Name : ……..……..…… Form : ……..……

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2014
MAJLIS PENGETUA SEKOLAH MALAYSIA (KEDAH)

ADDITIONAL MATHEMATICS
Kertas 1
Mei 2014
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	3	
2	4	
3	4	
4	3	
5	3	
6	2	
7	3	
8	3	
9	3	
10	3	
11	3	
12	2	
13	3	
14	3	
15	4	
16	3	
17	4	
18	4	
19	3	
20	3	
21	3	
22	3	
23	4	
24	3	
25	4	
TOTAL	**80**	

Kertas soalan ini mengandungi **19** halaman bercetak dan **1** halaman tidak 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 $(a^m)^n = a^{mn}$

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

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

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

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

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

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

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

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

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

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

2 Midpoint

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

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

4 $\hat{\underset{\sim}{r}} = \dfrac{x\underset{\sim}{i} + y\underset{\sim}{j}}{\sqrt{x^2 + y^2}}$

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

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

STATISTICS

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

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

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

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

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

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

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

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

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

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

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

12 Mean $\mu = np$

13 $\sigma = \sqrt{npq}$

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

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

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

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

1 Diagram 1 shows the relation between set X and set Y.

Rajah 1 *menunjukkan hubungan antara set X dan set Y.*

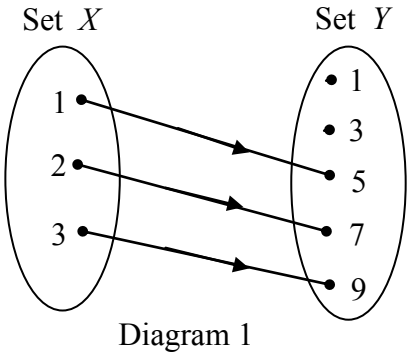


Diagram 1

Rajah 1

State
Nyatakan

(*a*) the image of 1,
imej bagi 1,

(*b*) the range of the relation,
julat bagi hubungan itu,

(*c*) the codomain of the relation.
kodomain bagi hubungan itu.

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

Answer/*Jawapan*:

(*a*)

(*b*)

(*c*)

1

3

For examiner's use only

2 Given function $f(x) = 3x + 2$ and $g(x) = 2x - 9$, find
Diberi fungsi $f(x) = 3x + 2$ *dan* $g(x) = 2x - 9$, *cari*
Cari

(*a*) $f^{-1}(x)$.
(*b*) $f^{-1}g(7)$.

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

Answer/*Jawapan*:

(a)

(b)

2

4

---

3 Given that the function $g(x) = 3x + 7$ and $fg(x) = 6x + 5$, find
Diberi fungsi $g(x) = 3x + 7$ *dan* $fg(x) = 6x + 5$, *cari*

(*a*) $fg(-2)$.
(*b*) $f(x)$.

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

Answer/*Jawapan*:

(a)

(b)

3

4

For examiner's use only

4 Solve the quadratic equation $2x^2 + 3 = 5(x + 1) + 2$. Give your answer correct to three decimal places.

Selesaikan persamaan kuadratik $2x^2 + 3 = 5(x + 1) + 2$. *Berikan jawapan anda betul kepada tiga tempat perpuluhan.*

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

Answer/*Jawapan*:

4
3

5 A quadratic equation $3x^2 + 4x - 6 = 0$ has roots α and β. Form the quadratic equation which has the roots 3α and 3β.

Persamaan kuadratik $3x^2 + 4x - 6 = 0$ *mempunyai punca-punca* α *dan* β. *Bentukkan persamaan kuadratik yang mempunyai punca-punca* 3α *dan* 3β.

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

Answer/*Jawapan*:

5
3

For examiner's use only

6 Given that the graph of the quadratic function $f(x)=(x-m)^2+3t-8$, where m and t are constants, has a minimum point at $(4,1)$. Find the value of m and t.

Diberi graf fungsi kuadratik $f(x)=(x-m)^2+3t-8$, *dengan keadaan* m *dan* t *ialah pemalar, mempunyai titik minimum di* $(4,1)$. *Cari nilai bagi* m *dan* t.

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

Answer/*Jawapan*:

6

2

---

7 Given that $f(x) = 3x^2 - 2x - 8$, find the range of values of x for $f(x)$ is negative.

Diberi $f(x) = 3x^2 - 2x - 8$, *cari julat nilai x untuk* $f(x)$ *ialah negatif.*

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

Answer/*Jawapan*:

7

3

For examiner's use only

8 Solve the equation :
Selesaikan persamaan :

$$3\left(5^{m+1}\right)-10\left(5^{m}\right)=625$$

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

Answer/*Jawapan*:

8

3

---

9 Solve the equation :
Selesaikan persamaan :

$$\log_3 y-\log_3(4-y)=1$$

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

Answer/*Jawapan*:

9

3

For examiner's use only

10 Solve the equation :
Selesaikan persamaan :

$$\log_2 x - 2\log_x 4 = 0$$

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

Answer/*Jawapan*:

10

3

---

11 The sum of the first *n* terms of an arithmetic progression is given by $S_n = 5n - 2n^2$. Find
Hasil tambah n sebutan pertama bagi suatu janjang aritmetik ialah $S_n = 5n - 2n^2$. *Cari*

(*a*) the first term of the progression.
sebutan pertama janjang itu.

(*b*) the common difference of the progression.
beza sepunya janjang itu.

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

Answer/*Jawapan*:

(*a*)

(*b*)

11

3

For examiner's use only

12 Given that the first three terms of a geometric progression are q, 6, $4q$. Find the possible values of q.

Diberi tiga sebutan pertama bagi satu janjang geometri ialah q, 6, $4q$. Cari nilai-nilai yang mungkin bagi q.

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

Answer/*Jawapan*:

12

2

---

13 Given the geometric progression $2, -\frac{4}{3}, \frac{8}{9}, \ldots$, find

Diberi janjang geometri $2, -\frac{4}{3}, \frac{8}{9}, \ldots$, *cari*

(*a*) the common ratio ,
nisbah sepunya ,

(*b*) the sum of the progression when $r^n \approx 0$.
hasil tambah janjang itu apabila $r^n \approx 0$.

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

Answer/*Jawapan*:

(*a*)

(*b*)

13

3

For examiner's use only

14 The variables x and y are related by equation $y = \frac{k}{3^x}$, where k is a constant.
Diagram 14 shows the straight line graph obtained by plotting $\log_{10} y$ against x.

Pemboleh ubah x *dan* y *dihubungkan oleh persamaan* $y = \frac{k}{3^x}$, *dengan keadaan k ialah pemalar*. Rajah 14 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $\log_{10} y$ *melawan* x.

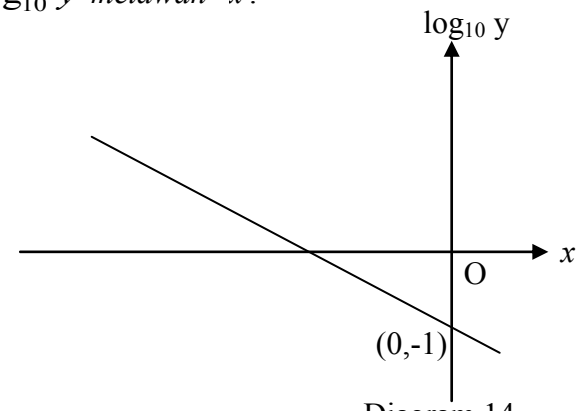


Diagram 14
Rajah 14

(*a*) Express the equation $y = \frac{k}{3^x}$ in linear form used to obtain the straight line graph shown in Diagram 14.
Ungkapkan persamaan $y = \frac{k}{3^x}$ *dalam bentuk linear yang digunakan untuk memperoleh graf garis lurus seperti ditunjukkan dalam* Rajah 14.

(*b*) Find the value of k.
Cari nilai k.

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

Answer/*Jawapan*:
(*a*)

(*b*)

14

3

For examiner's use only

15 The point $P(2, 5)$, $Q(-3, 1)$ and $R(m, -1)$ are the vertices of a triangle. Find the values of m if the area of the triangle PQR is 21 unit².

Titik-titik $P(2, 5)$, $Q(-3, 1)$ *dan* $R(m, -1)$ *ialah bucu-bucu sebuah segi tiga. Cari nilai-nilai bagi* m *jika luas bagi segi tiga PQR ialah* 21 *unit*².

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

Answer/*Jawapan*:

15

4

---

16 A point P moves such that its distance from point $A(-3, 4)$ is always twice its distance from point $B(6, -2)$. Find the equation of the locus of point P.

Titik P bergerak dengan keadaan jaraknya dari titik $A(-3, 4)$ *sentiasa dua kali ganda jaraknya dari titik* $B(6, -2)$. *Cari persamaan lokus bagi titik P.*

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

Answer/*Jawapan*:

16

3

For examiner's use only

17 Diagram 17 shows a circle with centre O. The radius of the circle is 2.5 cm and the area of the shaded region is 6.25 cm^2.

Rajah 17 *menunjukkan sebuah bulatan berpusat O. Diberi jejari bulatan ialah* 2.5 cm *dan luas kawasan berlorek ialah* 6.25 cm^2.

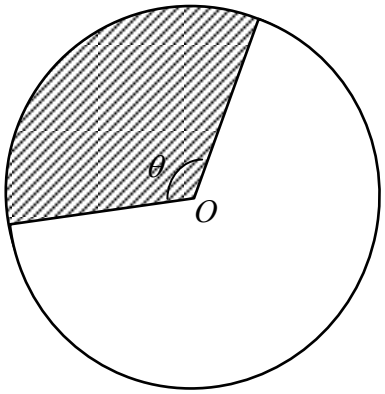


Diagram 17
Rajah 17

Calculate the perimeter of shaded region .

Hitungkan perimeter bagi kawasan berlorek .

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

Answer/*Jawapan*:

17

4

For examiner's use only

18 Diagram 18 shows a triangle, OAB , drawn on a Cartesian plane.
Rajah 18 *menunjukkan sebuah segitiga, OAB, dilukis pada suatu satah Cartesan.*

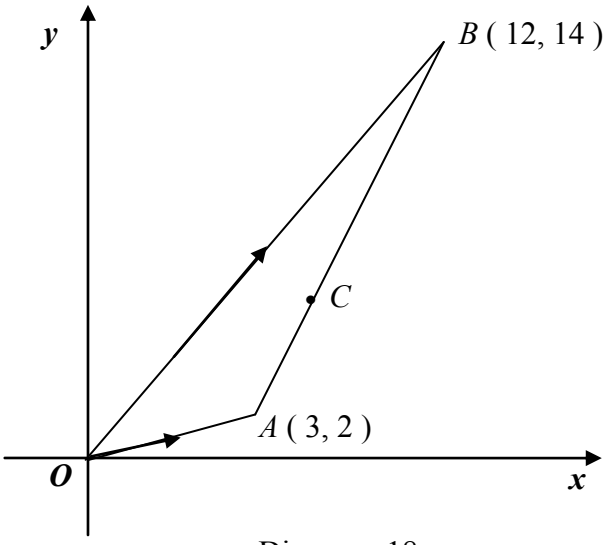


Diagram 18
Rajah 18

It is given that $\overrightarrow{AC} = \frac{1}{3}\overrightarrow{AB}$. Find

Diberi bahawa $\overrightarrow{AC} = \frac{1}{3}\overrightarrow{AB}$. *Cari*

(*a*) $\overrightarrow{AB}$

(*b*) the unit vector in the direction of $\overrightarrow{AC}$.
vektor unit dalam arah $\overrightarrow{AC}$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

18

4

For examiner's use only

19

Given that $\overrightarrow{OA} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ and $\overrightarrow{AB} = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$.

(*a*) Find $\overrightarrow{OB}$.

(*b*) State the coordinates of point B.

Diberi $\overrightarrow{OA} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ *dan* $\overrightarrow{AB} = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$.

(*a*) *Cari* $\overrightarrow{OB}$.

(*b*) *Nyatakan koordinat bagi titik* B.

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

Answer/*Jawapan*:

(*a*)

(*b*)

19

3

---

20 The mean of ten numbers is $\sqrt{p}$ and the sum of the squares is 70. The variance of the numbers is $4q$. Express p in terms of q.

Min bagi sepuluh nombor ialah $\sqrt{p}$ *dan hasil tambah kuasa dua nombor-nombor itu ialah* 70. *Varians nombor-nombor itu ialah* $4q$. *Ungkapkan p dalam sebutan q.*

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

Answer/*Jawapan*:

20

3

For examiner's use only

21 Find the equation of a straight line that passes through the point $(3, 1)$ and perpendicular to the straight line $2y + 3x = 16$.

Cari suatu persamaan garis lurus yang melalui titik $(3, 1)$ *dan berserenjang dengan garis lurus* $2y + 3x = 16$.

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

Answer/*Jawapan*:

21

3

---

22 It is given that $\cos A = -\frac{8}{17}$, where A is a reflex angle. Find

Diberi bahawa $\cos A = -\frac{8}{17}$ *, dengan keadaan A ialah sudut refleks. Cari*

(*a*) $\sin A$,

(*b*) $\cot A$.
kot A .

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

Answer/*Jawapan*:

(*a*)

(*b*)

22

3

For examiner's use only

23 Given that $y = \left(\frac{x}{2} - 7\right)^2$, find

Diberi $y = \left(\frac{x}{2} - 7\right)^2$, *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 increase from 4 to $4 + p$.

perubahan kecil bagi y *apabila* x *bertambah dari* 4 *kepada* $4 + p$.

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

Answer/*Jawapan*:

(*a*)

(*b*)

23

4

---

24 When a spherical ball bearing is heated, its surface area increases at a constant rate of $3 \cdot 2\ \pi\ \text{cm}^2\ \text{s}^{-1}$. Find the rate of change of the radius of the ball bearing when its radius is 5 cm.

Apabila sebiji bebola berbentuk sfera dipanaskan, luas permukaannya bertambah dengan kadar $3 \cdot 2\ \pi\ \text{cm}^2\ \text{s}^{-1}$. *Cari kadar perubahan jejari bebola apabila jejarinya* 5 cm.

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

Answer/*Jawapan*:

24

3

For examiner's use only

25 Given that $\int_0^4 f(x)dx = 8$, find

Diberi $\int_0^4 f(x)dx = 8$, *cari*

(*a*) the value of $\int_4^0 \frac{1}{2} f(x)dx$,

nilai $\int_4^0 \frac{1}{2} f(x)dx$,

(*b*) the value of *m* if $\int_0^2 f(x)dx + \int_2^4 [f(x)+m]\,dx = 12$.

nilai m jika $\int_0^2 f(x)dx + \int_2^4 [f(x)+m]\,dx = 12$.

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

Answer/*Jawapan*:
(*a*)

(*b*)

25

4

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions.
   *Kertas soalan ini mengandungi **25** soalan.*

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

3. Write your answers in the spaces provided in the question paper.
   Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.

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

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

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

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

8. A list of formulae is provided on pages 2 and 3.
   Satu senarai rumus disediakan di halaman 2 *dan* 3.

9. A booklet of four-figure mathematical tables is provided.
   Sebuah buku sifir matematik empat angka disediakan.

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

11. Hand in this question paper to the invigilator at the end of the examination.
    Serahkan kertas soalan ini kepada pengawas peperiksaan di akhir peperiksaan.

MAJLIS PENGETUA SEKOLAH MALAYSIA
NEGERI KEDAH DARUL AMAN

3472/2

MODUL PENINGKATAN PRESTASI TINGKATAN LIMA 2014
MATEMATIK TAMBAHAN
KERTAS 2
MODUL 1

$2\frac{1}{2}$ **jam** **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 **16** printed pages.

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. $(a^m)^n = a^{mn}$
5. $\log_a mn = \log_a m + \log_a n$
6. $\log_a \dfrac{m}{n} = \log_a m - \log_a n$
7. $\log_a m^n = n \log_a m$
8. $\log_a b = \dfrac{\log_c b}{\log_c a}$
9. $T_n = a + (n-1)d$
10. $S_n = \dfrac{n}{2}[2a + (n-1)d]$
11. $T_n = ar^{n-1}$
12. $S_n = \dfrac{a(r^n - 1)}{r - 1} = \dfrac{a(1 - r^n)}{1 - r}, \quad r \neq 1$
13. $S_\infty = \dfrac{a}{1 - r}, \quad |r| < 1$

CALCULUS

1. $y = uv, \quad \dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$
2. $y = \dfrac{u}{v}, \quad \dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$
3. $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$
4. Area under a curve
   $= \int_a^b y\,dx$ or
   $= \int_a^b x\,dy$
5. Volume of revolution
   $= \int_a^b \pi y^2\,dx$ or
   $= \int_a^b \pi x^2\,dy$

GEOMETRY

1. Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2. Mid point
   $(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$
3. Division of line segment by a point
   $(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$
4. Area of triangle
   $= \dfrac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$
5. $\left|\underset{\sim}{r}\right| = \sqrt{x^2 + y^2}$
6. $\hat{r} = \dfrac{x\underset{\sim}{i} + y\underset{\sim}{j}}{\sqrt{x^2 + y^2}}$

STATISTICS

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

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

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

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

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

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

7. $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

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

9. ${}^{n}C_r = \dfrac{n!}{(n-r)!r!}$

10. $\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$

11. $\mathrm{P}(X = r) = {}^{n}C_r \, p^r q^{n-r}, \; p + q = 1$

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, $\mathrm{A} = \dfrac{1}{2} r^2 \theta$

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

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

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

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

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

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

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

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

Section A
Bahagian A
[40 *marks*]
[40 *markah*]

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

1 Solve the simultaneous equations $x - y = 4$ and $x^2 + y^2 = 10$.

[5 *marks*]

Selesaikan persamaan serentak $x - y = 4$ *dan* $x^2 + y^2 = 10$.

[5 *markah*]

2 (*a*) Given that $g : x \to x^2 - 4$ and $gf(x) = x^2 + 6x + 5$. Find the function of $f(x)$

[3 *marks*]

(*b*) Given that $k : x \to 3x - 4$, find the value of

(i) $k^{-1}(5)$

(ii) p if $k^{-1}(p) = 2$ [3 *marks*]

(a) *Diberi bahawa* $g : x \to x^2 - 4$ *dan* $gf(x) = x^2 + 6x + 5$. *Cari fungsi* $f(x)$.

[3 *markah*]

(*b*) *Diberi bahawa* $k : x \to 3x - 4$, *cari nilai bagi*

(i) $k^{-1}(5)$

(ii) p *jika* $k^{-1}(p) = 2$. [3 *markah*]

3 (*a*) The quadratic function $f(x) = x^2 - 10x + 12$ can be expressed in the form of $y = (x + m)^2 - n$, find the value of *m* and *n*. [2 *marks*]

(*b*) If α and β are the roots of quadratic equation $2x^2 + 9x - 8 = 0$, form the equation with roots 3α and 3β.

[4 *marks*]

(*a*) *Persamaan kuadratik* $f(x) = x^2 - 10x + 12$ *boleh dinyatakan dalam bentuk* $y = (x + m)^2 - n$, *cari nilai* m *dan* n. [2 *markah*]

(*b*) *Jika* α *and* β *adalah punca-punca bagi persamaan kuadratik* $2x^2 + 9x - 8 = 0$, *terbitkan satu persamaan kuadratik yang mempunyai punca-punca* 3α *dan* 3β.

[4 *markah*]

4

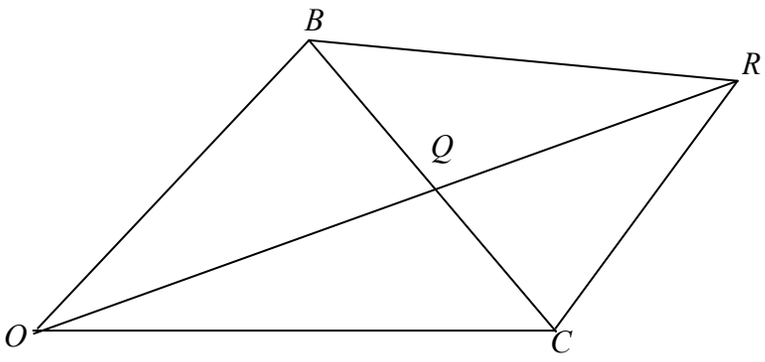


Diagram 4 / *Rajah* 4

In Diagram 4, point Q lies on the straight line OR such that $OQ:QR=3:2$. Point Q also is the midpoint of the straight line BC. Given that $\overrightarrow{OC}=6\underset{\sim}{x}, \overrightarrow{CR}=3\underset{\sim}{y}$ and $\overrightarrow{OB}=4\underset{\sim}{y}$.

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

(i) $\overrightarrow{OR}$,

(ii) $\overrightarrow{QR}$,

(iii) $\overrightarrow{BR}$. [6 *marks*]

(*b*) Hence, determine whether $\overrightarrow{BR}$ is parallel to $\overrightarrow{OC}$. [2 *marks*]

Dalam Rajah 4*, titik Q terletak pada garis OR dengan keadaan* $OQ:QR=3:2$.

Titik Q juga adalah titik tengah bagi garis lurus BC. Diberi bahawa $\overrightarrow{OC}=6\underset{\sim}{x}, \overrightarrow{CR}=3\underset{\sim}{y}$ *dan* $\overrightarrow{OB}=4\underset{\sim}{y}$

(*a*) *Ungkapan dalam sebutan* $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$,

(i) $\overrightarrow{OR}$,

(ii) $\overrightarrow{QR}$,

(iii) $\overrightarrow{BR}$. [6 *markah*]

(*b*) *Seterusnya, tentukan samada* $\overrightarrow{BR}$ *adalah selari dengan* $\overrightarrow{OC}$. [2 *markah*]

5 (*a*) A set of eight numbers, $x_1, x_2, x_3, ...x_8$, has a mean of 5 and variance of 9.

Find

(i) $\sum x$,

(ii) $\sum x^2$ [3 *marks*]

(*b*) If each of the numbers is multiplied by 3 and then increased by 5, find the new value for the

(i) mean,

(ii) standard deviation.

[4 *marks*]

(*a*) *Suatu set yang terdiri daripada lapan nombor*, $x_1, x_2, x_3, ...x_8$, *mempunyai min* 5 *dan varians* 9. *Cari*

(i) $\sum x$,

(ii) $\sum x^2$ [3 *markah*]

(*b*) *Jika setiap nombor didarab dengan* 3 *dan ditambah dengan* 5, *cari nilai yang baru untuk*

(i) *min* ,

(ii) *sisihan piawai* .

[4 *markah*]

6

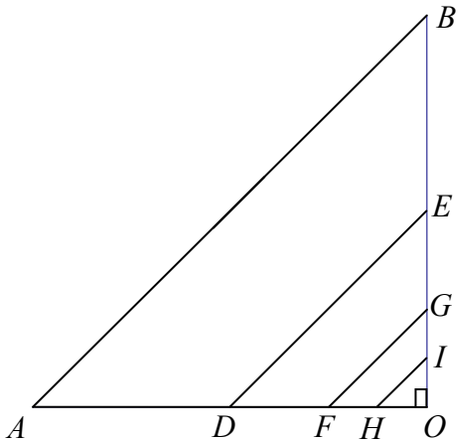


Diagram 6 / *Rajah* 6

Diagram 6 shows part of the arrangement of an infinite series of right angle triangles. It is given $OA = OB$, $OD = OE$, $OF = OG$, $OH = OI$ and so on. The length of OA is p cm. D is the midpoint of AO, F is the midpoint of DO, H is the midpoint of FO and so on.

(*a*) Show that the areas of the triangle AOB, DOE, FOG, ... form a geometric progression and hence, state the common ratio of the progression.

[3 *marks*]

(*b*) Given $OA = 80$ cm,

(i) determine which triangle has an area of $\frac{25}{128}$ cm^2,

(ii) find the sum to infinity of the areas, in cm^2, of the triangles.

[5 *marks*]

Rajah 6 *menunjukkan sebahagian daripada susunan tak terhingga bagi siri segitiga tepat. Diberi* $OA = OB$, $OD = OE$, $OF = OG$, $OH = OI$ *dan seterusnya. Panjang OA ialah* p cm. *D ialah titik tengah bagi AO, F ialah titik tengah bagi DO, H ialah titik tengah bagi FO dan seterusnya.*

(*a*) *Tunjukkan luas bagi segitiga tepat AOB, DOE, FOG, ...membentuk satu janjang geometri dan seterusnya, nyatakan nisbah sepunya bagi janjang ini.*

[3 *markah*]

(*b*) *Diberi* $OA = 80$ cm,

(i) *tentukan segitiga yang keberapa mempunyai luas* $\frac{25}{128}$ cm^2.

(ii) *cari hasil tambah hingga tak terhinggaan, dalam* cm^2, *bagi siri segitiga itu.*

[5 *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.

x	1	2	3	4	5	6
y	2·94	4·12	5·76	8·07	11·29	15·81

Table 7 / *Jadual* 7

Table 7 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = hk^x$, where h and k are constants.

(*a*) Plot $\log_{10} y$ against x, using a scale of 2 cm to 1 unit on the $x-$axis and 2 cm to $0{\cdot}1$ unit on the $\log_{10} y-$axis. Hence, draw the line of best fit.

[4 *marks*]

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

(i) h,

(ii) k,

(iii) y when $x = 3{\cdot}5$. [6 *marks*]

Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = hk^x$, *dengan keadaan h dan k ialah pemalar.*

(*a*) *Plot* $\log_{10} y$ *melawan* x, *dengan menggunakan skala* 2 cm *kepada* 1 unit *pada paksi* $-x$ *dan* 2 cm *kepada* $0{\cdot}1$ unit *pada paksi* $-\log_{10} y$. *Seterusnya, lukis garis lurus penyuaian terbaik.* [4 *markah*]

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

(i) h,

(ii) k,

(iii) y *apabila* $x = 3{\cdot}5$. [6 *markah*]

8

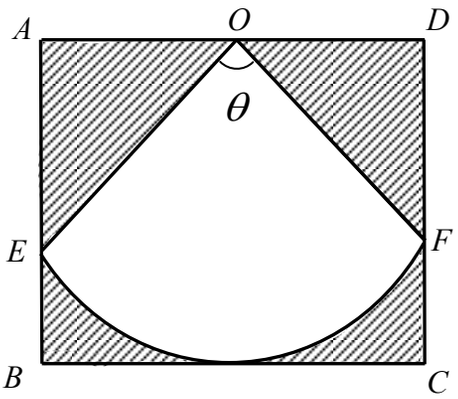


Diagram 8 / *Rajah* 8

Diagram 8 shows a sector *OEF* with centre *O* and radius 6 cm. *ABCD* is a rectangle and the straight line *BC* is a tangent to the curve *EF*. It is given that $AD = 8$ cm .
[Use $\pi = 3 \cdot 142$]

Calculate
(*a*) the value of θ , 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 8 *menunjukkan sebuah sektor OEF dengan pusat O dan jejari* 6 cm. *ABCD adalah sebuah segi empat tepat dan garis lurus BC adalah tangen kepada lengkung EF. Diberi* $AD = 8$ cm .
[*Guna* $\pi = 3 \cdot 142$]

Hitung
(*a*) *nilai bagi* θ *, dalam radian,* [2 *markah*]

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

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

9

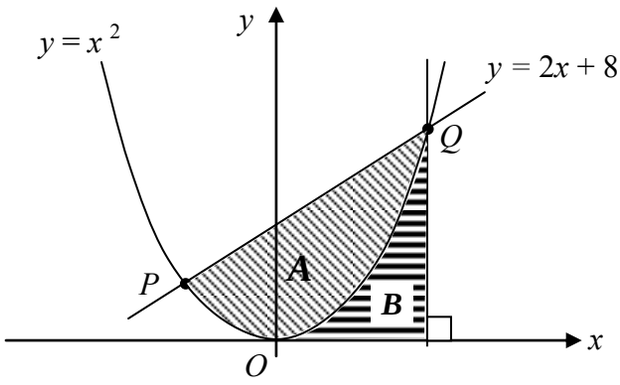


Diagram 9/*Rajah* 9

Diagram 9 shows the straight line $y = 2x + 8$ intersecting the curve $y = x^2$ at the points P and Q.

Find

(*a*) the coordinates of P and Q, [3 *marks*]

(*b*) the area of the shaded region A, [4 *marks*]

(*c*) the volume generated, in terms of π, when the shaded region B is revolved through 360^o about the x-axis.

[3 *marks*]

Rajah 9 *menunjukkan garis lurus* $y = 2x + 8$ *yang menyilang lengkung* $y = x^2$ *pada titik* P *dan* Q.

Cari

(*a*) *koordinat* P *dan* Q, [3 *markah*]

(*b*) *luas rantau berlorek* A, [4 *markah*]

(*c*) *isipadu janaan, dalam sebutan* π, *apabila rantau berlorek* B *dikisarkan melalui* 360^o *pada paksi-x.*

[3 *markah*]

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

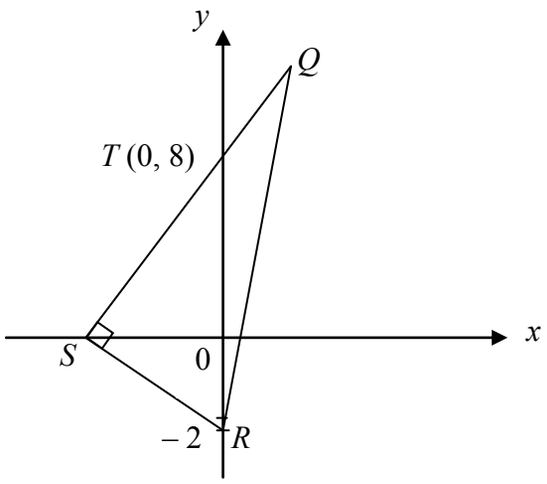


Diagram 10 / *Rajah* 10

Diagram 10 shows a triangle *QRS*. The straight line *RS* is perpendicular to the straight line *QS*. Point *S* lies on the *x*-axis and point *R* lies on the *y*-axis. The equation of straight *RS* is $-\frac{x}{4}-\frac{y}{2}=1$.

(*a*) Find

(i) the coordinates of *S*, [1 *mark*]

(ii) the equation of the straight line *QS*. [2 *marks*]

(*b*) Given that *ST* : *TQ* = 2 : 1, find the coordinates of *Q*, [2 *marks*]

(*c*) Calculate the area of triangle *QRS*, [2 *marks*]

(*d*) Point *P*(*x* ,*y*) moves such that its distance from S is always twice its distance from *R*. Find the equation of locus *P*. [3 *marks*]

Rajah 10 *menunjukkan sebuah segi tiga QRS. Garis RS adalah berserenjang dengan garis QS. Titik S terletak pada paksi-x dan titik R terletak pada paksi-y. Persamaan garislurus RS adalah* $-\frac{x}{4}-\frac{y}{2}=1$.

(*a*) *Cari*

(i) *koordinat S,* [1 *markah*]

(ii) *persamaan garis lurus QS* . [2 *markah*]

(*b*) *Diberi ST : TQ* = 2 : 1, *cari koordinat Q* , [2 *markah*]

(*c*) *Hitung luas segi tiga QRS* , [2 *markah*]

(*d*) *Titik P(x, y) bergerak dengan keadaan jaraknya dari S adalah sentiasa dua kali jaraknya dari R. Cari persamaan lokus bagi P* . [3 *markah*]

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

11 Diagram 11 shows a quadrilateral *PQRS*, *QS* = 8 cm, *QR* = 9 cm, *SP* = 12 cm, $\angle PQS = 106°$, $\angle SQR = 39°$

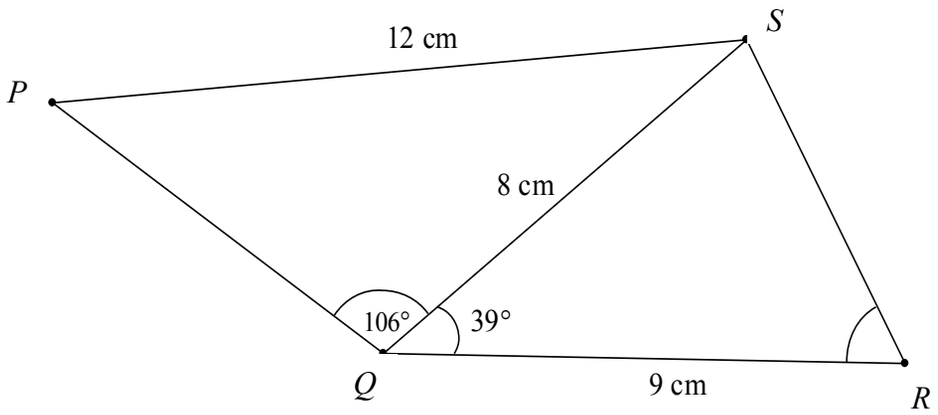


Diagram 11/*Rajah* 11

(a) Calculate

(i) the angle of *QSP* [3 *marks*]

(ii) area of triangle *QSP* [2 *marks*]

(iii) the length, in cm, of *RS* [2 *marks*]

(b) Given *S'* lies on the straight-line *SQ* which further expanded, and *S'P* = *SP*

(i) sketch triangle *SPS'* [1 *mark*]

(ii) find the length of *QS'* [2 *marks*]

Rajah 11 *menunjukkan sebuah sisiempat PQRS. QS* = 8 cm, *QR* = 9 cm, *SP* = 12 cm, $\angle PQS = 106°$, $\angle SQR = 39°$

(*a*) *Hitungkan*

(i) *sudut QPS* [3 *markah*]

(ii) *luas bagi segitiga PQS* [2 *markah*]

(iii) *panjang, dalam* cm, *RS* [2 *markah*]

(*b*) *Diberi bahawa titik S' berada di atas garis lurus SQ yang diperpanjangkan dan S'P = SP*

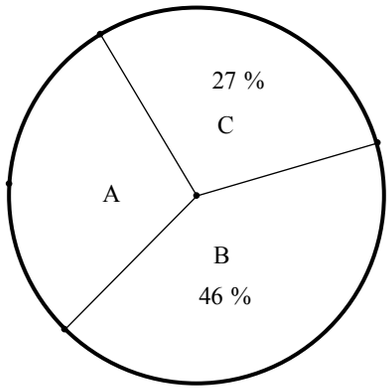
(i) *lakar kan segitiga SPS'* [1 *markah*]

(ii) *cari panjang QS'* [2 *markah*]

12 Table 12 shows the price indices of three types of fuel for the year 2010 based on the year 2008. The pie chart represents the proportion of the fuel used in a factory

FUEL *BAHAN API*	**Year 2010 based on the year Price indexs for the year 2008** *Indeks harga pada tahun* 2010 *berasaskan tahun* 2008
A	135
B	120
C	105

Table 12 / *Jadual* 12



(a) If the factory spends RM6 000 per week for fuel *A* in the year 2010, find the corresponding expenditure for fuel *A* in the year 2008. [2 *marks*]

(b) Calculate the composite index for fuel expenditure of the factory in the year 2010 based on the year 2008. [3 *marks*]

(c) The fuel expenditure of the factory is RM30 000 per week in the year 2008. Calculate its corresponding expenditure in the year 2010. [2 *marks*]

(d) The price of fuel *A* remains unchanged, while the price of fuel *B* increases 35%, the price of fuel *C* increases 30% from 2010 to the year 2013. Calculate the composite index for the fuel expenditure of the factory in the year 2013 based on the year 2008. [3 *marks*]

Jadual 12 *menunjukkan indeks harga bagi tiga jenis bahan api pada tahun* 2010 *berasaskan tahun* 2008. *Carta pai mewakili pembahagian bahan api itu yang digunakan di sebuah kilang.*

(a) *Jika kilang itu membelanjakan* RM6 000 *seminggu untuk bahan api A pada tahun* 2010*, cari perbelanjaan yang sepadan untuk bahan api A pada tahun* 2008. [2 *markah*]

(b) *Hitungkan indeks gubahan bagi perbelanjaan bahan api kilang itu pada tahun* 2010 *berasaskan tahun* 2008. [3 *markah*]

(c) *Perbelanjaan bahan api bagi kilang itu pada tahun* 2008 *ialah* RM 30 000 *seminggu. Hitungkan perbelanjaan bahanapi yang sepadan pada tahun* 2010. [2 *markah*]

(d) *Harga bahan api A tidak berubah, manakala harga bahan api B meningkat* 35%, *harga bahan api C meningkat* 30% *dari tahun* 2010 *ke tahun* 2013. *Hitungkan indeks gubahan bagi perbelanjaan bahan api kilang itu pada tahun* 2013 *berasaskan tahun* 2008. [3 *markah*]

13 A hardware store wants to load *x* boxes of nail and *y* boxes of screw into a lorry to be delivered to a project site. The constraints that the hardware store has are as follows:

I The lorry cannot carry more than 60 boxes.

II The number of boxes of nail must not exceed twice the number of boxes of screw.

III At least 15 boxes of nail are delivered.

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

(b) Using scale of 2 cm to 10 boxes for both axes, construct and shade the region **R** satisfy all the constraints. [3 *marks*]

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

(i) The maximum numbers of screw boxes that can be delivered if the lorry has 35 boxes of nail.

(ii) The maximum profit of the hardware store if the profit from the sale of every box of nail and screw are RM30 and RM35 respectively. [4 *marks*]

Sebuah kedai ingin memuatkan x kotak paku dan y kotak skrew ke sebuah lori untuk dihantar ke suatu tapak projek. Kekangan kedai itu adalah seperti berikut.

I *Lori itu tidak boleh membawa lebih daripada* 60 *kotak.*

II *Bilangan kotak paku hendaklah tidak melebihi dua kali bilangan kotak skrew.*

III *Sekurang-kurangnya* 15 *kotak paku dihantar.*

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

(b)Dengan menggunakan skala 2 *cm kepada* 10 *kotak pada kedua-dua paksi, bina dan lorek rantau* ***R*** *yang memenuhi semua kekangan.* [3 *markah*]

(c) Guna graf yang dibina di (b), cari

(i) Bilangan maksimum kotak skrew yang boleh dihantar jika lori itu telah dimuatkan dengan 35 *kotak paku.*

(ii) Keuntungan maksimum kedai itu jika keuntungan daripada jualan setiap kotak paku dan kotak skrew masing-masing RM30 *dan* RM35. [4 *markah*]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

Additional
Mathematics
Paper 1

May, 2014

PROGRAM PENINGKATAN PRESTASI AKADEMIK
SPM 2014

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA (KEDAH)

ADDITIONAL MATHEMATICS

MARKING SCHEME

Paper 1

MODUL 1

.

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2014
Marking Scheme Module 1
Additional Mathematics Paper 1

Question	Solution/ Marking Scheme	Answer	Marks
1		(*a*) 5 (*b*) {5, 7, 9} (*c*) {1, 3, 5, 7, 9}	1 1 1
2	(*a*) B1: $3a + 2 = x$ (*b*) B1: $f^{-1}(5)$	(*a*) $\frac{x-2}{3}$ (*b*) 1	2 2
3	(*b*) B2: $6(\frac{x-7}{3})+5$ B1 : $g^{-1}(x)=\frac{x-7}{3}$	(*a*) -7 (*b*) $2x-9$	1 3
4	B2 : $x=3\cdot137$ *or* $x=-0\cdot637$ B1 : $2x^2-5x-4=0$	$x=3\cdot137$ *and* $x=-0\cdot637$	3
5	B2 : $3\alpha+3\beta=-4$ *and* $(3\alpha)(3\beta)=-18$ B1 : $\alpha+\beta=-\frac{4}{3}$ *and* $\alpha\beta=-2$	$x^2+4x-18=0$	3
6	B1 : $m = 4$ **or** $t = 3$	$m = 4$ **and** $t = 3$	2

Question	Solution/ Marking Scheme	Answer	Marks
7	B2 : $x=2$ *and* $x=-\frac{4}{3}$ @ $-1\cdot33$ B1 : $f(x)=3x^2-2x-8<0$	$-\frac{4}{3}<x<2$	3
8	B2: $5^m = 5^3$ or $5^{1+m} = 5^4$ B1 : $3(5^m)(5)$ or 5^{1+m} or 5^4 or $5^m(15-10)= 625$	3	3
9	B2 : $\frac{y}{4-y}=3$ **or** $y=3(4-y)$ B1 : $\log_3\frac{y}{4-y}$ or $\log_3 3$ or 3^1	$y = 3$	3
10	B2 : $2\log_2 x=\log_2 4^2$ or $x^2 = 4^2$ B1 : $\log_2 x=\frac{\log_2 4^2}{\log_2 x}$	$x = 4$	3
11	(*b*) B1 : $T_2=5(2)-2(2)^2-3$ $[d=S_2-S_1-S_1]$	(*a*) 3 (*b*) -4	1 2
12	B1: $\frac{6}{q}=\frac{4q}{6}$	$q = 3, -3$	2

Question	Solution/ Marking Scheme	Answer	Marks
13	(*b*) B1 : $S_n = \dfrac{2(1)}{1-\left(-\frac{2}{3}\right)}$	(*a*) $-\frac{2}{3}$ (*b*) $\frac{6}{5}$	1 2
14	(*b*) B1 : $\log_{10} k = -1$	(*a*) $\log_{10} k = (-\log_{10} 3)x + \log_{10} k$ (*b*) $\frac{1}{10}$@0.1	1 2
15	B3: $22 + 4m = 42$ **or** $22 + 4m = -42$ B2 : $\frac{1}{2}\left\|(2+3+5m)-(-15+m-2)\right\| = 21$ B1 : $(2+3+5m)$ or $(-15+m-2)$	$m = 5$ **and** $m = -16$	4
16	B2 : $x^2+6x+9+y^2-8y+16=4\left(x^2-12x+36+y^2+4y+4\right)$ B1 : $\sqrt{(x+3)^2+(y-4)^2} = 2\sqrt{(x-6)^2+(y+2)^2}$	$x^2+y^2-18x+8y+45=0$	3
17	B3: $2.5(2)+2.5+2.5$ B2 : $\theta = 2$ B1 : $\frac{1}{2}(2.5)^2\theta = 6.25$	10	4

Question	Solution/ Marking Scheme	Answer	Marks
18	(*b*) B2 : $\left\|\overrightarrow{AC}\right\| = \sqrt{3^2+4^2} = 5$ B1 : $\overrightarrow{AC} = \frac{1}{3}\begin{pmatrix}9\\12\end{pmatrix} = \begin{pmatrix}3\\4\end{pmatrix}$	(*a*) $\overrightarrow{AB} = \begin{pmatrix}9\\12\end{pmatrix}$ @ $9\underset{\sim}{i}+12\underset{\sim}{j}$ (*b*) $\frac{1}{5}\begin{pmatrix}3\\4\end{pmatrix}$ @ $\frac{1}{5}\left(3\underset{\sim}{i}+4\underset{\sim}{j}\right)$	1 3
19	(*a*) B1: $\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$	(*a*) $\overrightarrow{OB} = \begin{pmatrix}11\\7\end{pmatrix}$ (*b*) $B(11, 7)$	2 1
20	B2 : $4q = \frac{70}{10} - (\sqrt{p})^2$ B1 : $\frac{70}{10} - (\sqrt{p})^2$	$p = 7 - 4q$	3
21	B2: $y - 1 = \frac{2}{3}(x-3)$ B1: $m_{\text{perpendicular}} = \frac{2}{3}$	$y = \frac{2}{3}x - 1$	3
22	(*b*) B1 : $\cot A = \frac{1}{\frac{15}{8}}$ or $\tan A = \frac{15}{8}$	(*a*) $-\frac{15}{17}$ (*b*) $\frac{8}{15}$	1 2

Question	Solution/ Marking Scheme	Answer	Marks
23	(*a*) B1 : $\frac{dy}{dx} = \left(\frac{x}{2} - 7\right)$ (*b*) B1 : $\delta x = p$ **or** $\delta y = -5(p)$	(*a*) -5 (*b*) $-5p$	2 2
24	B2 : $3 \cdot 2\pi = 8\pi(5) \bullet \frac{dr}{dt}$ B1 : $\frac{dA}{dr} = 8\pi r$	$0 \cdot 08 \text{cms}^{-1}$	3
25	(*b*) B2 : $8 + m[4-2] = 12$ B1 : $\int_0^2 f(x)dx + \int_2^4 f(x)dx = 8$	(*a*) -4 (*b*) $m = 2$	1 3

END OF MARKING SCHEME

3472/2

Additional

Mathematics

Mei 2014

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2014

MODUL 1

ADDITIONAL MATHEMATICS

Paper 2

MARKING SCHEME

MARKING SCHEME
ADDITIONAL MATHEMATICS PAPER 2

N0.	SOLUTION	MARKS
1	$x = y + 4$ or $y = x - 4$ $(y+4)^2 + y^2 = 10$ $x^2 + (x-4)^2 = 10$ $2y^2 + 8y + 6 = 0$ $2x^2 - 8x + 6 = 0$ $(y+1)(y+3) = 0$ $(x-3)(x-1) = 0$ $x = 1$ and $x = 3$ (both) $y = -3$ and $y = -1$ (both	**P1** **K1 Eliminate x/y** **K1 Solve quadratic equation** **N1** **N1**
		5
2 **(a)**	$g[f(x)] = x^2 + 6x + 5$ $[f(x)]^2 - 4 = x^2 + 6x + 5$ $[f(x)]^2 = (x+3)^2$ $f(x) = x + 3$	**K1(find composite function)** **N1** **N1**
(b)	(i) $k^{-1}(x) = \frac{x+4}{3}$ $k^{-1}(5) = \frac{5+4}{3} = 3$ (ii) $k^{-1}(p) = \frac{p+4}{3} = 2$ $p = 2$	**K1(find inverse function)** **N1** **K1** **N1**
		7
3 **(a)**	$f(x) = x^2 - 10x + 12$ $= (x-5)^2 - 13$	**P1** **P1**
(b)	$2x^2 + 9x - 8 = 0$ $\alpha + \beta = -\frac{9}{2}$ $\alpha\beta = 4$ $sor = 3\alpha + 3\beta$ $por = 9\alpha\beta$ $= 3\left(-\frac{9}{2}\right)$ $= 9(4)$ $= -\frac{27}{2}$ $= 36$	**P1** **K1** **N1** **N1**
		6

4 **(a)** (i)	$\overrightarrow{OR} = \overrightarrow{OC} + \overrightarrow{CR}$	**K1**
(ii)	$= 6\underset{\sim}{x} + 3\underset{\sim}{y}$	**N1**
	$\overrightarrow{QR} = \frac{2}{5}\overrightarrow{OR}$	
	$= \frac{2}{5}(6x + 3y)$	**K1**
	$= \frac{12}{5}\underset{\sim}{x} + \frac{6}{5}\underset{\sim}{y}$	**N1**
(iii)	$\overrightarrow{BR} = \overrightarrow{BQ} + \overrightarrow{QR}$	**K1**
	$= 6\underset{\sim}{x} - \underset{\sim}{y}$	**N1**
(b)	$\overrightarrow{BR} = h\overrightarrow{OC}$	**K1 find h**
	cannot find h.	**N1**
	not parallel	
		8
5 **(a)** **(i)**	$5 = \frac{\sum x}{8}$	**P1**
	$\sum x = 40$	
(ii)	$9 = \frac{\sum x^2}{8} - 5^2$	**K1**
	$\sum x^2 = 272$	**N1**
(b)	new mean $= 3(5) + 5 = 20$	**K1 N1**
	new standard deviation $= 3(3) = 9$	**K1 N1**
		7

6		
(a)	$\frac{1}{2}p^2, \frac{1}{8}p^2, \frac{1}{32}p^2, \ldots$	**K1**
	$\frac{\frac{1}{8}p^2}{\frac{1}{2}p^2} = \frac{\frac{1}{32}p^2}{\frac{1}{8}p^2}$	**K1**
	$r = \frac{1}{4}$	**N1**
(b)	(i)	
	$3200(\frac{1}{4})^{n-1} = \frac{25}{128}$	**K1K1**
	$n = 8$	**N1**
	(ii)	
	$S_\infty = \frac{3200}{1-\frac{1}{4}}$	**K1**
	$4266\frac{2}{3}$	**N1**
		8

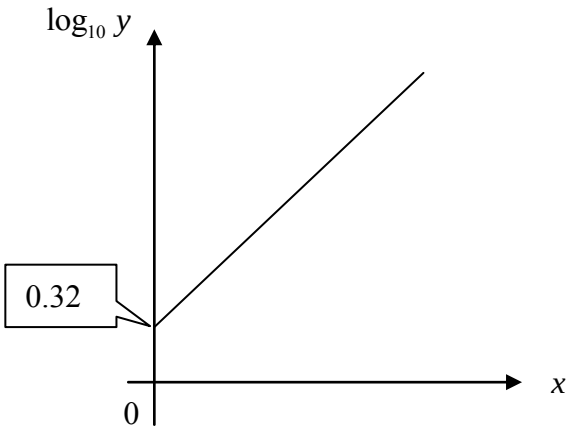
7

(a)

x	1	2	3	4	5	6
$\log_{10} y$	0.47	0.61	0.76	0.91	1.05	1.20

N1 **6 correct values** of $\log y$

(b)



K1 **Plot** $\log_{10} y$ **vs** x.
Correct axes & uniform scale

N1 **6 points plotted correctly**

N1 **Line of best-fit**

(c) $\log_{10} y = x \log_{10} k + \log_{10} h$ **P1**

(i) $\log_{10} k$ = *gradient **K1**
N1

h = **1.40**

(ii) $\log_{10} h$ = *y-intercept **K1**
N1

h = **2.09**

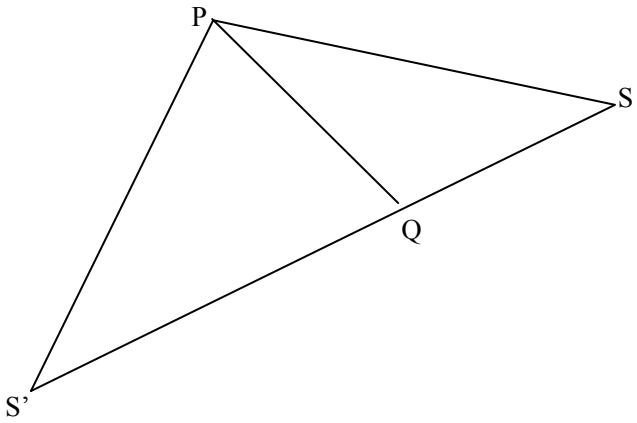
(iii) $y = 6.76$ **N1**

10

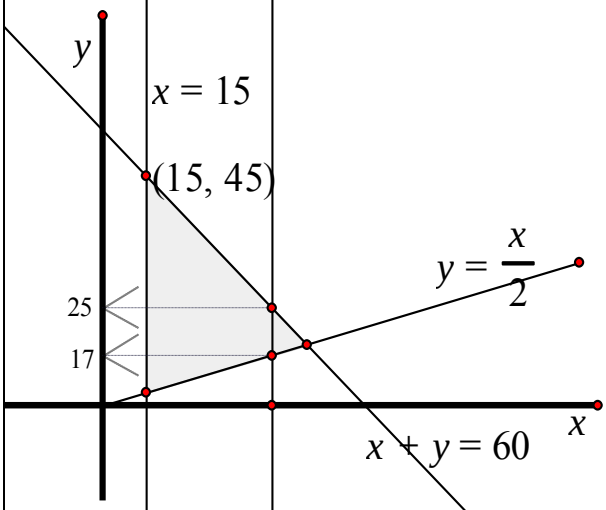
N0.	SOLUTION	MARKS
8		
(a)	$\sin\frac{1}{2}\theta = \frac{4}{6}$	**K1**
	$\theta = 1.46$ rad	**N1**
(b)	$S_{EF} = 6(1.46)$	**K1 Use** $s = r\theta$
	$= 8.76$ cm	**N1**
	Perimeter $= 8.76 + 2(6) + 2(6) + 2(8)$	**K1**
	$= 48.76$ cm	**N1**
(c)	Area of sector OEF $= \frac{1}{2}(6)^2(1.46) = 26.28$	**K1**
		K1
	Area of rectangle $= 48$	
		K1
	Area of the shaded region $= 48 - 26.28$	
	$=$ **21.72** cm^2	**N1**
		10

N0.	SOLUTION	MARKS
9		
(a)	$x^2 = 2x - 8$	
	$x = -2, x = 4$	**K1 for solving quad.eqn.**
	$P(-2, 4)$,	**N1**
	$Q(4, 16)$	**N1**
(b)	$A = \int_{-2}^{4} [(2x+8) - x^2]\,dx$	**K1 use** $\int (y_2 - y_1)\,dx$
	$= \left[x^2 + 8x - \frac{x^3}{3}\right]_{-2}^{4}$	**K1 integrate correctly**
	$= \left[(4)^2 + 8(4) - \frac{(4)^3}{3}\right] - \left[(-2)^2 + 8(-2) - \frac{(-2)^3}{3}\right]$	**K1 Sub. the limit correctly**
	$= 36$	**N1**
	Note : If use area of trapezium and $\int y\,dx$ ***, give marks accordingly***.	
(c)	$V = \pi \int_{0}^{4} (x^2)^2\,dx$	**K1 correct limit**
	$= \pi \left[\frac{x^5}{5}\right]_{0}^{4}$	**K1 integrate correctly**
	$= 204\frac{4}{5}\pi$ or **204.8π**	**N1**
		10

N0.	SOLUTION	MARKS
10		
(a)	(i) $(-4, 0)$	**N1**
	(ii) $m = 2$	**K1**
	$y = 2x + 8$	**N1**
(b)	$\frac{2x-4}{3} = 0 \quad or \quad \frac{2y+0}{3} = 8$	**K1**
	$(2, 12)$	**N1**
(c)	Area of $\Delta = \frac{1}{2}\begin{vmatrix} 2 & -4 & 0 & 2 \\ 12 & 0 & -2 & 12 \end{vmatrix}$	**K1 use area formula correctly**
	$= \frac{1}{2}[8-(-48-4)]$	
	$= 30 \text{ unit}^2$	**N1**
(d)	$PS = 2PR$	**P1**
	$\sqrt{(x+4)^2 + y^2} = 2\sqrt{x^2 + (y+2)^2}$	**K1**
	$3x^2 + 3y^2 - 8x + 16y = 0$	**N1**
		10

N0.	SOLUTION	MARKS
11	*i*) $\frac{\sin QPS}{8} = \frac{\sin 106°}{12}$	K1
	$\angle QPS = 39.8546°$	
	$= 39.85°$	N1
	$\angle QSP = 180° - 106° - 39.8546°$	
	$= \mathbf{34.15°}$	N1
	ii) $Luas\ \Delta PQS = \frac{1}{2} \times 8 \times 12 \times \sin 34.15°$	K1
	$= \mathbf{26.95}\ cm^2$	N1
	iii) $(RS)^2 = 8^2 + 9^2 - 2 \times 8 \times 9 \times \cos 39°$	K1
	$RS = 5.75\ \text{cm}$	N1
	b)i) 	N1
	ii) $\frac{QS'}{Sin71.85^o} = \frac{12}{Sin74^o}$	K1
	QS' **= 11.86 cm**	N1
		10

N0.	SOLUTION	MARKS
12	$a)$ Perbelanjaan bahan api A tahun $2010 = \frac{100}{135} \times 6000$ $= RM\,4444.44$	**K1** **N1**
	27+46+27 can be seen	**P1**
	b) Indeks gubahan $= \frac{135(27) \times 120(46) \times 105(27)}{100}$ $= 120$	**K1** **N1**
	c) Perbelanjaan bahan api $2010 = \frac{120}{100} \times 30\,000$ $= 36\,000$	**K1** **N1**
	d) Indeks harga bahan api 2013 $I_A = 135$ $I_B = 120 \times \frac{135}{100} = 162$ $I_C = 105 \times \frac{130}{100} = 136.5$ Indeks gubahan pada tahun 2013 berasaskan tahun 2008 $= \frac{135(27) + 162(46) + 136.5(27)}{100}$ $= 147.83$	**P1** (I_A=135 OR I_B = 162 OR I_C=136.5) **K1** **N1**
		10

N0.	SOLUTION	MARKS
13	a) Tiga ketaksamaan : i. $x + y \leq 60$ ii. $x \leq 2y$ iii. $x \geq 15$	N1 N1 N1
	• At least one straight line is drawn correctly from inequalities involving x and y. • All the three straight lines are drawn correctly. • Region is correctly shaded.	K1 K1 N1
		
	c) i.) Bilangan maksimum skrew = 25 kotak	N1
	(ii) Titik maksimum (15,45) Keuntungan maksimum; $30x + 35y = k$ $30(15) + 35(45) = k$ k = **RM2 025**	P1 K1 N1
		10

END OF MARKING SCHEME