SULIT
3472/1
Matematik
Tambahan
Kertas 1
September
2011
2 jam

Nama : .....

Tingkatan : .....

MAJLIS PENGETUA SEKOLAH - SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN

PEPERIKSAAN PERCUBAAN SPM
TINGKATAN LIMA
2011

MATEMATIK TAMBAHAN

KERTAS 1

Masa : 2 jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan :

1. *Tuliskan nama dan tingkatan anda pada ruangan yang disediakan.*
2. *Kertas soalan ini adalah dalam dwi bahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Malaysia.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 21 halaman bercetak.

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

For Examiner's Use

1 Diagram 1 shows the function *f*.
Rajah 1 *menunjukkan fungsi f.*

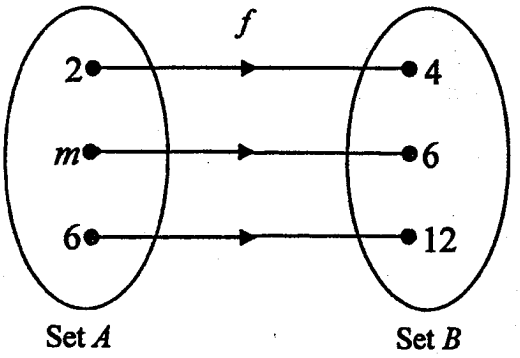


Diagram 1
Rajah 1

(*a*) State the codomain of the function *f*.
Nyatakan kodomain untuk fungsi f.

(*b*) Determine the value of *m*.
Tentukan nilai m.

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

Answer / *Jawapan* :

(a)

(b)

1
2

For Examiner's Use

2 The following information is about the function g and the composite function g^2.
Maklumat berikut adalah berkaitan dengan fungsi g dan fungsi gubahan g^2.

$g : x \to 2x + k,$
$g^2 : x \to hx - 9,$

where h and k are constants .
dengan keadaan h dan k ialah pemalar.

Find the value of h and of k. [3 *marks*]
Cari nilai h dan nilai k. [3 *markah*]

Answer / *Jawapan:*

2
3

3 Given the functions $f : x \to 2x + 1$ and $g : x \to 3 - 4x$, find

Diberi fungsi $f : x \to 2x + 1$ *dan* $g : x \to 3 - 4x$, *cari*

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

(b) the value of m such that $gf^{-1}(m) = 7 - m$.
nilai m dengan keadaan $gf^{-1}(m) = 7 - m$.

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

Answer / *Jawapan:*
(a)

3
3

(b)

For Examiner's Use

4 Given 3 and $2h$ are the roots of the quadratic equation $x^2 - 4x + k = 0$, where h and k are constants. Find the value of h and of k.

[3 *marks*]

Diberi 3 *dan* $2h$ *ialah punca-punca persamaan kuadratik* $x^2 - 4x + k = 0$, *dengan keadaan* h *dan* k *adalah pemalar. Cari nilai* h *dan nilai* k.

[3 *markah*]

Answer / *Jawapan:*

4

3

5 Find the range of values of x for which $(x-2)^2 > 8 - x$.

[4 *marks*]

Cari julat nilai x *bagi* $(x-2)^2 > 8 - x$.

[4 *markah*]

Answer / *Jawapan:*

5

4

For Examiner's Use

6 Diagram 6 shows the graph of quadratic function $f(x) = (x - k)^2 + r$, where k and r are constants.
Rajah 6 menunjukkan graf fungsi kuadratik $f(x) = (x - k)^2 + r$, *dengan keadaan* k *dan* r *adalah pemalar.*

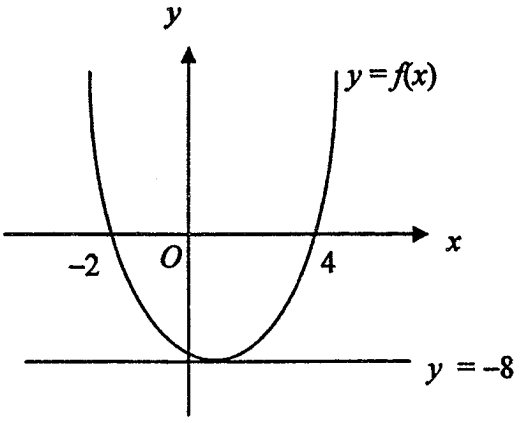


Diagram 6
Rajah 6

State
Nyatakan

(*a*) the value of k,
nilai k,
(*b*) the value of r,
nilai r,
(*c*) the equation of axis of symmetry.
persamaan bagi paksi simetri.

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

Answer / *Jawapan*:

(*a*)

(*b*)

(*c*)

6

3

7 Solve the equation:
Selesaikan persamaan:

$$2^x (8) = \frac{1}{32^{x-3}}$$

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

Answer / *Jawapan*:

For Examiner's Use

7

3

8 Given $\log_m 4 = p$ and $\log_m 3 = t$. Express $\log_m \left(\frac{64}{3m}\right)$ in terms of p and t.

[3 *marks*]

Diberi $\log_m 4 = p$ *dan* $\log_m 3 = t$. *Ungkapkan* $\log_m \left(\frac{64}{3m}\right)$ *dalam sebutan p dan t*.

[3 *markah*]

Answer / *Jawapan*:

8

3

For Examiner's Use

9 The first three terms of an arithmetic progression are -3, 4, 11. Find the greatest number of terms for the progression that is less than 43.

[3 *marks*]

Tiga sebutan pertama bagi janjang aritmetik ialah -3, 4, 11. *Cari bilangan sebutan terbesar janjang ini yang kurang daripada* 43.

[3 *markah*]

Answer / *Jawapan:*

9

3

10 The first three terms of an arithmetic progression are $3k$, $k+4$, 11.

Tiga sebutan pertama suatu janjang aritmetik ialah $3k$, $k+4$, 11.

Find
Cari

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

(b) the sum of the first 8 terms of the progression.
hasil tambah bagi 8 *sebutan pertama bagi janjang itu.*

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

Answer / *Jawapan*:

10

4

(a)

(b)

11 In a geometric progression, the first term is 8 and the sixth term is $\frac{1}{4}$.

Dalam suatu janjang geometri, sebutan pertama ialah 8 *dan sebutan keenam ialah* $\frac{1}{4}$.

Find
Cari

(a) the common ratio of the progression,
nisbah sepunya janjang itu,

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

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

For Examiner's Use

Answer / *Jawapan* :

(*a*)

(*b*)

11

4

For Examiner's Use

12 The variables x and y are related by the equation $y = 100p^x$, where p is a constant. Diagram 12 shows the straight graph obtained by plotting $\log_{10} y$ against x.

Pembolehubah x dan y dihubungkan oleh persamaan $y = 100p^x$, *dengan keadaan p ialah pemalar.*
Rajah 12 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $\log_{10} y$ *melawan x.*

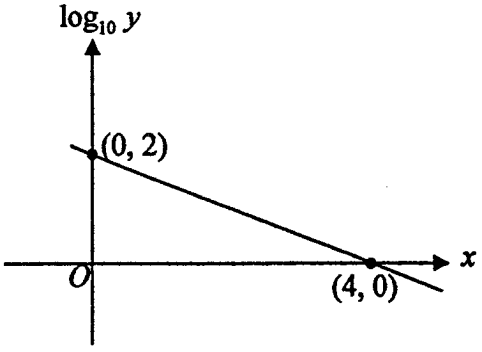


Diagram 12
Rajah 12

(a) Express the equation $y = 100p^x$ in its linear form used to obtain the straight line graph shown in Diagram 12.

Ungkapkan persamaan $y = 100p^x$ *dalam bentuk linear yang digunakan untuk memperoleh graf garis lurus seperti ditunjukkan dalam Rajah* 12.

(b) Find the value of p.
Cari nilai p

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

Answer / *Jawapan* :

(a)

12
3

(b)

13 Diagram 13 shows a straight line passing through A (0, 4) and C(6, -2).
Diagram 13 menunjukkan garis lurus yang melalui A(0, 4) dan C(6, -2).

For Examiner's Use

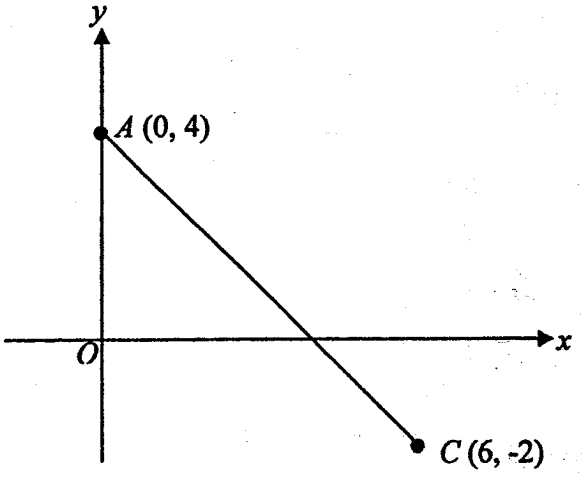


Diagram 13
Rajah 13

(a) A point B is midpoint AC, find the coordinates of B.
Suatu titik B ialah titik tengah AC, cari titik B.

(b) A point $P(x, y)$ moves such that $PB = PC$, find the equation of the locus of P.
Suatu titik P(x, y) bergerak dengan keadaan PB = PC, cari persamaan lokus bagi P.

[4 marks]
[4 *markah*]

Answer / *Jawapan* :
(a)

(b)

13
4

14 Given that $P(-1, -4)$, $Q(2, k)$ and $R(4, 11)$ are colinear, find the value of k.
Diberi P(-1, -4), Q(2, k) dan R(4, 11) adalah segaris, cari nilai k.

[3 marks]
[3 markah]

Answer / *Jawapan:*

14
3

For Examiner's Use

15 Diagram 15 shows vector $\overrightarrow{OB}$ and vector $\overrightarrow{AB}$.
Rajah 15 menunjukkan vektor $\overrightarrow{OB}$ *dan vektor* $\overrightarrow{AB}$.

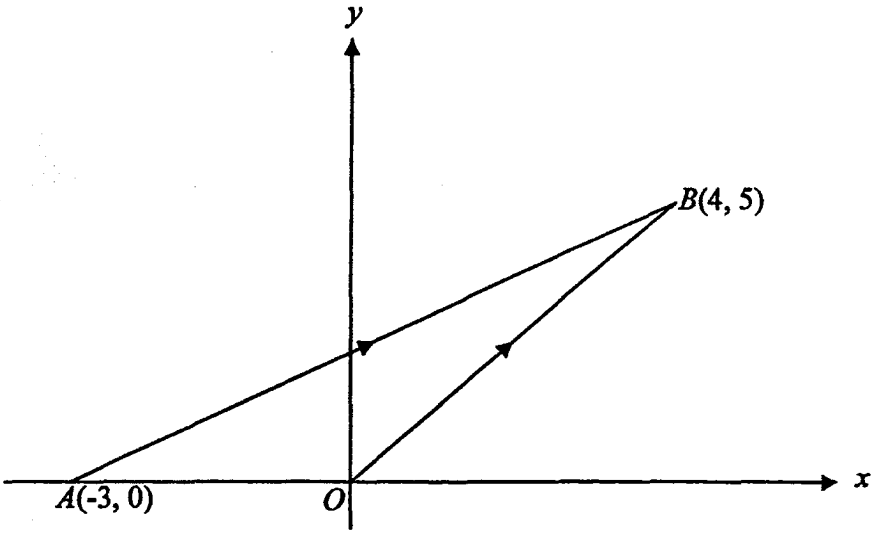


Diagram 15
Rajah 15

Express
Ungkapkan

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

(b) $\overrightarrow{AB}$ in the form $x\underset{\sim}{i} + y\underset{\sim}{j}$
$\overrightarrow{AB}$ *dalam bentuk* $x\underset{\sim}{i} + y\underset{\sim}{j}$

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

Answer / *Jawapan:*

(a)

15
2

(b)

16 Given that $\underset{\sim}{a} = 4\underset{\sim}{i} + 6\underset{\sim}{j}$ and $\underset{\sim}{b} = 2\underset{\sim}{i} + p\underset{\sim}{j}$, where p is a constant.
Diberi $\underset{\sim}{a} = 4\underset{\sim}{i} + 6\underset{\sim}{j}$ *dan* $\underset{\sim}{b} = 2\underset{\sim}{i} + p\underset{\sim}{j}$, *dengan keadaan p ialah pemalar.*

For Examiner's Use

(a) Find the value of p if $\underset{\sim}{a}$ and $\underset{\sim}{b}$ are parallel.
Cari nilai p jika $\underset{\sim}{a}$ *dan* $\underset{\sim}{b}$ *adalah selari.*

(b) By using the value of p in (*a*), find the value of $|\underset{\sim}{a} - \underset{\sim}{b}|$.
Dengan menggunakan nilai p dalam (a), cari nilai $|\underset{\sim}{a} - \underset{\sim}{b}|$.

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

Answer / *Jawapan*:

(a)

(b)

16

3

17 Solve the equation $4\cos^2 x + 4\sin x - 5 = 0$ for $0° \le x \le 360°$.
Selesaikan persamaan $4\cos^2 x + 4\sin x - 5 = 0$ *untuk* $0° \le x \le 360°$.

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

Answer / *Jawapan* :

17

3

For Examiner's Use

18 Diagram 18 shows a semicircle with centre O and radius 8 cm.
Rajah 18 *menunjukkan sebuah semi bulatan berpusat O dan berjejari* 8 cm.

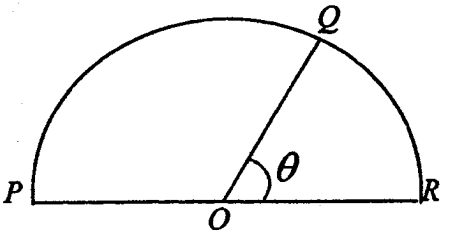


Diagram 18
Rajah 18

Given the length of arc PQ is equal to perimeter of minor sector OQR.
Diberi panjang lengkok PQ adalah sama dengan perimeter sektor minor OQR.

Find the value of θ, in radians. [3 *marks*]
Cari nilai θ, *dalam radian.* [3 *markah*]
[Use / *Guna* $\pi = 3.142$]

Answer / *Jawapan* :

18
3

19 The curve $y = f(x)$ is such that $\frac{dy}{dx} = 2kx - 9$, where k is a constant, has a turning point at $x = 3$. Find the value of k. [2 *marks*]

Suatu lengkung $y = f(x)$ *adalah dengan keadaan* $\frac{dy}{dx} = 2kx - 9$, *dengan keadaan* k *ialah pemalar, mempunyai titik pusingan pada* $x = 3$. *Cari nilai k.* [2 *markah*]

19
2

Answer / *Jawapan* :

For Examiner's Use

20 Given that $y = x^2 - 3x + 2$,

Diberi $y = x^2 - 3x + 2$,

(a) find the value of $\frac{dy}{dx}$ when $x = 4$,

cari nilai bagi $\frac{dy}{dx}$ *apabila* $x = 4$,

(b) express the approximate change in x, in terms of p, when y changes from 6 to $6 + p$, where p is a small value.

ungkapkan perubahan kecil bagi x, dalam sebutan p, apabila y berubah daripada 6 kepada $6 + p$, *dengan keadaan p ialah nilai yang kecil.*

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

Answer / *Jawapan*:

(a)

(b)

20

3

---

21 Given that $\frac{d}{dx}\left(\frac{x^2}{x-1}\right) = f(x)$, find the value of $\int_0^4 [x - f(x)]dx$. [4 *marks*]

Diberi $\frac{d}{dx}\left(\frac{x^2}{x-1}\right) = f(x)$, *cari nilai* $\int_0^4 [x - f(x)]dx$. [4 *markah*]

Answer / *Jawapan:*

21

4

For Examiner's Use

22 A set of data consists of 2, 3, 6, 6, 7, 8, 9, 12 and 13.
Suatu set data terdiri daripada 2, 3, 6, 6, 7, 8, 9, 12 *dan* 13.

Determine
Tentukan

(a) the range of the data,
julat bagi data itu,

(b) the interquartile range of the data.
julat antara kuartil bagi data itu.

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

Answer / *Jawapan*:
(a)

(b)

22
3

---

23 Diagram 23 shows six cards of different letters.
Rajah 23 *menunjukan enam keping kad huruf yang berlainan.*

L	I	N	E	A	R

Diagram 23
Rajah 23

How many
Berapa banyak

(a) the number of possible arrangement, in a row, of all the cards.
bilangan cara susunan yang mungkin, dalam satu baris, semua kad itu.

(b) the number of these arrangements in which a vowel are side by side.
bilangan cara susunan itu dengan keadaan huruf vokal adalah bersebelahan.

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

23
3

Answer / *Jawapan*:
(a)

(b)

For Examiner's Use

24 The probability that team *A* qualifies for the final of a tennis game is $\frac{3}{5}$ while the probability that team *B* qualifies is $\frac{1}{4}$.

Kebarangkalian pasukan A layak ke peringkat akhir dalam suatu perlawanan tenis ialah $\frac{3}{5}$ *manakala kebarangkalian pasukan B layak ialah* $\frac{1}{4}$.

Find the probability that
Cari kebarangkalian

(a) both of them qualify for the final,
kedua-dua pasukan layak ke peringkat akhir,

(b) only one of them qualifies for the final.
hanya satu pasukan layak ke peringkat akhir.

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

Answer / *Jawapan*:
(a)

(b)

24

3

For Examiner's Use

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

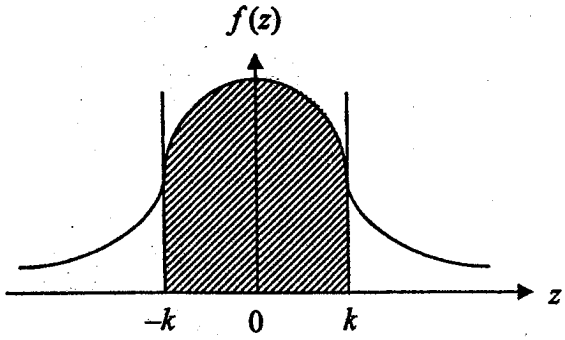


Diagram 25
Rajah 25

The probability represented by the area of the shaded region is 0.5160.
Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.5160.

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

3
3

(b) X is a continuous random variable which is normally distributed with a mean of 30 and a standard deviation of 4.
Find the value of X when the z-score is k.

X ialah pembolehubah rawak selanjar yang bertaburan secara normal dengan min 30 *dan sisihan piawai* 4.
Cari nilai X apabila skor-z ialah k.

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

Answer / *Jawapan*:

(a)

25
4

(b)

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

SULIT
3472/2
Matematik Tambahan
Kertas 2
September 2011
$2\frac{1}{2}$ Jam

Nama : .....

Tingkatan : .....

MAJLIS PENGETUA SEKOLAH - SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN

PEPERIKSAAN PERCUBAAN SPM
TINGKATAN LIMA
2011

MATEMATIK TAMBAHAN
KERTAS 2
Masa : Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*

2. *Soalan dalam bahasa Inggeris mendahuluisoalan yang sepadan dalam bahasa Malaysia.*

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

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.

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

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

GEOMETRY

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

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

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

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, $s = r\theta$

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

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

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

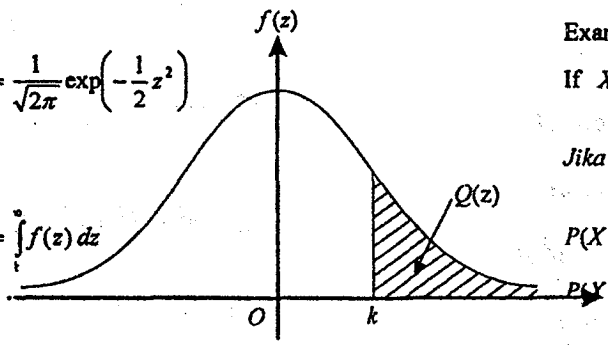
$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

then

maka

$$Q(z) = \int_{z}^{\infty} f(z)\, dz$$

$Q(2.1) = 0.0179$



Example / *Contoh*:

If $X \sim N(0, 1)$,

Jika $X \sim N(0, 1)$,

$P(X > k) = Q(k)$

$P(X > 2.1) =$

Section A
Bahagian A

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

Answer **all** questions from this section
Jawab **semua** *soalan daripada bahagian ini.*

1 Solve the following simultaneous equations:

Selesaikan persamaan serentak berikut :

$$m-2n-7=0$$
$$m^2+4n^2-37=0$$

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

2 (a) Sketch the graph of $y=|3\sin 2x|$ for $0\le x\le 2\pi$. [4 *marks*]

Lakar graf $y=|3\sin 2x|$ *untuk* $0\le x\le 2\pi$. [4 *markah*]

(b) Hence, using the same axes, sketch the suitable straight line to find the number of solutions for the equation $3\left[|\sin 2x|-1\right]+\frac{x}{\pi}=0$ for $0\le x\le 2\pi$.

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

$3\left[|\sin 2x|-1\right]+\frac{x}{\pi}=0$ *untuk* $0\le x\le 2\pi$.

Nyatakan bilangan penyelesaian itu. [3 *markah*]

3 Diagram 3 shows the part of side elevation of a child built model using plastic blocks.

Rajah 3 menunjukkan sebahagian daripada sisi sebuah model permainan kanak-kanak yang dibina menggunakan blok plastik.

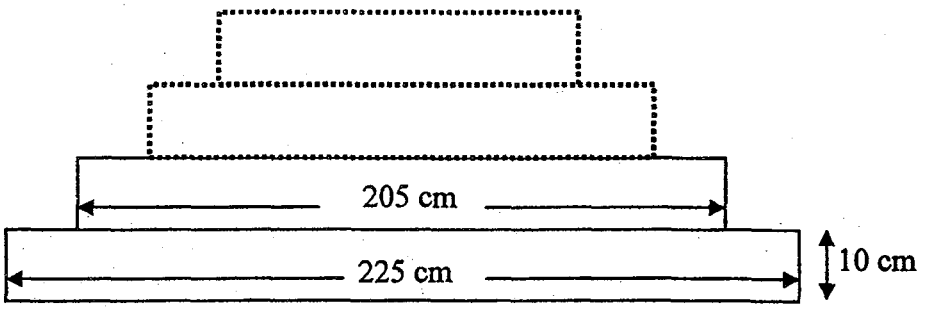


Diagram 3
Rajah 3

The thickness of each block is 10 cm. The length of the first block is 225 cm. The length of each subsequent block is 20 cm less than the preceding block as shown in Diagram 3.

Tebal setiap blok ialah 10 cm. *Panjang blok yang pertama ialah* 225 cm. *Panjang setiap blok yang berturutan yang berikutnya* 20 *cm kurang daripada blok yang sebelumnya seperti yang ditunjukkan pada Rajah* 3.

(a) Find what's block will have a length of 25 cm.
Cari blok keberapa yang panjangnya ialah 25 cm. [2 *marks*] [2 *markah*]

(b) Find the total length of the blocks if the height of the model constructed is a maximum .
[4 *marks*]
Cari jumlah panjang blok itu jika tinggi model yang hendak dibina adalah maksimum. [4 *markah*]

4 A curve has a gradient function $4x^3 - px$, where p is a constant. The tangent to the curve at the point (2, 5) is perpendicular to the straight line $x + 8y = 1$.

Suatu lengkung mempunyai fungsi kecerunan $4x^3 - px$, *dengan keadaan p ialah pemalar.*
Tangen kepada lengkung pada titik (2, 5) *adalah berserenjang dengan garis lurus* $x + 8y = 1$.

Find
Cari

(a) the value of p,
nilai p,

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

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

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

5 Table 5 shows the frequency distribution of 25 pupils in a games.

Jadual 5 menunjukkan taburan kekerapan bagi 25 orang murid dalam suatu permainan.

Score *Skor*	Number of pupils *Bilangan murid*
1 – 10	2
11 – 20	3
21 – 30	5
31 – 40	h
41 – 50	k
51 – 60	4

Table 5
Jadual 5

(a) It is given that the median score of the distribution is 35.5.
Diberi skor median bagi taburan itu ialah 35.5

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

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

(b) Hence, calculate the mean score.
Seterusnya, hitung skor min.

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

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

Diagram 6 shows a triangle ABC. Point D lies on the line AB, which is perpendicular to the line DC.

Rajah 6 menunjukkan segi tiga ABC. Titik D terletak pada garis AB, yang berserenjang dengan garis DC.

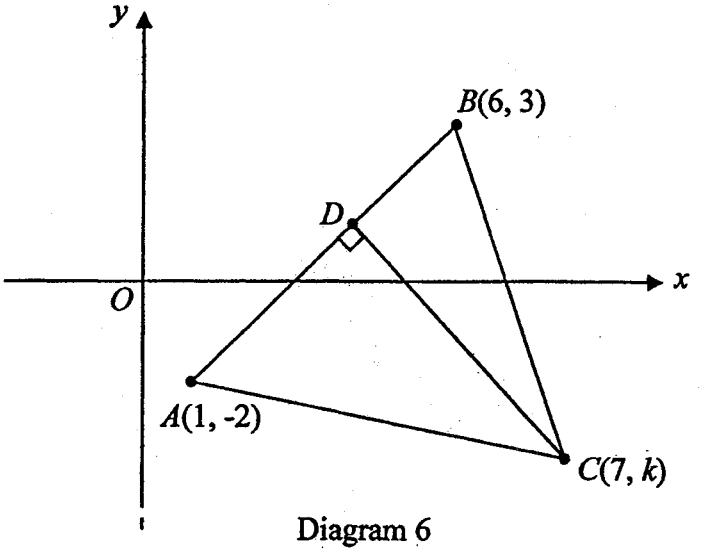


Diagram 6
Rajah 6

(a) Given $AD : DB = 3:2$, find
Diberi $AD : DB = 3:2$, *cari*

(i) the coordinates of D.
koordinat D.

(ii) the equation of straight line DC
persamaan garis lurus DC.

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

(b) Given the area of triangle ABC is $20\,unit^2$, find the value of k. [3 *marks*]

Diberi luas segi tiga ABC ialah $20\,unit^2$, *cari nilai k.* [3 *markah*]

Section B
Bahagian B

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

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

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

Table 7 shows the values of two variables, x and y, obtained from an experiment.

Variables x and y are related by the equation $y = \frac{x^2}{k} - 5px$, where k and p are constants.

Jadual 2 *menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan* $y = \frac{x^2}{k} - 5px$, *dengan keadaan k dan p ialah pemalar.*

x	0.2	0.3	0.5	0.7	0.8	0.9
y	3.60	4.79	6.01	5.62	4.88	3.69

Table 7
Jadual 7

(a) Plot $\frac{y}{x}$ against x, using a scale of 2 cm to 0.1 unit on the x-axis and 2 cm to 2 units on the $-\frac{y}{x}$ axis.
Hence, draw the line of best fit.

Plot $\frac{y}{x}$ *melawan x, dengan menggunakan skala* 2 cm *kepada* 0.1 unit *pada paksi-x dan* 2 cm *kepada* 2 unit *pada paksi-*$\frac{y}{x}$.
Seterusnya, lukis garis lurus penyuaian terbaik.

[4 *marks*]
[4 *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) y when $x = 0.4$.
y *apabila* $x = 0.4$.

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

8 Diagram 8 shows a triangle ABC. Point R lies on BP and point T lies on BC.

Rajah 8 menunjukkan sebuah segitiga ABC. Titik R teletak pada BP dan titik T terletak pada BC.

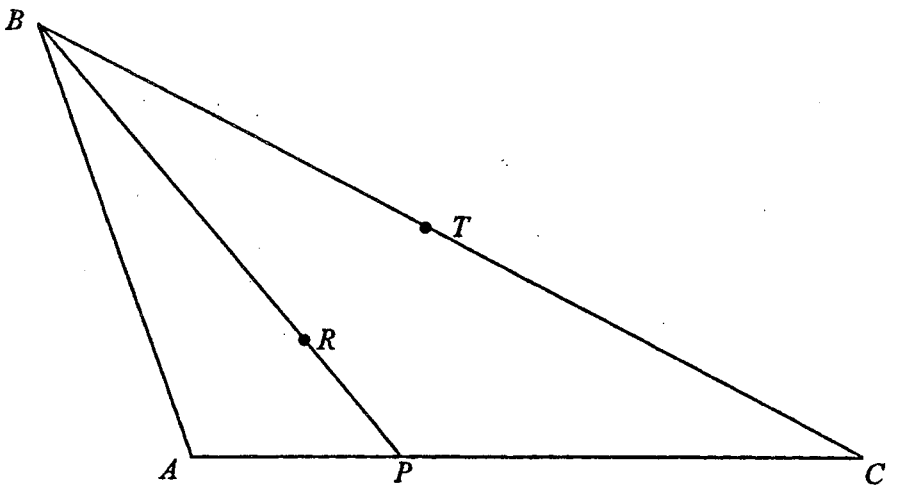


Diagram 8
Rajah 8

It is given that $\overrightarrow{AB} = 6\underset{\sim}{x}$, $\overrightarrow{AC} = 4\underset{\sim}{y}$, $3AP=PC$ and T is the midpoints of BC.

Diberi bahawa, $\overrightarrow{AB} = 6\underset{\sim}{x}$, $\overrightarrow{AC} = 4\underset{\sim}{y}$, $3AP=PC$ *dan T adalah titik tengah bagi BC.*

(a) Express in terms of $\underset{\sim}{x}$ and $\underset{\sim}{y}$.

Ungkapkan dalam sebutan $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$.

(i) $\overrightarrow{BC}$, [4 *marks*]

(ii) $\overrightarrow{AT}$. [4 *markah*]

(b) It is given that $\overrightarrow{AR} = k\overrightarrow{AT}$ and $\overrightarrow{AR} = \overrightarrow{AP} - h\overrightarrow{BP}$, where h and k are constants.

Diberi bahawa $\overrightarrow{AR} = k\overrightarrow{AT}$ *dan* $\overrightarrow{AR} = \overrightarrow{AP} - h\overrightarrow{BP}$, *dengan keadaan h dan k ialah pemalar.*

Find the value of h and of k. [6 *marks*]

Cari nilai h dan nilai k. [6 *markah*]

9 In Diagram 9, ABC is a semicircle with centre O and radius 12 cm. BCD is a sector of a circle with centre B .

Dalam Rajah 9, ABC ialah semibulatan berpusat O dan berjejari 12 cm. *BCD ialah sektor sebuah bulatan berpusat B.*

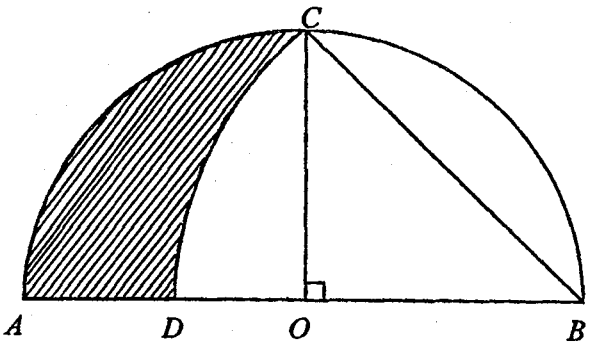


Diagram 9
Rajah 9

[Use/Guna $\pi = 3.142$]

Given that $\angle BOC = 90°$.
Diberi bahawa $\angle BOC = 90°$

Calculate
Hitung

(a) the radius, in cm, of the sector *BCD*, [1 *marks*]

radius, dalam cm, *sektor BCD,* [1 *markah*]

(b) the area, in cm^2, of the sector *BCD*, [3 *marks*]

luas, dalam cm^2, *sektor BCD,* [3 *markah*]

(c) the area, in cm^2, of the shaded region. [6 *marks*]

luas, dalam cm^2, *kawasan berlorek.* [6 *markah*]

10 Diagram 10 shows the straight line $3x + 2y = 6$ intersecting the curve $y^2 = 9 - x$ at point P and point Q. The curve intersects the x-axis at point R.

Rajah 10 menunjukkan garis lurus $3x + 2y = 6$ *menyilangi lengkung* $y^2 = 9 - x$ *pada titik P dan titik Q. Lengkung itu menyilangi paksi-x di titik R.*

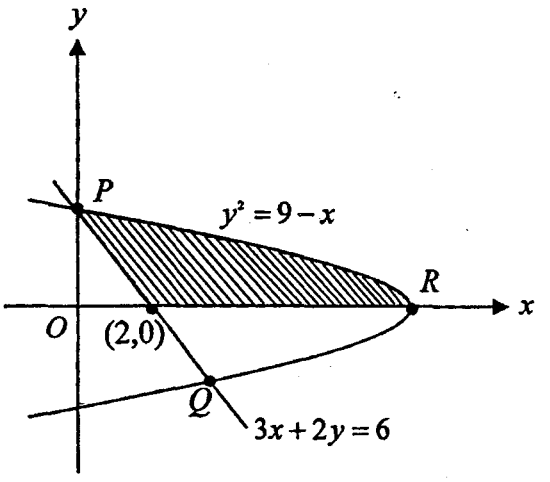


Diagram 10
Rajah 10

Find

Cari

(a) the coordinates of P and of R,
koodinat P dan koordinat R,
[2 *marks*]
[2 *markah*]

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

(c) the volume generated, in terms of π, when the region enclosed by the curve, x-axis and y-axis is revolved through 360° about the x-axis.
[4 *marks*]

isipadu janaan, dalam sebutan π, *apabila rantau yang dibatasi oleh lengkung, paksi-x dan paksi-y dikisarkan melalui* 360° *pada paksi-x.*
[4 ***markah***]

11 The costs of pens in a school cooperative stall have a normal distribution with a mean of RM0.85 and a standard deviation of RM0.10.
Harga pen di sebuah kedai koperasi sekolah mempunyai taburan normal dengan min RM0.85 *dan sisihan piawai* RM0.10.

(a) Find the probability that a pen chosen at random costs less than RM0.80.

Cari kebarangkalian bahawa sebatang pen yang dipilih berharga kurang dari RM0.80. [3 *marks*] [3 *markah*]

(b) There are 500 pens in the cooperative stall.

Kedai koperasi ini mempunyai 500 *batang pen.*

(i) Calculate the number of pens that are costs less than RM0.80.

Hitungkan bilangan pen yang berharga kurang daripada RM0.80. [2 *marks*] [2 *markah*]

(ii) If 300 there are pens cost more then RM k, find the value of k. [5 *marks*] [5 *markah*]

Jika 300 *batang pen berharga* RM k, *cari nilai* k.

12 Table 12 shows the prices, the price indices and the percentage composition of four ingredients, *P*, *Q*, *R* and *S* used in making a type of pizza in the year 2010 based on the year 2007.

Jadual 12 *menunjukkan harga, indeks harga dan peratus kandungan empat bahan, P, Q, R dan S yang digunakan untuk membuat piza pada tahun* 2010 *berasaskan tahun* 2007.

Ingredient *Bahan*	Price per kg (RM) for the year *Harga se kg* (RM) *pada tahun*		Price index for the year 2010 based on the year 2007 *Harga Indeks pada tahun* 2010 *berasas-kan tahun* 2007	Percentage composition *Peratus kandungan*
	2007	2010		
P	5.50	7.15	*x*	15
Q	5.00	5.70	114	35
R	10.00	*y*	124	20
S	*z*	29.00	116	30

Table 12
Jadual 12

(a) Find the value of *x*, of *y* and of *z*.

Cari nilai x, nilai y dan nilai z.

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

(b) (i) Calculate the composite index for the cost of making the pizza in the year 2010 based on the year 2007.

[3 *marks*]

Hitung nombor indeks gubahan untuk membuat piza itu pada tahun 2010 *berasaskan tahun* 2007.

[3 *marks*]

(ii) Hence, calculate the corresponding cost of making the pizza in the year 2007 if the cost in the year 2010 is RM23.40.

[2 *marks*]

Seterusnya, hitung kos membuat piza *itu yang sepadan bagi tahun* 2007 *jika kos membuatnya pada tahun* 2010 *ialah* RM23.40.

[2 *markah*]

(c) The cost of making these pizza is expected to increase by 20% from the year 2010 to the year 2012. Find the expected composite index for the year 2012 based on the year 2007.

[2 *marks*]

Kos membuat piza itu dijangka meningkat sebanyak 20% *dari tahun* 2010 *ke tahun* 2012. *Cari nombor indeks gubahan kos membuat piza itu yang dijangkakan pada tahun* 2012 *berasaskan tahun* 2007.

[2 *markah*]

13 In Diagram 13, $ABCD$ is a parallelogram and ADE is a triangle. ACE is a straight line.

Dalam rajah 13, *ABCD ialah sebuah segiempat selari dan ADE ialah sebuah segitiga . ACE ialah garis lurus.*

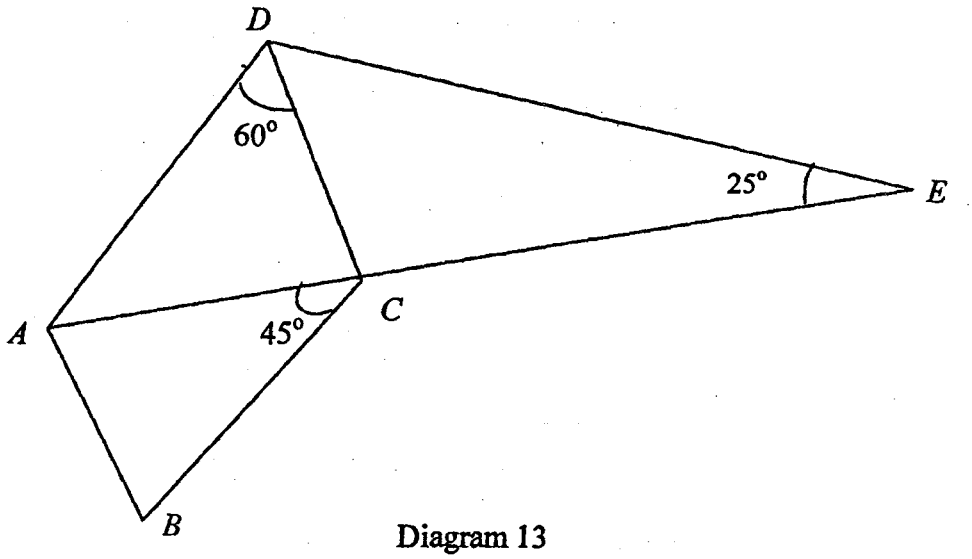


Diagram 13
Rajah 13

It is given $AD = 10$ cm and $AB = 6$ cm.
Diberi $AD = 10$ cm *dan* $AB = 6$ cm.

(a) Calculate the length, in cm, of

Hitungkan panjang, dalam cm bagi

(i) AC

(ii) DE

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

(b) Find the area, in cm^2, of parallelogram $ABCD$.

Cari luas, dalam cm^2, *bagi segiempat selari* $ABCD$.

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

(c) Point D' lies on AD such that $CD = CD'$.

Titik D' *terletak di atas* AD *dengan keadaan* $CD = CD'$.

(i) Sketch triangle ACD',

Lakar segitiga ACD',

(ii) *State* $\angle ACD'$.

Nyatakan $\angle ACD'$.

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

14 A particle moves along a straight line and passes through a fixed point O. Its velocity, v m s^{-1}, is given by $v = t^2 - 9t + 14$, where t is the time, in seconds, after passing through O.

Satu zarah bergerak disepanjang suatu garis lurus melalui satu titik tetap O. Halajunya, v m s^{-1}, di beri oleh $v = t^2 - 9t + 14$, *dengan keadaan t ialah masa, dalam saat, selepas melalui O.*

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

(a) Find
Cari

(i) the initial velocity, in m s^{-1}, of the particle,
halaju awal, dalam m s^{-1}, zarah itu, [1 *marks*] [1 *markah*]

(ii) the minimum velocity, in m s^{-1}, of the particle,
halaju minimum, dalam m s^{-1}, *zarah itu,* [3 *marks*] [3 *markah*]

(b) Sketch the velocity-time graph of the motion of the particle for $0 \le t \le 7$.
Lakar graf halaju-masa bagi pergerakan zarah itu untuk $0 \le t \le 7$. [2 *marks*] [2 *markah*]

(c) the total distance, in m, traveled by the particle in the first 7 seconds.
jumlah jarak, dalam m, yang dilalui oleh zarah dalam 7 saat pertama. [4 *marks*] [4 *markah*]

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

A school wants to send a few of its PMR and SPM students to participate a certain motivation course. The number of participants from the PMR students is x and for the SPM students is y.
The participation of the students is based on the following constraints:
Sebuah sekolah ingin menghantar beberapa pelajar PMR *dan* SPM *menyertai suatu kursus motivasi. Bilangan peserta* PMR *ialah x orang dan peserta* SPM *ialah y orang. Penyertaan pelajar adalah berdasarkan kekangan berikut:*

I : The total number of the participants is not more than 100.
Jumlah peserta tidak melebihi 100 *orang.*

II : The number of SPM participants is not more than three times the number of PMR participants.
Bilangan peserta SPM *tidak melebihi tiga kali ganda bilangan peserta* PMR.

III : The number of SPM participants must exceed the number of PMR participants by at most 10.
Bilangan peserta SPM *mesti melebihi bilangan peserta* PMR *sekurang - kurangnya* 10 *orang.*

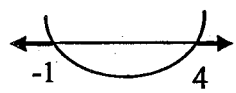
(a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints.
Tuliskan tiga ketaksamaan, selain $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.* [3 *marks*] [3 *markah*]

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

(c) By using your graph from (b), find
Dengan menggunakan graf anda dari (b), *cari*
(i) the range of the number of SPM participants if the number of PMR participants is 40.
julat bilangan peserta SPM *jika bilangan peserta* PMR *ialah* 40 *orang.*
(ii) the maximum total fees need to be paid by the school if the fee for each PMR and SPM participant is RM20 and RM30 respectively.
jumlah yuran maksimum yang perlu dibayar oleh sekolah jika yuran untuk setiap peserta PMR *dan* SPM *masing-masing ialah* RM20 *dan* RM30. [4 *marks*] [4 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

TRIAL SPM 2011
ADDITIONAL MATHEMATICS (PAPER 1)

No.	Solution and mark scheme	Sub marks	Full marks
1 (a) (b)	{4, 6, 12} 3		2
2	$h=4$, $k=-3$ (both) B2 : $h=4$ *or* $k=-3$ B1 : $2(2x+k)+k$		3
3 (a) (b)	$\frac{x-1}{2}$ -2 B1 : $3-4\left(\frac{m-1}{2}\right)$ Note: accept m or x	1 2	3
4	$h=\frac{1}{2}$, $k=3$ (*both*) B2: $h=\frac{1}{2}$ *or* k = 3 B1: $3+2h=4$ *or* $6h=k$		3
5	$x<-1$, $x>4$ B3 :  B2: $(x+1)(x-4)>0$ B1: $x^2-3x-4>0$		4
6 (a) (b) (c)	1 -8 $x=1$	1 1 1	3

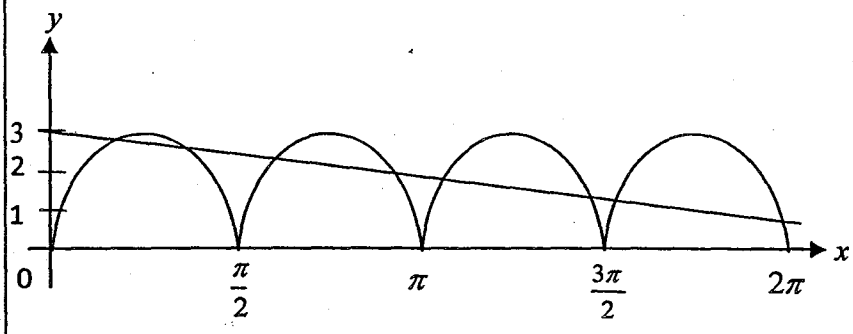
7	$x=2$ B2 : $x+3=-5x+15$ B1 : 2^{x+3} *or* $2^{-5(x-3)}$		3
8	$3p-t-1$ B2 : $3\log_m 4-(\log_m 3+\log_m m)$ B1 : $\log_m 64-\log_m 3m$ *or* $\log_m 3+\log_m m$		3
9	$n=7$ B2 : $n<7.571$ B1 : $-3+(n-1)7<43$		3
10(a) (b)	-3 B1 : $k+4-3k=11-(k+4)$ 208 B1 : $S_8=\frac{8}{2}[2(-9)+(8-1)(10)]$	2 2	4
11 (a) (b)	$\frac{1}{2}$ *or* 0.5 B1 : $8r^5=\frac{1}{4}$ 16 B1 : $\frac{8}{1-\frac{1}{2}}$	2 2	4
12(a) (b)	$\log_{10} y=x\log_{10} p+2$ 0.3162 B1 : $\log_{10} p=\frac{2-0}{0-4}$	1 2	3

13 (a)	$(3, 1)$	1	
(b)	$x-y-5=0$ *or equivalent*		4
	B2 : $\sqrt{(x-3)^2+(y-1)^2} = \sqrt{(x-6)^2+(y+2)^2}$	3	
	B1 : $\sqrt{(x-3)^2+(y-1)^2}$ *or* $\sqrt{(x-6)^2+(y-(-2))^2}$		
14	$k=5$		
	B2: $\frac{1}{2}\lvert(-1\times k+2\times 11+4\times -4)-(-4\times 2+k\times 4+11\times -1)\rvert = 0$		
	OR $\frac{k-(-4)}{2-(-1)} = \frac{11-k}{4-2}$		3
	B1: $\frac{1}{2}\lvert(-1\times k+2\times 11+4\times -4)-(-4\times 2+k\times 4+11\times -1)\rvert$		
	OR $\frac{k-(-4)}{2-(-1)}$ *or* $\frac{11-k}{4-2}$ *or* $\frac{11-(-4)}{4-(-1)}$		
15(a)	$\begin{pmatrix}4\\5\end{pmatrix}$	1	
			2
(b)	$7\underset{\sim}{i}+5\underset{\sim}{j}$	1	
16 (a)	3	2	
	B1: $2\lambda = 4$		4
(b)	$\sqrt{13}$ *or* 3.606	2	
	B1: $\sqrt{(4-2)^2+(6-3)^2}$		
17	$30°, 150°$ [both]		
	B2 : $(2\sin x-1)(2\sin x-1)=0$		3
	B1 : $4(1-\sin^2 x)+4\sin x-5=0$		
18	0.571		
	B2: $8(\pi-\theta) = 8+8+8\theta$		3
	B1: $8(\pi-\theta)$ or 8θ		

16 of 20

19	$k = \frac{3}{2}$ or 1.5 or $1\frac{1}{2}$ B1: $0 = 2k(3) - 9$		2
20(a)	5 B1: $2x$-3	2	4
(b)	$\frac{p}{5}$ *or* $0.2p$ B1 : $p = 5\delta x$	2	
21	$\frac{8}{3}$ *or* $2\frac{2}{3}$ *or* 2.667 B3 : $8 - \left[\frac{16}{3}\right]$ B2 : $\left[\frac{x^2}{2}\right]_0^4$ *or* $\left[\frac{x^2}{x-1}\right]_0^4$ B1 : $\int x dx - \int f(x) dx$		4
22 (a)	11	1	3
(b)	6 B1 : $Q_1 = 4.5$ *or* $Q_3 = 10.5$	2	
23 (a)	720	1	3
(b)	144 B1 : 3! x 4!	2	
24 (a)	$\frac{3}{20}$ *or* 0.15	1	3
(b)	$\frac{11}{20}$ *or* 0.55 B1 : $\frac{3}{5} \times \frac{3}{4}$ *or* $\frac{2}{5} \times \frac{1}{4}$	2	
25 (a)	$k = 0.7$ B1 : 0.2420 *OR* 0.4840 *(seen)*	2	4
(b)	32.8 B1 : $0.7 = \frac{X - 30}{4}$	2	

TRIAL SPM 2011
ADDITIONAL MATHEMATICS (PAPER 2)

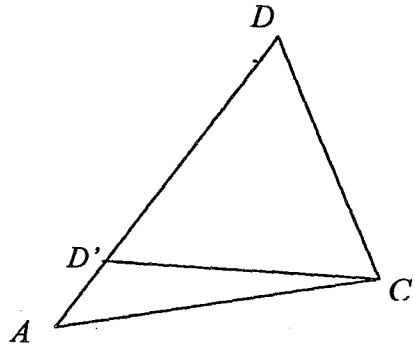
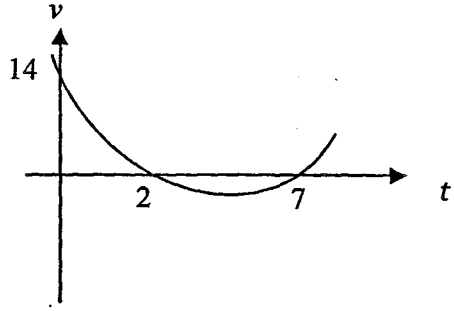
NO	SOLUTIONS	MARKS	TOTAL
1	$m = 2n + 7$ or $\frac{m-7}{2} = n$	P1	5
	$(2n+7)^2 + 4n^2 - 37 = 0$ or $m^2 + 4\left(\frac{m-7}{2}\right)^2 - 37 = 0$	K1	
	$2n^2 + 7n + 3 = 0$ or $m^2 - 7m + 6 = 0$	K1	
	$(n+3)(2n+1) = 0$ or $(m-1)(m-6) = 0$		
	$n = -3\ ,\ -\frac{1}{2}$ or $m = 1\ ,\ 6$	N1(*both*)	
	$m = 1\ ,\ 6$ or $n = -3\ ,\ -\frac{1}{2}$	N1(*both*)	
2(a)		P1 Shape of sine graph P1 Amplitude = 3 P1 2 cycles for $0 \le x \le 2\pi$ P1 Graph modulus	6
(b)	$y = 3 - \frac{x}{\pi}$ or equivalent	N1	
	Draw the straight line from the equation	K1	
	Straight line drawn correctly and number of solutions = 8	N1	

3(a)	$25 = 225 + (n-1)(-20)$ $n = 11$	K1 N1	
(b)	$225 + (n-1)(-20) > 0$ $n < 12.25$ $n = 12$ $S_{12} = \frac{12}{2}\left[2(225) + (12-1)(-20)\right]$ $= 1380$	K1 N1 K1 N1	6
4(a)	$m_1 = -\frac{1}{8}$ $m_2 = 8$ $\frac{dy}{dx} = 4x^3 - px$ $8 = 4(2)^3 - p(2)$ $p = 12$	 P1 P1 K1 N1	
(b)	$y = \int(4x^3 - 12x)dx$ $y = \frac{4x^4}{4} - \frac{12x^2}{2} + c$ $5 = \frac{4(2)^4}{4} - \frac{12(2)^2}{2} + c$ $y = x^4 - 6x^2 + 13$	 K1 K1 N1	7
5(a)	$h + k = 11$ $30.5 + \left[\frac{\frac{1}{2}(25) - 10}{h}\right]10 = 35.5$ $h = 5$ $k = 6$	P1 P1 K1 N1 N1	7
(b)	$\bar{x} = \frac{5.5\times2 + 15.5\times3 + 25.5\times5 + 35.5\times*5 + 45.5\times*6 + 55.5\times4}{25}$ $= 34.3$	K1 N1	

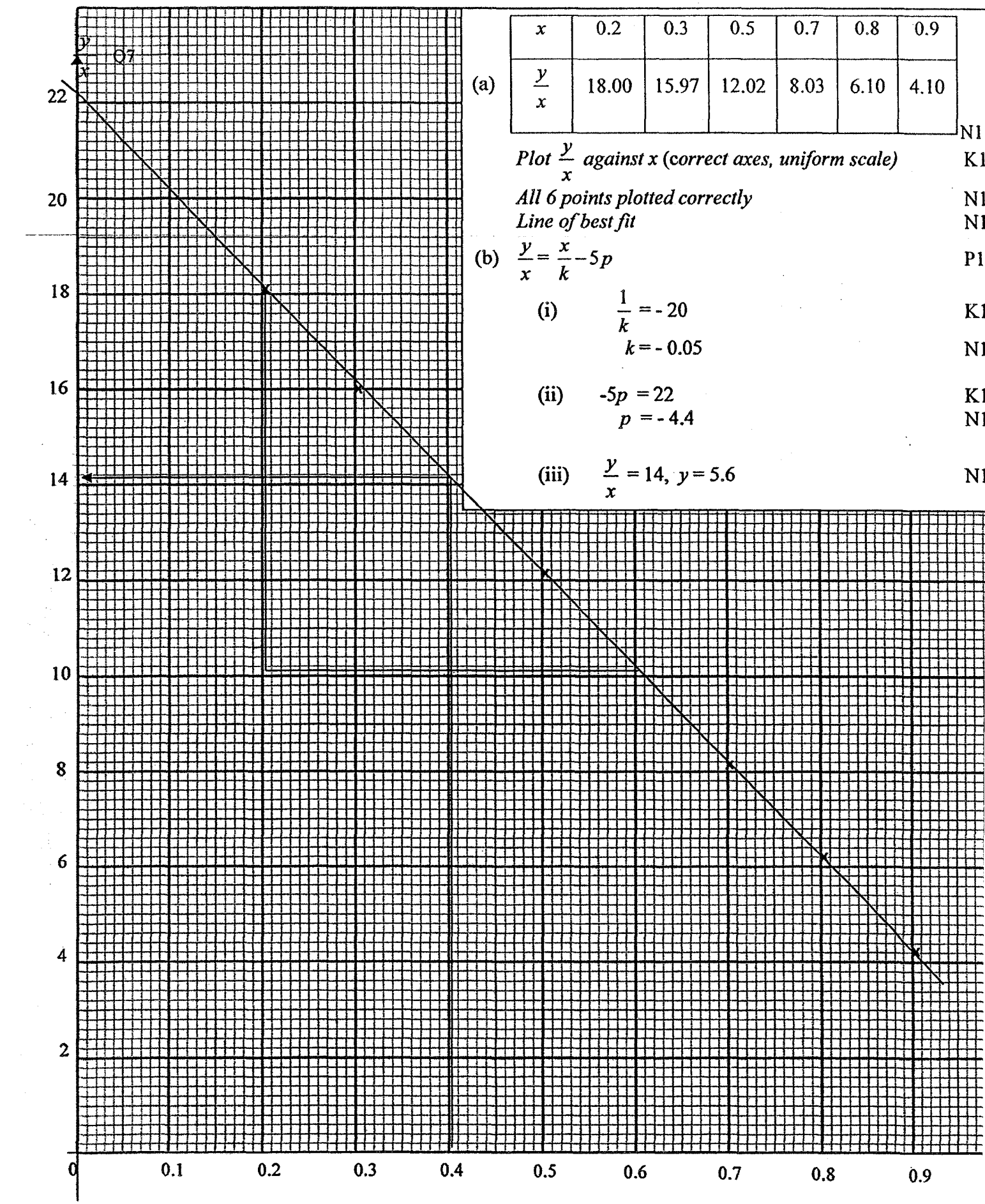
6(a)(i)	$\left(\frac{2(1)+3(6)}{3+2}, \frac{2(-2)+3(3)}{3+2}\right)$	K1	
	(4, 1)	N1	
(ii)	$\frac{3-(-2)}{6-1}=1$		
	$m_{CD}=-1$		7
	$y-1=-1(x-4)$	P1	
	$y=-x+5$	K1	
(b)	$\frac{1}{2}\left\|[(k+(7)(3)+(6)(-2)]-[(7)(-2)+6k+(1)(3)]\right\|=20$	N1	
	$\left\|-5k+20\right\|=40$	K1	
	$k=-4$	N1	
8(a)(i)	$\overrightarrow{BC}=\overrightarrow{BA}+\overrightarrow{AC}$	K1	
	$=-6\underset{\sim}{x}+4\underset{\sim}{y}$	N1	
(ii)	$\overrightarrow{AT}=\overrightarrow{AB}+\frac{1}{2}\overrightarrow{BC}$ *or* $\overrightarrow{AT}=\overrightarrow{AC}+\overrightarrow{CT}$	K1	
	$=3\underset{\sim}{x}+2\underset{\sim}{y}$	N1	
(b)	$\overrightarrow{AR}=k\overrightarrow{AT}$		10
	$=k(3\underset{\sim}{x}+2\underset{\sim}{y})$	P1	
	$\overrightarrow{AR}=\overrightarrow{AP}-h\overrightarrow{BP}$		
	$=\underset{\sim}{y}-h(-6\underset{\sim}{x}+\underset{\sim}{y})$	K1	
	$=6h\underset{\sim}{x}+(1-h)\underset{\sim}{y}$	N1	
	Compare		
	$3k=6h$, $2k=1-h$ *and solve the equation*	K1	
	$h=\frac{1}{5}$, $k=\frac{2}{5}$ *(both)*	N1 N1	

9(a)	$\frac{45^\circ}{180^\circ}\times 3.142$ $= 0.7855$	P1	
(b)	$\sqrt{288}$ $\frac{1}{2}\times\left(\sqrt{288}\right)^2\times 0.7855$ $= 113.112$ cm	P1 K1 N1	
(c)	Area of the chord $= \frac{1}{2}\times 12^2\times 1.571$ or $\frac{1}{2}\times 12\times 12$ $= \frac{1}{2}\times 12^2\times 1.571-\frac{1}{2}\times 12\times 12$ $= 41.112$ cm^2 Area of the shaded region $= \frac{1}{2}\times 12^2\times 3.142-41.122-113.112$ $= 72$ cm^2	K1 K1 K1 K1 K1 N1	10
10(a)	$P(0, 3),\ R(9, 0)$	P1 P1	
(b)	$\int(9-y^2)dy$ $\left[9y-\frac{y^3}{3}\right]$ $\left[9(3)-\frac{(3)^3}{3}\right]$ or $\frac{1}{2}(3)(2)$ The area of shaded region $= \int(9-y^2)dy$ - triangle OPQ $= 15$ unit^2.	K1 K1 K1 N1	10
(c)	$V=\pi\int_0^9(9-x)dx$ $=\pi\left[9x-\frac{x^2}{2}\right]_0^9$ $=\pi\left[9(9)-\frac{9^2}{2}\right]-[0]$ $= 40.5\ \pi$ unit^3	K1 K1 K1 N1	

11(a)	$P(X<0.80) = P\left(Z < \frac{0.80-0.85}{0.10}\right)$ $= P(Z<-0.5)$ $= 0.3085$	K1 N1	
(b)(i)	500 x 0.3085	K1	
	= 154 batang	N1	
(ii)	$P(X>k) = \frac{300}{500}$		10
	$P\left(Z> \frac{k-0.85}{0.10}\right) = 0.6$	K1K1	
	$1- P\left(Z> \frac{k-0.85}{0.10}\right) = 0.6$	K1	
	$P\left(Z> \frac{k-0.85}{0.10}\right) = 0.4$		
	$-\frac{k-0.85}{0.10} = 0.253$	P1 K1	
	$k = 0.8247$	N1	
12(a)	Use $\frac{P_1}{P_0}\times 100$ $x=130, y=12.40, z=25$	K1 N2, 1, 0	
(b)(i)	$\bar{I}_{\frac{2010}{2007}} = \frac{130(15)+114(35)+124(20)+116(30)}{15+35+20+30}$ $=119$	K1K1 N1	
(ii)	$\frac{23.40}{P_{2007}} \times 100 = 119$ $P_{2007} = RM19.66$	K1 N1	10
(c)	$I_{\frac{2012}{2007}} = 119 \times \frac{120}{100}$ $= 142.8$	K1 N1	

13(a)(i)	$AC^2 = 10^2 + 6^2 - 2(10)(6)\cos 60^o$	K1	
	$AC = 8.718$ cm	N1	
(ii)	$\angle DCE = 105^o$	P1	
	$\frac{DE}{\sin 105^0} = \frac{6}{\sin 25^o}$	K1	
	$DE = 13.713$ cm	N1	
(b)	Area $= 2\left(\frac{1}{2}\times 10\times 6\times sin60^0\right)$	K1K1	10
	$= 51.96$ cm^2	N1	
(c)(i)		P1	
(ii)	$\angle ACD' = 15^o$	P1	
14(i)	$t = 0, v_o = 14$ ms^{-1}	P1	
(ii)	$\frac{dv}{dt} = 2t - 9$ minimum velocity, $a = 0$		
	$2t - 9 = 0$ $t = 4.5$ s	K1	
	$v_{min} = (4.5)^2 - 9(4.5) + 14$	K1	
	$= -6.25$ *or* $-6\frac{1}{4}$ m s^{-1}	N1	
(b)		P1(shape) P1	10

(c)	The total distance		
	$=\int_0^2 (t^2-9t+14)dt+\left\lvert\int_2^7 (t^2-9t+14)dt\right\rvert$	K1	
	$=\frac{t^3}{3}-9\frac{t^2}{2}+14t\Big]_0^2+\left\lvert\frac{t^3}{3}-9\frac{t^2}{2}+14t\Big]_2^7\right\rvert$	K1	
	$=\left[\frac{(2)^3}{3}-9\frac{(2)^2}{2}+14(2)-0\right]+\left\lvert\left(\frac{(7)^3}{3}-9\frac{(7)^2}{2}+14(7)\right)-\left(\frac{(2)^3}{3}-9\frac{(2)^2}{2}+14(2\right)\right\rvert$	K1	
	$=33.5\,m$	N1	



x	0.2	0.3	0.5	0.7	0.8	0.9
$\frac{y}{x}$	18.00	15.97	12.02	8.03	6.10	4.10

(a) N1

Plot $\frac{y}{x}$ *against* x *(correct axes, uniform scale)* K1

All 6 points plotted correctly N1

Line of best fit N1

(b) $\frac{y}{x} = \frac{x}{k} - 5p$ P1

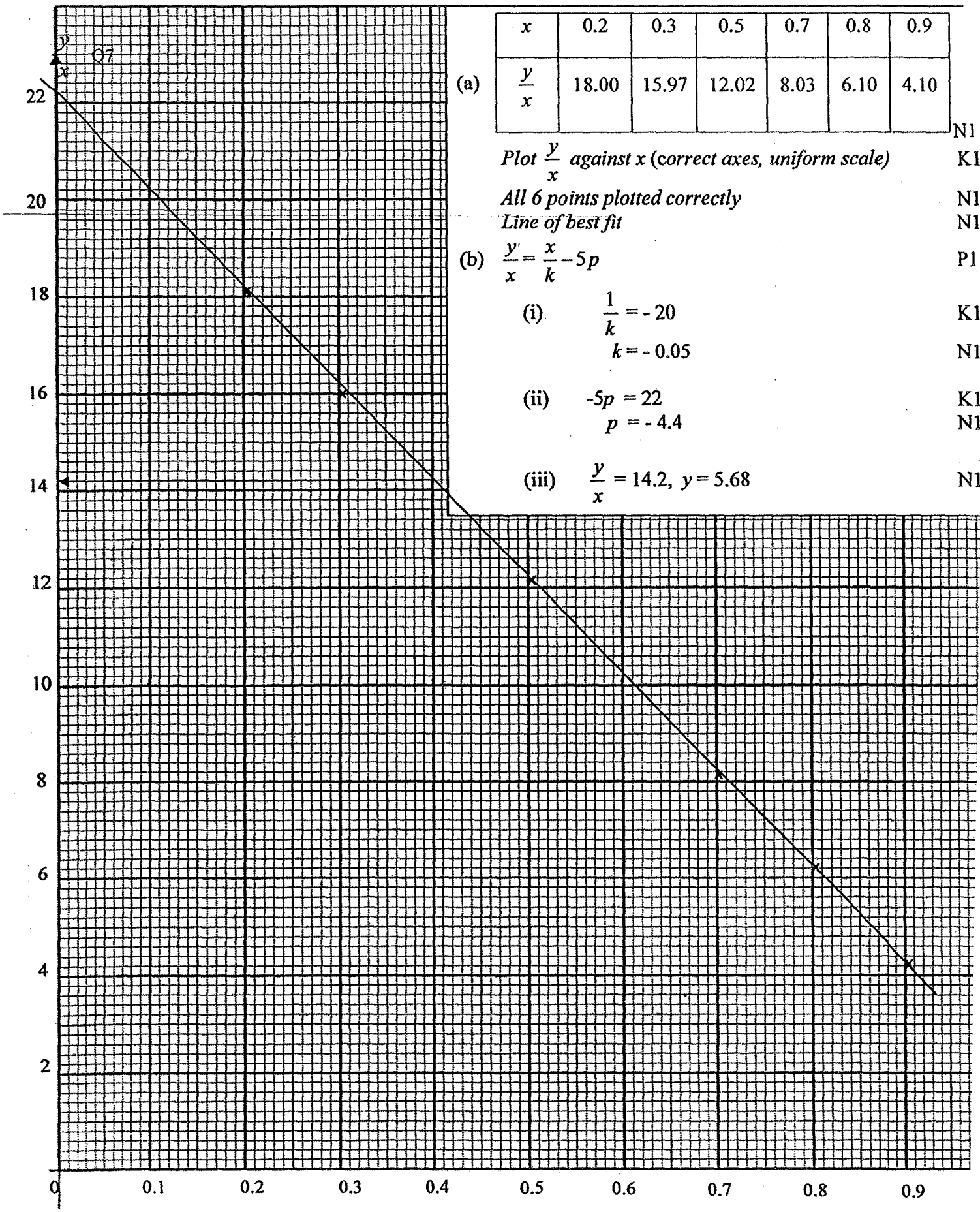
(i) $\frac{1}{k} = -20$ K1

$k = -0.05$ N1

(ii) $-5p = 22$ K1

$p = -4.4$ N1

(iii) $\frac{y}{x} = 14,\ y = 5.6$ N1



x	0.2	0.3	0.5	0.7	0.8	0.9
$\frac{y}{x}$	18.00	15.97	12.02	8.03	6.10	4.10

(a) N1

Plot $\frac{y}{x}$ *against* x *(correct axes, uniform scale)* K1

All 6 points plotted correctly N1

Line of best fit N1

(b) $\frac{y'}{x} = \frac{x}{k} - 5p$ P1

(i) $\frac{1}{k} = -20$ K1

$k = -0.05$ N1

(ii) $-5p = 22$ K1

$p = -4.4$ N1

(iii) $\frac{y}{x} = 14.2,\ y = 5.68$ N1

Q.15

(a) I : $x + y \leq 100$ *or equivalent* N1
II : $y \leq 3x$ *or equivalent* N1
III : $y - x \geq 10$ *or equivalent* N1

(b) Draw correctly at least one straight line K1
Draw correctly all the three straight lines N1
(accept dotted line)
The correct region shaded N1

(c) (i) The range of the number of SPM participants is $50 \leq y \leq 60$ N1
(ii) (30, 70) N1
Subtitute any point in the shaded region into $20x + 30y$ K1
$20(26) + 30(74) = RM2740$ N1