Name : ……..……

Form : ……..……

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2011

ADDITIONAL MATHEMATICS
Kertas 1
Ogos 2011
2 jam **Dua jam**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis nama dan tingkatan anda pada ruangan yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

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

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

Kertas soalan ini mengandungi 20 halaman bercetak

For examiner's use only

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

1 Diagram 1 shows the relation between set *A* and set *B*.
Rajah 1 *menunjukkan hubungan antara set A dan set B.*

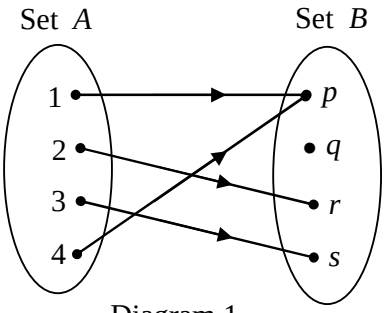


Diagram 1

Rajah 1

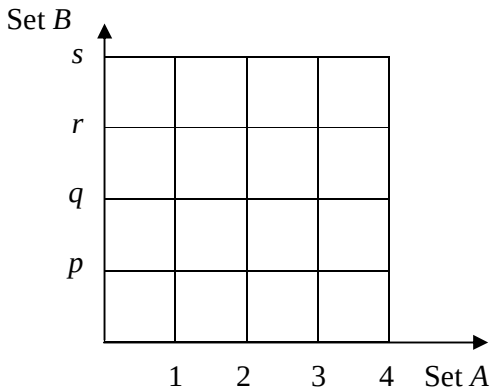
(*a*) Plot the relation in the graph form,
Plotkan hubungan itu dalam bentuk graf,

(*b*) State the type of the relation .
Nyatakan jenis hubungan itu .

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

Answer/*Jawapan*:

(*a*)



(*b*)

1

2

For examiner's use only

2 Given the function $h:x\to|3x-5|$.

Diberi fungsi $h:x\to|3x-5|$.

Find
Cari

(*a*) the image of -2,
imej bagi -2,

(*b*) the values of x such that $h(x)=4$.
nilai-nilai x dengan keadaan $h(x)=4$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

2

3

---

3 Given the function $h(x)=2+3x$ and $k(x)=px-15$, find
Diberi fungsi $h(x)=2+3x$ *dan* $k(x)=px-15$, *cari*

(*a*) $h^{-1}(7)$,

(*b*) the value of p such that $kh(4)=13$.
nilai bagi p *dengan keadaan* $kh(4)=13$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

3

4

For examiner's use only

4 Diagram 4 shows the graph of the function $f(x) = 2(x-p)^2 - 5$.

Rajah 4 *menunjukkan graf bagi fungsi* $f(x) = 2(x-p)^2 - 5$.

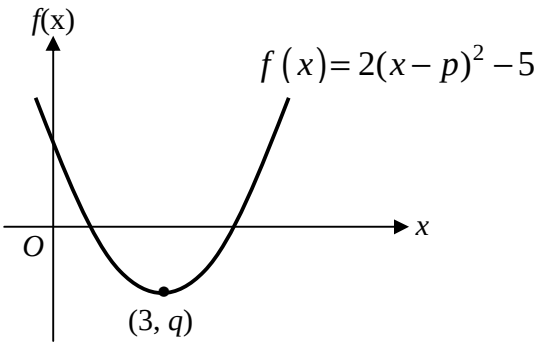


Diagram 4
Rajah 4

The curve has the minimum point $(3, q)$.
Lengkung tersebut mempunyai titik minimum $(3, q)$.

State
Nyatakan

(*a*) the value of p,
nilai bagi p,

(*b*) the value of q,
nilai bagi q,

(*c*) the equation of the axis of symmetry.
persamaan bagi paksi simetri.

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

Answer/*Jawapan*:
(*a*)

(*b*)

(*c*)

4
3

For examiner's use only

5 Given that α and β are the roots of the quadratic equation $2x^2+5x+k=0$, where k is a constant.

Diberi α dan β adalah punca-punca bagi persamaan kuadratik $2x^2+5x+k=0$, dengan keadaan k ialah pemalar.

Find
Cari

(*a*) the value of $\alpha+\beta$,
nilai bagi $\alpha+\beta$,

(*b*) the value of k such that $\alpha\beta=3$.
nilai bagi k *dengan keadaan* $\alpha\beta=3$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

5
3

6 Find the range of values of x for which $4x^2 \geq 3-4x$.

[3 *marks*]

Cari julat nilai-nilai x *bagi* $4x^2 \geq 3-4x$.

[3 *markah*]

Answer/*Jawapan*:

6
3

For examiner's use only

7 Solve the equation :
Selesaikan persamaan :

$$2^x = 5(2^{x+1}) - 144$$

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

Answer/*Jawapan*:

7
3

---

8 Solve the equation $\log_5 x = 1 + \log_5 (x-4)$. [3 *marks*]

Selesaikan persamaan $\log_5 x = 1 + \log_5 (x-4)$. [3 *markah*]

Answer/*Jawapan*:

8
3

9 The n^{th} term of an arithmetic progression is given by $T_n = 11 - 3n$. Find the common difference of the progression.

Diberi sebutan ke-n bagi suatu janjang aritmetik ialah $T_n = 11 - 3n$. *Cari beza sepunya bagi janjang ini.*

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

Answer/*Jawapan*:

9
2

---

10 Given that 12, 6, 3, ... is a geometric progression, find the sum of the first 7 terms after the 3rd term of the progression.

Diberi 12, 6, 3, ... *ialah suatu janjang geometri, cari hasil tambah* 7 *sebutan pertama selepas sebutan ke*-3.

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

Answer/*Jawapan*:

10
3

For examiner's use only

11 Given $0\cdot471 + 0\cdot000\,471 + 0\cdot000\,000\,471 + ... = \frac{p}{333}$. Find the value of p.

Diberi $0\cdot471 + 0\cdot000\,471 + 0\cdot000\,000\,471 + ... = \frac{p}{333}$. *Cari nilai bagi* p.

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

Answer/*Jawapan*:

11

3

---

12 Diagram 12 shows the straight line graph obtained by plotting $\log_{10} y$ against $\log_{10} x$.
Rajah 12 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $\log_{10} y$ *melawan* $\log_{10} x$.

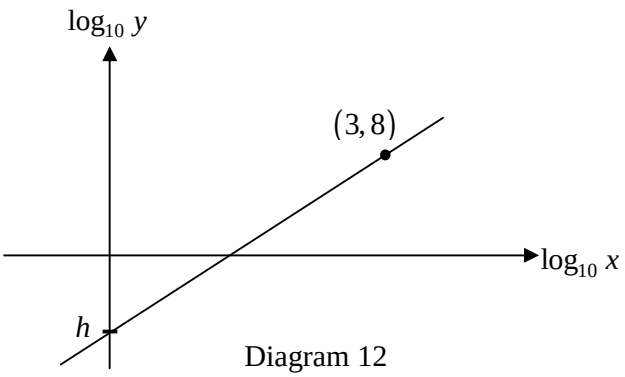


Diagram 12
Rajah 12

The variables x and y are related by the equation $y = \frac{x^k}{10}$ where k is a constant. Find the value of h and of k.

Pembolehubah x dan y dihubungkan oleh persamaan $y = \frac{x^k}{10}$, *dengan keadaan k ialah pemalar. Cari nilai h dan nilai k.*

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

Answer/*Jawapan*:

12

3

13 Find the equation of a straight line that passes through the point $(5, 3)$ and perpendicular to the straight line $2y - 4x = 7$.

Cari suatu persamaan garis lurus yang melalui titik $(5, 3)$ *dan berserenjang dengan garis lurus* $2y - 4x = 7$.

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

Answer/*Jawapan*:

13
3

14 Given points $A(k, 3k)$, $B(-2, 1)$ and $C(3, 2)$. Find the values of k if the area of the triangle ABC is $10 \cdot 5$ unit².

Diberi titik $A(k, 3k)$, $B(-2, 1)$ *dan* $C(3, 2)$. *Cari nilai-nilai bagi* k *jika luas segi tiga ABC ialah* $10 \cdot 5$ unit².

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

Answer/*Jawapan*:

14
4

For examiner's use only

15 Diagram 15 shows two vectors, $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

Rajah 15 *menunjukkan dua vektor,* $\overrightarrow{OA}$ *dan* $\overrightarrow{OB}$.

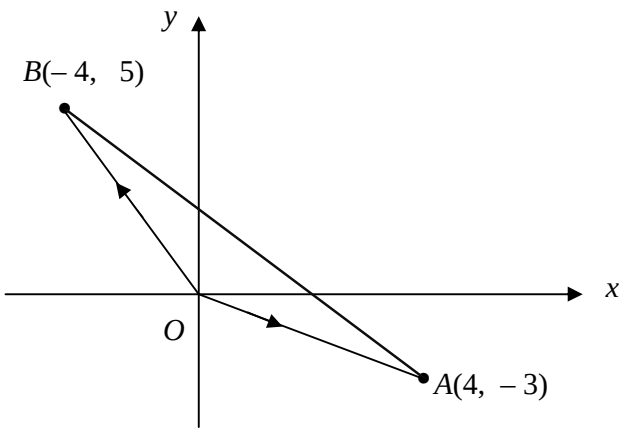


Diagram 15
Rajah 15

Express $\overrightarrow{BA}$ in the form $x\underline{i} + y\underline{j}$.
Ungkapkan $\overrightarrow{BA}$ *dalam bentuk* $x\underline{i} + y\underline{j}$.

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

Answer/*Jawapan*:

15

2

16

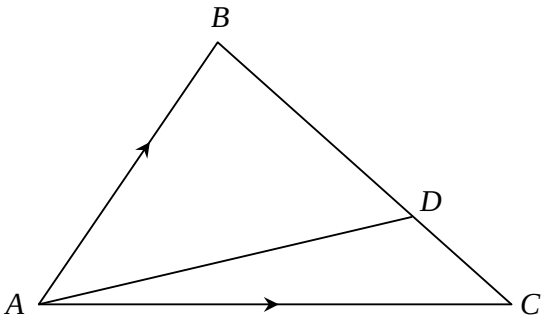


Diagram 16
Rajah 16

Diagram 16 shows a triangle *ABC* and *D* is a point on *BC*. Given $\overrightarrow{AB} = 3\underset{\sim}{i} + 7\underset{\sim}{j}$, $\overrightarrow{AC} = 11\underset{\sim}{i} + 3\underset{\sim}{j}$ and $BD = 3DC$, find $\overrightarrow{AD}$.

Rajah 16 *menunjukkan segi tiga ABC dan D ialah satu titik pada BC. Diberi* $\overrightarrow{AB} = 3\underset{\sim}{i} + 7\underset{\sim}{j}$, $\overrightarrow{AC} = 11\underset{\sim}{i} + 3\underset{\sim}{j}$ *dan* $BD = 3DC$, *cari* $\overrightarrow{AD}$.

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

Answer/*Jawapan*:

16

3

For examiner's use only

17

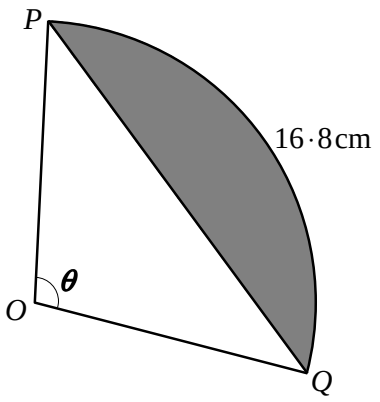


Diagram 17
Rajah 17

Diagram 17 shows a sector *OPQ* of a circle with centre *O* and radius of 7 cm. Given the length of the arc *PQ* is 16·8 cm.
Rajah 17 *menunjukkan sektor OPQ bagi sebuah bulatan berpusat O dan jejari* 7 cm. *Diberi panjang lengkok PQ ialah* 16·8 cm.

Find
Cari

(*a*) the value of θ in radians,
nilai bagi θ *dalam radian,*

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

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

Answer/*Jawapan*:
(*a*)

(*b*)

17
4

---

18 Solve the equation $3\sin 2x = 2\cos x$ for $0^\circ \le x \le 360^\circ$.
Selesaikan persamaan $3\sin 2x = 2\cos x$ *bagi* $0^\circ \le x \le 360^\circ$.

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

Answer/*Jawapan*:

18
4

19 Given $\int_1^3 f(x)dx = 5$ and $\int_3^1 g(x)dx = 2$. Find the value of $\int_1^3 [2f(x) - g(x)]dx$.

Diberi $\int_1^3 f(x)dx = 5$ *dan* $\int_3^1 g(x)dx = 2$. *Cari nilai* $\int_1^3 [2f(x) - g(x)]dx$.

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

Answer/*Jawapan*:

19

3

---

20 It is given that $y = \frac{2x+1}{x-3}$, $x \neq 3$.

Diberi bahawa $y = \frac{2x+1}{x-3}$, $x \neq 3$.

Find
Cari

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

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

(*b*) the approximate change in y when x increases from 4 to $4 \cdot 01$.
perubahan kecil bagi y *apabila* x *bertambah dari* 4 *kepada* $4 \cdot 01$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

20

4

For examiner's use only

21 Point A lies on the curve $y = 2x^4 - x$, find the coordinates of point A where the gradient of the normal at point A is $-\frac{1}{7}$.

Titik A terletak pada lengkung $y = 2x^4 - x$, cari koordinat bagi titik A dengan keadaan kecerunan normal pada titik A ialah $-\frac{1}{7}$.

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

Answer/*Jawapan*:

21

4

---

22 The standard deviation of a set of six numbers is $\sqrt{15}$. Given that the sum of square for the set of numbers is 144. Find the new mean when a number 10 is added to this set.

Sisihan piawai bagi satu set yang terdiri daripada enam nombor ialah $\sqrt{15}$. Diberi bahawa hasil tambah kuasa dua bagi nombor-nombor tersebut ialah 144. *Cari min baru apabila satu nombor* 10 *ditambah kepada set ini.*

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

Answer/*Jawapan*:

22

3

23 Diagram 23 shows 3 letters and 4 digits.
Rajah 23 *menunjukkan* 3 *huruf dan* 4 *angka.*

A	B	C	1	2	3	4

Diagram 23
Rajah 23

A code is to be formed using those letters and digits. The code must consist of 2 letters followed by 3 digits. How many codes can be formed if no letter or digit is repeated in each code?

Satu kod dibentuk menggunakan huruf-huruf dan angka-angka berkenaan. Kod ini mesti menggunakan 2 *huruf dan diikuti dengan* 3 *angka. Berapa kod yang boleh dibentuk dengan tiada huruf dan angka yang berulang?*

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

Answer/*Jawapan*:

23
3

---

24 In an athletic championship, the probability that an athlete is being chosen to take part in the 100 m event is $\frac{3}{7}$ and in the 800 m event is $\frac{2}{5}$.
Dalam satu kejohanan olahraga, kebarangkalian bahawa seorang peserta dipilih untuk mengambil bahagian dalam acara 100 *m ialah* $\frac{3}{7}$ *dan acara* 800 *m ialah* $\frac{2}{5}$.

Find the probability that the athlete will be chosen to take part in
Cari kebarangkalian peserta itu dipilih untuk mengambil bahagian dalam

(*a*) both the events,
kedua-dua acara,

(*b*) at least one event.
sekurang-kurangnya satu acara.

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

Answer/*Jawapan*:
(*a*)

(*b*)

24
4

For examiner's use only

25 The random variable X is normally distributed with a mean of 62 and a standard deviation of 3.

Pembolehubah rawak X bertaburan normal dengan min 62 *dan sisihan piawai* 3.

Find the value of
Cari nilai bagi

(*a*) $P(X > 65)$,

(*b*) k if $P(X > k) = 0 \cdot 6915$.
k *jika* $P(X > k) = 0 \cdot 6915$.

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

Answer/*Jawapan*:
(*a*)

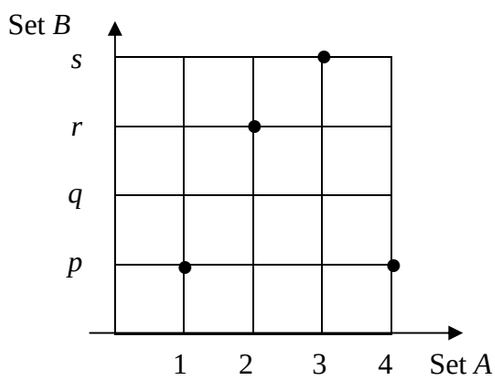
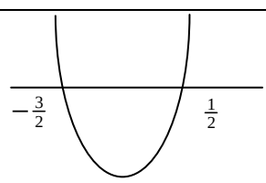
(*b*)

25

4

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2011
Marking Scheme
Additional Mathematics Paper 1

Question	Solution/ Marking Scheme	Answer	Marks
1	(*a*)  	(*b*) many-to-one	1 1
2	(*b*) B1 : $3x-5=\pm 4$ **or** $x=3$ **or** $x=\frac{1}{3}$	(*a*) 11 (*b*) 3 **and** $\frac{1}{3}$	1 2
3	(*a*) B1: $2+3y=7$ **or** $h^{-1}(x)=\frac{x-2}{3}$ (*b*) B1: $k(14)=13$ **or** $14a-15$	(*a*) $\frac{5}{3}$ (*b*) 2	2 2
4		(*a*) 3 (*b*) –5 (*c*) $x=3$	1 1 1
5	(*b*) B1 : $\frac{k}{2}=3$	(*a*) $-\frac{5}{2}$ (*b*) $k=6$	1 2
6	B2 :  **or** $x=\frac{1}{2}$, $x=-\frac{3}{2}$ B1: $(2x-1)(2x+3)$	$x\geq\frac{1}{2}$, $x\leq-\frac{3}{2}$	3

Question	Solution/ Marking Scheme	Answer	Marks
7	B2 : $2^x = 2^4$ **or** $2^x = 16$ B1 : $2^x = 5(2^x)2 - 144$ **or** $2^x = 10(2^x) - 144$	$x = 4$	3
8	B2 : $\frac{x}{x-4} = 5$ **or** $x = 5x - 20$ B1 : $\log_5 \frac{x}{x-4} = 1$	$x = 5$	3
9	B1: $T_{n+1} - T_n$	-3	2
10	B2 : $\frac{12\left(1-0\cdot5^{10}\right)}{1-0\cdot5} - \frac{12\left(1-0\cdot5^{3}\right)}{1-0\cdot5}$ **OR** $\frac{1\cdot5\left(1-0\cdot5^{7}\right)}{1-0\cdot5}$ B1 : $r = 0\cdot5$	$2\frac{125}{128}$ **or** $2\cdot98$	3
11	B2 : $S_\infty = \frac{0\cdot471}{1-0\cdot001}$ **or** $\frac{471}{999}$ **or** $\frac{157}{333}$ B1 : $r = 0\cdot001$	157	3
12	B2 : $h = -1$ **or** $k = 3$ B1 : $\log_{10} y = k \log_{10} x - \log_{10} 10$	$h = -1$ **and** $k = 3$	3
13	B2 : $y - 3 = -\frac{1}{2}(x-5)$ B1 : $m_1 = 2$ ***or*** $m_2 = -\frac{1}{2}$	$y = -\frac{1}{2}x + \frac{11}{2}$ **or** $2y = -x + 11$	3
14	B3 : $14k - 7 = \pm 21$ **or** $k = -1$ **or** $k = 2$ B2 : $\left\lvert(-4+9k+k)-(3+2k-6k)\right\rvert = 21$ B1 : $\frac{1}{2}\begin{vmatrix}-2 & 3 & k & -2\\ 1 & 2 & 3k & 1\end{vmatrix} = 10\cdot5$	$k = -1$ **and** 2	4
15	B1: $\overrightarrow{BA} = \overrightarrow{BO} + \overrightarrow{OA}$ **or** $\overrightarrow{BA} = \overrightarrow{OA} - \overrightarrow{OB}$	$8\underset{\sim}{i} - 8\underset{\sim}{j}$	2

Question	Solution/ Marking Scheme	Answer	Marks
16	B2 : $\overrightarrow{AD}=\overrightarrow{AB}+\frac{3}{4}\overrightarrow{BC}$ **OR** $\overrightarrow{AD}=\overrightarrow{AC}+\frac{1}{4}\overrightarrow{CB}$ B1 : $\overrightarrow{BD}=\frac{3}{4}\overrightarrow{BC}$ **or** $\overrightarrow{BC}=\begin{pmatrix}8\\-4\end{pmatrix}$ **OR** $\overrightarrow{CD}=\frac{1}{4}\overrightarrow{CB}$ **or** $\overrightarrow{CB}=\begin{pmatrix}-8\\4\end{pmatrix}$	$9\underset{\sim}{i}+4\underset{\sim}{j}$ **or** $\begin{pmatrix}9\\4\end{pmatrix}$	3
17	(*a*) B1 : $7\theta=16\cdot8$ (*b*) B1 : $A=\frac{1}{2}(7)^2(2\cdot4-\sin 2\cdot4)$	(*a*) $\theta=2\cdot4rad$ (*b*) $A=$ $42\cdot25\,\text{cm}^2$	2 2
18	B3 : $19\cdot47^\circ,\ 90^\circ,\ 160\cdot53^\circ,\ 270^\circ$ (any 2 correct answer) B2: $\cos x=0$ **or** $\sin x=\frac{1}{3}$ B1: $3\,(\ 2\sin x\cos x\ )$	$19\cdot47^\circ,\ 90^\circ,\ 160\cdot53^\circ,\ 270^\circ$	4
19	B2 : $2\,(5)\ -\ (-2\,)$ B1 : $2\int_1^3 f(x)\,dx-\int_1^3 g(x)\,dx$ **or** $2(5)$ **or** $(-2\,)$	12	3
20	(*a*) B1 : $\frac{dy}{dx}=\frac{2(x-3)-(2x+1)}{(x-3)^2}$ (*b*) B1 : $\delta x=0\cdot01$ **or** $\delta y=-7(0\cdot01)$	(*a*) -7 (*b*) $-0\cdot07$	2 2
21	B3 : $x=1$ B2 : $8x^3-1=7$ B1 : gradient = 7 **or** $8x^3-1$	$(1,\ 1)$	4

Question	Solution/ Marking Scheme	Answer	Marks
22	B2: $\frac{18+10}{7}$ B1: $\sqrt{\frac{144}{6}-\left(\frac{\sum x}{6}\right)}=\sqrt{15}$ **or** $\sum x=18$ **or** $\bar{x}=3$	4	3
23	B2 : ${}^{3}P_{2} \times {}^{4}P_{3}$ B1 : ${}^{3}P_{2}$ **or** ${}^{4}P_{3}$	144	3
24	(*a*) B1 : $\frac{3}{7}\times\frac{2}{5}$ (*b*) B1 : $1-\left(\frac{4}{7}\times\frac{3}{5}\right)$ **OR** $\left(\frac{3}{7}\times\frac{3}{5}\right)+\left(\frac{4}{7}\times\frac{2}{5}\right)+\left(\frac{3}{7}\times\frac{2}{5}\right)$	(*a*) $\frac{6}{35}$ (*b*) $\frac{23}{35}$	2 2
25	(*a*) B1 : $\frac{65-62}{3}$ (*b*) B1 : $\frac{k-62}{3}=-0.5$	(*a*) 0.1587 (*b*) 60.5	2 2

END OF MARKING SCHEME

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM

TAHUN 2011

MATA PELAJARAN

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 your marks.*
5. *The diagrams provided are not drawn according to scale unless stated.*
6. *The marks allocated for each question and sub - part of a question are shown in brackets.*
7. *You may use a* ***non-programmable*** *scientific calculator.*
8. *A list of formulae is provided in page* 2 *and* 3.

This question paper consists of **20** printed pages.

Section A
Bahagian A

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

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

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

$$x + 2y = 3$$
$$x^2 + 4y^2 = 5$$

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

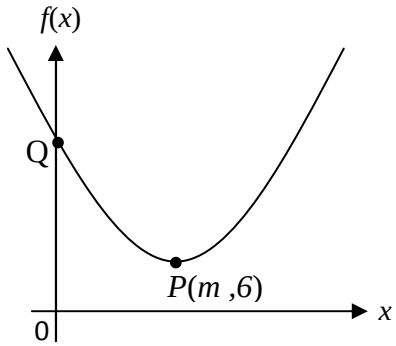
2 (a) Sketch the graph of $y = 3\cos 2x + 1$ for $0 \leq x \leq \pi$. [4 *marks*]

(b) Hence using the same axes, sketch a suitable straight line to find the number of solutions to the equation $\pi \cos 2x = x - \pi$ for $0 \leq x \leq \pi$.
State the number of solutions. [3 *marks*]

(a) *Lakar graf bagi* $y = 3\,kos\,2x + 1$ *untuk* $0 \leq x \leq \pi$. [4 *markah*]

(b) *Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan* $\pi\,kos\,2x = x - \pi$ *untuk* $0 \leq x \leq \pi$.
Nyatakan bilangan penyelesaian itu. [3 *markah*]

3 The diagram shows the curve of a quadratic function $f(x) = 2x^2 + 4x + k$. The curve has a minimum point $P(m, 6)$ and intersects the $f(x)$-axis at point Q.



(a) Find
(i) the value of k,
(ii) the value of m.
[4 *marks*]

(b) State the coordinates of Q. [1 *marks*]

(c) Determine the range of values of x, if $f(x) > 8$. [3 *marks*]

Rajah di atas menunjukkan lengkung bagi suatu fungsi kuadratik $f(x) = 2x^2 + 4x + k$. *Lengkung itu mempunyai titik minimum pada* $P(m, 6)$ *dan memotong paksi-*$f(x)$ *pada titik* Q.

(a) Cari

(i) nilai bagi k,
(ii) nilai bagi m.
[4 *markah*]

(b) Nyatakan koordinat Q. [1 *markah*]

(c) Tentukan julat nilai x, jika $f(x) > 8$. [3 *markah*]

4 The table shows the frequency distribution of the marks of a group of students.

Jadual menunjukkan taburan kekerapan markah bagi sekumpulan murid.

Marks *Markah*	Number of students *Bilangan murid*
30 – 39	8
40 – 49	19
50 – 59	13
60 – 69	6
70 – 79	4

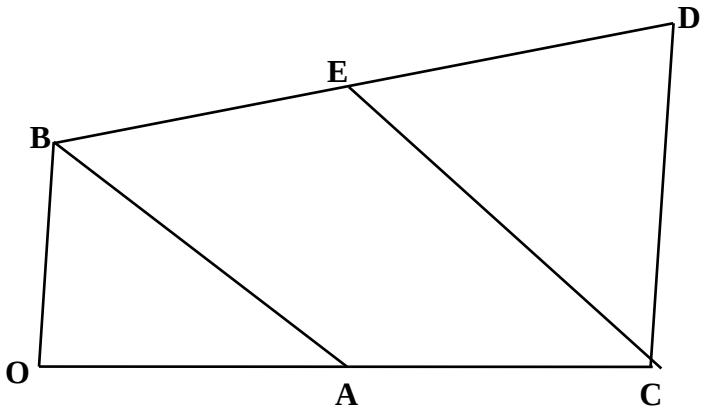
(a) Without drawing an ogive, find the median of the marks. [4 marks]

(b) Calculate the variance of the marks. [3 marks]

(a) Tanpa melukis ogif, cari median bagi markah itu. [4 *markah*]

(b) Hitungkan varians bagi markah itu. [3 *markah*]

5



The diagram above shows quadrilateral *OCDB*. It is given that $\overrightarrow{OA} = 3\underset{\sim}{a}$ and $\overrightarrow{OB} = 2\underset{\sim}{b}$. *AB* is parallel to *CE*, $OA = \frac{1}{2}OC$, *BD* = *2BE* and $CD = \frac{3}{2}OB$.

(a) Express in terms of $\underset{\sim}{a}$ and / or $\underset{\sim}{b}$:

(i) $\overrightarrow{OD}$,

(ii) $\overrightarrow{BE}$.

[4 *marks*]

(b) Given $\overrightarrow{AE} = h\underset{\sim}{a} + k\underset{\sim}{b}$, where *h* and *k* are constants, find the value of *h* and of *k*.

[3 *marks*]

Rajah di atas menunjukkan sisi empat OCDB. Diberi bahawa $\overrightarrow{OA} = 3\underset{\sim}{a}$ *dan* $\overrightarrow{OB} = 2\underset{\sim}{b}$. *AB adalah selari dengan CE,* $OA = \frac{1}{2}OC$, *BD = 2 BE dan* $CD = \frac{3}{2}OB$.

(a) Ungkapkan dalam sebutan $\underset{\sim}{a}$ *dan / atau* $\underset{\sim}{b}$ *:*

(i) $\overrightarrow{OD}$,

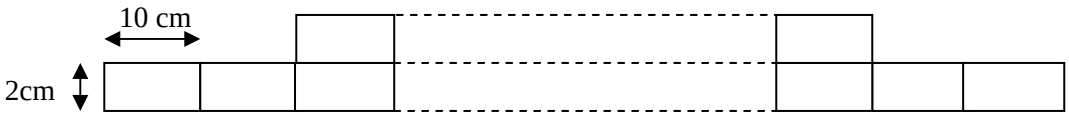
(ii) $\overrightarrow{BE}$.

[4 *markah*]

(b) Diberi $\overrightarrow{AE} = h\underset{\sim}{a} + k\underset{\sim}{b}$ *,dengan keadaan h dan k ialah pemalar, cari nilai h dan k.*

[3 *markah*]

6



The diagram shows part of an arrangement of a structure made up of rectangular bricks. The lowest row has 60 bricks. For each of the other rows, the number of bricks is 4 less than in the row below. The width of each brick is 5 cm.

(a) Find the number of rows of the structure. [3 *marks*]

(b) Calculate

(i) the total number of bricks in the structure,

(ii) the total volume of the structure.

[4 *marks*]

Rajah di atas menunjukkan sebahagian daripada susunan suatu struktur yang terdiri daripada bata-bata yang berbentuk segi empat tepat. Baris yang paling bawah mempunyai 60 *ketul bata. Bagi setiap baris berikutnya, bilangan bata adalah* 4 *ketul kurang daripada baris yang di bawahnya. Lebar setiap ketul bata ialah* 5 cm.

(a) Cari bilangan baris bagi struktur itu. [3 *markah*]

(b) Hitungkan

(i) jumlah bilangan bata bagi struktur itu,

(ii) jumlah isipadu bagi struktur itu.

[4 *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 question.
Gunakan kertas graf untuk menjawab soalan ini.

x	2	4	6	7	8	9
y	4.5	12.5	27.0	38.0	52.0	69.3

The table shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = px + qx^3$, where p and q are constants.

(a) Plot $\frac{y}{x}$ against x^2, using a scale of 2 cm to 10 units on the x^2-axis and 2 cm to 1 unit on the $\frac{y}{x}$-axis. Hence draw the line of best fit. [4 *marks*]

(b) Use your graph in 7(a) to find the value of

(i) p,

(ii) q,

(iii) y when $x = 5$. [6 *marks*]

Jadual menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = px + qx^3$, *dengan keadaan p dan q ialah pemalar.*

(a) *Plot* $\frac{y}{x}$ *melawan* x^2, *dengan menggunakan skala* 2 cm *kepada* 10 *unit pada paksi-*x^2 *dan* 2 cm *kepada* 1 *unit pada paksi-*$\frac{y}{x}$. *Seterusnya, lukis garis lurus penyuaian terbaik.* [4 *markah*]

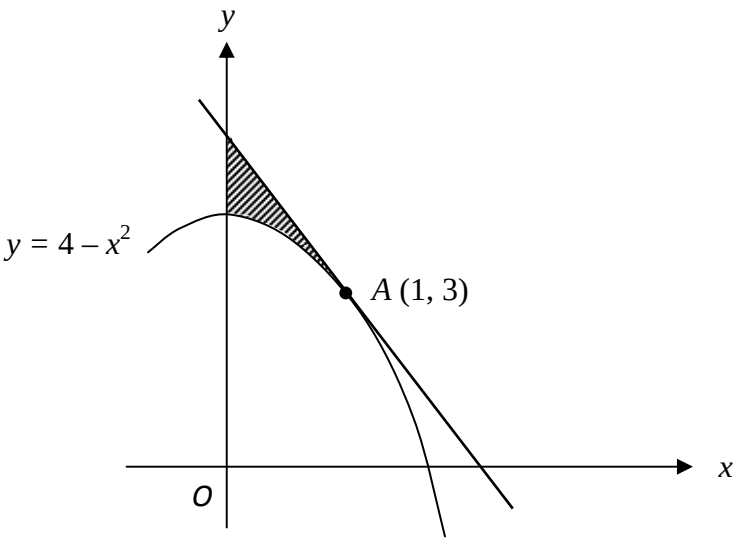
(b) *Gunakan graf di* 7(a) *untuk mencari nilai*

(i) p,

(ii) q,

(iii) y *apabila* $x = 5$. [6 *markah*]

8



The diagram shows part of the curve $y = 4 - x^2$ and the tangent to the curve at the point $A(1, 3)$.

Find

(*a*) the equation of the tangent at *A*, [3 *marks*]

(*b*) the area of the shaded region, [3 *marks*]

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

Rajah menunjukkan sebahagian daripada lengkung $y = 4 - x^2$ *dan tangen kepada lengkung itu pada* $A(1, 3)$.

Cari

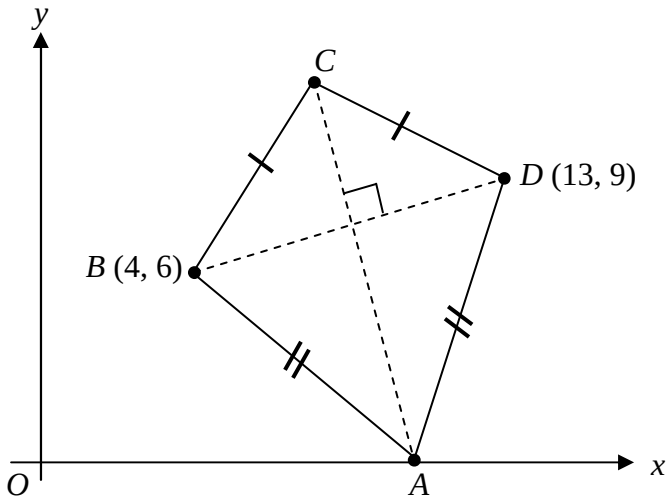
(*a*) *persamaan tangen pada A,* [3 *markah*]

(*b*) *luas rantau yang berlorek,* [3 *markah*]

(*c*) *isipadu kisaran, dalam sebutan* π, *apabila rantau yang dibatasi oleh lengkung, paksi-x dan paksi-y, dikisarkan melalui* 360^o *pada paksi-x.* [4 *markah*]

9 Solution by scale drawing is not accepted.

Penyelesaian secara lukisan berskala tidak diterima.



The diagram shows a quadrilateral *ABCD* in the shape of a kite with $AB = AD$ and $CB = CD$. Point A lies on the x-axis and the equation of BC is $y = 2x - 2$. A point $P(x, y)$ moves such that $PB = PD$.

(*a*) Describe the locus of P. [1 *mark*]

(*b*) Find

(i) the equation of AC, [3 *marks*]

(ii) the coordinates of C, [2 *marks*]

(iii) the area, in unit^2, of triangle ABC. Hence, state the area, in unit^2, of quadrilateral $ABCD$. [4 *marks*]

Rajah menunjukkan sebuah sisi empat ABCD dalam bentuk layang-layang dengan $AB = AD$ *dan* $CB = CD$. *Titik* A *terletak pada paksi-x dan persamaan BC ialah* $y = 2x - 2$. *Suatu titik* $P(x, y)$ *bergerak dengan keadaan* $PB = PD$.

(*a*) *Huraikan lokus P.* [1 *markah*]

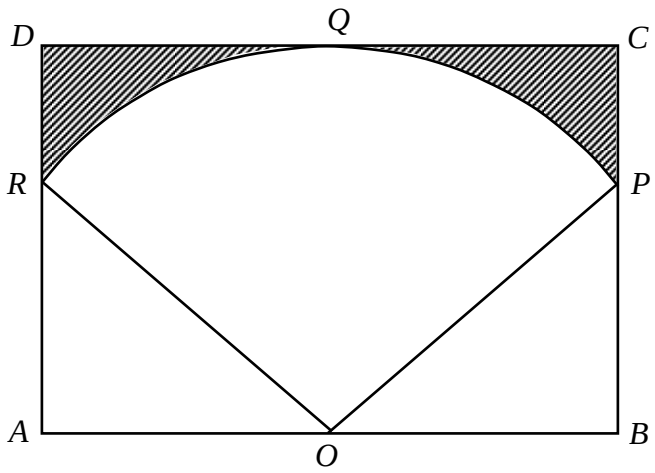
(*b*) *Cari*

(i) *persamaan AC,* [3 *markah*]

(ii) *koordinat C,* [2 *markah*]

(iii) *luas , dalam* unit^2, *bagi segi tiga ABC. Seterusnya, nyatakan luas, dalam* unit^2, *bagi sisi empat ABCD.* [4 *markah*]

10



The diagram shows a sector *OPQR* with centre *O* inscribed in a rectangle *ABCD*.
Given *AB* = 20 cm and *BC* = 15 cm.
[Use $\pi = 3.142$]

Calculate

(*a*) $\angle POR$, in radians, [2 *marks*]

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

(*c*) the area, in cm^2, of the shaded region. [4 *marks*]

Rajah menunjukkan sebuah sektor OPQR dengan pusat O terterap dalam sebuah segi empat tepat ABCD. Diberi bahawa AB = 20 cm *dan BC* = 15 cm.
[*Guna* $\pi = 3.142$]

Hitung

(*a*) $\angle POR$, *dalam radian*, [2 *markah*]

(*b*) *perimeter, dalam* cm, *kawasan berlorek,* [4 *markah*]

(*c*) *luas, dalam* cm^2, *kawasan berlorek.* [4 *markah*]

11 (*a*) 250 students were involved in a test and the passing rate is 80%.

(i) If a random sample of 8 students are chosen, find the probability that at most 2 students had failed the test.

(ii) Find the standard deviation for the number of students who passed the test.

[5 *marks*]

(*b*) The mass of printing papers for greeting cards has a normal distribution with a mean of 110 gsm and a standard deviation of 4 gsm. Each pile of printing papers contains 480 sheets.

(i) Find the probability that a piece of printing paper chosen at random has a mass between 100 gsm and 120 gsm.

(ii) Any paper weighing less than 100 gsm is considered unfit for printing purposes. Calculate the number of printing papers rejected from each pile. [5 *marks*]

(*a*) 250 *orang pelajar terlibat dalam suatu ujian dan didapati kadar kelulusan ialah* 80%.

(i) *Jika suatu sampel rawak seramai* 8 *orang pelajar dipilih, cari kebarangkalian selebih-lebihnya* 2 *orang pelajar telah gagal dalam ujian itu.*

(ii) *Cari sisihan piawai bagi bilangan pelajar yang lulus ujian itu.*

[5 *markah*]

(*b*) *Jisim kertas cetak untuk kad ucapan adalah mengikut taburan normal dengan min* 110 gsm *dan sisihan piawai* 4 gsm. *Setiap bungkusan kertas cetak itu mengandungi* 480 *helai kertas.*

(i) *Cari kebarangkalian bahawa sehelai kertas cetak yang dipilih secara rawak mempunyai jisim antara* 100 gsm *dan* 120 gsm.

(ii) *Sebarang kertas dengan jisim kurang daripada* 100 gsm *dianggap sebagai tidak sesuai bagi tujuan pencetakan. Hitung bilangan kertas cetak yang ditolak dari setiap bungkusan kertas itu.*

[5 *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 has a velocity, v ms^{-1}, given by $v = 15t - 3t^2$, where t is the time, in seconds, after leaving O.

[Assume motion to the right is positive]

Find

(a) the range of values of t during which the particle moves to the left, [2 *marks*]

(b) the maximum velocity, in ms^{-1}, of the particle, [4 *marks*]

(c) the total distance, in m, travelled by the particle in the first 6 seconds. [4 *marks*]

Satu zarah bergerak di sepanjang suatu garis lurus melalui satu titik tetap O. Halaju zarah itu, v ms^{-1}, *diberi oleh* $v = 15t - 3t^2$, *dengan keadaan t ialah masa, dalam s, selepas melalui O.*

[*Anggapkan gerakan ke arah kanan sebagai positif*]

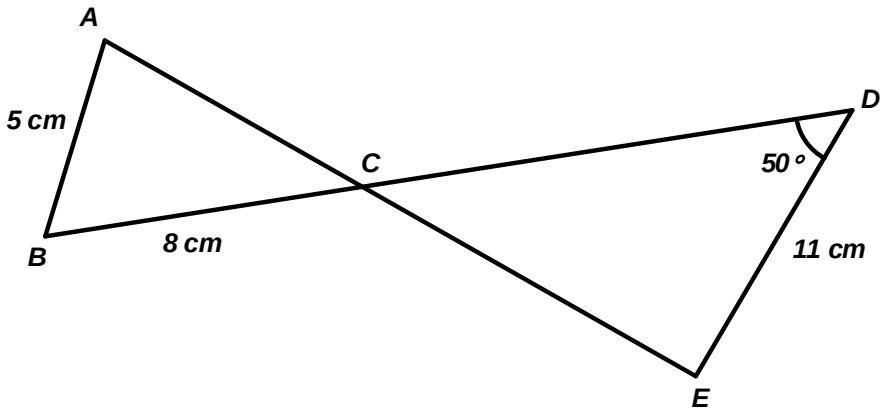
Cari

(a) julat nilai t ketika zarah itu bergerak ke kiri, [2 *markah*]

(b) halaju maksimum, dalam ms^{-1}, *zarah itu,* [4 *markah*]

(c) jumlah jarak, dalam m, *yang dilalui oleh zarah itu dalam* 6 *saat pertama.* [4 *markah*]

13 The diagram below shows triangle *ABC* and triangle *CDE* where *ACE* and *BCD* are straight lines. Given that the area of triangle *ABC* is 18 cm^2.



Calculate

(a) $\angle ABC$, [2 *marks*]

(b) the length, in cm, of *AC*, [2 *marks*]

(c) the length, in cm, of *CE*, given $\angle BAC$ is 75°, [3 *marks*]

(d) the area, in cm^2, of triangle *CDE*. [3 *marks*]

Rajah di atas menunjukkan segi tiga ABC dan segi tiga CDE dengan keadaan ACE dan BCD ialah garis lurus. Diberi bahawa luas segi tiga ABC ialah 18 cm^2.

Hitung

(a) $\angle ABC$, [2 *markah*]
(b) *panjang, dalam* cm, *bagi AC*, [2 *markah*]
(c) *panjang, dalam* cm, *bagi CE, diberi bahawa* $\angle BAC$ *ialah* 75°, [3 *markah*]
(d) *luas, dalam* cm^2, *bagi segi tiga CDE.* [3 *markah*]

14 Use graph paper to answer this question.

A school choir wants to recruit members for a competition. There are x boys and y girls joining the choir. However, the number of choir members is based on the following constraints:

I The total number of choir members is at least 35.

II The number of boys in the choir is at most 19.

III The number of girls in the choir is not more than twice the number of boys.

(a) Write down three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints. [3 *marks*]

(b) Using a scale of 2 cm to 5 members on both axes, construct and shade the region ***R*** which satisfies all of the above constraints. [3 *marks*]

(c) Using the graph constructed in **14**(*b*), find

(i) the range for the number of boys in the choir if there are 20 girls joining the choir.

(ii) the maximum total subsidy on uniform if the school subsidises RM20 for a boy's uniform and RM25 for a girl's uniform.

[4 *marks*]

Gunakan kertas graf untuk menjawab soalan ini.

Pasukan koir sebuah sekolah ingin memilih ahlinya untuk menyertai suatu pertandingan. Terdapat x *bilangan lelaki dan* y *bilangan perempuan menyertai pasukan koir tersebut. Walau bagaimanapun, bilangan ahli dalam pasukan koir adalah berdasarkan kekangan berikut:*

I *Jumlah ahli koir sekurang-kurangnya* 35.

II *Bilangan maksimum lelaki dalam pasukan koir adalah* 19.

III *Bilangan perempuan dalam pasukan koir tidak melebihi dua kali ganda bilangan lelaki.*

(a) Tuliskan tiga ketaksamaan, selain $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.* [3 *markah*]

(b) Menggunakan skala 2 cm *kepada* 5 *ahli pada kedua-dua paksi, bina dan lorek rantau* ***R*** *yang memenuhi semua kekangan di atas.* [3 *markah*]

(c) Dengan menggunakan graf yang dibina di **14***(b), cari*

(i) julat bilangan lelaki dalan pasukan koir, jika bilangan perempuan yang menyertai pasukan koir adalah 20.

(ii) jumlah maksimum subsidi uniform jika sekolah memberi subsidi sebanyak RM20 *bagi satu unit uniform lelaki dan sebanyak* RM25 *bagi satu unit uniform perempuan.*

[4 *markah*]

15 The table shows the price indices and respective weightages for four different materials, *P*, *Q*, *R* and *S*, used in the production of a type of perfume.

Material *Bahan*	Price index in the year 2009 based on the year 2008 *Indeks harga dalam tahun* 2009 *berasaskan tahun* 2008	Weightage *Pemberat*
P	*n*	3
Q	110	5
R	125	4
S	109	*w* + 2

(a) The price of material *P* is increased by 16% from the year 2008 to the year 2009. Find the value of *n*. [1 *mark*]

(b) The price of material *Q* is RM60.50 in the year 2009, calculate its price in the year 2008. [2 *marks*]

(c) Given the price index of material *R* in the year 2010 based on the year 2008 is 140. Find its price index in the year 2010 based on the year 2009. [2 *marks*]

(d) The composite index for the production cost of the perfume in the year 2009 based on the year 2008 is 114.

Calculate

(i) the value of *w*,

(ii) the price of the perfume in the year 2009, if the corresponding price in the year 2008 is RM150.

[5 *marks*]

Jadual di sebelah menunjukkan indeks harga dan pemberat masing-masing bagi empat bahan P, Q, R dan S dalam penghasilan suatu jenis pewangi.

(a) *Harga bagi bahan P bertambah sebanyak* 16% *dari tahun* 2008 *ke tahun* 2009. *Hitungkan nilai n.* [1 *markah*]

(b) *Harga bagi bahan Q pada tahun* 2009 *ialah* RM60.50. *Hitungkan harganya pada tahun* 2008. [2 *markah*]

(c) *Diberi indeks harga bagi bahan R dalam tahun* 2010 *berasaskan tahun* 2008 *ialah* 140. *Hitungkan indeks harganya dalam tahun* 2010 *berasaskan tahun* 2009. [2 *markah*]

(d) *Indeks gubahan untuk kos pengeluaran pewangi itu pada tahun* 2009 *berasaskan tahun* 2008 *ialah* 114.

Hitung

(i) *nilai w,*

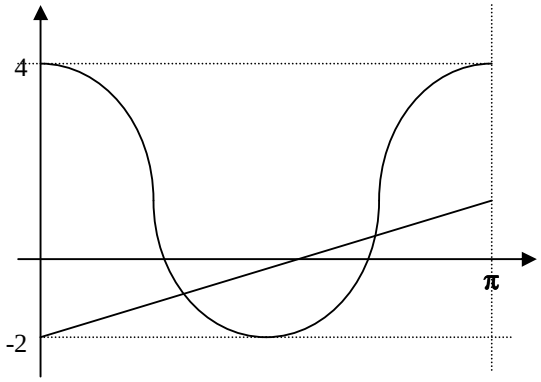
(ii) *harga bagi pewangi itu pada tahun* 2009, *jika harga sepadan pada tahun* 2008 *ialah* RM150.

[5 *markah*]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

MARKING SCHEME
ADDITIONAL MATHEMATICS PAPER 2

N0.	SOLUTION	MARKS
1	$x= 3 -2y$ $2y^2 -3y +1 =0$ $(2y – 1)(y – 1) = 0$ $y = ½$ and $y = 1$ (both) $x = 2$ and $x = 1$ (both)	**P1** **K1 Eliminate y** **K1 Solve quadratic equation** **N1** **N1**
		5
2 **(a)**		**P1 cos shape correct.** **P1 Amplitude = 6 [Maximum = 4 and Minimum = -2]** **P1 1 full cycle in $0 \leq x \leq \pi$** **P1 Shift up the graph**
(b)	$y = \frac{3x}{\pi} - 2$ **dr**aw the straight line $y = \frac{3x}{\pi} - 2$ Number of solutions = **2**	**N1 For equation** **K1 Sketch the straight line** **N1**
		7
3	$f(x)=2x^2+4x+k$ $= 2[(x+1)^2 – 1] + k$ $= 2(x+1)^2 – 2 + k$	**K1 Use completing the square**
(a)	$x= -1$ or $-2 + k = 6$ $m = -1$ $k = 8$	**K1** **N1 N1**
(b)	$Q(0 , 8)$	**P1**
(c)	$f(x) > 8$ $2x^2+4x+8 > 8$ $x(x+2)>0$ $x<-2$ and $x>0$ (both)	**K1** **K1** **N1**
		8

4 **(a)** **(b)**	Median = $39.5 + \left[\frac{\frac{1}{2}(50)-8}{19}\right](10)$ $= 48.45$ $\sum f = 50, \quad \sum fx = 2515$ $\sum fx^2 = 132922.5$ $\partial^2 = \frac{132922.5}{50} - \left(\frac{2515}{50}\right)^2$ $= 128.36$	**P1 for L=39.5 or F=8 or f_m=19** **K1 use correct formula** **N1** **K1 for $\sum fx^2 = 132922.5$** **K1 using formula** **N1**
		6
5 **(a)** **(i)** **(ii)** **(b)**	$\overrightarrow{OD} = \overrightarrow{OC} + \overrightarrow{CD}$ $= 6\underset{\sim}{a} + 3\underset{\sim}{b}$ $\overrightarrow{BE} = \frac{1}{2}\overrightarrow{BD}$ $= 3\underset{\sim}{a} + \frac{1}{2}\underset{\sim}{b}$ $\overrightarrow{AE} = \overrightarrow{AB} + \overrightarrow{BE}$ $= -3\underset{\sim}{a} + 2\underset{\sim}{b} + 3\underset{\sim}{a} + \frac{1}{2}\underset{\sim}{b}$ $= \frac{5}{2}\underset{\sim}{b}$ h=0, k=$\frac{5}{2}$	**K1** **N1** **K1** **N1** **K1** **N1 N1**
		7
6 **(a)** **(b)**	a + (n – 1)d = 60 or 60 + (n – 1)(-4) = 4 4 + (n – 1)4 = 60 n = 15 n= 15 i) $S_{15} = \frac{15}{2}[\ 2(4) + 14(4)\ ]$ = 480 ii) V= 480(2x5x10) = 48000	**P1 for a = 4 or d =4** **K1 Use T_n = a + (n-1)d** **N1** **K1 $S_n = \frac{n}{2}$ [2a + (n-1)d]** **N1** **K1** **N1**
		7

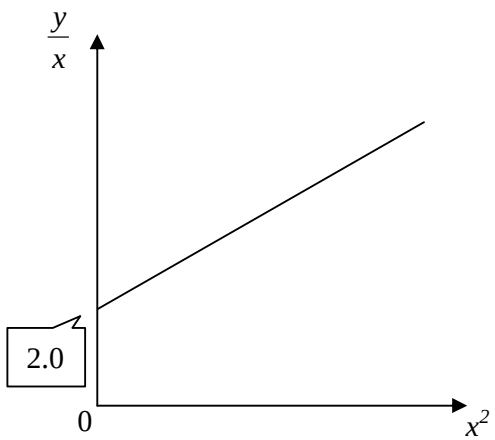
7

(a)

x^2	4	16	36	49	64	81
$\frac{y}{x}$	2.25	3.13	4.5	5.43	6.5	7.7

N1 **6 correct values of** $\frac{y}{x}$

(b)



K1 **Plot** $\frac{y}{x}$ **vs** x^2

Correct axes & uniform scale

N1 **6 points plotted correctly**

N1 **Line of best-fit**

(c) $\frac{y}{x} = p + qx^2$ **P1**

(i) y-intercept = p **K1**

$p = 2.0$ **N1**

(ii) gradient = q **K1**

$q = 0.07$ **N1**

(iii) $y = 18.5$ **N1**

10

N0.	SOLUTION	MARKS
8		
(a)	$\frac{dy}{dx} = -2x$	**K1**
	$y-3=-2(x-1)$	**K1 use eqn of str. line with m = –2**
	$y=-2x+5$	**N1**
(b)	$A = \int_0^1 [(-2x+5)-(4-x^2)]dx$	**K1 use** $\int (y_2-y_1)\,dx$
	$= \int_0^1 (1-2x+x^2)\,dx$	
	$= \left[x-x^2+\frac{x^3}{3}\right]_0^1$	**K1 integrate correctly**
	$= \frac{1}{3}$	**N1**
	Note : If use area of trapezium and $\int y\,dx$ ***, give marks accordingly.***	
(c)	$V = \pi\int_0^2 (4-x^2)^2\,dx$	**K1 integrate** $\pi\int y^2\,dx$
	$= \pi\int_0^2 (16-8x^2+x^4)\,dx$	**K1 correct limit**
	$= \pi\left[16x-\frac{8x^3}{3}+\frac{x^5}{5}\right]_0^2$	**K1 integrate correctly**
	$= 17\frac{1}{15}\pi$ or **17.07π**	**N1**
		10

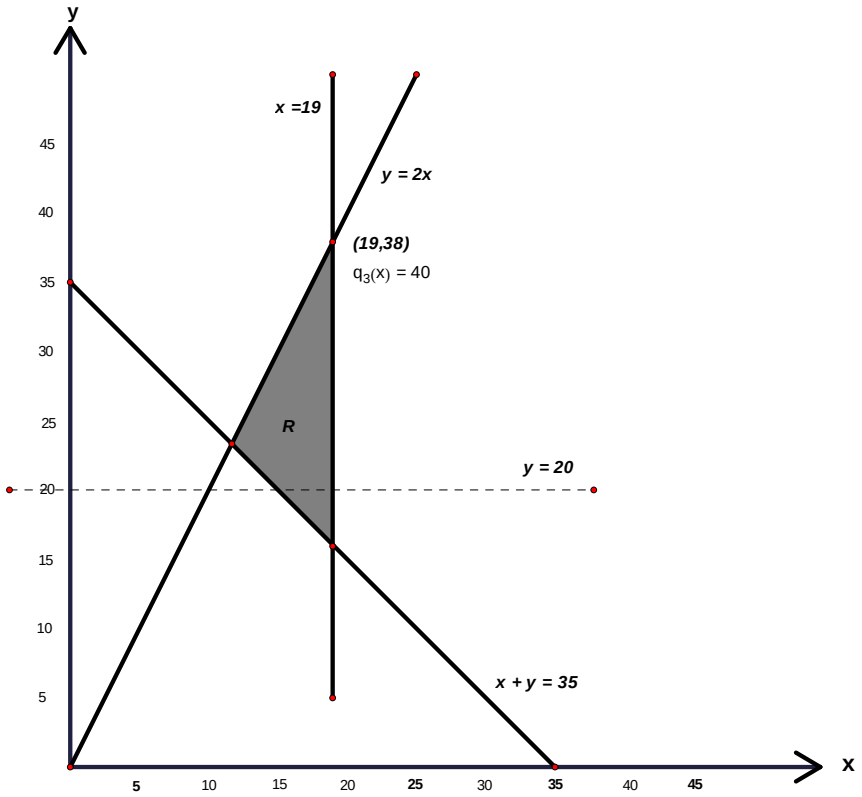
N0.	SOLUTION	MARKS
9		
(a)	Straight line AC ***or*** perpendicular bisector of BD	**P1**
(b)	$\sqrt{(x-4)^2+(y-6)^2} = \sqrt{(x-13)^2+(y-9)^2}$	**K1 Use distance formula**
	$x^2 - 8x + 16 + y^2 - 12y + 36 = x^2 - 26x + 169 + y^2 - 18y + 81$	**K1 expend correctly**
	$3x + y - 33 = 0$	**N1**
	Note : If use mid-point of BD and gradient of AC to find equation of AC, give marks accordingly	
(c)	$2x - 2 = -3x + 33$	**K1 solving simultaneous equations**
	$C(7, 12)$	**N1**
(d)	$A(11, 0)$	**N1**
	Area of $\Delta = \frac{1}{2}\begin{vmatrix} 11 & 7 & 4 & 11 \\ 0 & 12 & 6 & 0 \end{vmatrix}$	**K1 use area formula correctly**
	$= \frac{1}{2}[(132+42)-(48+66)]$	
	$= 30 \text{ unit}^2$	**N1**
	Area of quadrilateral = 60 unit^2	**N1**
		10

N0.	SOLUTION	MARKS
10. **(a)**	sin $\angle POQ = \frac{10}{15}$ ***or*** $20^2 = 15^2 + 15^2 - 2(15)(15)\cos\angle POR$	**K1 Use ratio of trigonometry or equivalent**
	$\angle POR$ = 1.46 rad.	**N1**
(b)	PQR = 15 (1.46) = 21.9 cm	**K1 Use** $s = r\theta$
	$\sqrt{15^2 - 10^2}$ = 11.18 cm	**P1**
	perimeter = 21.9 + 20 + 2 (15 – 11.18)	**K1**
	= 49.54 cm	**N1**
(c)	Area of sector $OPQR$ = $\frac{1}{2}(15)^2(1.46)$ = 164.25 cm^2	**K1 Use formula** $A = \frac{1}{2}r^2\theta$
	Area of triangle OBP = $\frac{1}{2}(10)\times 11.18_{nya}$ = 55.9 cm^2	**N1**
	Area of shaded region	**K1**
	= 20×15 – 164.25 – 2 (55.9)	
	= 23.95 cm^2	**N1**
		10

N0.	SOLUTION	MARKS
11		
(a)	$p = 0.8, \quad n = 8$	
(i)		
	$P(X \geq 6) = P(X=6) + P(X=7) + P(X=8)$	**K1**
	$= {}^8C_6 (0.8)^6 (0.2)^2 + {}^8C_7 (0.8)^7 (0.2)^1 + {}^8C_8 (0.8)^8 (0.2)^0$	**K1 Use** $P(X=r) = {}^nC_r \; p^r \; q^{n-r}$
	$= 0.7969$	**N1**
(ii)	$n = 250, \quad p = 0.8, \quad q = 0.2$	
	$\sigma = \sqrt{250 \times 0.8 \times 0.2}$	**K1 use** $\sigma = \sqrt{n\,p\,q}$
	$= 6.32$	**N1**
(b)	$\mu = 110, \; \sigma = 4$	
(i)	$P(100 \leq X \leq 120) = P(\frac{100-110}{4} \leq Z \leq \frac{120-110}{4})$	**K1 Use Z =** $\frac{X-\mu}{\sigma}$
	$= P(-2.5 \leq Z \leq 2.5)$	
	$= 1 - 2\,(0.00621)$	**K1 Use 1 – 2[Q(Z)]**
	$= 0.9876$	**N1**
(ii)	0.00621×480	**K1**
	$= 2.98$ or 3	**N1**
		10

N0.	SOLUTION	MARKS
12 (a)	$v < 0$	
	$15t - 3t^2 < 0$	K1
	$\boldsymbol{t > 5}$	N1
(b)	$a = 0$	
	$15 - 6t = 0$	K1
	$\boldsymbol{t} = \frac{5}{2}$	N1
	$V_{max} = 15\left(\frac{5}{2}\right) - 3\left(\frac{5}{2}\right)^2$	K1
	$= \mathbf{18.75\ ms^{-1}}$	N1
(c)	$\textit{Total dis}\tan\textit{ce} = \int_0^5 v\,dt + \left\lvert\int_5^6 v\,dt\right\rvert$	K1 for $\int_0^5$ and $\int_5^6$
	$= \left[\frac{15}{2}t^2 - t^3\right]_0^5 + \left\lvert\left[\frac{15}{2}t^2 - t^3\right]_5^6\right\rvert$	K1 (for Integration; either one)
	$= \left[\left(\frac{15}{2}(5)^2 - (5)^3\right) - (0)\right] + \left\lvert\left[\left(\frac{15}{2}(6)^2 - (6)^3\right) - \left(\frac{15}{2}(5)^2 - (5)^3\right)\right]\right\rvert$	K1 (for use and summation)
	$= \mathbf{71}\,\text{m}$	N1
		10

N0.	SOLUTION	MARKS
13 (a)	$18 = \frac{1}{2}(5)(8)\sin\angle ABC$	K1
	$\angle ABC = 64.16^o$ or $64^o 9'$	N1
(b)	$AC^2 = 5^2 + 8^2 - 2(5)(8)\cos 64.16^o$	K1
	$AC = 7.36$ cm	N1
(c)	$\angle DCE = 180° - 75° - 64.16° = 40.84°$	N1
	$\frac{CE}{Sin50^0} = \frac{11}{Sin40.84^0}$	K1
	$CE = 12.89$ cm	N1
(d)	$\angle CED = 180° - 50° - 40.84° = 89.16°$	N1
	$Area\ \Delta CDE = \frac{1}{2}(12.89)(11)\sin 89.16^0$	K1
	$= 70.89\ cm^2$	N1
		10

N0.	SOLUTION	MARKS
14		
(a)	$x + y \geq 35$	N1
	$x \leq 19$	N1
	$y \leq 2x$	N1
(b)		
	• At least one straight line is drawn correctly from inequalities involving x and y.	K1
	• All the three straight lines are drawn correctly.	N1
	• Region is correctly shaded.	N1
(c)		
(i)	**$15 \leq x \leq 19$**	N1
(ii)	Maximum point **(**19, 38**)**	N1
	Maximum profit = 20(19) + 25(38)	K1
	= **RM 1330**	N1
		10

N0.	SOLUTION	MARKS
15		
(a)	**116**	N1
(b)	$\frac{60.50}{P_{08}} \times 100 = 110$	K1
	$P_{08} = RM\,55$	N1
(c)	$I_{\frac{10}{09}} = \frac{140}{125} \times 100$	K1
	$= 112$	N1
(d)(i)	$(116\times3) + (110\times5) + (125\times4) + 109(w + 2)$	K1
	$114 = \frac{(116\times3)+(110\times5)+(125\times4)+109(w+2)}{14+w}$	K1 (use formula)
	$114w + 1596 = 348 + 550 + 500 + 109w + 218$	
	$w = 4$	N1
(ii)	$P_{09} = \frac{114}{100} \times 150$	K1
	$= RM\,171$	N1
		10

END OF MARKING SCHEME