

SULIT  
3472/1  
Matematik  
Tambahan  
Kertas 1  
Ogos 2010  
2 jam



NAMA .....

KELAS .....

**PERSIDANGAN KEBANGSAAN PENGETUA SEMENANJUNG MALAYSIA**

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**

| MATEMATIK TAMBAHAN<br>Kertas 1<br>Dua jam  | Untuk Kegunaan Pemeriksa |              |                  |
|--|--------------------------|--------------|------------------|
|  | Soalan                   | Markah Penuh | Markah Diperoleh |
| <p style="text-align: center;"><b>JANGAN BUKA KERTAS SOALAN INI<br/>SEHINGGA DIBERITAHU</b></p> <p>1 Tulis nama dan kelas anda pada ruangan yang disediakan.</p> <p>2 Kertas soalan ini adalah dalam dwibahasa.</p> <p>3 Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.</p> <p>4 Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.</p> <p>5 Calon dikehendaki membaca maklumat di halaman 2.</p> | 1                        | 2            |                  |
|  | 2                        | 2            |                  |
|  | 3                        | 4            |                  |
|  | 4                        | 2            |                  |
|  | 5                        | 3            |                  |
|  | 6                        | 3            |                  |
|  | 7                        | 3            |                  |
|  | 8                        | 3            |                  |
|  | 9                        | 4            |                  |
|  | 10                       | 2            |                  |
|  | 11                       | 3            |                  |
|  | 12                       | 4            |                  |
|  | 13                       | 4            |                  |
|  | 14                       | 4            |                  |
|  | 15                       | 2            |                  |
|  | 16                       | 4            |                  |
|  | 17                       | 3            |                  |
|  | 18                       | 4            |                  |
|  | 19                       | 3            |                  |
|  | 20                       | 3            |                  |
| Kertas soalan ini mengandungi 20 halaman bercetak.   | 21                       | 4            |                  |
|  | 22                       | 4            |                  |
|  | 23                       | 3            |                  |
|  | 24                       | 3            |                  |
|  | 25                       | 4            |                  |
|  | <b>JUMLAH</b>            | <b>80</b>    |                  |

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

1. In Diagram 1, the function  $h$  maps  $x$  to  $y$  and the function  $g$  maps  $y$  to  $z$ .  
Dalam Rajah 1, fungsi  $h$  memetakan  $x$  kepada  $y$  dan fungsi  $g$  memetakan  $y$  kepada  $z$ .

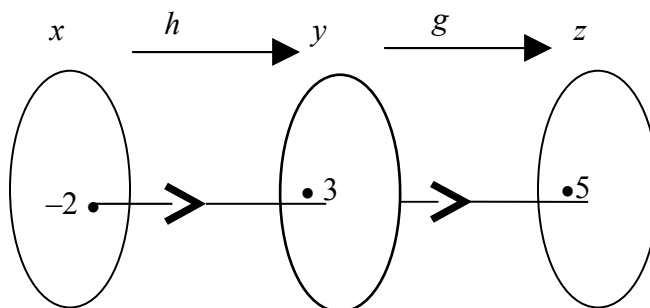


Diagram 1  
Rajah 1

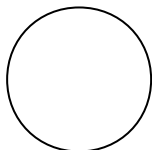
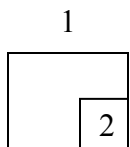
Determine  
Tentukan

- (a)  $g^{-1}(5)$ ,  
(b)  $gh(-2)$ .

[2 marks]  
[2 markah]

Answer / Jawapan : (a).....

(b).....



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2. Given the function  $f: x \rightarrow |2x - 3|$ , find the values of  $x$  such that  $f(x) = 7$ .

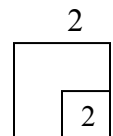
[2 marks]

*Diberi fungsi  $f: x \rightarrow |2x - 3|$ , cari nilai-nilai  $x$  dengan keadaan  $f(x) = 7$ .*

[2 markah]

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Answer / Jawapan : .....



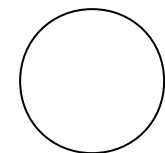
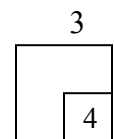
3. Solve the quadratic equation  $3 - 8(x - 1) = 2x(x + 1)$ . Give your answers correct to four significant figures.

[4 marks]

*Selesaikan persamaan kuadratik  $3 - 8(x - 1) = 2x(x + 1)$ . Berikan jawapan anda betul kepada empat angka bererti.*

[4 markah]

Answer / Jawapan : .....



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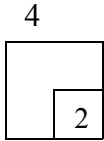
8

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4. Given that  $-5$  is one of the roots of the quadratic equation  $15 - px = 2x^2$ .  
Find the value of  $p$ . [2 marks]

*Diberi bahawa  $-5$  adalah salah satu daripada punca-punca persamaan kuadratik  $15 - px = 2x^2$ . Cari nilai  $p$ .* [2 markah]



Answer / Jawapan :  $p = \dots\dots\dots$

5. The quadratic function  $f(x) = p(x + q)^2 + r$  where  $p$ ,  $q$  and  $r$  are constants, has a maximum value of 16. The equation of the axis of symmetry is  $x = 2$ .

*Fungsi kuadratik  $f(x) = p(x + q)^2 + r$  dengan keadaan  $p$ ,  $q$  dan  $r$  adalah pemalar, mempunyai nilai maximum 16. Persamaan paksi simetrinya ialah  $x = 2$ .*

State  
*Nyatakan*

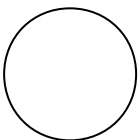
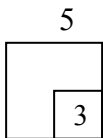
- (a) the range of the values of  $p$ ,  
*julat nilai  $p$ ,*
- (b) the value of  $q$ ,  
*nilai  $q$ ,*
- (c) the value of  $r$ .  
*nilai  $r$ .*

[ 3 marks ]  
[3 markah]

Answer / Jawapan : (a) .....

(b)  $q = \dots\dots\dots$

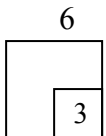
(c)  $r = \dots\dots\dots$



6. Given  $f(x) = 4x^2 - 1$ . Find the range of value of  $x$  so that  $f(x)$  is always positive. [3 marks]

Diberi  $f(x) = 4x^2 - 1$ . Cari julat nilai  $x$  supaya  $f(x)$  sentiasa positif. [3 markah]

Answer / Jawapan : .....

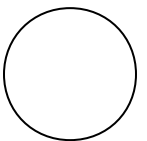
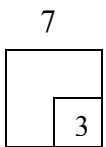


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7. Given  $8^{x-3} = \frac{4^{2x}}{64}$ . Find the value of  $x$ . [3 marks]

Diberi  $8^{x-3} = \frac{4^{2x}}{64}$ . Cari nilai  $x$ . [3 markah]

Answer / Jawapan :  $x =$  .....



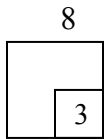
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8. Solve the equation  $3^{2x+1}(4^{x-2}) = 32$ .

[3 marks]

*Selesaikan persamaan  $3^{2x+1}(4^{x-2}) = 32$ .*

[3 markah]



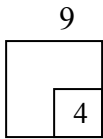
Answer / Jawapan: .....

9. Given  $\log_m 5 = p$  and  $\log_m 3 = t$ . Express  $\log_m \left( \frac{125}{3m} \right)$  in terms of  $t$  and  $p$ .

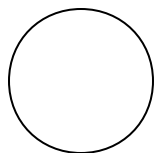
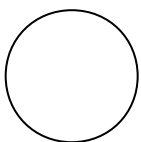
*Diberi  $\log_m 5 = p$  dan  $\log_m 3 = t$ . Ungkapkan  $\log_m \left( \frac{125}{3m} \right)$  dalam sebutan  $t$  dan  $p$ .*

[4 marks]

[4 markah]



Answer / Jawapan : .....



10. The first three terms of a sequence are 2,  $x$  and 18. Find the positive value of  $x$  so that the sequence is  
*Tiga sebutan pertama suatu jujukan ialah 2,  $x$  dan 18. Cari nilai positif bagi  $x$  supaya jujukan tersebut adalah*

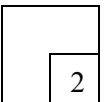
- (a) an arithmetic progression,  
*panjang aritmetik,*
- (b) a geometric progression.  
*panjang geometri.*

[2 marks]  
[2 markah]

Answer / Jawapan : (a) .....  
 (b) .....

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11. The second term and the fourth term of a geometric progression are 10 and  $\frac{2}{5}$  respectively.  
*Sebutan kedua dan keempat bagi panjang geometri masing-masing ialah 10 dan  $\frac{2}{5}$ .*

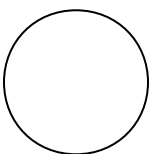
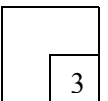
Find  
*Cari*

- (a) the first term,  $a$  and the common ratio,  $r$  where  $r > 0$ ,  
*sebutan pertama,  $a$  dan nisbah sepunya,  $r$  di mana  $r > 0$ ,*
- (b) the sum to infinity of the geometric progression.  
*hasil tambah hingga sebutan ketakterhinggaan bagi panjang itu.*

[3 marks]  
[3 markah]

Answer / Jawapan: (a) .....  
 (b) .....

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12. Diagram 2 shows a straight line passing through  $A(2, 0)$  and  $B(0, -7)$ .  
Rajah 2 menunjukkan graf garis lurus yang melalui  $A(2, 0)$  dan  $B(0, -7)$ .

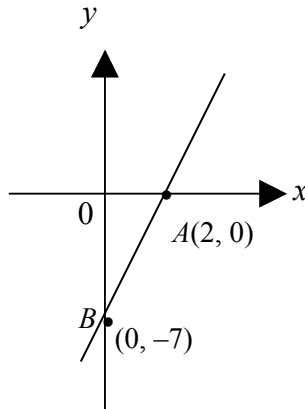


Diagram 2  
Rajah 2

- (a) Write the equation of the straight line  $AB$  in the form  $\frac{x}{a} + \frac{y}{b} = 1$

[1 mark]

Tuliskan persamaan garis lurus  $AB$  dalam bentuk  $\frac{x}{a} + \frac{y}{b} = 1$  [1

markah ]

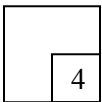
- (b) The point  $P(x, y)$  moves such that  $PA = 2PB$ . Find the equation of the locus of  $P$ .

[3 marks]

Suatu titik  $P(x, y)$  bergerak dengan keadaan  $PA = 2PB$ . Cari persamaan lokus bagi  $P$ .

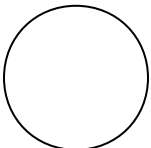
[3 markah]

12



Answer / Jawapan: (a) .....

(b) .....



13. The diagram 3 shows the straight line graph obtained by plotting  $\log_2 y$  against  $\log_2 x$ . The variables  $x$  and  $y$  are related by the equation  $y = \frac{x^{2p}}{q}$ , where  $p$  and  $q$  are constants.

Rajah 3 menunjukkan graf garis lurus yang diperolehi dengan memplot  $\log_2 y$  melawan  $\log_2 x$ . Pemboleh ubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = \frac{x^{2p}}{q}$ , dengan keadaan  $p$  dan  $q$  adalah pemalar.

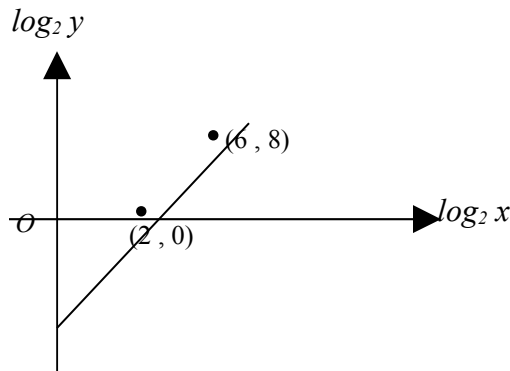


Diagram 3  
Rajah 3

(a) Express the equation  $y = \frac{x^{2p}}{q}$  in its linear form . [1 mark]

Ungkapkan persamaan  $y = \frac{x^{2p}}{q}$  dalam bentuk linear. [1 markah]

(b) Find the value of

Cari nilai

(i)  $p$ ,

(ii)  $q$ .

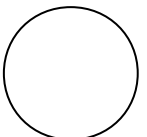
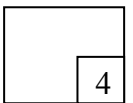
[3 marks]  
[3 markah]

Answer / Jawapan : (a) .....

(b)  $p =$  .....

$q =$  .....

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14. The points  $A(q, 3)$ ,  $B(-4, 6)$ ,  $C(8, 7)$  and  $D(6, 4)$  are the vertices of a parallelogram. Given that the area of the parallelogram is  $34 \text{ unit}^2$ , find the values of  $q$ .

*Titik  $A(q, 3)$ ,  $B(-4, 6)$ ,  $C(8, 7)$  dan  $D(6, 4)$  adalah bucu bagi sebuah segiempat selari. Diberi luas segiempat selari itu ialah  $34 \text{ unit}^2$ , cari nilai-nilai  $q$ .*

[4 marks]

[4 markah]

14



Answer / Jawapan : .....

15. The vectors  $\mathbf{a}$ , and  $\mathbf{b}$ , are non-zero and non-parallel. It is given that

$$(8h - 1)\mathbf{a} = (2k + 8)\mathbf{b}, \text{ where } h \text{ and } k \text{ are constants.}$$

*Vektor  $\mathbf{a}$ , dan  $\mathbf{b}$ , adalah bukan sifar dan bukan selari. Diberi bahawa*

$$(8h - 1)\mathbf{a} = (2k + 8)\mathbf{b}, \text{ di mana } h \text{ dan } k \text{ adalah pemalar.}$$

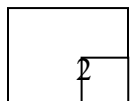
Find the value of  $h$  and of  $k$ .

*Cari nilai  $h$  dan  $k$ .*

[2 marks]

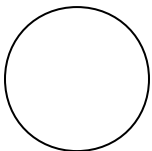
[2 markah]

15



Answer / Jawapan :  $h =$  .....

$k =$  .....



16. Given  $\mathbf{q}_{o'} = 6\mathbf{i}_{o'} + 3\mathbf{j}_{o'}$  and  $\mathbf{r}_{o'} = -\mathbf{i}_{o'} + 5\mathbf{j}_{o'}$ . If  $\mathbf{p}_{o'} = 2\mathbf{q}_{o'} - \mathbf{r}_{o'}$ , find the unit vector in the direction of  $\mathbf{p}_{o'}$ .

Diberi  $\mathbf{q}_{o'} = 6\mathbf{i}_{o'} + 3\mathbf{j}_{o'}$  dan  $\mathbf{r}_{o'} = -\mathbf{i}_{o'} + 5\mathbf{j}_{o'}$ . Jika  $\mathbf{p}_{o'} = 2\mathbf{q}_{o'} - \mathbf{r}_{o'}$ , cari vektor unit dalam arah  $\mathbf{p}_{o'}$ .

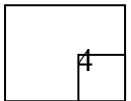
[4 marks]

[4 markah]

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Answer / Jawapan :  $p = \dots\dots\dots$

17. Given that  $\sin \theta = p$ , where  $p$  is a constant and  $90^\circ < \theta < 180^\circ$ .

Diberi bahawa  $\sin \theta = p$ , di mana  $p$  ialah satu pemalar dan  $90^\circ < \theta < 180^\circ$ .

Find in terms of  $p$ ,

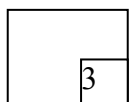
Cari dalam sebutan  $p$ ,

- (a)  $\sec \theta$ ,
- (b)  $\cos 2\theta$ .

[3 marks]

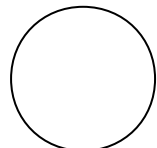
[3 markah]

17



Answer / Jawapan : (a)  $\dots\dots\dots$

(b)  $\dots\dots\dots$



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18. Diagram 4 shows a sector  $OKLMN$  of a circle with centre  $O$ .  
Rajah 4 menunjukkan sektor  $OKLMN$  bagi sebuah bulatan berpusat  $O$ .

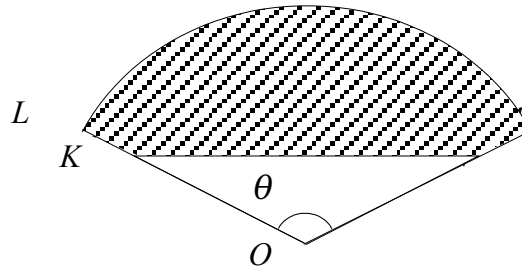


Diagram 4  
Rajah 4

Given that  $OK = ON = 5$  cm,  $KL = NM = 2$  cm,  $KN = 8$  cm and the length of the arc  $LM = 13$  cm.

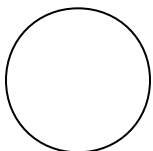
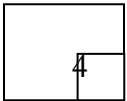
Diberi bahawa  $OK = ON = 5$  cm,  $KL = NM = 2$  cm,  $KN = 8$  cm dan panjang lengkok  $LM = 13$  cm.

Find  
Cari

- (a) the value of  $\theta$  in radian,  
nilai  $\theta$  dalam radian,  
(b) the area, in  $\text{cm}^2$ , of the shaded region.  
luas kawasan berlerek dalam  $\text{cm}^2$ .

[4 marks]  
[4 markah]

18



Answer / Jawapan : (a) .....

(b) .....

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19. Given  $y = (x - 3)^2 (2x - 5)$ , find  $\frac{d^2y}{dx^2}$ .

Diberi  $y = (x - 3)^2 (2x - 5)$ , cari  $\frac{d^2y}{dx^2}$ .

[3 marks]  
[3 markah]

Answer / Jawapan : .....

|    |
|----|
| 19 |
| 3  |

20. Two variables,  $x$  and  $y$ , are related by the equation  $y = \frac{2x^2 - 3}{x}$ , find

Dua pemboleh ubah,  $x$  dan  $y$ , dihubungkan oleh persamaan  $y = \frac{2x^2 - 3}{x}$ , cari

(a)  $\frac{dy}{dx}$  when  $x = 3$ ,

$\frac{dy}{dx}$  bila  $x = 3$ ,

(b) the small change in  $y$  in terms of  $h$  when  $x$  increases from 3 to  $3 + h$ , where  $h$  is a small value.

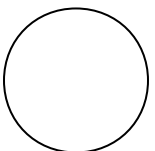
perubahan kecil bagi  $y$  dalam sebutan  $h$  bila  $x$  menokok dari 3 ke  $3 + h$ , di mana  $h$  adalah satu nilai kecil.

[3 marks]  
[3 markah]

Answer / Jawapan : (a) .....

(b) .....

|    |
|----|
| 20 |
| 3  |



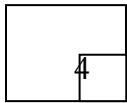
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Examiner's  
Use/  
Untuk  
Kegunaan  
Pemeriksa

21. Given that  $\int(4x^3 - x) dx = x^4 - px^2 + c$ , where  $p$  and  $c$  are constants, find  
Diberi bahawa  $\int(4x^3 - x) dx = x^4 - px^2 + c$ , di mana  $p$  dan  $c$  adalah pemalar, cari

- (a) the value of  $p$ ,  
nilai bagi  $p$ ,
- (b) the value of  $c$  if  $\int(4x^3 - x) dx = 2$  when  $x = 1$ .  
nilai bagi  $c$  jika  $\int(4x^3 - x) dx = 2$  bila  $x = 1$ .

[4 marks]  
[4 markah]

21



Answer / Jawapan : (a) .....  
(b) .....

22. Diagram 5 shows six letter cards.

Rajah 5 menunjukkan enam keping kad huruf.



Diagram 5  
Rajah 5

Four cards are arranged to form four-lettered words.

Empat keping kad disusun untuk membentuk perkataan dengan empat huruf.

Find  
Cari

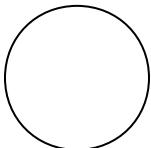
- (a) the number of different words can be formed,  
bilangan perkataan berbeza yang boleh dibentuk,
- (b) the probability that the words formed have all the consonants.  
kebarangkalian perkataan yang terbentuk semuanya mempunyai konsonan.

[4 marks]  
[4 markah]

22



Answer / Jawapan : (a) .....  
(b) .....



SULIT

19

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23. A set of five numbers has a mean of 8 and a standard deviation of  $\sqrt{2}$ .  
 Satu set lima nombor mempunyai min 8 dan sisihan piawai  $\sqrt{2}$ .

Find  
 Cari

- (a)  $\sum x$ ,
- (b)  $\sum x^2$

[3 marks]  
 [3 markah]

Answer / Jawapan: (a) .....  
 (b) .....

For  
 Examiner's  
 Use/  
 Untuk Kegunaan  
 Pemeriksa

23

|  |   |
|--|---|
|  | 3 |
|--|---|

24. Table 1 shows the distribution of students of Form Five Beta.  
 Jadual 1 menunjukkan taburan pelajar dari Tingkatan Lima Beta.

| Student<br>Pelajar | Race / Bangsa  |                |                |
|--------------------|----------------|----------------|----------------|
|                    | Malay / Melayu | Chinese / Cina | Indian / India |
| Boy / Lelaki       | 14             | 5              | 2              |
| Girl / Perempuan   | 4              | 2              | 3              |

Table 1  
 Jadual 1

If two students are selected randomly, find the probability that both students are of the same race.

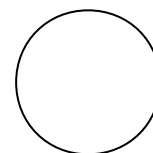
Jika dua orang pelajar dipilih secara rawak, cari kebarangkalian bahawa kedua-dua pelajar adalah dari bangsa yang sama.

[3 marks]  
 [3 markah]

Answer / Jawapan : .....

24

|  |   |
|--|---|
|  | 3 |
|--|---|



SULIT

20

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For  
Examiner's  
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Untuk Kegunaan  
Pemeriksa

25. Diagram 6 shows a standard normal distribution graph.  
*Rajah 6 menunjukkan satu graf taburan normal yang biasa.*

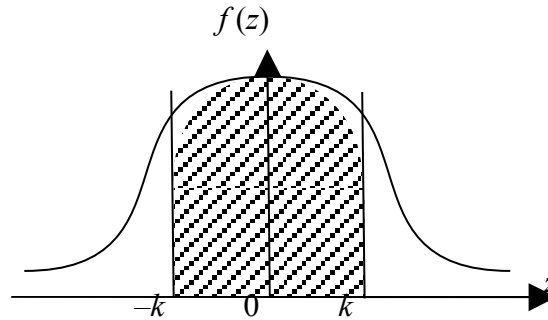


Diagram 6  
*Rajah 6*

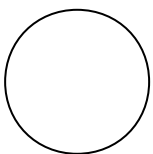
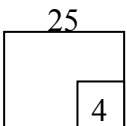
$X$  is a continuous random variable which is normally distributed with a mean of 30 and a standard deviation of 2. It is given that the area of the shaded region is 0.5284.  
 *$X$  ialah pembolehubah rawak selanjar yang bertabur secara normal dengan min 30 dan sisihan piawai 2. Diberi bahawa luas kawasan berlorek ialah 0.5284.*

Find the value of  
*Cari nilai*

- (a)  $k$ ,  
(b)  $X$ .

[4 marks]  
[4 markah]

Answer/Jawapan : (a)  $k =$  .....  
(b)  $X =$  .....



**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**

SULIT

3472/2

3472/2  
Matematik Tambahan  
Kertas 2  
Ogos 2010  
2 ½ jam



**PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA  
SEKOLAH MENENGAH MALAYSIA  
CAWANGAN NEGERI SEMBILAN DARUL KHUSUS**

---

**PEPERIKSAAN PERCUBAAN**

**SIJIL PELAJARAN MALAYSIA 2010**

---

**MATEMATIK TAMBAHAN**

Kertas 2

Dua jam tiga puluh minit

---

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*
3. *Calon dikehendaki membaca arahan di halaman 2 .*
4. *Calon dikehendaki menceraikan halaman 20 dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.*

---

Kertas soalan ini mengandungi 20 halaman bercetak.

**[ Lihat sebelah**

**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**, **four** questions from **Section B** and **two** questions from **Section C**.  
*Jawab **semua** soalan dalam **Bahagian A**, **empat** soalan daripada **Bahagian B** dan **dua** soalan daripada **Bahagian C**.*
3. 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 .*
4. The diagrams in the questions provided are not drawn to scale unless stated.  
*Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
5. The marks allocated for each question and sub-part of a question are shown in brackets.  
*Markah yang diperuntukkan bagi setiap soalan dan ceraihan soalan ditunjukkan dalam kurungan.*
6. A list of formulae is provided on pages 3 to 4.  
*Satu senarai rumus disediakan di halaman 3 hingga 4 .*
7. Graph papers are provided.  
*Kertas graf disediakan.*
8. You may use a non – programmable scientific calculator.  
*Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*

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

## ALGEBRA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

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

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

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

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

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

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

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

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

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

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

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

## CALCULUS

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

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

$$3 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4 Area under a curve

$$= \int_a^b y \, dx \quad \text{or}$$

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

5 Volume generated

$$= \int_a^b \pi y^2 \, dx \quad \text{or}$$

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

## GEOMETRY

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

2 Midpoint

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

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

$$4 \quad \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

5 A point dividing a segment of a line

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

6 Area of triangle =

$$\frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

## STATISTICS

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

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

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

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

5 
$$M = L + \left[ \frac{\frac{N}{2} - F}{f_m} \right] c$$

6 
$$I = \frac{P_1}{P_0} \times 100$$

7 
$$\bar{I} = \frac{\sum I_i w_i}{\sum w_i}$$

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

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

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

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

12 Mean,  $\mu = np$

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

14 
$$z = \frac{x - \mu}{\sigma}$$

## TRIGONOMETRY

1 Arc length,  $s = r\theta$

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

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

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

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

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

7 
$$\begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

8 
$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

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

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

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

14 Area of triangle  $= \frac{1}{2} ab \sin C$

**Section A**  
**Bahagian A**

[40 marks]

[40 markah]

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

1. Solve the simultaneous equations

*Selesaikan persamaan serentak berikut:*

$$2x - y - 5 = 0$$

$$2x + 3x^2 + y - y^2 - 14 = 0$$

[5 marks]

[5 markah]

2. Diagram 1 shows the curve of a quadratic function  $y = 4x^2 - qx + 25$ . The curve has a minimum point at  $A(p, 0)$  and intersects the  $y$ -axis at point  $B$ .

*Rajah 1 menunjukkan lengkung bagi suatu fungsi kuadratik  $y = 4x^2 - qx + 25$ . Lengkung itu mempunyai titik minimum pada  $A(p, 0)$  dan bersilang pada paksi- $y$  di titik  $B$ .*

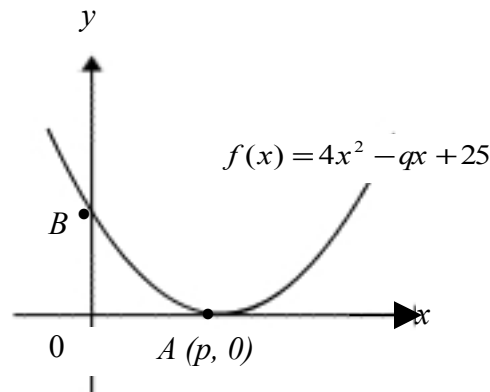


Diagram 1

Rajah 1

- (a) State the coordinates of  $B$ .

[1 mark]

*Nyatakan koordinat titik  $B$ .*

[1 markah]

- (b) By using the method of completing the square, find the value of  $p$  and of  $q$ .

[6 marks]

*Dengan menggunakan kaedah melengkapkan kuasadua, carikan nilai  $p$  dan  $q$ .*

[6 markah]

3. Two factories,  $A$  and  $B$ , start to produce gloves at the same time.

*Dua buah kilang,  $A$  dan  $B$ , mula mengeluarkan sarung tangan pada masa yang sama.*

- (a) Factory  $A$  produces  $h$  pairs of gloves in the first month and its production increases constantly by  $k$  pairs of gloves every subsequent month. It produces 300 pairs of gloves in the 5<sup>th</sup> month and the total production for first seven months is 1750. Find the value of  $h$  and of  $k$ . [5 marks]

*Kilang  $A$  mengeluarkan  $h$  pasang sarung tangan dalam bulan yang pertama dan meningkat sebanyak  $k$  pasang sarung tangan pada setiap bulan. Kilang ini mengeluarkan 300 pasang sarung tangan dalam bulan ke lima dan sejumlah 1750 pasang sarung tangan telah dikeluarkan bagi tujuh bulan pertama. Carikan nilai  $h$  dan  $k$ . [5 markah]*

- (b) Factory  $B$  produces 200 pairs of gloves in the first month and its production increases constantly by 25 pairs of gloves every subsequent month. Find the month when both of the factories produce the same total number of gloves. [2 marks]

*Kilang  $B$  mengeluarkan 200 pasang sarung tangan dalam bulan pertama dan meningkat sebanyak 25 pasang sarung tangan setiap bulan. Pada bulan ke berapakah kedua-dua kilang mengeluarkan jumlah sarung tangan yang sama. [2 markah]*

- 4 (a) Prove that

*Buktikan*

$$\tan^2 x - \sec^2 x + \frac{2}{\sec^2 x} = \cos 2x \quad [2 \text{ marks}]$$

[2 markah]

- b) (i) Sketch the graph of  $y = \cos 2x$  for  $0 \leq x \leq \pi$ .

*Lakarkan graf bagi  $y = \cos 2x$  untuk  $0 \leq x \leq \pi$ .*

- (ii) Hence, using the same axes, draw a suitable straight line to find the number of solutions for the equation  $2 \cos 2x = 1 - \frac{x}{\pi}$  for  $0 \leq x \leq \pi$ . State the number of solutions.

[6 marks]

*Seterusnya, pada paksi yang sama, lukiskan satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan  $2 \cos 2x = 1 - \frac{x}{\pi}$  untuk  $0 \leq x \leq \pi$ .*

*Nyatakan bilangan penyelesaiannya.*

[6 markah]

5. Table 1 shows the frequency distribution of the scores of a group of 40 pupils in a quiz.

*Jadual 1 menunjukkan taburan kekerapan bagi skor untuk 40 orang pelajar dalam suatu kuiz.*

| Score<br><i>Skor</i> | Number of pupils<br><i>Bilangan pelajar</i> |
|----------------------|---|
| 10 – 19              | 1   |
| 20 – 29              | 2   |
| 30 – 39              | $h$   |
| 40 – 49              | 12  |
| 50 – 59              | 4   |
| 60 – 69              | $k$   |

Table 1  
*Jadual 1*

(a) It is given that the median score of the distribution is 42, find the value of  $h$  and of  $k$ .

*Diberi skor median bagi taburan itu ialah 42, carikan nilai  $h$  dan nilai  $k$ .*

(b) State the modal class of the distribution.

*Nyatakan kelas mod bagi taburan itu.*

[5 marks]

[5 markah]

6. Diagram 2 shows  $OSR$  and  $PSQ$  are two straight lines.

Rajah 2 menunjukkan  $OSR$  dan  $PSQ$  adalah dua garis lurus.

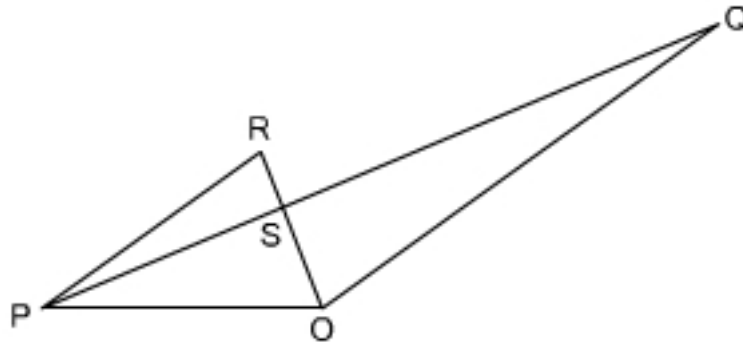


Diagram 2  
Rajah 2

Given that  $\vec{OP} = 5p_{o,r}$ ,  $\vec{OQ} = 10q_{o,r}$ ,  $PS : SQ = 2 : 3$ ,  $\vec{PR} = m\vec{OQ}$  and  $\vec{OS} = n\vec{OR}$ .

Diberi  $\vec{OP} = 5p_{o,r}$ ,  $\vec{OQ} = 10q_{o,r}$ ,  $PS : SQ = 2 : 3$ ,  $\vec{PR} = m\vec{OQ}$  dan  $\vec{OS} = n\vec{OR}$ .

(a) Express  $\vec{OR}$  in terms of

Ungkapkan  $\vec{OR}$  dalam sebutan

(i)  $m$ ,  $p_{o,r}$  and  $q_{o,r}$  [2 marks]  
 $m$ ,  $p_{o,r}$  dan  $q_{o,r}$  [2 markah]

(ii)  $n$ ,  $p_{o,r}$  and  $q_{o,r}$  [2 marks]  
 $n$ ,  $p_{o,r}$  dan  $q_{o,r}$  [2 markah]

(b) Hence, find the value of  $m$  and of  $n$ . [4 marks]

Seterusnya, carikan nilai bagi  $m$  dan  $n$ . [4 markah]

**Section B**  
**Bahagian B**

[40 marks]  
[40 markah]

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

- 7 (a) Given that a curve has a gradient function  $hx^2 + x$  such that  $h$  is a constant. If  $y = 5 - 4x$  is the equation of tangent to the curve at point  $(-1, k)$ , find the value of  $h$  and of  $k$ . [3 marks]

*Diberi suatu lengkung dengan fungsi kecerunan  $hx^2 + x$  dengan keadaan  $h$  ialah pemalar. Jika  $y = 5 - 4x$  ialah persamaan tangen bagi lengkung itu pada titik  $(-1, k)$ , cari nilai  $h$  dan nilai  $k$ .* [3 markah]

- (b) Diagram 3 shows a curve  $y = (x-3)^2$  and the straight line  $y = 2x + 2$  intersect at point  $(1, 4)$ .

*Rajah 3 menunjukkan lengkung  $y = (x-3)^2$  dan garis lurus  $y = 2x + 2$  yang bersilang pada titik  $(1, 4)$ .*

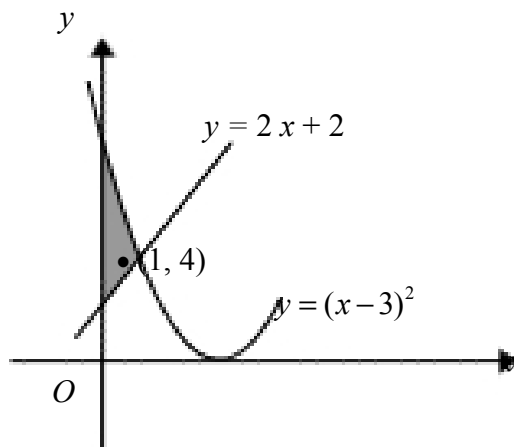


Diagram 3  
Rajah 3

Calculate  
*Hitung*

- (i) the area of the shaded region, [4 marks]  
*luas kawasan berlorek,* [4 markah]
- (ii) the volume of revolution, in terms of  $\pi$ , when the region bounded by the curve, the  $x$ -axis, the  $y$ -axis and the straight line  $x = 2$  is revolved through  $360^\circ$  about the  $x$ -axis. [3 marks]  
*isipadu janaan, dalam sebutan  $\pi$ , apabila rantau yang dibatasi oleh lengkung, paksi- $x$ , paksi- $y$  dan garis lurus  $x = 2$  dikisarkan melalui  $360^\circ$  pada paksi- $x$ .* [3 markah]
- 8 Use graph paper to answer this question.

[ Lihat sebelah  
SULIT\_

Gunakan kertas graf untuk menjawab soalan ini.

Table 2 shows the values of two variables,  $x$  and  $y$ , obtained from an experiment. Variables  $x$  and  $y$  are related by the equation  $y = ab^{\sqrt{x}}$ , where  $a$  and  $b$  are constants.

Jadual 2 menunjukkan nilai-nilai bagi dua pembolehubah,  $x$  dan  $y$ , yang diperolehi daripada satu eksperimen. Pembolehubah  $x$  dan  $y$  dihubungkan oleh persamaan  $y = ab^{\sqrt{x}}$ , dengan keadaan  $a$  dan  $b$  ialah pemalar.

|     |      |      |      |      |      |       |
|-----|------|------|------|------|------|-------|
| $x$ | 1    | 4    | 9    | 16   | 25   | 36    |
| $y$ | 1.80 | 2.70 | 4.05 | 6.08 | 9.11 | 13.67 |

Table 2  
Jadual 2

- (a) Plot  $\log_{10} y$  against  $\sqrt{x}$ , using a scale of 2 cm to 1 unit on the  $\sqrt{x}$ -axis and 2 cm to 0.1 unit on the  $\log_{10} y$ -axis. Hence, draw the line of best fit.

[5 marks]

Plot  $\log_{10} y$  melawan  $\sqrt{x}$ , dengan menggunakan skala 2 cm kepada 1 unit pada paksi- $\sqrt{x}$  dan 2 cm kepada 0.1 unit pada paksi- $\log_{10} y$ . Seterusnya, lukiskan garis lurus penyuaian terbaik.

[5 markah]

- (b) Use your graph from 8(a) to find the value of

Gunakan graf di 8(a) untuk mencari nilai

(i)  $a$

(ii)  $b$

[5marks]

[5 markah]

- 9 Diagram 4 shows a circular sector  $POQ$  centre  $O$  with radius of 5 cm and  $\angle POQ = 1.2$  radian.  $RQ$  is an arc of the circle with centre  $P$ .

Rajah 4 menunjukkan sebuah sektor  $POQ$  berpusat  $O$  dan berjari 5 cm dan  $\angle POQ = 1.2$  radian.  $RQ$  ialah lengkok bulatan berpusat di  $P$ .

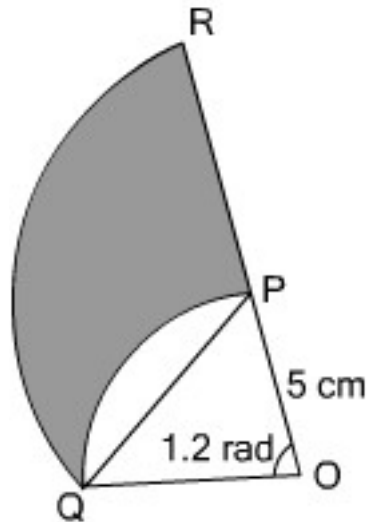


Diagram 4

Rajah 4

Calculate  
Hitung

- |     |  |                         |
|-----|--|-------------------------|
| (a) | the length, in cm, of an arc $PQ$ ,<br><i>panjang, dalam cm, lengkok <math>PQ</math>,</i>                          | [2 marks]<br>[2 markah] |
| (b) | the length, in cm, of the radius $PR$ ,<br><i>panjang, dalam cm, jejari <math>PR</math>,</i>                       | [2 marks]<br>[2 markah] |
| (c) | $\angle RQP$ , in radian,<br><i><math>\angle RQP</math>, dalam radian,</i>   | [2 marks]<br>[2 markah] |
| (d) | the area in $\text{cm}^2$ , of the shaded region.<br><i>luas dalam <math>\text{cm}^2</math>, kawasan berlorek.</i> | [4 marks]<br>[4 markah] |

10 Solution by scale drawing is not accepted.

*Penyelesaian secara lukisan berskala tidak diterima.*

Diagram 5 shows a triangle  $ABC$  with point  $A$  on the  $y$ -axis. The equation of the straight line  $ADC$  is  $y - 2x + 4 = 0$ . Given that straight line  $BD$  is perpendicular to straight line  $ADC$ .

*Rajah 5 menunjukkan segitiga  $ABC$  dengan titik  $A$  berada di atas paksi- $y$ . Diberi persamaan garis lurus  $ADC$  ialah  $y - 2x + 4 = 0$ . Diberi bahawa garis lurus  $BD$  berserenjang dengan garis  $ADC$ .*

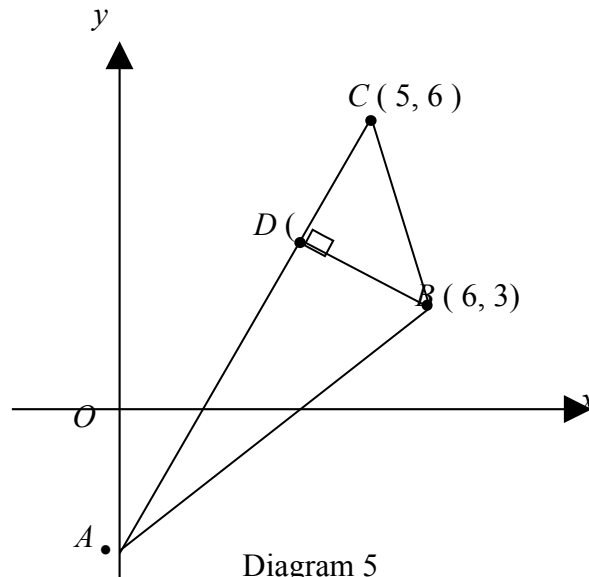


Diagram 5  
Rajah 5

Find  
Cari

- |     |   |                         |
|-----|---|-------------------------|
| (a) | the coordinates of point $A$ ,<br><i>koordinat titik <math>A</math>,</i>              | [1 mark]<br>[1 markah]  |
| (b) | equation of the straight line $BD$ ,<br><i>persamaan garis lurus <math>BD</math>,</i> | [3 marks]<br>[3 markah] |
| (c) | the coordinates of point $D$ ,<br><i>koordinat titik <math>D</math>,</i>              | [3 marks]<br>[3 markah] |
| (d) | the ratio of $AD : DC$ .<br><i>nisbah <math>AD : DC</math>.</i>                       | [3 marks]<br>[3 markah] |

- 11 (a) A hockey club organizes a practice session for trainees on scoring goals from penalty strokes. Each trainees takes 5 penalty strokes. The probability that a trainee scores a goal from a penalty stroke is  $p$ . After the session, it is found that the mean number of goals scored by a trainee is 2.75.

*Sebuah kelab hoki telah menganjurkan sesi latihan dalam menjaringkan gol untuk pemain kelabnya. Setiap pemain perlu membuat 5 pukulan penalti. Kebarangkalian pemain menjaringkan gol adalah  $p$ . Setelah sesi tersebut didapati bahawa min jaringan gol ialah 2.75.*

- (i) Find the value of  $p$ .  
*Cari nilai  $p$ .*
- (ii) If a trainee is chosen at random, find the probability that he scores at least two goals.  
*Jika seorang pemain dipilih secara rawak, cari kebarangkalian bahawa pemain itu menjaringkan sekurang-kurangnya 2 gol.*

[5 marks]

[5markah]

- (b) The body masses a group of students in a particular town have a normal distribution with a mean of 52 kg and a variance of 144 kg<sup>2</sup>.

*Jisim badan bagi suatu kumpulan pelajar di sebuah bandar adalah mengikut satu taburan normal dengan min 52 kg dan varians 144 kg<sup>2</sup>.*

- (i) If a student is chosen at random from the town, find the probability that the mass of the student is less than 42 kg.

*Jika seorang pelajar dipilih secara rawak dari bandar itu, cari kebarangkalian bahawa jisim pelajar itu kurang daripada 42 kg.*

- (ii) Given that 80% of the student have a mass of more than  $t$  kg, find the value of  $t$ .

*Diberi bahawa 80% daripada pelajar tersebut mempunyai jisim melebihi  $t$  kg, cari nilai  $t$ .*

[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 along a straight line and passes through a fixed point  $O$ . Its velocity,  $v \text{ m s}^{-1}$ , is given by  $v = 15 + 4t - 3t^2$ , where  $t$  is the time, in seconds, after passing through  $O$ .

*Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap  $O$ .*

*Halajunya,  $v \text{ m s}^{-1}$ , diberi oleh  $v = 15 + 4t - 3t^2$ , dengan keadaan  $t$  ialah masa, dalam saat, selepas melalui  $O$ .*

[Assume motion to the right is positive.]

[Anggapkan gerakan ke arah kanan sebagai positif.]

Find

*Cari*

- (a) the initial velocity of the particle, in  $\text{m s}^{-1}$ , [1 mark]  
*halaju awal zarah itu, dalam  $\text{m s}^{-1}$ ,* [1 markah]
- (b) the time interval during which the acceleration of the particle is positive, [3 marks]  
*julat masa apabila pecutan zarah itu adalah positif,* [3 markah]
- (c) the maximum velocity, in  $\text{m s}^{-1}$ . [3 marks]  
*halaju maksimum, dalam  $\text{m s}^{-1}$ .* [3 markah]
- (d) sketch the velocity-time graph of the motion of the particle for  $0 \leq t \leq 5$ . [3 marks]  
*lakarkan graf halaju melawan masa bagi pergerakan zarah itu untuk  $0 \leq t \leq 5$ .* [3 markah]

- 13 Table 3 shows the prices and price indices for the four ingredients,  $A$ ,  $B$ ,  $C$  and  $D$  used in making a type of biscuit. Diagram 6 is a pie chart which represents the usage of four ingredients,  $A$ ,  $B$ ,  $C$  and  $D$  used in the production of this biscuit.

*Jadual 3 menunjukkan harga dan indeks harga bagi empat bahan yang digunakan untuk membuat sejenis biskut. Rajah 6 menunjukkan carta pai yang mewakili kuantiti relatif bagi penggunaan bahan  $A$ ,  $B$ ,  $C$  dan  $D$  dalam pembuatan biskut ini.*

| Ingredients<br><i>Bahan</i> | Price (RM) for the year<br><i>Harga (RM) pada tahun</i> |      | Price index for the year 2008 based<br>on the year 2006<br><i>Indeks harga pada tahun 2008<br/>berdasarkan tahun 2006</i> |
|-----------------------------|---|------|---|
|                             | 2006  | 2008 |   |
| $A$                         | 2.00  | 2.50 | $x$   |
| $B$                         | 5.00  | $y$  | 140   |
| $C$                         | 1.40  | 2.10 | 150   |
| $D$                         | $z$   | 4.00 | 125   |

Table 3  
*Jadual 3*

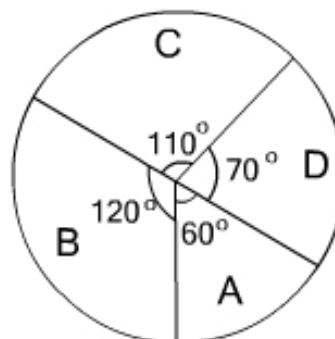


Diagram 6  
*Rajah 6*

- (a) Find the value

*Cari nilai*

- i)  $x$   
ii)  $y$   
iii)  $z$

[3 marks]

[3 markah]

- (b) i) Calculate the composite index for the cost of production of this biscuit in the year 2008 based on the year 2006.

*Hitung indeks gubahan bagi kos pembuatan biskut tahun 2008 berdasarkan tahun*

[ Lihat sebelah

SULIT\_

2006.

- ii) Hence, calculate the cost of the production of this biscuit in the year 2006 if the cost of the production in the year 2008 was RM20 000.

*Seterusnya, hitung kos pembuatan biskut itu pada tahun 2006 jika kos pembuatannya pada tahun 2008 ialah RM20 000.*

[5 marks]

[5 markah]

- (c) The cost of production of this biscuit is expected to decrease by 10% from the year 2008 to the year 2010. Find the expected composite index for the year 2010 based on the year 2006.

*Kos pembuatan biskut ini dijangka menurun sebanyak 10% dari tahun 2008 ke tahun 2010. Cari jangkaan indeks gubahan pada tahun 2010 berasaskan tahun 2006.*

[2 marks]

[2 markah]

- 14 Pak Samad wants to divide a piece of triangular shaped land  $ABC$  into three parts as in Diagram 7.  $AFB$ ,  $AEDC$  and  $BGC$  are straight lines. Given that  $BF = 18\text{ m}$ ,  $AF = 96\text{ m}$ ,  $AE = 26\text{ m}$ ,  $CE = 70\text{ m}$  and  $\sin \angle BAC = \frac{5}{13}$ .

*Pak Samad ingin membahagikan sebidang tanahnya yang berbentuk segi tiga  $ABC$  kepada tiga bahagian seperti dalam Rajah 7.  $AFB$ ,  $AEDC$  dan  $BGC$  ialah garis lurus.*

*Diberi  $BF = 18\text{ m}$ ,  $AF = 96\text{ m}$ ,  $AE = 26\text{ m}$ ,  $CE = 70\text{ m}$  dan  $\sin \angle BAC = \frac{5}{13}$ .*

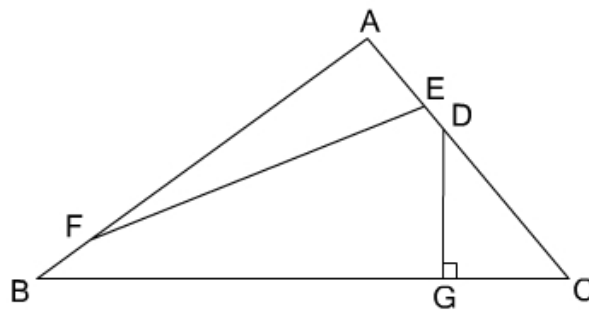


Diagram 7  
Rajah 7

- (a) Calculate the length of  $BC$ . [3 marks]  
*Hitung panjang  $BC$ .* [3 markah]
- (b) Calculate  $\angle ACB$ . [2 marks]  
*Hitung  $\angle ACB$ .* [2 markah]
- (c) Find the area of triangle  $AEF$ . [2 marks]  
*Cari luas segi tiga  $AEF$ .* [2 markah]
- (d) Given the area of triangle  $AEF$  is equal to the area of triangle  $CDG$ , calculate the length of  $CD$ . [3 marks]  
*Diberi luas segi tiga  $AEF$  adalah sama dengan luas segi tiga  $CDG$ , hitung panjang  $CD$ .* [3 markah]

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

In Institute *A*, two types of courses are offered. Table 4 shows the number of students and the monthly fee for each course.

*Institut A* menawarkan dua jenis kursus. Jadual 4 menunjukkan jumlah pelajar dan yuran bulanan bagi setiap kursus.

| Course<br><i>Kursus</i>           | Number of students<br><i>Bilangan pelajar</i> | Monthly fee<br><i>Yuran Bulanan</i> |
|-----------------------------------|---|-------------------------------------|
| Computer<br><i>Komputer</i>       | $x$   | RM80                                |
| English<br><i>Bahasa Inggeris</i> | $y$   | RM60                                |

Table 4  
*Jadual 4*

The recruitment of students for the courses is subject to the following constraints:  
*Pengambilan pelajar untuk kursus tersebut adalah berdasarkan kekangan berikut:*

- I The maximum number of students is 400.  
*Bilangan maksimum pelajar ialah 400.*
- II The number of students who enrol in the computer course is at most three times the number of students who enrol in the English course.  
*Bilangan pelajar yang mendaftar untuk kursus computer selebih-lebihnya tiga kali bilangan pelajar yang mendaftar untuk kursus Bahasa Inggeris.*
- III The minimum total collection of monthly fees is RM7200.  
*Jumlah minimum kutipan yuran bulanan ialah RM7200.*
- (a) Write three inequalities, other than  $x \geq 0$  and  $y \geq 0$ , which satisfy all the above constraints. [3 marks]  
*Tulis tiga ketaksamaan, selain daripada  $x \geq 0$  dan  $y \geq 0$ , yang memenuhi semua kekangan di atas.* [3 markah]
- (b) Using a scale of 2 cm to 50 units on both axes, construct and shade the region *R* which satisfies all of the above constraints. [3 marks]  
*Menggunakan skala 2 cm kepada 50 unit pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.* [3 markah]

(c) Use the graph constructed in 15(b), to find

*Gunakan graf yang dibina di 15(b), untuk mencari*

i) the maximum collection of monthly fees.

*kutipan maksimum yuran bulanan*

ii) the minimum number of students enrolled in the English course if the number of students who enrolled for computer course is 150.

*bilangan minimum pelajar yang mendaftar untuk kursus Bahasa Inggeris jika blangan pelajar yang mendaftar untuk kursus computer ialah 150.*

[4 marks]

[4 markah]

**END OF QUESTION PAPER**

***KERTAS SOALAN TAMAT***

Nama:.....

Kelas:.....

**Arahan Kepada Calon**

- 1 Tulis nama dan kelas anda pada ruang yang disediakan.
- 2 Tandakan (  $\checkmark$  ) untuk soalan yang dijawab.
- 3 Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan buku jawapan.

| Bahagian | Soalan | Soalan Dijawab | Markah Penuh | Markah Diperolehi<br>(Untuk Kegunaan Pemeriksa) |
|----------|--------|----------------|--------------|---|
| A        | 1      |                | 5            |   |
|          | 2      |                | 7            |   |
|          | 3      |                | 7            |   |
|          | 4      |                | 8            |   |
|          | 5      |                | 5            |   |
|          | 6      |                | 8            |   |
| B        | 7      |                | 10           |   |
|          | 8      |                | 10           |   |
|          | 9      |                | 10           |   |
|          | 10     |                | 10           |   |
|          | 11     |                | 10           |   |
| C        | 12     |                | 10           |   |
|          | 13     |                | 10           |   |
|          | 14     |                | 10           |   |

|               |    |  |    |  |
|---------------|----|--|----|--|
|               | 15 |  | 10 |  |
| <b>Jumlah</b> |    |  |    |  |

## MARKING SCHEME FOR ADDITIONAL MATHEMATICS FORM 5 PAPER 1 - 2010

| No. | Marking Scheme  | Marks                       | Full Marks |
|-----|---|-----------------------------|------------|
| 1   | (a) 3<br>(b) 5  | 1<br>1                      | 2          |
| 2   | 5, -2 both<br>$2x - 3 = 7$ or $2x - 3 = -7$   | 2<br>B1                     | 2          |
| 3   | 0.9278 and -5.928<br>0.9278 or -5.928<br>$\frac{-(10) \pm \sqrt{(10)^2 - 4(2)(-11)}}{2(2)}$ $2x^2 + 10x - 11 = 0$ | 4<br>B3<br><br>B2<br><br>B1 | 4          |
| 4   | 7<br>$15 - p(-5) = 2(-5)^2$   | 2<br>B1                     | 2          |
| 5   | $p < 0$<br>$q = -2$<br>$r = 16$   | 1<br>1<br>1                 | 3          |
| 6   | $x > \frac{1}{2}$ , $x < -\frac{1}{2}$<br>$(2x - 1)(2x + 1) > 0$<br>$4x^2 - 1 > 0$                                | 3<br><br>B2<br>B1           | 3          |
| 7   | -3<br>$3x - 9 = 4x - 6$<br>$2^{3(x-9)} = \frac{2^{4x}}{2^6}$  | 3<br>B2<br><br>B1           | 3          |
| 8   | 1.434<br>$2x \log 3 + x \log 4 = \log 32 + 2 \log 4 - \log 3$<br>$(2x + 1) \log 3 + (x - 2) \log 4 = \log 32$     | 3<br><br>B2<br><br>B1       | 3          |

| No. | Marking Scheme   | Marks               | Full Marks |
|-----|--|---------------------|------------|
|     | <a href="http://www.papercollection.batukawa.info">www.papercollection.batukawa.info</a>   |                     |            |
| 9   | $3p - t - 1$<br>$3\log_m 5 - (\log_m 3 + \log_m m)$<br>$3\log_m 5$ or $(\log_m 3 + \log_m m)$<br>$\log_m 125 - \log_m 3m$  | 4<br>B3<br>B2<br>B1 | 4          |
| 10  | (a) 10<br>(b) 6  | 1<br>1              | 2          |
| 11  | (a) $a = 50$ , $r = \frac{1}{5}$<br><br>$ar = 10$ or $ar^3 = \frac{2}{5}$<br>(b) 62.5  | 2<br>B1<br>1        | 3          |
| 12  | (a) $\frac{x}{2} + \frac{y}{-7} = 1$<br>(b) $3x^2 + 3y^2 + 4x + 56y + 192 = 0$<br>$(x - 2)^2 + (y - 0)^2 = 4((x - 0)^2 + (y + 7)^2)$<br>$\sqrt{(x - 2)^2 + (y - 0)^2} = 2\sqrt{(x - 0)^2 + (y + 7)^2}$           | 1<br>3<br>B2<br>B1  | 4          |
| 13  | (a) $\log_2 y = 2p \log_2 x - \log_2 q$<br>(b) i. $p = 16$<br>ii. 16<br>$\log_2 q = 4$   | 1<br>1<br>2<br>B1   | 4          |
| 14  | $q = 62$ , $-6$<br>$68 = 2q - 56$ atau $-68 = 2q - 56$<br>$68 =  6q - 28 + 32 + 18 + 12 - 48 - 42 - 4q $<br>$34 = \frac{1}{2} \begin{vmatrix} q & -4 & 8 & 6 & q \\ 3 & 6 & 7 & 4 & 3 \end{vmatrix}$ atau setara | 4<br>B3<br>B2<br>B1 | 4          |
| No. | Marking Scheme   | Marks               | Full Marks |
| 15  | $h = \frac{1}{8}$ dan $k = -4$<br>$8h - 1 = 0$ atau $2k + 8 = 0$   | 2<br>B1             | 2          |
| 16  | Unit vector $\hat{p} = \frac{13i + j}{\sqrt{170}}$   | 4<br>B3             | 4          |

| No. | Marking Scheme  | Marks              | Full Marks |
|-----|---|--------------------|------------|
| 21  | a) $p = \frac{1}{2}$<br>$\int 4x^3 - x \, dx = \frac{4x^4}{4} - \frac{x^2}{2} + c$<br>b) $c = \frac{3}{2}$<br>$1 - \frac{1}{2} + c = 2$   | 2<br>B1<br>2<br>B1 | 4          |
| 22  | a) 360<br>${}^6P_4$<br>b) $\frac{{}^4P_4}{{}^6P_4} = \frac{24}{360} = \frac{1}{15}$<br>${}^4P_4 \text{ or } 4! \text{ or } 24$  | 2<br>B1<br>2<br>B1 | 4          |
| 23  | a) $\sum x = 40$<br>b) $\sum x^2 = 330$<br>$\sqrt{2} = \sqrt{\frac{\sum x^2}{5} - 8^2}$   | 1<br>2<br>B1       | 3          |
| 24  | $\frac{184}{435}$<br>$\frac{306}{870} + \frac{42}{870} + \frac{20}{870}$<br>$\left(\frac{18}{30} \times \frac{17}{29}\right) \text{ atau } \left(\frac{7}{30} \times \frac{6}{29}\right) \text{ atau } \left(\frac{5}{30} \times \frac{4}{29}\right)$ | 3<br>B2<br>B1      | 3          |

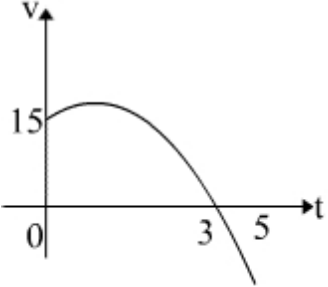
| No. | Marking Scheme   | Marks                          | Full Marks |
|-----|--|--------------------------------|------------|
| 25  | a) $k = 0.72$<br>$P(z > k) = 0.2358$<br>$P(z > k) = \frac{1 - 0.5284}{2}$<br><br>b) $X = 31.44$<br><br>$z = \frac{X - 30}{2} = 0.72$ | 2<br><br>B1<br><br>2<br><br>B1 | 4          |

| Number          | Solution and marking scheme   | Sub Marks  | Full Marks |
|-----------------|---|--|------------|
| 1               | $y = 2x - 5$ $2x + 3x^2 + (2x - 5) - (2x - 5)^2 - 14 = 0$ $(x - 2)(x - 22) = 0$ $x = 2 \text{ or } x = 22$ $y = -1 \text{ or } y = 39$  | P1<br><br>K1<br>K1<br>N1<br>N1                                 | 5          |
| 2(a)<br><br>(b) | $(0, 25)$ $4 \left[ x^2 - \frac{q}{4}x + \left(\frac{q}{8}\right)^2 + \frac{25}{4} - \left(\frac{q}{8}\right)^2 \right]$ $4 \left( x - \frac{q}{8} \right)^2 + 25 - \frac{q^2}{16}$ $25 - \frac{q^2}{16} = 0$ $q = 20$ $x - \frac{20}{8} = 0$ $p = \frac{5}{2}$ | P1<br><br>K1<br><br>N1<br><br>K1<br><br>N1<br><br>K1<br><br>N1 | 7          |
| 3(a)<br><br>(b) | $h + 4k = 300$ $\frac{7}{2}(2h + 6k) = 1750$ $14(300 - 4k) + 42k = 3500$ $k = 50$ $h = 100$ $\frac{n}{2} [2(100) + (n-1)(50)] = \frac{n}{2} [2(200) + (n-1)(25)]$ $n = 9$   | K1<br><br>K1<br><br>K1<br>N1<br>N1<br><br>K1<br><br>N1         | 7          |



| Number        | Solution and marking scheme  | Sub Marks            | Full Marks |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
|---------------|--|----------------------|------------|--------|--------|-------|---|---|---------------|-------|--------|--------|--------|--------|-------|--|---|--|--|--|--|--|----------------------------------|--|
| 7(a)          | $hx^2 + x = -4$ $h(-1)^2 + (-1) = -4$ $h = -3, k = 9$  | K1<br>K1<br>N1       |            |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
| (b)           | $\text{Area} = \int_0^1 (x^2 - 6x + 9) dx - \int_0^1 (2x + 2) dx$ $= \left[ \frac{x^3}{3} - \frac{8x^2}{2} + 7x \right]_0^1 \quad \text{or equivalent}$ $= \left( \frac{1}{3} - \frac{8}{2} + 7 \right) - 0$ $= 3\frac{1}{3} \text{ unit}^2$   | K1<br>K1<br>K1<br>N1 |            |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
| (c)           | $\text{Volume} = \pi \int_0^2 (x-3)^4 dx$ $\text{Volume} = \pi \left[ \frac{(x-3)^5}{5} \right]_0^2$ $\text{Volume} = \frac{242}{5} \pi \text{ or } 48\frac{2}{5} \pi$   | K1<br>K1<br>N1       | 10         |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
| 8(a)          | <table border="1" data-bbox="266 1312 1112 1438"> <tr> <td><math>\sqrt{x}</math></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td><math>\log_{10} y</math></td> <td>0.255</td> <td>0.4314</td> <td>0.6075</td> <td>0.7839</td> <td>0.9595</td> <td>1.136</td> </tr> <tr> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Using the correct, uniform scale and axes<br/>All points plotted correctly<br/>Line of best fit</p> | $\sqrt{x}$           | 1          | 2      | 3      | 4     | 5 | 6 | $\log_{10} y$ | 0.255 | 0.4314 | 0.6075 | 0.7839 | 0.9595 | 1.136 |  | 3 |  |  |  |  |  | N1<br>N1<br>P1<br>P1<br>P1<br>P1 |  |
| $\sqrt{x}$    | 1  | 2                    | 3          | 4      | 5      | 6     |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
| $\log_{10} y$ | 0.255  | 0.4314               | 0.6075     | 0.7839 | 0.9595 | 1.136 |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
|               | 3  |                      |            |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |
| (b)           | $\log_{10} y = (\log_{10} b) \sqrt{x} + \log_{10} a$ <p><i>use</i> * <math>m = \log_{10} b</math><br/><math>b = 1.493 \pm 0.01</math></p> <p><i>use</i> * <math>c = \log_{10} a</math><br/><math>a = 1.230 \pm 0.01</math></p>   | K1<br>N1<br>K1<br>N1 | 10         |        |        |       |   |   |               |       |        |        |        |        |       |  |   |  |  |  |  |  |                                  |  |

| Number | Solution and marking scheme  | Sub Marks | Full Marks |
|--------|--|-----------|------------|
| 9(a)   | $s = 5(1.2)$<br>$= 6\text{cm}$   | K1<br>N1  |            |
| (b)    | $\sin 34.375^\circ = \frac{x}{5}$ or equivalent<br>$x = 2.823\text{cm}$<br>$PQ = 2 \times 2.823\text{cm} = 5.646\text{cm}$ | K1        |            |
| (c)    | $\angle RQP = \frac{\pi\text{rad} - 2.171\text{rad}}{2}$<br>$0.4853\text{ rad}$  | K1<br>N1  |            |
| (d)    | $\text{Area sector } PQR = \frac{1}{2}(5.646)^2(2.171) = 34.603\text{cm}^2$  | K1        |            |
|        | $\text{Area sector } POQ = \frac{1}{2}(5)^2(1.2) = 15\text{cm}^2$ or   | K1        |            |
|        | $\text{Area triangle} = \frac{1}{2}(5)(5)\sin 68.75^\circ = 11.65\text{cm}^2$  | K1        |            |
|        | $\text{Area of shaded region} = 34.603 - (15 - 11.65)\text{cm}^2$  | K1        | 10         |
|        | $\text{Area of shaded region} = 31.253\text{cm}^2$   | N1        |            |
| 10(a)  | $A(0, -4)$   | P1        |            |
| (b)    | $m = -\frac{1}{2}$   | P1        |            |
|        | $y - 3 = -\frac{1}{2}(x - 6)$  | K1        |            |
|        | $y = -\frac{1}{2}x + 6$  | N1        |            |
| (c)    | $\text{Solve } y - 2x + 4 = 0 \text{ and } y = -\frac{1}{2}x + 6$<br>$x = 4, y = 4$<br>$D(4, 4)$                           | K1        |            |
|        | $\frac{5m}{m+n} = 4$   | K1        |            |
| (d)    | $\frac{m}{n} = \frac{4}{1}$<br>$m : n = 4 : 1$   | K1        |            |

|          |   | N1        | 10         |
|----------|---|-----------|------------|
| Number   | Solution and marking scheme   | Sub Marks | Full Marks |
| 11(a)(i) | $p = \frac{2.75}{5}$  | K1        |            |
| (a)(ii)  | $p = 0.55$ $P(X \geq 2) = 1 - P(X = 0) - P(X = 1)$ $= 1 - {}^5C_0(0.55)^0(0.45)^5 - {}^5C_1(0.55)^1(0.45)^4$ $= 0.8688$ | N1<br>P1  |            |
| (b)(i)   | $P\left(Z < \frac{42 - 52}{12}\right)$ $P(Z < -0.8333)$ $= 0.2025$  | K1        |            |
| (b)(ii)  | $P\left(Z > \frac{t - 52}{12}\right) = 0.8$ $\frac{t - 52}{12} = -0.842$ $t = 41.9 \text{ kg}$                          | N1<br>K1  |            |
|          |   | K1        | 10         |
| 12(a)    | 15  | P1        |            |
| (b)      | $v = 15 + 4t - 3t^2 \quad a = 4 - 6t$ $4 - 6t > 0$ $0 < t < \frac{2}{3}$  | K1<br>K1  |            |
| (c)      | $t = \frac{2}{3}$ $v = 15 + 4\left(\frac{2}{3}\right) - 3\left(\frac{2}{3}\right)^2$ $= 16\frac{1}{3}$                  | N1<br>K1  |            |
| (d)      |                                      |           |            |
|          | Bentuk<br>Melalui titik (0, 15), (3, 0)   | P1<br>P1  |            |

|               | dan (5, -40)  | P1               | 10                |
|---------------|---|------------------|-------------------|
| <i>Number</i> | <i>Solution and marking scheme</i>  | <i>Sub Marks</i> | <i>Full Marks</i> |
| 13(a)         | i) $x = 125$<br>ii) $y = 7$<br>iii) $z = 3.20$  | P1<br>P1<br>P1   |                   |
| (b) (i)       | $60 + 120 + 110 + 70$ or 360<br>$\frac{125(60) + 140(120) + 150(110) + 125(70)}{360}$ $= 137.64$  | P1<br>K1<br>N1   |                   |
| (ii)          | $137.64 = \frac{20000}{Q_0} \times 100$<br>$Q_0 = 14530.66$   | K1<br>N1         |                   |
| (c)           | $137.64 \times 0.9$<br>$= 123.88$   | K1<br>N1         | 10                |
| 14 (a)        | a) $\cos \angle BAC = \frac{12}{13}$<br>$BC^2 = 114^2 + 96^2 - 2(114)(96)\cos \angle BAC$<br>$BC = 44.81$   | K1<br>K1<br>N1   |                   |
| (b)           | $\frac{44.81}{5} = \frac{114}{13 \sin \angle ACB}$<br>$\angle ACB = 78.09^\circ$  | K1<br>N1         |                   |
| (c)           | $\frac{1}{2}(96)(26)\left(\frac{5}{13}\right)$<br>480   | K1<br>N1         |                   |
| (d)           | $\cos \angle DCG = \frac{GC}{CD}$<br>$\frac{1}{2}(CD)(GC) \sin \angle DCG = 480$<br>$\frac{1}{2}(CD)(CD \cos \angle DCG) \sin \angle DCG = 480$<br>$CD = 68.95$ | K1<br>K1<br>N1   | 10                |
| 15(a)         | $x + y \leq 400$<br>$x \leq 3y$<br>$80x + 60y \geq 7200$ or $4x + 3y \geq 360$  | N1<br>N1<br>N1   |                   |
| (b)           | (Refer to graph)  |                  |                   |

(c)(i) titik (300, 100)  
 $80(300) + 60(100)$   
 RM30 000

P1  
 K1  
 N1

$\log_{10}$  (ii)

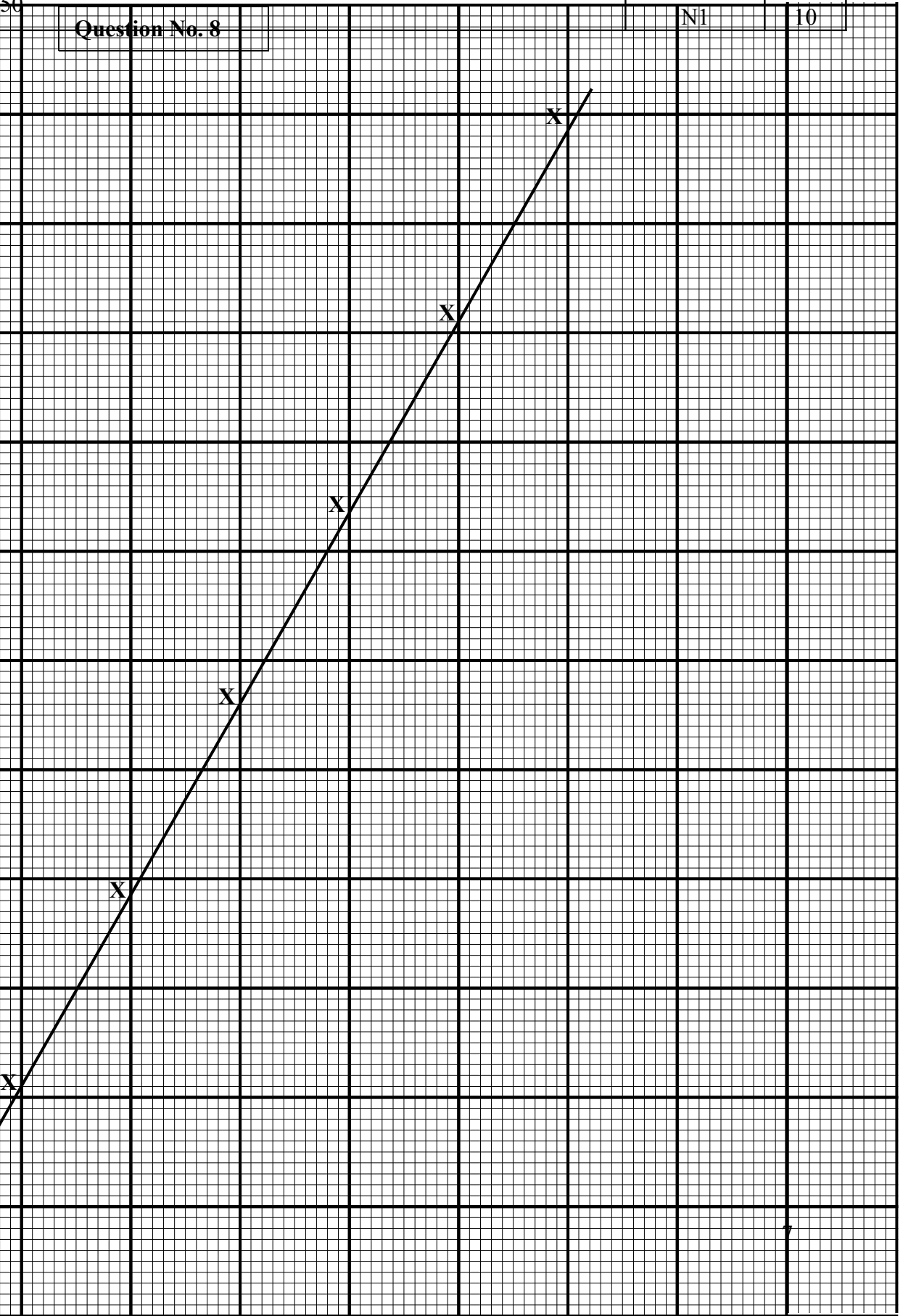
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Question No. 8

N1

10

1.2  
 1.1  
 1.0  
 0.9  
 0.8  
 0.7  
 0.6  
 0.5  
 0.4  
 0.3  
 0.2



0.1

No. 15

(b)

|   |    |
|---|----|
| Draw correctly at least one straight line | K1 |
| Draw correctly all straight lines         | N1 |
| Correct shaded region                     | N1 |

