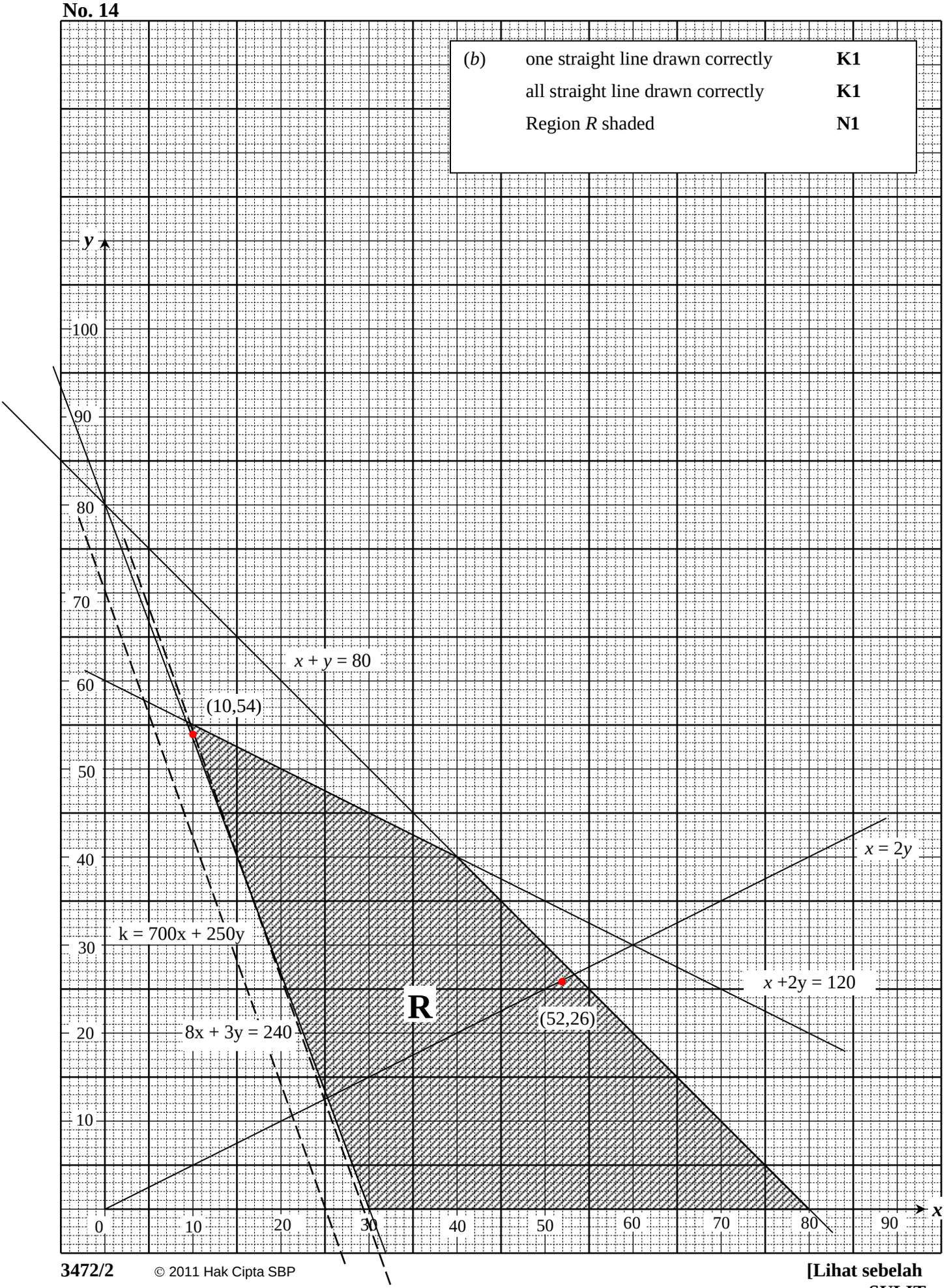
(c)	**OR** Area shaded = $\frac{1}{2}(8)(\sqrt{80})-\frac{1}{2}(8)^2(0.8411)$ K1K1 = 8.863 N1 $\angle AOB = 2.3009$ rad P1 Perimeter = arc AB + BC + arc CD + AE + ED = 8(2.3009) + 4 + 12(0.8411) + 16 + 4 K1K1 = 52.50 cm N1	4	
12(a) (i)	2t - 8 = 0 t = 4 K1 V = -4 N1	2	10
(ii)	$t^2-8t+12<0$ K1 $(t-2)(t-6)<0$ K1 $2<t<6$ N1	3	
(b)	 P1-shape P1-passing through point (0,12), (2,0) and (5,-3)	5	
	Total distance = $=\int_0^2 v\,dt+\left\lvert\int_2^5 v\,dt\right\rvert$ K1 $=\frac{32}{3}+\left\lvert\left(\frac{5}{3}-\frac{32}{2}\right)\right\rvert$ K1 $=\frac{59}{3}meter$ N1 OR t = 0 .s= 3 K1 t = 2 ,s = $13\frac{2}{3}$ t = 5, s = $4\frac{2}{3}$ $13\frac{2}{3}-3+(13\frac{2}{3}-4\frac{2}{3})$ K1 $=\frac{59}{3}meter$ N1		

13(a) (i)	$Sin\angle DEA = \frac{4\sin 38}{5}$ $\angle DEA = 29.507°$ $\angle DEC = 150.493°$	K1 K1 N1		10
	(ii) $\angle DAE = 180 - 38 - 29.507 = 112.493^o$ $DC^2 = 4^2 + 13^2 - 2(4)(13)\cos 112.49°$ $DC = 14.99$	P1 K1 N1		
	(iii) Area of ADC = $\frac{1}{2} \times 4 \times 13 \times \sin 112.49°$ = 24.02	K1 N1		
	(b)  	N1-shape N1-label		
14	(*a*) $x + y \leq 80$ $3x + 6y \leq 360$ or equivalent $800x + 300y \geq 24\,000$ or equivalent	N1 N1 N1	3	10
	(*b*) Refer graph		3	
	(*c*) (i) Draw $x = 2y$ $x = 52$, $y = 26$ (ii) K_{min} = 700(10) + 250(54) (substitud the point in *R*) = RM 20 500	K1 N1 (both) K1 N1	4	

15	(a) $p_{96} = \frac{150.65}{110} \times 100$	K1	2	10
	= RM136.95	N1		
	(b) (i) x + y = 55		3	
	$\frac{110x + 120(30) + 125y + 150(15)}{100} = 121.25$	K1		
	15y = 225 (Solve simultaneous equation)	K1		
	y = 15 , x = 40 (both)	N1		
	(ii) $p_{2000} = \frac{260}{100} \times 121.25$	K1	2	
	= RM315.25	N1		
	(c) $I_{\frac{2004}{1996}} = \frac{126.50(40) + 108(30) + 125(15) + 150(15)}{100}$	K1	3	
	126.50, 108, 125, 150 ($I_{\frac{2004}{1996}}$ for every item)	P1		
	= 124.25	N1		

No. 14

(*b*)	one straight line drawn correctly	**K1**
	all straight line drawn correctly	**K1**
	Region *R* shaded	**N1**

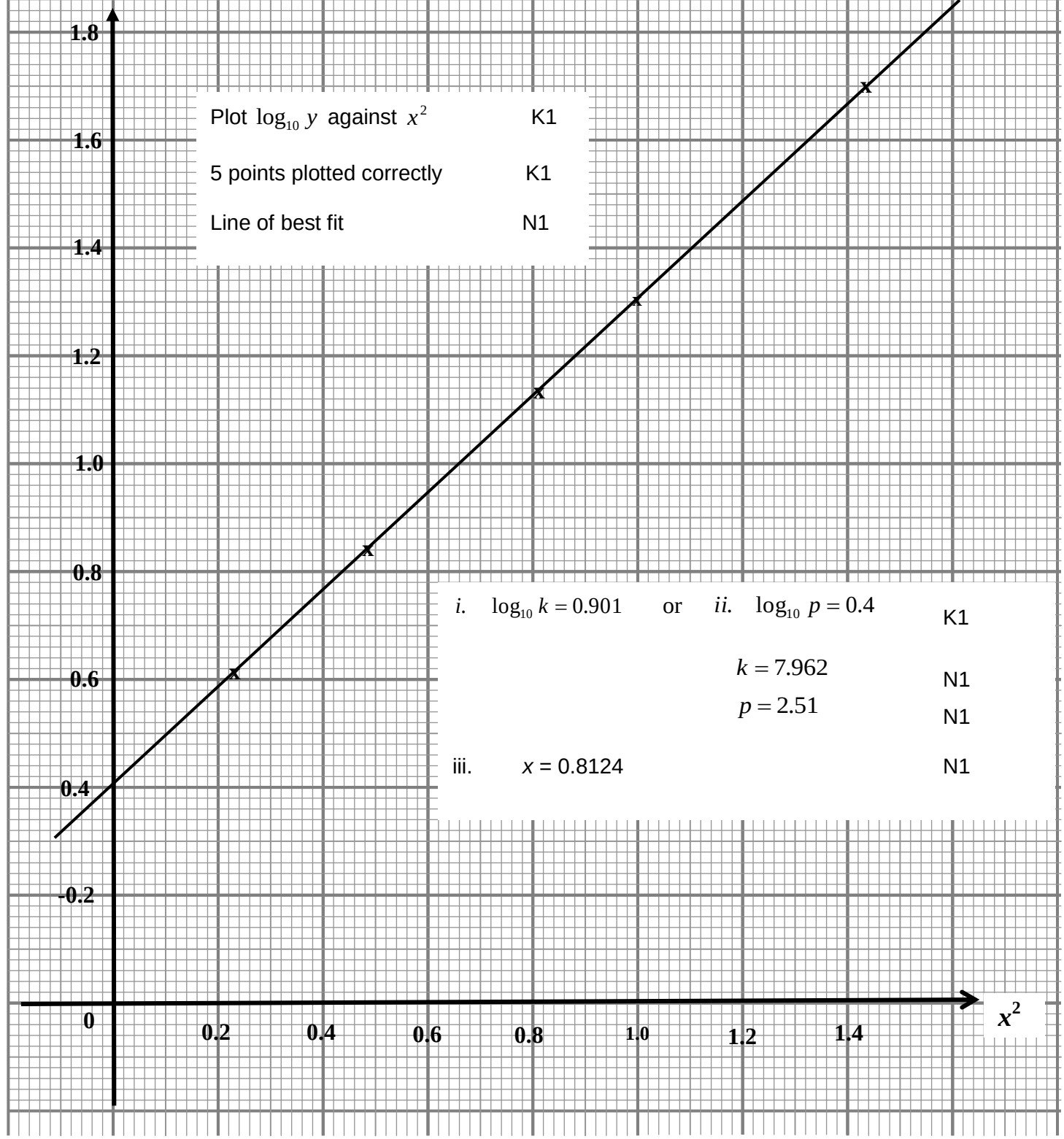


No.7(a)

x^2	0.25	0.49	0.81	1.0	1.44
$\log_{10} y$	0.602	0.845	1.114	1.301	1.699

N1
N1

$\log_{10} y = \log_{10} p + x^2 \log_{10} k$ P1



Plot $\log_{10} y$ against x^2 K1

5 points plotted correctly K1

Line of best fit N1

i. $\log_{10} k = 0.901$ or *ii.* $\log_{10} p = 0.4$ K1

$k = 7.962$ N1

$p = 2.51$ N1

iii. $x = 0.8124$ N1