NAMA:..... NO. ANGKA GILIRAN:.....

3472/1
Additional
Mathematics
Paper 1
Sept.
2011
2 hours

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA NEGERI PERAK TAHUN 2011

ADDITIONAL MATHEMATICS

Kertas 1

Dua Jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis* **nama** *dan* ***angka giliran*** *anda pada ruang 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 Pemeriksaan		
Soalan	Markah Penuh	Markah Diperolehi
1	3	
2	4	
3	3	
4	2	
5	3	
6	3	
7	3	
8	3	
9	2	
10	3	
11	2	
12	4	
13	4	
14	3	
15	3	
16	4	
17	3	
18	4	
19	3	
20	3	
21	3	
22	3	
23	4	
24	4	
25	4	
TOTAL	**80**	

Kertas soalan ini mengandungi 20 halaman bercetak.

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

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

1. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. $a^m \times a^n = a^{m+n}$

3. $a^m \div a^n = a^{m-n}$

4. $(a^m)^n = a^{mn}$

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
KALKULUS

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

   Luas di bawah lengkung

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

   $= \int_a^b x \, dy$

5. Volume of revolution

   Isipadu kisaran

   $= \int_a^b \pi y^2 \, dx$ or *(atau)*

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

STATISTICS
STATISTIK

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

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

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

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

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

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

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

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 / *Min* , $\mu = np$

13. $\sigma = \sqrt{npq}$

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

GEOMETRY
GEOMETRI

1. Distance / *Jarak*

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

2. Midpoint / *Titik tengah*

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

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

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

4. Area of a triangle / *Luas segi tiga*

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

5. $\left| \underset{\sim}{r} \right| = \sqrt{x^2 + y^2}$

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

TRIGONOMETRY
TRIGONOMETRI

1. Arc length, $s = r\theta$
   Panjang lengkok, $s = j\theta$

2. Area of sector, $A = \frac{1}{2}r^2\theta$
   Luas sektor, $L = \frac{1}{2}j^2\theta$

3. $\sin^2 A + \cos^2 A = 1$
   $\sin^2 A + \text{kos}^2 A = 1$

4. $\sec^2 A = 1 + \tan^2 A$
   $\text{sek}^2 A = 1 + \tan^2 A$

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

6. $\sin 2A = 2 \sin A \cos A$
   $\sin 2A = 2 \sin A \text{ kos } A$

7. $\cos 2A = \cos^2 A - \sin^2 A$
   $= 2\cos^2 A - 1$
   $= 1 - 2\sin^2 A$
   $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$
   $= 2\,\text{kos}^2 A - 1$
   $= 1 - 2\sin^2 A$

8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
   $\sin(A \pm B) = \sin A \text{ kos } B \pm \text{kos } A \sin B$

9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
   $\text{kos}(A \pm B) = \text{kos } A \text{ kos } B \mp \sin A \sin B$

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

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

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

13. $a^2 = b^2 + c^2 - 2bc\cos A$
    $a^2 = b^2 + c^2 - 2bc\,\text{kos } A$

14. Area of triangle / *Luas segi tiga*
    $= \frac{1}{2}ab\sin C$

For Examiner's Use

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

1 The following information shows set A, set B and the relation between set A and set B in the form of ordered pairs.

Maklumat berikut menunjukkan set A, set B dan hubungan antara set A dan set B dalam bentuk pasangan tertib.

$A = \{ t, v, w \}$

$B = \{ 6, 7, 8, 9 \}$

$\{(t, 6), (t, 7), (v, 7), (w, x)\}$

Given that the range of the relation between set A and set B is { 6, 7, 8 }, state
Diberi julat hubungan antara set A dan set B ialah { 6, 7, 8 }, nyatakan

(a) the image of v.
imej bagi v.

(b) the value of x.
nilai x.

(c) the type of the relation.
jenis hubungan itu.

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

Answer / *Jawapan* :

(a)

(b)

(c)

1

3

2 Given the function $f : x \to 3 - x$, $g : x \to hx^2 - k$ and $gf : x \to 3x^2 - 18x + 5$, find

Diberi fungsi $f : x \to 3 - x$, $g : x \to hx^2 - k$ *dan* $gf : x \to 3x^2 - 18x + 5$, *cari*

(a) $gf(-2)$,

(b) the value of h and of k.
nilai h dan nilai k.

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

For Examiner's Use

Answer / *Jawapan* :

(a)

(b)

2

4

3 The function g is defined as $g : x \to 7x - 4$, find

Fungsi g ditakrifkan sebagai $g : x \to 7x - 4$, *cari*

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

(b) the value of p if $g^{-1}(p) = 2$
nilai p jika $g^{-1}(p) = 2$.

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

Answer / *Jawapan* :

(a)

(b)

3

3

For Examiner's Use

4 It is given that -3 is one of the roots of the quadratic equation $x^2 + 5x - p = 0$. Find the value of p. [2 *marks*]

Diberi bahawa -3 *ialah satu daripada punca persamaan kuadratik* $x^2 + 5x - p = 0$. *Cari nilai* p. [2 *markah*]

Answer / *Jawapan* :

4 | 2

5 Find the range of the values of x for $3 - 5x \geq 2x^2$. [3 *marks*]

Cari julat nilai x *bagi* $3 - 5x \geq 2x^2$. [3 *markah*]

Answer / *Jawapan* :

5 | 3

6 Diagram 6 shows the graph of a quadratic function $y = f(x)$. The straight line $y = -16$ is a tangent to the curve $y = f(x)$.

Rajah 6 menunjukkan suatu graf fungsi kuadratik $y = f(x)$. *Garis lurus* $y = -16$ *ialah tangen kepada lengkung* $y = f(x)$.

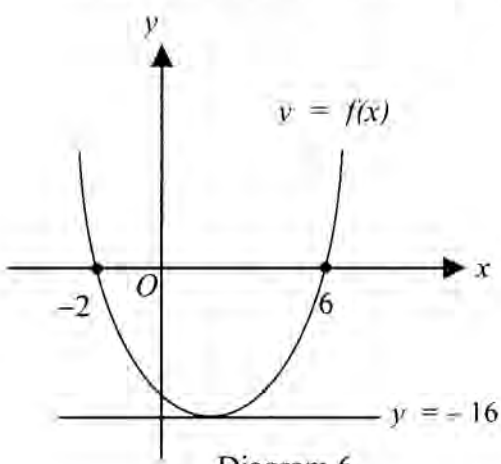


Diagram 6
Rajah 6

(a) Write the equation of the axis of symmetry of the curve.
Tulis persamaan paksi simetri bagi lengkung itu.

(b) Express $f(x)$ in the form of $(x + b)^2 + c$, where b and c are constants.
Ungkapkan f(x) dalam bentuk $(x + b)^2 + c$, *dengan keadaan b and c ialah pemalar.*

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

For Examiner's Use

Answer / *Jawapan* :

(a)

(b)

6
3

7 Solve $3^{n-2} \times 27^n = \frac{1}{81}$.

[3 *marks*]

Selesaikan $3^{n-2} \times 27^n = \frac{1}{81}$.

[3 *markah*]

Answer / *Jawapan* :

7
3

For Examiner's Use

8 Solve the equation :
Selesaikan persamaan :

$$\log_2 x - \log_4 x = 3$$

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

Answer / *Jawapan* :

8
3

9 The first three terms of a geometric progression are $x + 10$, x and $x - 8$.
Find the value of x. [2 *marks*]

Tiga sebutan pertama suatu janjang geometri adalah $x + 10$, x *dan* $x - 8$.
Cari nilai x.

[2 *markah*]

Answer / *Jawapan*:

9
2

For Examiner's Use

10 Given the geometric progression $-24, 8, -\frac{8}{3}, \ldots$, find

Diberi suatu janjang geometri $-24, 8, -\frac{8}{3}, \ldots$, cari

(a) the common ratio
nisbah sepunya

(b) the sum to infinity of the progression
hasil tambah ketakterhinggaan janjang geometri tersebut.

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

Answer / *Jawapan*:

(a)

(b)

10
3

11 The first three terms of an arithmetic progression are 56, 53 and 50. The n *th* term of this progression is negative.
Find the smallest value of n. [2 *marks*]

Tiga sebutan pertama suatu janjang aritmetik ialah 56, 53 *dan* 50. *Sebutan ke-n bagi janjang tersebut adalah negatif.*
Cari nilai terkecil bagi n. [2 *markah*]

Answer / *Jawapan*:

11
2

For Examiner's Use

12 Two variables, x and y, are related by the equation $y = 10^{a + bx^2}$, where a and b are constants. Diagram 12 shows the straight line graph obtained by plotting $\log_{10} y$ against x^2.

Dua pembolehubah, x dan y, dihubungkan oleh persamaan $y = 10^{a + bx^2}$ *dengan keadaan a dan b adalah pemalar. Rajah 12 menunjukkan graf garis lurus yang diperoleh dengan memplotkan* $\log_{10} y$ *melawan* x^2.

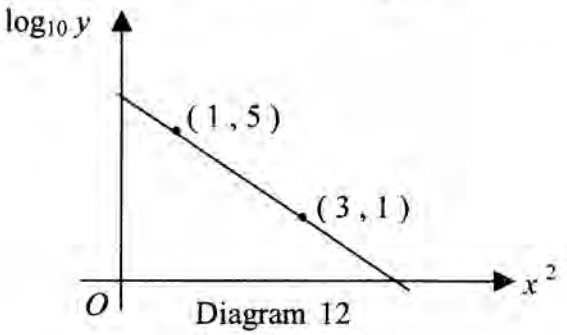


Diagram 12
Rajah 12

Find the value of a and of b.
Cari nilai a dan nilai b.

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

Answer / *Jawapan* :

12
4

13 Given that the points $P(1,4)$, $Q(3,0)$ and $R(6,h)$ are collinear, find

Diberi titik-titik $P(1,4)$, $Q(3,0)$ dan $R(6,h)$ *adalah segaris, cari*

(a) the value of h,
nilai h ,

(b) the ratio of $PQ : QR$ in the form of $m : n$.
Nisbah bagi PQ : QR dalam bentuk m : n.

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

Answer / *Jawapan* :

(a)

13
4

(b)

14 It is given that the straight line $\frac{x}{p}-\frac{y}{12}=1$ and $px-3y+15=0$ are parallel.

Find the values of p.

Diberi bahawa garis-garis lurus $\frac{x}{p}-\frac{y}{12}=1$ *dan* $px-3y+15=0$ *adalah selari.*

Cari nilai-nilai p.

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

Answer / *Jawapan* :

For Examiner's Use

14

3

15 Given that $\overrightarrow{AB}=k\underline{i}+8\underline{j}$ and $\left|\overrightarrow{AB}\right|=10$, where $k>0$, find ,

Diberi $\overrightarrow{AB}=k\underline{i}+8\underline{j}$ dan $\left|\overrightarrow{AB}\right|=10$, *dengan keadaan* $k>0$, *cari*

(a) the value of k
nilai k.

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

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

Answer / *Jawapan* :

(a)

(b)

15

4

For Examiner's Use

16 Diagram 16 shows a triangle ABC, the point D lies on BC such that $BD : BC = 1 : 4$.
Rajah 16 menunjukkan satu segitiga ABC, titik D terletak pada garis BC dengan keadaan BD : BC = 1 : 4.

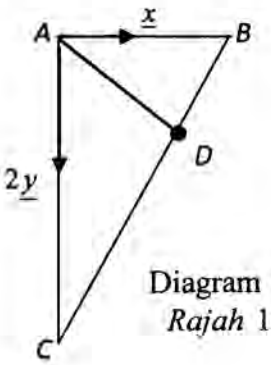


Diagram 16
Rajah 16

Express in terms of $\underline{x}$ and $\underline{y}$,
Ungkapkan, dalam sebutan $\underline{x}$ dan $\underline{y}$,

(a) $\overrightarrow{BC}$

(b) $\overrightarrow{AD}$

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

Answer / *Jawapan* :

(a)

(b)

16
4

17 Given that $\cos\theta = k$ for $270° \le \theta \le 360°$.
Diberi kos $\theta = k$ *untuk* $270° \le \theta \le 360°$.
Find in terms of k
Cari dalam sebutan k

(a) $\sec\theta$
sek θ

(b) $\tan\theta$

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

Answer / *Jawapan* :

(a)

(b)

For Examiner's Use

17

3

18 Diagram 18 shows a sector *OQS* of a circle with centre *O* and radius 13 cm. Given that *OPRT* is a trapezium with *OT* = 12 cm and *PR* = 2 *RT*.

Rajah 18 *menunjukkan sebuah sektor OQS dengan pusat O dan berjejari 13 cm. Diberi OPRT merupakan sebuah trapezium dengan OT= 12cm dan PR = 2 RT.*

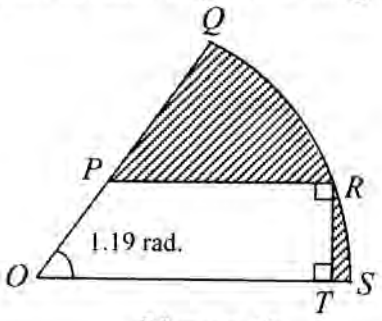


Diagram 18
Rajah 18

Find
Cari

(a) the length of *RT* in cm,
panjang RT dalam cm,

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

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

Answer / *Jawapan* :

(a)

(b)

18

4

For Examiner's Use

19 Given that $h(x) = \frac{1}{(2x-3)^2}$, evaluate $h''(1)$. [3 *marks*]

Diberi $h(x) = \frac{1}{(2x-3)^2}$, *nilaikan* $h''(1)$. [3 *markah*]

Answer / *Jawapan* :

19

3

20 Two variables, x and y, are related by the equation $y = 4x + \frac{3}{x}$.

Given that y increases at a constant rate of 5 units per second, find the rate of change of x when $x = 3$. [3 marks]

Dua pembolehubah , x *and* y , *dihubungkan oleh persamaan* $y = 4x + \frac{3}{x}$.

Diberi y *bertambah dengan kadar malar 5 unit sesaat, cari kadar perubahan* x *apabila* $x = 3$. [3 *markah*]

Answer / *Jawapan* :

20

3

21 Given $\frac{dy}{dx} = 6x - 4$ and $y = 2$ when $x = -1$, express y in terms of x. [3 *marks*]

Diberi $\frac{dy}{dx} = 6x - 4$ *dan* $y = 2$ *apabila* $x = -1$, *ungkapkan* y *dalam sebutan* x. [3 *markah*]

Answer / *Jawapan* :

21

3

For Examiner's Use

22 A set of six number has a mean of 7 and a standard deviation of $\sqrt{5}$. Find
Satu set enam nombor mempunyai min 7 dan sisihan piawai $\sqrt{5}$. Cari

(a) $\sum x$

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

Answer / *Jawapan* :

(a)

(b)

22
3

23 A committee of 6 members has to be selected from 5 women and 8 men.
Calculate the number of different ways the committee can be formed if
Satu jawatan kuasa yang terdiri 6 ahli akan dipilih daripada 5 perempuan dan 8 lelaki.
Hitungkan bilangan cara yang berlainan jawatan kuasa itu boleh dibentuk jika

(a) there is no restriction ,
tiada syarat dikenakan ,

(b) the committee must consist of at least 4 men ,
jawatan kuasa mesti terdiri sekurang-kurangnya 4 lelaki [4 *marks*]
[4 *markah*]

Answer / *Jawapan* :

(a)

(b)

23
4

For Examiner's Use

24 Table 24 shows the result for Additional Mathematics test in two Form 5 classes.
Jadual 24 menunjukkan keputusan ujian Matematik Tambahan bagi dua kelas Tingkatan 5.

Class *Kelas*	Number of students *Bilangan murid*			
	Pass *Lulus*		Fail *Gagal*	
	Boy *Lelaki*	Girl *Perempuan*	Boy *Lelaki*	Girl *Perempuan*
5 *Anggun*	10	15	3	2
5 *Bestari*	8	12	13	x

Table 24
Jadual 24

(a) Given that the probability a girl who passes the Additional Mathematics test from class 5 *Bestari* is $\frac{6}{19}$. Find the value of x.
Diberi kebarangkalian murid perempuan lulus ujian Matematik Tambahan dari kelas 5 Bestari ialah $\frac{6}{19}$ *. Cari nilai x.*

(b) If a student is chosen at random from each class, calculate the probability that both students fail in their Additional Mathematics test.
Jika seorang pelajar dipilih secara rawak dari setiap kelas, kira kebarangkalian kedua-dua murid gagal dalam ujian Matematik Tambahan mereka.

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

Answer / *Jawapan* :

(a)

(b)

24
4

25 The chest measurement of 20 year old footballers is normally distributed with a mean of 95 cm and a standard deviation of 8 cm.

Ukuran dada pemain bola sepak yang berumur 20 tahun tertabur secara normal dengan min 95 cm *dan sisihan piawai* 8 cm.

Calculate the probability that a 20 year old footballer chosen at random has a chest measurement of

Hitungkan kebarangkalian bahawa seorang pemain bola sepak berumur 20 tahun yang dipilih secara rawak mempunyai ukuran dada

(a) more than 103 cm,
melebihi 103 cm ,

(b) between 87 cm and 103 cm.
antara 87 cm *dan* 103 cm.

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

For Examiner's Use

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 diagram 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 3 to 5.
Satu senarai rumus disediakan di halaman 3 hingga 5.

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

10. You may use a scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik.

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

3472/2
Additional
Mathematics
Kertas 2
Sept.
2011
2½ jam

YAYASAN PERAK

JABATAN PELAJARAN NEGERI PERAK

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA NEGERI PERAK TAHUN 2011

ADDITIONAL MATHEMATICS

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini adalah dalam dwibahasa.*

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

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

4. *Calon dikehendaki menceraikan halaman 19 dan ikat bersama-sama dengan kertas jawapan, sebagai muka hadapan.*

Kertas soalan ini mengandungi 20 halaman bercetak.

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

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

1. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. $a^m \times a^n = a^{m+n}$

3. $a^m \div a^n = a^{m-n}$

4. $(a^m)^n = a^{mn}$

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
KALKULUS

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

   Luas di bawah lengkung

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

   $= \int_a^b x \, dy$

5. Volume of revolution

   Isipadu kisaran

   $= \int_a^b \pi y^2 \, dx$ or *(atau)*

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

STATISTICS
STATISTIK

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

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

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

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

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

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

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

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 / *Min* , $\mu = np$

13. $\sigma = \sqrt{npq}$

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

GEOMETRY
GEOMETRI

1. Distance / *Jarak*

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

2. Midpoint / *Titik tengah*

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

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

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

4. Area of a triangle / *Luas segi tiga*

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

5. $\left| \underset{\sim}{r} \right| = \sqrt{x^2 + y^2}$

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

TRIGONOMETRY
TRIGONOMETRI

1. Arc length, $s = r\theta$

   Panjang lengkok, $s = j\theta$

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

   Luas sektor, $L = \frac{1}{2}j^2\theta$

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

   $\sin^2 A + \text{kos}^2 A = 1$

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

   $\text{sek}^2 A = 1 + \tan^2 A$

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

   $\text{kosek}^2 A = 1 + \text{kot}^2 A$

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

   $\sin 2A = 2 \sin A \text{ kos } A$

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

   $= 2\cos^2 A - 1$

   $= 1 - 2\sin^2 A$

   $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$

   $= 2\,\text{kos}^2 A - 1$

   $= 1 - 2\sin^2 A$

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

   $\sin(A \pm B) = \sin A \text{ kos } B \pm \text{kos } A \sin B$

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

   $\text{kos}(A \pm B) = \text{kos } A \text{ kos } B \mp \sin A \sin B$

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

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

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

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

    $a^2 = b^2 + c^2 - 2bc\,\text{kos } A$

14. Area of triangle / *Luas segi tiga*

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

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

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

1 Solve the simultaneous equations $x - 3y = 5$ and $x^2 + 2y^2 = 31$
Give your answers correct to three decimal places. [5 *marks*]
Selesaikan persamaan serentak $x - 3y = 5$ dan $x^2 + 2y^2 = 31$
Beri jawapan anda betul kepada tiga tempat perpuluhan. [5 *markah*]

2 Diagram 2 shows the curve of a quadratic function $f(x) = x^2 - kx - 2$. The curve has a minimum point at $B(3, p)$ and intersects the $f(x)$-axis at point A.
Rajah 2 menunjukkan lengkung bagi fungsi kuadratik $f(x) = x^2 - kx - 2$. *Lengkung itu mempunyai titik minimum pada* $B(3, p)$ *dan memotong paksi-f(x) pada titik* A.

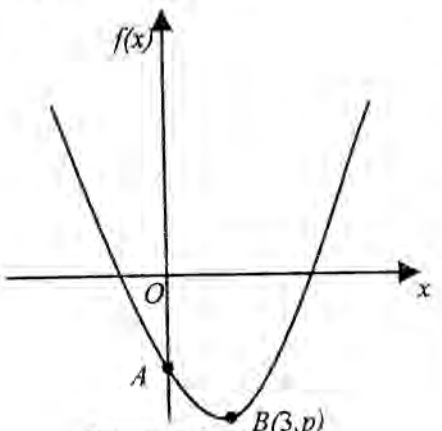


Diagram 2
Rajah 2

(a) State the coordinates of A. [1 *mark*]
Nyatakan koordinat A [1 *markah*]

(b) By using the method of completing the square, find the value of k and of p. [4 *marks*]
Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai k *dan nilai* p. [4 *markah*]

(c) Determine the range of values of x, if $f(x) \leq -2$. [2 *marks*]
Tentukan julat nilai x, *jika* $f(x) \leq -2$. [2 markah]

3 Diagram 3 shows a piece of wire which is bent to form a number of semicircles.
The first semicircle has a radius r cm and the radius of each subsequent semicircle increases by 3 cm.
[Circumference of circle = $2\pi r$]
Rajah 3 menunjukkan seutas dawai yang dibentuk kepada beberapa semibulatan. Semibulatan yang pertama mempunyai jejari r cm *dan jejari semibulatan berikutnya bertambah sebanyak* 3 cm.
[Lilitan bulatan = $2\pi r$]

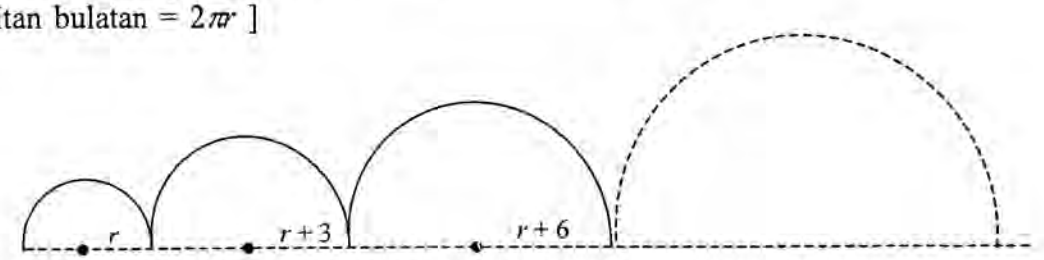


Diagram 3
Rajah 3

(a) Show that the lengths of wire used to form semicircle form an arithmetic progression and hence, state the common difference. [3 *marks*]
Tunjukkan bahawa panjang dawai setiap semibulatan itu membentuk satu janjang aritmetik dan seterusnya nyatakan beza sepunya janjang itu. [3 *markah*]

(b) Given that $r = 4$ cm,
Diberi bahawa $r = 4$ cm,
[Use / *Guna* $\pi = 3.142$]

(i) determine which semicircle has a wire of length 172.81 cm.
tentukan semibulatan yang ke berapakah mempunyai panjang dawai 172.81 cm.

(ii) find the sum of the length of wire for the first 10 semicircles.
cari hasil tambah panjang dawai bagi 10 *semibulatan pertama.*

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

4 (a) Prove that $\dfrac{2\sin x(1-\sin^2 x)}{\cos x} = \sin 2x$. [2 *marks*]

Buktikan bahawa $\dfrac{2\sin x(1-\sin^2 x)}{\cos x} = \sin 2x$. [2 *markah*]

(b) Sketch the graph of $y = 4\sin 2x$ for $0 \le x \le 2\pi$. [3 *marks*]
Lakarkan graf $y = 4\sin 2x$ *untuk* $0 \le x \le 2\pi$. [3 *markah*]

(c) Hence, using the same axes, draw a suitable straight line to find the number of solutions to equation $\pi(2\sin 2x+1)-x=0$ for $0\le x\le 2\pi$. [3 *marks*]

Seterusnya, dengan menggunakan paksi yang sama, lukiskan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\pi(2\sin 2x+1)-x=0$ *untuk* $0\le x\le 2\pi$. [3 *markah*]

5 Table 5 shows the total time spent on doing school homework by 120 students for a period of 4 weeks.
Jadual 5 menunjukkan jumlah masa yang diluangkan untuk membuat kerja rumah sekolah oleh 120 pelajar dalam jangka masa 4 minggu.

Total time (hours) ***Jumlah masa(jam)***	**Number of students** ***Bilangan pelajar***
5 – 14	12
15 – 24	17
25 – 34	26
35 – 44	31
45 – 54	16
55 – 64	10
65 – 74	8

Table 5
Jadual 5

Calculate,
Hitung,

(*a*) the mean,
min

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

(*b*) the interquartile range.
julat antara kuartil.

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

6 Diagram 6 shows a quadrilateral $ABCD$ where AED and EFC are straight lines.
Rajah 6 menunjukkan sebuah sisiempat ABCD dengan AED dan EFC adalah garis lurus.

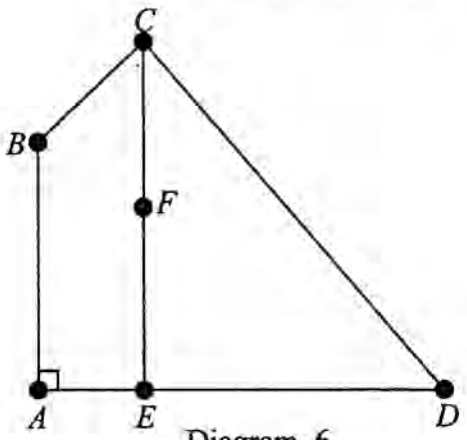


Diagram 6
Rajah 6

It is given that

$\overrightarrow{AB} = 20\underline{v}$, $\overrightarrow{AD} = 32\underline{u}$, $\overrightarrow{DC} = -24\underline{u} + 25\underline{v}$, $AE = \frac{1}{4}AD$ and $EF = \frac{3}{5}EC$.

Diberi bahawa

$\overrightarrow{AB} = 20\underline{v}$, $\overrightarrow{AD} = 32\underline{u}$, $\overrightarrow{DC} = -24\underline{u} + 25\underline{v}$, $AE = \frac{1}{4}AD$ *dan* $EF = \frac{3}{5}EC$

(a) Express in terms of $\underline{u}$ and/or $\underline{v}$,
Ungkapkan dalam sebutan $\underline{u}$ *dan/atau* $\underline{v}$,

(i) $\overrightarrow{BD}$,
(ii) $\overrightarrow{BF}$

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

(b) Show that the points B, F and D are collinear.
Tunjukkan bahawa titik-titik B, F dan D adalah segaris.

[3 *marks*]
[3 *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 Diagram 7 shows part of curve $y = f(x)$ which passes through the point $A(1, 3)$.
Rajah 7 menunjukkan sebahagian daripada lengkung $y = f(x)$ *yang melalui titik* $A(1, 3)$.

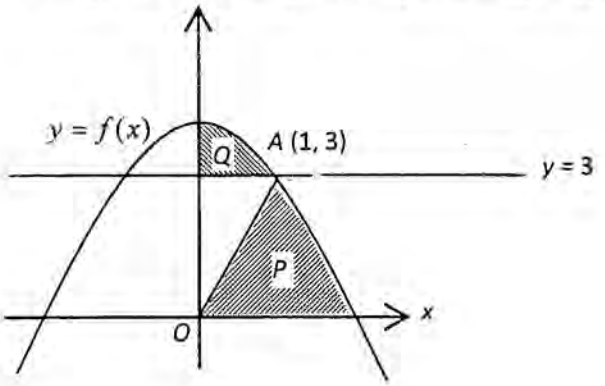


Diagram 7
Rajah 7

Given that $f'(x) = -2x$, find
Diberi bahawa $f'(x) = -2x$, cari

(a) $f(x)$. [3 *marks*]
[3 *markah*]

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

(c) the volume generated, in term of π, when the shaded region Q which is bounded by the curve, the y-axis and the line $y = 3$ is rotated through 360° about the y-axis.
[3 marks]

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

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

Table 8 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = hx^3 + kx^2$, where h and k are constants.

Jadual 8 menunjukkan nilai-nilai bagi dua pembolehubah, x *dan* y, *yang diperoleh daripada satu eksperimen. Pembolehubah* x *dan* y *dihubungkan oleh persamaan* $y = hx^3 + kx^2$, *dengan keadaan* h *dan* k *ialah pemalar.*

x	2	3	4	5	6	7
y	11.9	45.1	p	224.2	397.8	637.3

Table 8
Jadual 8

(a) Plot $\frac{y}{x^2}$ against x, using a scale of 2 cm to 1 unit on the x-axis and 2 cm to 2 unit on the $\frac{y}{x^2}$-axis.

Hence, draw the line of the best fit. [4 *marks*]

Plot $\frac{y}{x^2}$ *melawan* x, *dengan menggunakan skala* 2 cm *kepada* 1 *unit pada paksi-*x *dan* 2 cm *kepada* 2 *unit pada paksi-*$\frac{y}{x^2}$.

Seterusnya, lukis garis lurus penyuaian terbaik. [4 *markah*]

(b) Use the graph in 8(a) to find the value of
Gunakan graf di 8(a) *untuk mencari nilai*

(i) h,
(ii) k,
(iii) p.

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

9 Diagram 9 shows sector $OPQR$ of a circle with centre O and of radius 10 cm, and sector $PTSR$ of a circle with centre P. Given that $\angle POR = \angle TPR = 0.6$ radians.
Rajah 9 menunjukkan sektor OPQR bagi sebuah bulatan berpusat O dan berjejari 10 cm, *dan sebuah sektor PTSR bagi sebuah bulatan berpusat P.*
Diberi bahawa $\angle POR = \angle TPR = 0.6$ radian.

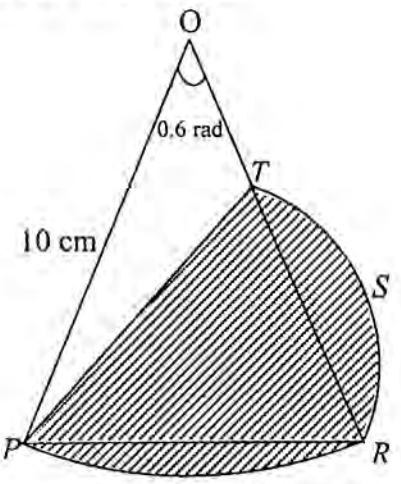


Diagram 9
Rajah 9

(a) Show that PR = 5.91 cm, [2 *marks*]
Tunjukkan PR = 5.91 cm, [2 *markah*]

(b) Find the perimeter, in cm, of the whole diagram, [4 *marks*]
Cari perimeter, dalam cm, *seluruh rajah itu*, [4 *markah*]

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

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

Diagram 10 shows a kite *ABCD*. The diagonals *AC* and *BD* intersect at point *M*.
Rajah 10 *menunjukkan sebuah lelayang ABCD. Pepenjuru-pepenjuru AC dan BD bersilang pada titik M.*

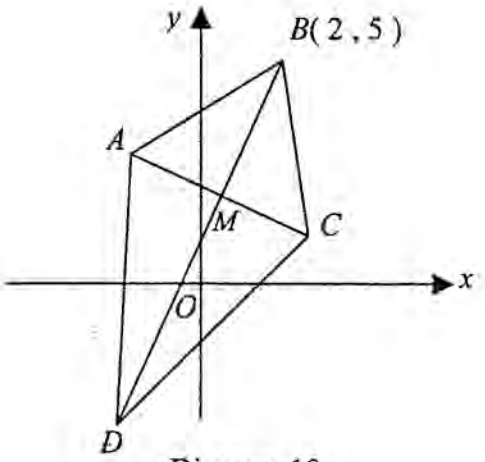


Diagram 10
Rajah 10

The equation of *AC* is $x + 2y = 7$ and $BM : MD = 1 : 2$.
Persamaan AC ialah $x + 2y = 7$ *dan* $BM : MD = 1 : 2$.

(a) Find
Cari

(i) the equation of the diagonal *BD*,
persamaan pepenjuru BD,

(ii) the coordinates of *M* and of *D*.
koordinat bagi *M* dan *D*.

[7 *marks*]
[7 *markah*]

(b) Point $P(x , y)$ moves in the Cartesian plane such that $PM = MD$.
Find the equation of the locus of *P*. [3 *marks*]

Titik $P(x , y)$ *bergerak pada satah Cartesan dengan keadaan* $PM = MD$.
Cari persamaan bagi lokus P. [3 *markah*]

11 (a) In a survey carried out on customers of Giga Supermarket, it is found that 4 out of 7 of their customers use credit card to pay their bills. If 9 of their customers are chosen at random, calculate the probability that

Dalam satu tinjauan yang dijalankan ke atas pelanggan Pasaraya Giga, didapati 4 *daripada* 7 *orang pelanggannya menggunakan kad kredit untuk membayar bil mereka. Jika* 9 *orang dari pelanggannya di pilih secara rawak, hitung kebarangkalian bahawa*

(i) exactly 3 customers pay their bills by using credit card.
tepat 3 *orang pelanggannya membayar bil menggunakan kad kredit.*

(ii) less than 3 customers pay their bills by cash.
kurang daripada 3 *pelanggannya membayar bil secara tunai.*

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

(b) In another survey carried out on the customers of Giga Supermarket, it is found that customers total expanses follows a normal distribution with a mean of RM76.00 and a standard deviation of RM15.00. Find

Dalam satu lagi tinjauan yang dijalankan ke atas pelanggan Pasaraya Giga, didapati jumlah perbelanjaan pelanggannya mengikut taburan normal dengan min RM76.00 *dan sisihan piawai* RM15.00. *Cari*

(i) the probability that a customer chosen at random spends not less than RM70.00.
kebarangkalian bahawa seorang pelanggan yang dipilih secara rawak membelanja tidak kurang daripada RM70.00.

(ii) the value of p if 33% of the customers spend more than RM p.
nilai p jika 33% *daripada pelanggannya membelanja lebih daripada* RM p.

[5 *marks*]
[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 in a straight line and passes through a fixed point O. The velocity of the particle, v cm s^{-1}, is given by $v = 8 + 10t - 3t^2$, where t is the time, in seconds, after leaving O.

Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O. Halaju zarah itu, v cm s^{-1}, diberi oleh $v = 8 + 10t - 3t^2$ dengan keadaan t ialah masa, dalam saat, selepas melalui O.

Find
Cari

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

(b) the initial acceleration, in cm s^{-2}, of the particle,
pecutan awal, dalam cm s^{-2}, *zarah itu ,* [2 *marks*] [2 *markah*]

(c) the maximum velocity, in cm s^{-1}, of the particle,
halaju maksimum, dalam cm s^{-1}, *zarah itu,* [3 *marks*] [3 *markah*]

(d) the distance, in cm, from O when the particle stops instantaneously.
jarak, dalam cm, *dari O apabila zarah itu berhenti seketika.* [4 *marks*] [4 *markah*]

13 An electronic product consists of four components: *A, B, C* and *D*.
Table 13 shows the average prices and the price indices of these components for the years 2009 and 2010.
Diagram 13 is a pie chart which represent the relative quantities of the components used in manufacturing the electronic product.

Suatu bahan elektronik terdiri daripada empat komponen: A, B, C dan D.
Jadual 13 *menunjukkan harga purata dan indeks harga bagi empat komponen tersebut pada tahun* 2009 *dan* 2010.
Rajah 13 *adalah sebuah carta pai yang mewakili kuantiti relatif komponen yang digunakan dalam penghasilan bahan elektronik tersebut.*

Component *Komponen*	**Price (RM) per unit in the year** *Harga* **(RM) seunit pada tahun**		**Price index in the year 2010 based on the year 2009** *Indeks harga pada tahun* **2010***berasaskan tahun* **2009**
	2009	**2010**	
A	40	48	x
B	75	y	130
C	50	45	150
D	z	81	135

Table 13
Jadual 13

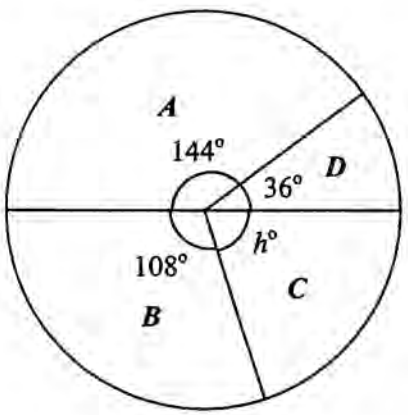


Diagram 13
Jadual 13

(*a*) Find the values of x, y and z. [3 *marks*]
Cari nilai x, y dan z. [3 *markah*]

(b) Calculate the value of h.
Hence, find the composite index for the price of the electronic product in the year 2010 based on the year 2009.

[3 *marks*]

Hitungkan nilai h.
Seterusnya, cari indeks gubahan bagi harga bahan elektronik tersebut pada tahun 2010 *berasaskan tahun* 2009.

[3 *markah*]

(c) If the cost of components used to produce 1 unit of the electronic product in the year 2009 is RM600, find the cost of components used to produce 1 unit of the product in the year 2010.

[2 *marks*]

Jika harga komponen yang digunakan untuk menghasilkan 1 *unit bahan elektronik tersebut pada tahun* 2009 *ialah* RM600, *cari harga komponen yang digunakan untuk menghasilkan* 1 *unit bahan elektronik tersebut pada tahun* 2010.

[2 *markah*]

(d) The cost of making the electronic product increased by 20% from the year 2010 to the year 2011.
Find the composite index for the year 2011 based on the year 2009.

[2 *marks*]

Kos membuat bahan elektronik tersebut meningkat 20% *dari tahun* 2010 *ke tahun* 2011.
Cari indeks gubahan pada tahun 2011 *berasaskan tahun* 2009.

[2 *markah*]

14 Solution by scale drawing is **not** be accepted.
Penyelesaian secara lukisan berskala **tidak** *diterima.*

Diagram 14 shows a triangles ABC with point K lies on AC.

Given that $BC = 12$ cm, $BK = 16$ cm, $\sin\angle AKB = \frac{3}{5}$ and area of triangle $ABK = 24$ cm^2.

Rajah 14 menunjukkan segi tiga ABC dengan titik K terletak pada AC.

Diberi $BC = 12$ cm, $BK = 16$ cm, $\sin\angle AKB = \frac{3}{5}$ *dan luas segi tiga* $ABK = 24$ cm^2.

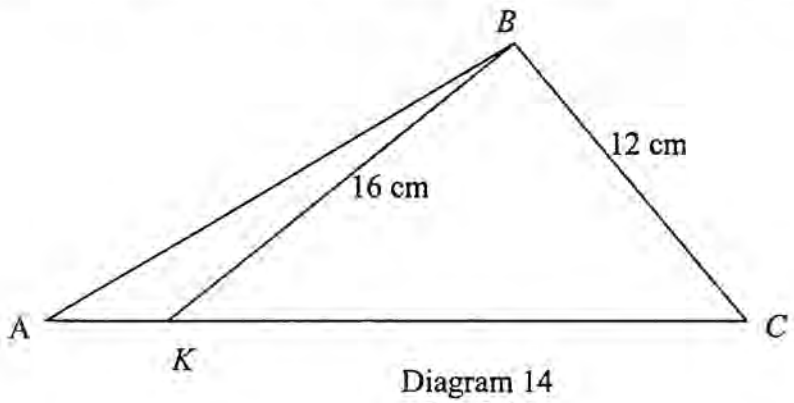


Diagram 14
Rajah 14

(a) Calculate the length, in cm, of
Hitung panjang, dalam cm, *bagi*

(i) AK
(ii) AB

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

(b) The length of CK in triangle BCK is x cm.
By using Cosine rule, shows that x satisfies quadratic equation $5x^2 - 128x + 560 = 0$
Panjang CK dalam segi tiga BCK ialah x cm. *Dengan menggunakan petua kosinus, tunjukkan bahawa x memuaskan persamaan kuadratik* $5x^2 - 128x + 560 = 0$

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

(c) A triangle $B'C'K'$ has a different shape from triangle BCK such that $B'C' = BC$, $B'K' = BK$ and $\angle B'K'C' = \angle BKC$.
Segi tiga $B'C'K'$ *mempunyai bentuk yang berlainan daripada segi tiga BCK dengan keadaan* $B'C' = BC$, $B'K' = BK$ dan $\angle B'K'C' = \angle BKC$.

(i) Sketch triangle $B'C'K'$
Lakarkan segi tiga $B'C'K'$

(ii) Find $\angle K'C'B'$
Cari $\angle K'C'B'$

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

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

Erin plans to sew dresses and pants in a week. The time taken to sew a dress is 2 hours and the time taken to sew a pants is 2.5 hours. The cost of sewing a dress and a pants is RM40 and RM80 respectively. Erin can sew x dresses and y pants in a week based on the following constraints:

Erin bercadang untuk menjahit baju dan seluar dalam masa seminggu. Masa yang diambil untuk menjahit sehelai baju ialah 2 jam dan masa yang diambil untuk menjahit sehelai seluar ialah 2.5 jam. Kos untuk menjahit sehelai baju dan sehelai seluar ialah RM40 *dan* RM80 masing-masing. *Erin dapat menjahit x helai baju dan y helai seluar berdasarkan kekangan berikut :*

I : Erin works at least 20 hours in a week
Erin bekerja sekurang-kurangnya 20 jam seminggu.

II : The total cost of sewing the dresses and pants does not exceed RM640 in a week.
Jumlah kos untuk menjahit baju dan seluar tidak melebihi RM640 *dalam satu minggu.*

III : The number of dresses sewed does not exceed two times the number of pants sewed.
Bilangan baju yang dijahit tidak melebihi dua kali bilangan seluar yang dijahit.

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

(b) Using a scale of 2 cm to 2 dresses for the x-axis and 2 cm to 1 pants for the y-axis, construct and shade the region R which satisfies all the above constraints. [3 *marks*]
Dengan menggunakan skala 2 cm *kepada* 2 *baju pada paksi-x dan* 2 cm *kepada* 1 *seluar pada paksi-y, bina dan lorek rantau R yang memenuhi semua kekangan di atas.* [3 *markah*]

(c) Based on the graph constructed in 15(*b*), find
Berdasarkan graf yang dibina di 15(*b*), *cari*

(i) the range of the number of dresses sewn if she sewed 5 pants,
julat bagi bilangan baju yang dijahit jika Erin menjahit 5 helai seluar,

(ii) the maximum profit per week if the profit for each dress and pants sewn is RM25 and RM45 respectively.
keuntungan maksimum seminggu jika keuntungan bagi sehelai baju dan sehelai seluar yang dijahit adalah RM25 *dan* RM45 *masing-masing.*

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

NAMA : .....

ANGKA GILIRAN

Arahan Kepada Calon

1. Tuliskan **nama** dan **angka giliran** anda pada ruang yang disediakan.

2. Tandakan (√) untuk soalan yang dijawab.

3. Ceraikan helaian ini dan ikatkan bersama-sama dengan kertas jawapan sebagai muka hadapan.

Kod Pemeriksa				
Bahagian	*Soalan*	*Soalan Dijawab*	*Markah Penuh*	*Markah Diperoleh (Untuk Kegunaan Pemeriksa)*
A	**1**		5	
	2		7	
	3		7	
	4		8	
	5		6	
	6		7	
B	**7**		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	**12**		10	
	13		10	
	14		10	
	15		10	
Jumlah				

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A, Section B** and **Section C.**
*Kertas soalan ini mengandungi tiga bahagian: **Bahagian A, Bahagian B** dan **Bahagian C.***

2. Answer **all** questions in **Section A**, any **four** questions from **Section B** and **any two** questions from **Section C**.
*Jawab **semua** soalan dalam **Bahagian A**, mana-mana **empat** soalan daripada **Bahagian B** dan mana-mana **dua** soalan daripada **Bahagian C.***

3. Write your answers on your answer sheet.
Jawapan anda hendaklah ditulis di atas kertas jawapan anda.

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

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

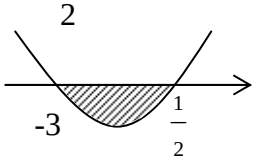
6. The marks allocated for each question and sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

7. A list of formulae is provided on pages 3 to 5.
Satu senarai rumus disediakan di halaman 3 hingga 5.

8. You may use a non-programmable scientific calculator or a booklet of four-figure mathematical tables.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram atau buku sifir matematik empat angka.

9. Tie the 'helaian tambahan' and the graph papers together with your answer paper and hand in to the invigilator at the end of the examination.
Ikat 'helaian tambahan' dan kertas graf bersama-sama dengan kertas jawapan anda serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

SPM Trial Examination 2011
Mark Scheme
Addition Mathematics Paper 1

No	Marking Scheme	Total Mark
1.	(a) 7 (b) 8 (c) many to many *banyak dengan banyak*	1 1 1
2.	(a) 53 (b) $h = 3$ and $k = 22$ B2: $h = 3$ or $9h - k = 5$ or g(x) = $3x^2$ - 22 B1: $h(3-x)^2 - k$	1 3
3.	(a) $g^{-1}(x) = \frac{x+4}{7}$ Accept: $\frac{x+4}{7}$ (b) $p = 10$ B1: $\frac{p+4}{7} = 2$ or $7(2) - 4 = p$	1 2
4.	$p = -6$ B1: $(-3)^2 + 5(-3) - p = 0$ <u>OR</u> $(x+3)(x+2) = 0$ <u>OR</u> $-3 + h = -5$ and $-3h = -p$	2
5.	$-3 \le x \le \frac{1}{2}$ B2:  (indicated the correct region) B1: $(x+3)(2x-1)$	3
6.	(a) $x = 2$ (b) $f(x) = (x-2)^2 - 16$ B1: $b = -2$ <u>or</u> $c = -16$	1 2

7.	$n = -\frac{1}{2}$ B2: $n - 2 + 3n = -4$ or equivalent B1: $3^{n-2} \times 3^{3n} = 3^{-4}$ or equivalent	3
8.	$x = 64$ B2: $\log_2 x^{\frac{1}{2}} = 3$ or $\log_4 x = 3$ B1: $\frac{\log_2 x}{\log_2 4}$ or $\frac{\log_4 x}{\log_4 2}$	3
9.	$x = 40$ B1: $\frac{x}{x+10} = \frac{x-8}{x}$	2
10.	(a) $-\frac{1}{3}$ (b) -18 B1: $\frac{-24}{1-\left(-\frac{1}{3}\right)}$	1 2
11.	$n = 20$ B: $56 + (n-1)(-3) < 0$	2
12.	$a = 7$ and $b = -2$ B3: $a = 7$ or $b = -2$ OR $1 = a - 2(3)$ or $5 = a - 2(1)$ B2: $5 = a + b(1)$ or $1 = a + b(3)$ OR $b = \frac{5-1}{1-3}$ B1: $\log y = bx^2 + a$	4
13.	(a) $h = -6$ B1: $\frac{4-0}{1-3} = \frac{h-0}{6-3}$ or equivalent (b) $2:3$ B1: $3 = \frac{n(1)+m(6)}{n+m}$	2 2

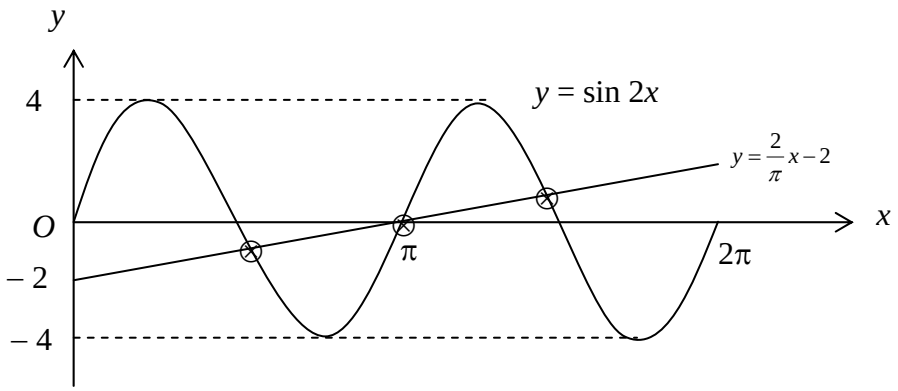
14.	$6, \ -6$ B2: $\frac{p}{3}=\frac{12}{p}$ B1: $m_1=\frac{12}{p}$ or $m_2=\frac{p}{3}$	3
15.	(a) $k=6$ B1: $\sqrt{k^2+8^2}=10$ (b) $\frac{1}{10}\left(^*6i+8j\right)$ $\frac{3}{5}i+\frac{4}{5}j$	2 1
16.	(a) $-\underline{x}+2\underline{y}$ (b) $\frac{3}{4}\underline{x}+\frac{1}{2}\underline{y}$ B2: $\underline{x}+\frac{1}{4}(-\underline{x}+2\underline{y})$ or $2\underline{y}-\frac{3}{4}(-\underline{x}+2\underline{y})$ B1 : $\frac{1}{4}(-\underline{x}+2\underline{y})$ or $-\frac{3}{4}(-\underline{x}+2\underline{y})$	1 3
17.	(a) $\sec\theta=\frac{1}{k}$ (b) $-\frac{\sqrt{1-k^2}}{k}$ B1: $\sqrt{1-k^2}$	1 2
18.	(a) 5 (b) 45.56 B2: $\frac{1}{2}(13)^2(1.19)-\frac{1}{2}(10+12)5$ B1 : $\frac{1}{2}(13)^2(1.19)$ or $\frac{1}{2}(10+12)5$	1 3
19.	24 B2: $-2(2)(-3)(2x-3)^{-4}(2)$ B1: $-2(2x-3)^{-2-1}(2)$	3
20.	$\frac{15}{11}$ B2 : $\frac{dx}{dt}=\frac{5}{(4-3x^{-2})}$ or equavalent	3

	B1: $\frac{dy}{dx} = 4 - 3x^{-2}$ or $\frac{dy}{dt} = 5$	
21.	$y = 3x^2 - 4x - 5$ B2: $2 = 3(1)^2 - 4(1) + c$ B1: $y = 3x^2 - 4x + c$	3
22.	(a) $\sum x = 42$ (b) $\sum x^2 = 324$ B1: $\sqrt{5} = \sqrt{\frac{\sum x^2}{6} - 7^2}$	1 2
23.	(a) 1716 (b) 1008 B2 : ${}^8C_4 \times {}^5C_2 + {}^8C_5 \times {}^5C_1 + {}^8C_6 \times {}^5C_0$ B1: ${}^8C_4 \times {}^5C_2$	1 3
24.	(a) $x = 5$ B1 : $\frac{12}{33+x} = \frac{6}{19}$ (b) $\frac{3}{38}$ B1 : $\frac{5}{30} \times \frac{18}{38}$ or $1 - \frac{25}{30} \times \frac{20}{38}$	2 2
25.	(a) 0.1587 B1: $P(Z > \frac{103-95}{8})$ (b) 0.6826 B1: P(–1 < Z < 1)	2 2
	Total	80

SPM TRIAL EXAM 2011
Marking Scheme
Additional Mathematics Paper 2

Section A

Question	Part	Solution	Marks
1		$x = 5 + 3y$ … (1) $x^2 + 2y^2 = 31$ … (2)	1
		$(5 + 3y)^2 + 2y^2 = 31$ $11y^2 + 30y - 6 = 0$	1
		$y = \dfrac{-30 \pm \sqrt{30^2 - 4(11)(-6)}}{2(11)}$	1
		$y = 0.187, -2.914$	1
		$x = 5 + 3(0.187)$, $x = 5 + 3(-2.914)$ $= 5.561$ $= -3.742$ or -3.743	1
2	(a)	A(0, -2)	1
	(b)	$f(x) = (x^2 - kx + \dfrac{k^2}{4} - \dfrac{k^2}{4}) - 2$	1
		$= (x - \dfrac{k}{2})^2 - \dfrac{k^2}{4} - 2$	1
		$3 - \dfrac{k}{2} = 0$ $k = 6$	1
		$p = -\dfrac{k^2}{4} - 2$ $= -11$	1
	(c)	$x(x - 6) \le 0$	1
		$0 \le x \le 6$	1
3	(a)	$L_1 = \pi r$, $L_2 = \pi(r+3)$, $L_3 = \pi(r+6)$	1
		$L_2 - L_1 = \pi(r+3) - \pi r = 3\pi$ $L_3 - L_2 = \pi(r+6) - \pi(r+3) = 3\pi$	1
		Common difference, $d = 3\pi$	1
	(b)(i)	$4\pi + (n-1)(3\pi) = 172.81$	1
		$n = \dfrac{172.81 - 3.142}{3 \times 3.142}$ $n = 18$	1
	(b)(ii)	$S_{10} = \dfrac{10}{2}\left[2 \times 4 \times 3.142 + (10-1)(3 \times 3.142)\right]$	1
		$S_{10} = 549.85$ cm or 549.78 cm (using π in calculator)	1

4	(a)	LHS $= \dfrac{2\sin x(\cos^2 x)}{\cos x}$	**1**
		$= 2\sin x\cos x$ $= \sin 2x$	**1**
	(b)		
		Graph $y = \sin x$	**1**
		2 cycle or amlitude 4	**1**
		All correct	**1**
	(c)	$y = \dfrac{2}{\pi}x - 2$	**1**
		Straight line $y = \dfrac{2}{\pi}x - 2$	**1**
		Number of solution = 3	**1**

5	(a)	$\bar{x} = \dfrac{12(9.5)+17(19.5)+26(29.5)+31(39.5)+16(49.5)+10(59.5)+8(69.5)}{120}$	**1**
		$= 36.5$	**1**
	(b)	$Q_1 = 24.5 + \left(\dfrac{\frac{1}{4}(120)-29}{26}\right)10$	**1**
		$Q_3 = 44.5 + \left(\dfrac{\frac{3}{4}(120)-86}{16}\right)10$	**1**
		$Q_3 - Q_1 = 47 - 24.88$	**1**
		$= 22.12$	**1**

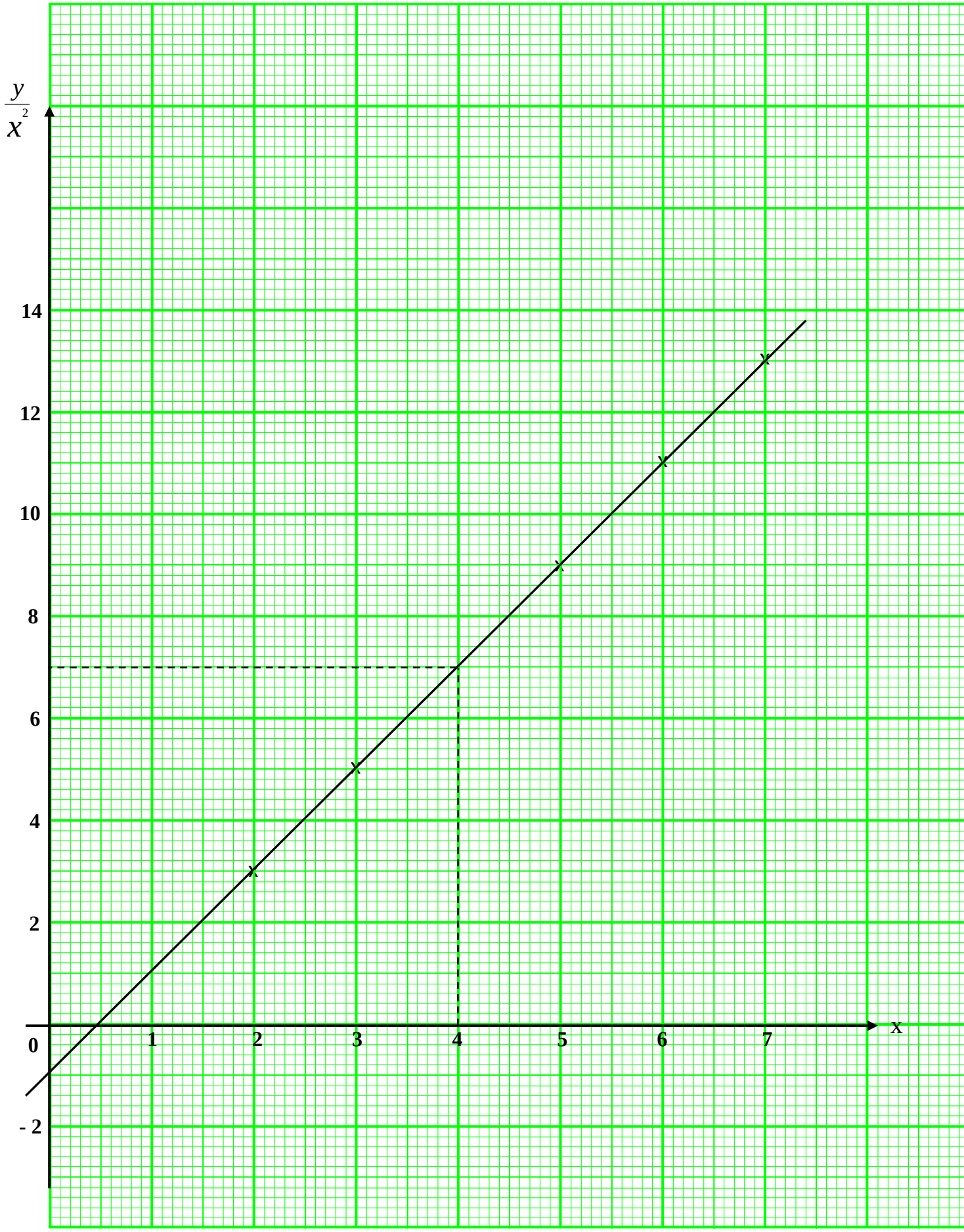
6	(a)(i)	$32\underline{u} - 20\underline{v}$	**1**
	(ii)	$\overrightarrow{EF} = \frac{3}{5}\overrightarrow{EC}$ $= \frac{3}{5}(\overrightarrow{ED} + \overrightarrow{DC})$ $= \frac{3}{5}(24\underline{u} - 24\underline{u} + 25\underline{v})$ $= 15\underline{v}$	**1**
		$\overrightarrow{BF} = \overrightarrow{BA} + \overrightarrow{AE} + \overrightarrow{EF}$ $= -20\underline{v} + 8\underline{u} + 15\underline{v}$	**1**
		$= 8\underline{u} - 5\underline{v}$	**1**
	(b)	$\overrightarrow{BF} = 8\underline{u} - 5\underline{v}$ $\overrightarrow{BD} = 32\underline{u} - 20\underline{v}$ $= 4(8\underline{u} - 5\underline{v})$ $\overrightarrow{BF} = \frac{1}{4}\overrightarrow{BD}$	**1**
		BF // BD and B is the common point	**1**
		Thus B, F and D are collinear	**1**

Section B

7	(a)	$f(x) = -x^2 + c$	**1**
		$3 = -1 + c$	**1**
		$f(x) = -x^2 + 4$	**1**
	(b)	$\int_1^2 (-x^2 + 4)\,dx + ½\,(1)(3)$	**1**
		$\left[-\frac{x^3}{3} + 4x\right]_1^2$	**1**
		$\left[\left(-\frac{2^3}{3} + 4(2)\right) - \left(-\frac{1^3}{3} + 4(1)\right)\right] + \frac{3}{2}$	**1**
		$\frac{19}{6}\ unit^2$	**1**
	(c)	$\pi\int_3^4 (4 - y)dy$ $= \pi\left[4y - \frac{y^2}{2}\right]_3^4$	**1**
		$= \pi\left[\left(4(4) - \frac{4^2}{2}\right) - \left(4(3) - \frac{3^2}{2}\right)\right]$	**1**
		$= \frac{1}{2}\pi$	**1**

8	(a)	$\frac{y}{x^2}$ | 2.98 | 5.01 | 8.97 | 11.05 | 13.01 x | 2 | 3 | 5 | 6 | 7	**1**
		Refer to graph	**1**
		Using the correct, uniform scale and axes	**1**
		All points plotted correctly	**1**
		Line of best fit	**1**
	(b)(i)	$\frac{y}{x^2} = hx + k$	**1**
		$h = \frac{13.01 - 2.98}{7 - 2}$	**1**
		$= 2.01$	**1**
	(ii)	$k = -1$	**1**
	(iii)	when $x = 4$, $\frac{y}{x^2} = 7$	**1**
		$y = 7x^2 = 7(4)^2$ $p = 112$	**1**

Answer for No. 8(a)



9	**(a)**	$0.6\times\frac{180}{\pi}$ *or* 34.38^o or 34.37^{oo}	
		$PR = 2\,(10)\sin\left(\frac{34.38}{2}\right)$ or $2(10)\sin(0.3r)$	**1**
		$= 5.910$	**1**
	(b)	$S_{PQR} = 10(0.6)$ *or* $S_{RST} = 5.910(0.6)$	**1**
		$\text{OT} = 10 - 2(5.910)\sin\left(\frac{34.38}{2}\right)$ or 6.507	**1**
		Perimeter = 10 + 10(0.6) + 5.911(0.6) + 6.507	**1**
		= 26.05	**1**
	(c)	$\frac{1}{2}(5.910)^2(0.6)$	**1**
		$\frac{1}{2}(10)^2(0.6-\sin 34.38^o)$	**1**
		$\frac{1}{2}(5.910)^2(0.6)+\frac{1}{2}(10)^2(0.6-\sin 34.38^o)$	**1**
		= 12.24	**1**

10	**(a)(i)**	$m_{BD} = 2$	**1**
		$y - 5 = 2\,(x - 2)$	**1**
		$y = 2x + 1$	**1**
	(ii)	$2(2x + 1) + x = 7$ or equivalent	**1**
		$M(1, 3)$	**1**
		$\frac{x + 4}{1 + 2} = 1$ or $\frac{y + 10}{1 + 2} = 3$, $1=\frac{x(1)+2(2)}{1+2}$, $3=\frac{y(1)+2(5)}{1+2}$	**1**
		$D(-1, -1)$	**1**
	(b)	$\sqrt{(x-1)^2+(y-3)^2}$ **or** $\sqrt{(1+1)^2+(3+1)^2}$	**1**
		$(x-1)^2 + (y-3)^2 = (1+1)^2 + (3+1)^2$	**1**
		$x^2 + y^2 - 2x - 6y - 10 = 0$	**1**

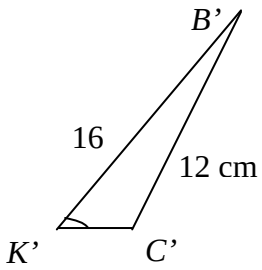
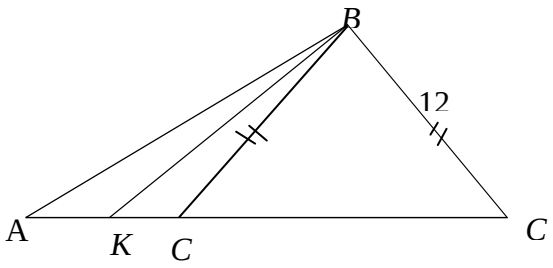
11	**(a)(i)**	${}^9C_3\left(\frac{4}{7}\right)^3\left(\frac{3}{7}\right)^6$	**1**
		$=0.0971$	**1**
	(ii)	${}^9C_0\left(\frac{3}{7}\right)^0\left(\frac{4}{7}\right)^9$ or ${}^9C_1\left(\frac{3}{7}\right)^1\left(\frac{4}{7}\right)^8$ or ${}^9C_2\left(\frac{3}{7}\right)^2\left(\frac{4}{7}\right)^7$ or equivalent	**1**
		${}^9C_0\left(\frac{3}{7}\right)^0\left(\frac{4}{7}\right)^9+{}^9C_1\left(\frac{3}{7}\right)^1\left(\frac{4}{7}\right)^8+{}^9C_2\left(\frac{3}{7}\right)^2\left(\frac{4}{7}\right)^7$ or equivalent	**1**
		$=0.1819$	**1**
	(b)	$P(X>70)=P\left(Z>\frac{70-76}{15}\right)$	**1**
		$=0.6554$	**1**
		$P(X>p)=33\%$ or $P\left(Z>\frac{p-76}{15}\right)=0.33$	**1**
		$\frac{p-76}{15}=0.44$	**1**
		$p=82.60$	**1**

Section C

12	(a)	$v=8\ ms^{-1}$	**1**
	(b)	$a=10-6t$	**1**
		$=10-6(0)$ $=10\ \text{cm s}^{-2}$	**1**
	(c)	$10-6t=0$ $t=\frac{5}{3}\ s$	**1**
		$v=8+10(\frac{5}{3})-3\left(\frac{5}{3}\right)^2$	**1**
		$=16\frac{1}{3}\ cm\,s^{-1}$	**1**
	(d)	$v=0$ $8+10t-3t^2=0$	**1**
		$(4-t)(2+3t)=0$ $t=4$	**1**
		$s=8t+\frac{10t^2}{2}-\frac{3t^3}{3}+c$	**1**

		$s = 8t + 5t^2 - t^3$	
		$= 8(4) + 5(4)^2 - 4^3$ $= 48\ cm$	**1**

13	(a)	$x = 120$	**1**
		$y = 97.50$	**1**
		$z = 60$	**1**
	(b)	$h = 72$	**1**
		$\frac{120\times144+130\times108+150\times72+135\times36}{360}$	**1**
		130.5	**1**
	(c)	$\frac{130.5\times600}{100}$	**1**
		RM783	**1**
	(d)	$130.5\times\frac{120}{100}$	**1**
		156.6	**1**

14	(a)(i)	½(16)(*AK*)($\frac{3}{5}$) = 24 Using formula of area of triangle	**1**
		AK = 5 cm	**1**
	(ii)	$\cos\angle AKB = -\frac{4}{5}$	**1**
		$AB^2 = 5^2 + 16^2 - 2(5)(16)(-\frac{4}{5})$ Using cosine rule	**1**
		AB = 20.22 cm	**1**
	(b)	$12^2 = x^2 + 16^2 - 2(x)(16)(\frac{4}{5})$ Using cosine rule	**1**
		$5x^2 - 128x + 560 = 0$ Simplify to general form	**1**
	(c)(i)	Draw obtuse triangle or shows point *C*' on *KC* and side *BC*'  or  	**1**

	(ii)	$\frac{\sin \angle K'C'B'}{16} = \frac{3/5}{12}$ Using sine rule	**1**
		$\angle K'C'B' = 126.87°$	**1**

15	(a)	$2x + 2.5y \geq 20$ or $4x + 5y \geq 40$	**1**
		$40x + 80y \leq 640$ or $x + 2y \leq 16$	**1**
		$x \leq 2y$	**1**
	(b)	Refer to graph	
		x and y axes with correct scales	**1**
		At least two lines drawn correctly	**1**
		Correct region shaded	**1**
	(c)(i)	{4,5,6} or $4 \leq x \leq 6$	**1**
	(ii)	Maximum point (8 , 4)	**1**
		25 (8) + 45 (4)	**1**
		RM 380	**1**

Graph for Question **15**