SULIT

Nama : ……..……..……

Tingkatan : ……..……..

JABATAN PELAJARAN
WILAYAH PERSEKUTUAN KUALA LUMPUR

PEPERIKSAAN PERCUBAAN SPM 2009 3472/1

ADDITIONAL MATHEMATICS

Kertas 1
September
2 jam **Dua jam**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nama** *dan* **tingkatan** *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 Pemeriksa		
Kod Pemeriksa:		
Soalan	Markah Penuh	Markah Diperoleh
1	2	
2	4	
3	4	
4	3	
5	3	
6	3	
7	3	
8	3	
9	3	
10	3	
11	3	
12	4	
13	3	
14	3	
15	2	
16	4	
17	3	
18	3	
19	3	
20	4	
21	3	
22	3	
23	4	
24	3	
25	4	
Jumlah	80	

Kertas soalan ini mengandungi 19 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 $S_n = \dfrac{n}{2}\left[2a + (n-1)d\right]$

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

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

3 $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4 Area under the curve
Luas di bawah lengkung
$= \int_a^b y\, dx$ or (*atau*)
$= \int_a^b x\, dy$

5 Volume generated
Isipadu janaan
$= \int_a^b \pi y^2\, dx$ or (*atau*)
$= \int_a^b \pi x^2\, dy$

STATISTICS / *STATISTIK*

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

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

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

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

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

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

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

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

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

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 / *Min* , $\mu = np$

13 $\sigma = \sqrt{npq}$

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

GEOMETRY / *GEOMETRI*

1 Distance / *Jarak*
$= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

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

5 $|\underline{r}| = \sqrt{x^2 + y^2}$

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

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

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

1 Diagram 1 shows the relation of set *A* to set *B*.
Rajah 1 *menunjukkan hubungan set A kepada set B.*

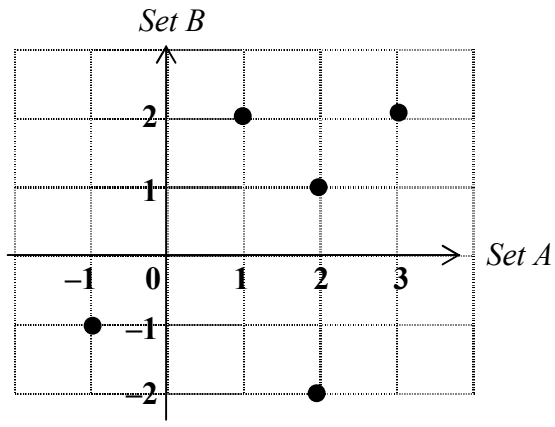


Diagram 1
Rajah 1

State
Nyatakan

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

(*b*) the object that maps onto itself.
objek yang memeta kepada dirinya sendiri.

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

1
2

Answer / *Jawapan*: (*a*) ……

(*b*) ……

For Examiner's Use

2 Given that $f: x \to 7 - 3x$ and $g: x \to |2x - k|$.
Diberi $f: x \to 7 - 3x$ *dan* $g: x \to |2x - k|$.

Find
Cari

(*a*) $f^2(x)$,

(*b*) the possible values of *k*, if g(1) = 4.
nilai-nilai yang mungkin bagi k, jika $g(1) = 4$.

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

Answer / *Jawapan*: (*a*) ……

(*b*) $k =$ ……

2
4

---

3 Given the function $g(x) = \frac{5}{2x-1}$, $x \neq \frac{1}{2}$ and $hg(x) = 2 - 3x$.
Diberi fungsi $g(x) = \frac{5}{2x-1}$, $x \neq \frac{1}{2}$ *dan* $hg(x) = 2 - 3x$.

(*a*) Find $g^{-1}(x)$.
Cari $g^{-1}(x)$.

(*b*) Hence, find $h(x)$.
Seterusnya, cari $h(x)$.

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

Answer / *Jawapan*: (*a*) ……

(*b*) ……

3
4

4 The sum of the roots of a quadratic equation $2(x+p)^2 = 1$ is 7. Find the value of p.
[3 *marks*]

Hasiltambah punca-punca bagi persamaan kuadratik $2(x+p)^2 = 1$ *ialah* 7. *Carikan nilai bagi p.* [3 *markah*]

4
3

Answer / *Jawapan*: p = ……..……..……...

---

5 Find the range of the values of x for $x(x-2) > 5x - 6$. [3 *marks*]

Cari julat nilai x bagi $x(x-2) > 5x - 6$. [3 *markah*]

5
3

Answer / *Jawapan*: ……..……...

---

6 A quadratic function $f(x) = 3(x+h)^2 - 5$ has a minimum point at $(-4, k)$.

Suatu fungsi kuadratik $f(x) = 3(x+h)^2 - 5$ *mempunyai titik minimum di* $(-4, k)$.

Find the value of
Cari nilai bagi

(a) h,

(b) k,

(c) the y-intercept.
pintasan-y.
[3 *marks*]
[3 *markah*]

6
3

Answer / *Jawapan*: (a) h = ……..
(b) k = ……

(c) ……

For Examiner's Use

7 The straight line $y = 2x - p$ intersects the quadratic function $y - 2 = 3x^2 - x + 5p$ at two different points. Find the range of values of p. [3 marks]

Garis lurus $y = 2x - p$ *menyilangi fungsi kuadratik* $y - 2 = 3x^2 - x + 5p$ *di dua titik yang berbeza. Cari julat bagi nilai p.* *[3 marks]*

Answer / *Jawapan* : ……...

7 | 3

---

8 Solve the equation:
Selesaikan persamaan:

$$2^{x-2}(3^x) = 4$$

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

Answer / *Jawapan*: ……...

8 | 3

---

9 Given $\log_3 7 = m$ and $\log_9 2 = n$. Find, in terms of m and n, $\log_3 14$. [3 *marks*]
Diberi $\log_3 7 = m$ *dan* $\log_9 2 = n$. *Cari, dalam sebutan m dan n,* $\log_3 14$. [3 *markah*]

Answer / *Jawapan* : ……..……..……

9 | 3

10 An arithmetic progression 3, 2*m*, 13, … has a common difference of 5.

Suatu janjang aritmetik 3, 2*m*, 13, ... *mempunyai beza sepunya* 5.

Find
Cari

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

(*b*) the term with value 103. [3 *marks*]
sebutan yang mempunyai nilai 103. [3 *markah*]

10
3

Answer / *Jawapan* : (*a*) …...……..……

(*b*) .....

---

11 In a geometric progression, the sum to infinity is –8 and the sum of the first five terms is $-\frac{31}{4}$. Find the value of the common ratio. [3 *marks*]

Dalam suatu janjang geometri, hasil tambah ketakterhinggaannya ialah –8 *dan hasiltambah lima sebutan yang pertama ialah* $-\frac{31}{4}$. *Cari nilai nisbah sepunyanya.*
[3 *markah*]

11
3

Answer / *Jawapan* : ……..……

For Examiner's Use

12 The variables x and y are related by the equation $y = p\,x^{2k}$ where p and k are constants. Diagram 2 shows the straight line graph obtained by plotting $\log_{10} y$ against $\log_{10} x$.

Pembolehubah x dan y dihubungkan oleh persamaan $y = p\,x^{2k}$ *dengan keadaan p dan k ialah pemalar. Rajah* 2 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $\log_{10} y$ *melawan* $\log_{10} x$.

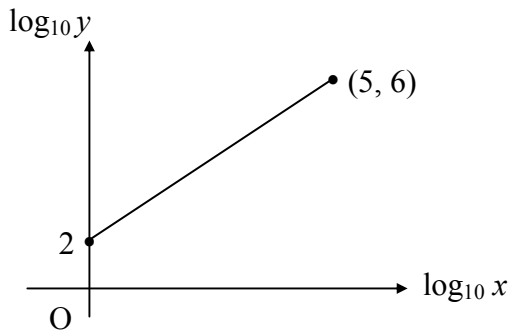


Diagram 2
Rajah 2

(*a*) Express the equation $y = p\,x^{2k}$ in its linear form used to obtain the straight line graph shown in Diagram 2.

Ungkapkan persamaan $y = p\,x^{2k}$ *dalam bentuk linear yang digunakan untuk memperoleh graf pada Rajah* 2.

(*b*) Hence, find the values of p and k.
Seterusnya, cari nilai-nilai bagi p dan k.

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

12
4

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

(*b*) p = ...

k = …….

13 Digaram 3 shows a triangle ABC with the vertices $A(1, 5)$, $B(4, 0)$ and $C(h, -1)$, where h is a constant.

Rajah 3 *menunjukkan segitiga ABC dengan titik-titik* $A(1, 5)$, $B(4, 0)$ *dan* $C(h, -1)$, *di mana h ialah pemalar.*

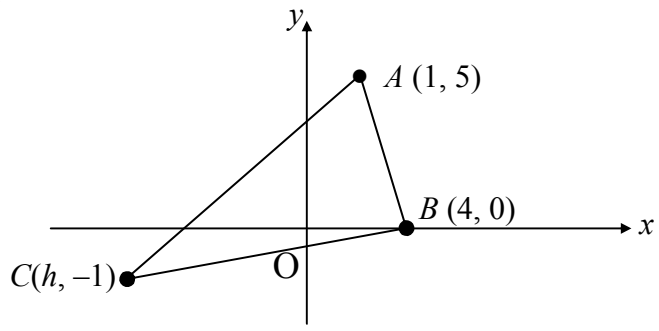


Diagram 3
Rajah 3

If the area of the triangle is 29 unit^2, find the value of h. [3 *marks*]

Jika luas segitiga itu ialah 29 *unit*^{2}, *cari nilai bagi h*. [3 *markah*]

13 3

Answer / *Jawapan* : h = ……..……

---

14 A point R (3, 1) divides the straight line AB in the ratio of 1 : 3. Given that the coordinates of A are (0, –1), find the coordinates of B. [3 *marks*]

Satu titik R (3, 1) *membahagi garis lurus AB dalam nisbah* 1 : 3. *Diberi koordinat A ialah* (0, –1), *cari koordinat B*. [3 *markah*]

14 3

Answer / *Jawapan* : ……..……..……

For Examiner's Use

15 Diagram 4 in the answer space, shows vectors $\overrightarrow{OM} = \underline{m}$, $\overrightarrow{ON} = \underline{n}$ drawn on a grid of equal squares. Draw, on the grid, vector $\overrightarrow{OR}$ where $\overrightarrow{OR} = \underline{m} + \underline{n}$.

[2 *marks*]

Rajah 4 *pada ruang jawapan*, *menunjukkan vektor-vektor* $\overrightarrow{OM} = \underline{m}$, $\overrightarrow{ON} = \underline{n}$ *yang dilukis pada garisan bergrid segiempat sama. Lukis, pada grid itu, vektor* $\overrightarrow{OR}$ *dengan keadaan* $\overrightarrow{OR} = \underline{m} + \underline{n}$. [2 *markah*]

Answer / *Jawapan*:

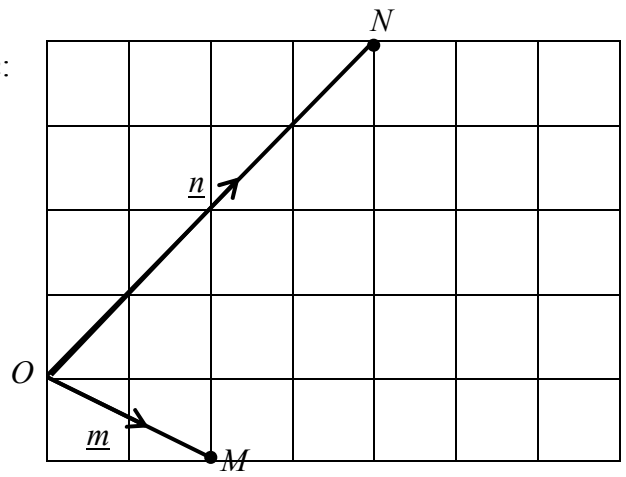


Diagram 4
Rajah 4

15

2

---

16 Given that $\underline{u} = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$ and $\underline{v} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$.

Diberi bahawa $\underline{u} = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$ *dan* $\underline{v} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$.

Find
Cari

(*a*) $|\ \underline{u} + \underline{v}\ |$,

(*b*) the unit vector in the direction of $\underline{u} + \underline{v}$. [4 *marks*]
vector unit dalam arah $\underline{u} + \underline{v}$. [4 *markah*]

16

4

Answer / *Jawapan* : (a) ……..……..……

(b) ……

17 Given an equation of a curve $y = 2x^3 - 6x^2 + 1$. Find the value of x when y is maximum. [3 *marks*]

Diberi satu persamaan lengkung $y = 2x^3 - 6x^2 + 1$. *Cari nilai x apabila y adalah maksimum.* [3 *markah*]

17
3

Answer / *Jawapan* : ……...……..……

---

18 The area of a circle increases at the rate of 16π cm^2 s^{-1}. Find the rate of change of the radius when the radius is 4 cm. [3 *marks*]

Luas suatu bulatan bertambah pada kadar 16π cm^2 s^{-1}. *Cari kadar perubahan jejari ketika jejari ialah* 4 *cm.* [3 *markah*]

18
3

Answer / *Jawapan* : ……..……..……

For Examiner's Use

19 Given that $\int_1^4 g(x)\,dx = 7$ and $\int_1^k 2g(x)\,dx + \int_k^4 2[5 + g(x)]\,dx = 29$

where $1 \le k \le 4$ and $g(x) > 0$. Find the value of k. [3 *marks*]

Diberi bahawa $\int_1^4 g(x)\,dx = 7$ dan $\int_1^k 2g(x)\,dx + \int_k^4 2[5 + g(x)]\,dx = 29$

dengan keadaan $1 \le k \le 4$ *dan* $g(x) > 0$. Cari nilai bagi k. [3 *markah*]

19

3

Answer / *Jawapan* : $k =$ ……

---

20 Solve $2\cos 2x = \cos x + 1$ for $0° \le x \le 360°$. [4 *marks*]

Selesaikan $2\text{kos } 2x = \text{kos } x + 1$ *untuk* $0° \le x \le 360°$. [4 *markah*]

20

4

Answer / *Jawapan* : ……

21 Diagram 5 shows two sectors of circles with center *O*. The radii of the quadrant *OAB* and the sector *ORS* are 8 cm and 12 cm respectively. Given $\angle SOR = \theta$.

Rajah 5 *menunjukkan dua sektor bulatan berpusat O. Jejari bagi sukuan bulatan OAB dan sektor ORS masing-masing ialah* 8 cm *dan* 12 cm. *Diberi* $\angle SOR = \theta$.

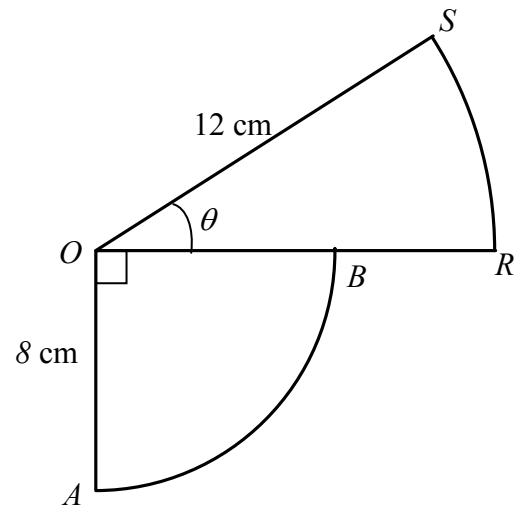


Diagram 5
Rajah 5

If the area of *ORS* is equal to the area of *OAB,* find the value of θ in radian.
(Use $\pi = 3.142$) [3 *marks*]

Jika luas ORS adalah sama dengan luas OAB, cari nilai θ *dalam radian.*
(*Guna* $\pi = 3.142$) [3 *markah*]

21
3

Answer / *Jawapan* : ……..……..……..…….

For Examiner's Use

22 Table 1 shows the number of goals obtained by a football team in several games.
Jadual 1 *menunjukkan jumlah gol yang diperoleh satu pasukan bola sepak dalam beberapa perlawanan.*

Goals *Gol*	0	1	2	4
Number of games *Bilangan perlawanan*	1	*x*	3	2

Table 1
Jadual 1

(*a*) Find the possible values of *x* if the mode is 2.
Cari nilai-nilai yang mungkin bagi x jika mod ialah 2.

(*b*) If $x = 2$ and the mean = 2, find the standard deviation for the number of goals.
Jika x = 2 dan min = 2, *cari sisihan piawai bagi bilangan gol.*

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

Answer / *Jawapan* : (*a*) ……..……..……

(*b*) ……...……

22
3

23 Five letters from the word S U P E R B are chosen to be arranged in a row.
Lima huruf daripada perkataan S U P E R B *dipilih untuk disusun sebaris.*

(*a*) Find the number of arrangements that can be formed.
Cari bilangan susunan yang boleh dibuat.

(*b*) If the vowels must be chosen, find the number of arrangements that can be formed so that the vowels are next to each other.
Jika huruf vokal mesti dipilih, cari bilangan susunan yang boleh dibuat supaya huruf-huruf vokal berada sebelah menyebelah.

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

23

4

Answer / *Jawapan* : (*a*) ……..……..……

(*b*) ……...……

---

24 The probabilities of Aminah and Mei Mei solving a crossword puzzle in less than one hour, are $\frac{2}{3}$ and $\frac{1}{5}$ respectively. Find the probability that, within one hour,
Kebarangkalian Aminah dan Mei Mei menyelesaikan satu teka silangkata dalam masa kurang daripada satu jam, masing-masing ialah $\frac{2}{3}$ *dan* $\frac{1}{5}$ *. Cari kebarangkalian, dalam masa satu jam,*

(*a*) none of them can solve the crossword puzzle,
tiada seorang pun yang dapat menyelesaikan teka silangkata itu,

(*b*) at least one of them can solve the crossword puzzle.
sekurang-kurangnya seorang daripada mereka dapat menyelesaikan teka silangkata itu.

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

24

3

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

(*b*) .....

For Examiner's Use

25 Given 85% of the students in a class passed the Calculus test. If 10 students are chosen randomly from the class, find

Diberi 85% *pelajar dalam satu kelas telah lulus ujian Kalkulus. Jika* 10 *pelajar dipilih secara rawak daripada kelas tersebut, cari*

(*a*) the probability that exactly 6 students pass the test,
kebarangkalian bahawa tepat 6 *pelajar lulus ujian itu,*

(*b*) the number of students in the class, if the variance of students who pass the test is 5.355.
bilangan pelajar dalam kelas itu, *jika varians bagi pelajar yang lulus ujian ialah* 5.355.

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

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

(*b*) .....

25

4

END OF QUESTION PAPER

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.
Jawapan hendaklah ditulis dalam ruangan 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 work that you had done. Then write down the new answer.
Sekiranya anda hendak menukar jawapan, batalkan jalan kerja yang telah dibuat. Kemudian tulis jawapan yang baru.

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

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

8. A list of formulae is provided on pages 2 to 4.
Satu senarai rumus disediakan di halaman 2 *hingga* 4.

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

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

SULIT

JABATAN PELAJARAN WILAYAH PERSEKUTUAN
KUALA LUMPUR

PEPERIKSAAN PERCUBAAN

SIJIL PELAJARAN MALAYSIA 2009 3472/2

ADDITIONAL MATHEMATICS
Kertas 2
September

$2\frac{1}{2}$ jam **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 maklumat di halaman belakang kertas soalan ini.*

4. *Calon dikehendaki menceraikan halaman* 20 *dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.*

Kertas soalan ini mengandungi 21 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 $S_n = \dfrac{a(r^n - 1)}{r - 1} = \dfrac{a(1 - r^n)}{1 - r}, \; r \neq 1$

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

CALCULUS (KALKULUS)

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

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 generated /*Isipadu janaan*
$= \int_a^b \pi y^2 \, dx$ or (atau)
$= \int_a^b \pi x^2 \, dy$

STATISTICS (STATISTIK)

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

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

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

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

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

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

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

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

12 Mean (Min), $\mu = np$

13 $\sigma = \sqrt{npq}$

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

GEOMETRY (GEOMETRI)

1 Distance /*Jarak*

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

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 triangle/*Luas segitiga*

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

5 $|\ \underline{r}\ | = \sqrt{x^2 + y^2}$

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

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 $a^2 = b^2 + c^2 - 2bc\ cosA$

$a^2 = b^2 + c^2 - 2bc\ kosA$

14 Area of triangle /*Luas segitiga*

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

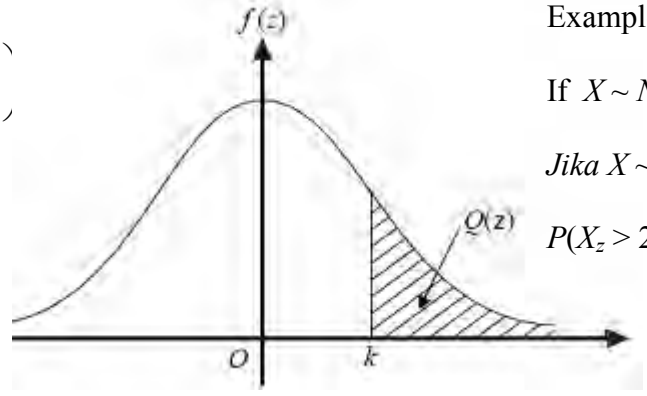
THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0, 1)

KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	13	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	1	1	2	2	3	3

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

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



Example / *Contoh*:

If $X \sim N(0,1)$, then $P(X > k) = Q(k)$

Jika $X \sim N(0,1)$, *maka* $P(X > k) = Q(k)$

$P(X_z > 2.1) = Q(2.1) = 0.0179$

Section A
Bahagian A

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

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

1 Solve the simultaneous equations $x + 2y = 5$ and $3x^2 + xy = 1$.
Give your answers correct to three decimal places. [5 *marks*]

Selesaikan persamaan serentak $x + 2y = 5$ *dan* $3x^2 + xy = 1$.
Berikan jawapan anda betul kepada tiga tempat perpuluhan. [5 *markah*]

2 Table 1 shows the frequency distribution of marks obtained by a group of students in a mathematics test.

Jadual 1 *menunjukkan taburan kekerapan markah yang didapati oleh sekumpulan pelajar dalam satu ujian matematik.*

Marks	Number of students
1 - 10	2
11 - 20	5
21 - 30	11
31 - 40	*h*
41 - 50	6

Table 1
Jadual 1

(*a*) Given that the mean mark is 30.25, find the value of *h*. [3 *marks*]
Diberi markah min ialah 30.25*, cari nilai h*. [3 *markah*]

(*b*) Find the standard deviation of the distribution. [3 *marks*]
Cari sisihan piawai bagi taburan itu. [3 *markah*]

(c) What is the new standard deviation of the distribution if the mark of each student is increased by 3? [1 *mark*]
Apakah sisihan piawai baru bagi taburan itu jika markah setiap pelajar ditambah sebanyak 3? [1 *markah*]

3 Solutions by scale drawing is not accepted.
Penyelesaian secara lukisan berskala tidak diterima.

Diagram 1 shows straight lines *PSQ* and *RST* in a Cartesian plane. Points *P* and *Q* lie on *x*-axis and *y*-axis respectively.

Rajah 1 *menunjukkan garis lurus PSQ dan RST dalam satah Cartesian. Titik P dan titik Q masing-masing terletak pada paksi-x dan paksi-y.*

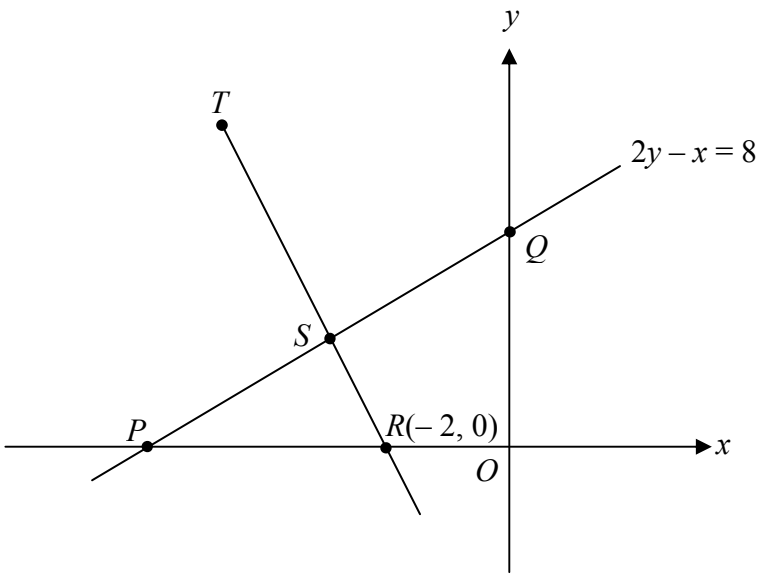


Diagram 1
Rajah 1

Given that the equation of straight line *PQ* is $2y - x = 8$. Point *S* is the midpoint of *PQ* and *RS* : *ST* = 2 : 3.
Diberi bahawa persamaan garis lurus PQ ialah $2y - x = 8$. *Titik S ialah titik tengah PQ dan RS* : *ST* = 2 : 3.

Find
Cari

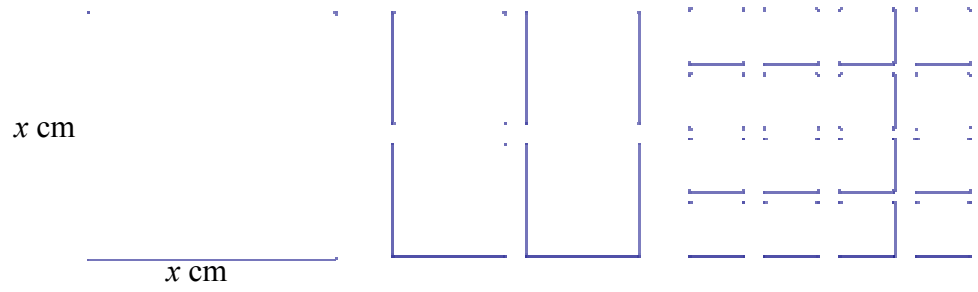
(*a*) the coordinates of *S*, [2 *marks*]
koordinat titik S, [2 *markah*]

(*b*) the area of quadrilateral *OQSR*, [2 *marks*]
luas sisiempat OQSR, [2 *markah*]

(*c*) the coordinates of *T*. [2 *marks*]
koordinat titik T. [2 *markah*]

4 Diagram 2 shows a square with length x cm was cut into four squares as shown at stage 2. Then every square was cut into another four squares for the subsequent stages.

Rajah 2 *menunjukkan sebuah segiempat sama dengan panjang sisi x cm dipotong kepada empat buah segiempat sama saperti yang ditunjukkan pada peringkat* 2. *Kemudian setiap segiempat sama yang dipotong tadi, dipotong lagi kepada segiempat sama yang lain dan proses ini diulang pada peringkat seterusnya.*



Stage 1 *Peringkat* 1 | Stage 2 *Peringkat* 2 | Stage 3 *Peringkat* 3

Diagram 2
Rajah 2

(*a*) Show that the sum of perimeters of the squares at every stage form a geometric progression and state the common ratio. [2 *marks*]

Tunjukkan bahawa jumlah perimeter bagi segiempat sama bagi setiap peringkat membentuk suatu janjang geometri dan nyatakan nisbah sepunya. [2 *markah*]

(*b*) Given the sum of the perimeters of the squares cut at stage 10 is 10240, find the value of x. [2 *marks*]

Diberi jumlah perimeter segiempat sama yang dipotong dalam peringkat ke - 10 *ialah* 10240, *cari nilai bagi x*. [2 *markah*]

(*c*) Calculate the total number of squares cut from stage 5 until stage 10. [3 *marks*]

Hitung jumlah segiempat sama yang dipotong dari peringkat ke-5 *hingga peringkat ke-10.* [3 *markah*]

5 The equation of the straight line $13y + x = k$ is normal to the curve $y = 4x^2 - 3x - 5$ at the point A.
Persamaan garis lurus $13y + x = k$ *ialah normal kepada lengkung* $y = 4x^2 - 3x - 5$ *pada titik* A.

Find
Cari

(i) the coordinates of the point *A,* [3 *marks*]
koordinat titik A, [3 *markah*]

(ii) the value of *k*, [2 *marks*]
nilai k, [2 *markah*]

(iii) the equation of the tangent at the point *A*. [2 *marks*]
persamaan tangen pada titik A. [2 *markah*]

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

Buktikan $\dfrac{\cos 2x - 1}{\cos 2x + 1} = -\tan^2 x$ [2 *markah*]

(*b*)(i) Sketch the graph of $y = \dfrac{3}{2}\cos 2x$ for $0 \le x \le 2\pi$. [3 *marks*]

Lakar graf bagi $y = \dfrac{3}{2}\cos 2x$ *untuk* $0 \le x \le 2\pi$. [3 *markah*]

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\dfrac{3}{2}\cos 2x + \dfrac{x}{\pi} = 1$ for $0 \le x \le 2\pi$.
State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\dfrac{3}{2}\cos 2x + \dfrac{x}{\pi} = 1$ *untuk* $0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian.

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

Section B
Bahagian B

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

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

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

Table 2 shows the values of two variables x and y, obtained from an experiment. The variables x and y are related by the equation $y = \frac{p}{q}x^2 + qx$, where p and q are constants.

Jadual 2 menunjukkan nilai-nilai bagi dua pembolehubah x dan y yang diperoleh daripada suatu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = \frac{p}{q}x^2 + qx$, *dengan keadaan p dan q adalah pemalar.*

x	1	2	3	4	6	7
y	– 2.8	– 4.2	– 4.5	– 2.8	4.2	10.5

Table 2
Jadual 2

(*a*) Plot $\frac{y}{x}$ against x, by using 2 cm to 1 unit on the x-axis and 2 cm to 1 unit on the $\frac{y}{x}$ – axis . Hence, draw the line of best fit. [5 *marks*]

Plotkan $\frac{y}{x}$ *melawan x, dengan menggunakan* 2 *cm kepada 1 unit pada paksi-x dan* 2 *cm kepada* 1 *unit pada paksi-*$\frac{y}{x}$. *Seterusnya, lukiskan garis lurus penyuaian terbaik.* [5 *markah*]

(*b*) Use the graph from (*a*) to find the values of
Gunakan graf anda di (a) untuk mencari nilai bagi

(i) p,

(ii) q,

(iii) y when $\frac{y}{x}=1.2$.

y apabila $\frac{y}{x} = 1.2$. [5 *marks*]

[5 *markah*]

8 Diagram 3 shows a trapezium *ABCD*.

Rajah 3 *menunjukkan sebuah trapezium ABCD.*

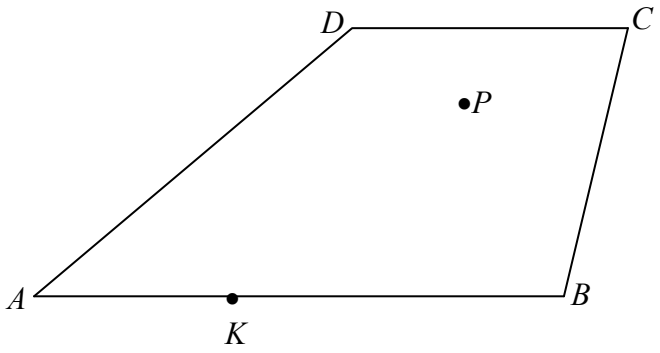


Diagram 3
Rajah 3

It is given that $\overrightarrow{AD}=4\underset{\sim}{x}$, $\overrightarrow{AB}=8\underset{\sim}{y}$, $3\overrightarrow{AK}=\overrightarrow{AB}$, and $2\overrightarrow{DC}=\overrightarrow{AB}$.

Diberi bahawa $\overrightarrow{AD}=4\underset{\sim}{x}$, $\overrightarrow{AB}=8\underset{\sim}{y}$, $3\overrightarrow{AK}=\overrightarrow{AB}$, *dan* $2\overrightarrow{DC}=\overrightarrow{AB}$.

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

Nyatakan, dalam sebutan $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$

(i) $\overrightarrow{BD}$,

(ii) $\overrightarrow{BC}$. [3 *marks*]

[3 *markah*]

(*b*) Point P lies inside the trapezium *ABCD* such that $\overrightarrow{KP} = n\overrightarrow{AD}$, *n* is a constant.

Titik P terletak dalam trapezium ABCD dengan keadaan $\overrightarrow{KP} = n\overrightarrow{AD}$, *n ialah pemalar.*

(i) Express $\overrightarrow{AP}$, in terms of *n*, $\underset{\sim}{x}$ and $\underset{\sim}{y}$.

Nyatakan $\overrightarrow{AP}$, *dalam sebutan n,* $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$.

(ii) Hence, if the point *A*, *P* and *C* are collinear, find the value of *n*.

Seterusnya, jika titik A, P dan C adalah segaris, cari nilai n.

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

9 Diagram 4 shows an arc *LAK* of a circle with centre *M* and radius 8 cm. *LOKB* is a semi-circle with centre *O* and a radius of 5 cm.

Rajah 4 *menunjukkan suatu lengkok LAK bagi sebuah bulatan berpusat M dan berjejari* 8 *cm. LOKB ialah sebuah semi bulatan berpusat O dan berjejari* 5 *cm.*

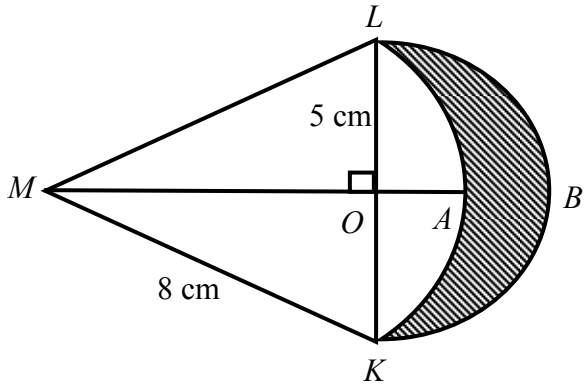


Diagram 4
Rajah 4

Find
Cari

(*a*) $\angle KML$, in radians, [2 *marks*]
$\angle KML$, *dalam radian*, [2 *markah*]

(*b*) the perimeter, in cm, of the shaded region, [3 *marks*]
perimeter, dalam cm, rantau yang berlorek, [3 *markah*]

(*c*) the area, in cm², of the shaded region. [5 *marks*]
luas, dalam cm², rantau yang berlorek. [5 *markah*]

10 Diagram 5 shows the straight line $3y = -x + 3$, intersecting the curve $y = (x-1)^2$ at points *P* and *Q*.

Rajah 5 *menunjukkan satu garis lurus* $3y = -x + 3$, *menyilang lengkung* $y = (x-1)^2$ *pada titik-titik P dan Q.*

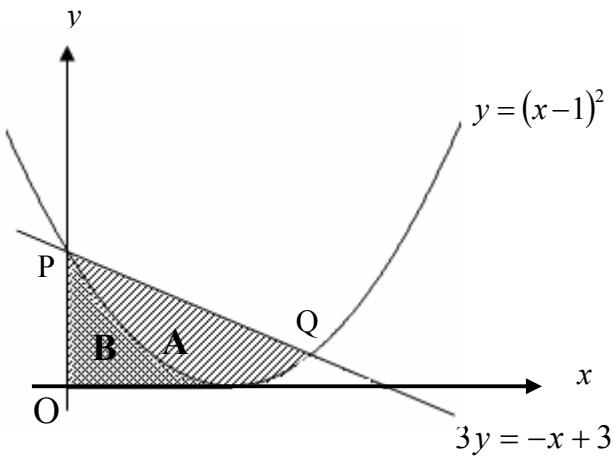


Diagram 5
Rajah 5

Find
Cari

(*a*) the coordinates of point *Q*, [2 *marks*]
koordinat titik Q, [2 *markah*]

(*b*) the area of the shaded region *A,* [5 *marks*]
luas rantau berlorek A, [5 *markah*]

(*c*) the volume of revolution, in terms of π, when the shaded region *B* is rotated 360° about the *x*- axis. [3 marks]
isipadu kisaran, dalam sebutan π, apabila rantau berlorek B diputar melalui 360° *pada paksi-x.* [3 *markah*]

11 Diagram 6 shows a probability distribution graph of continuous random variable X that is normally distributed with mean 52 and standard deviation of 5.

Rajah 6 *menunjukkan graf taburan kebarangkalian bagi pembolehubah selanjar* X *yang membentuk satu taburan normal dengan min* 52 *dan sisihan piawai* 5.

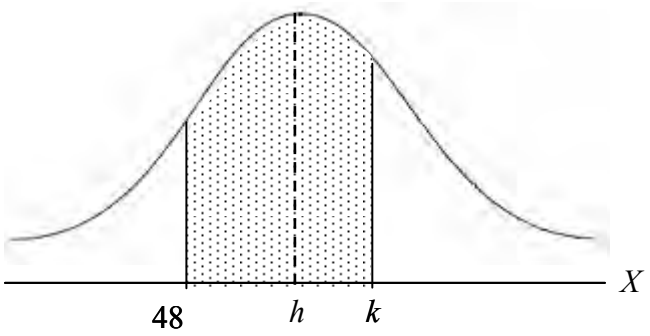


Diagram 6
Rajah 6

(*a*) (i) State the value of h.
Nyatakan nilai bagi h.

(ii) If the standard score of $X = k$ is 1.2, find the value of k.
Jika skor piawai bagi $X = k$ adalah 1.2, *cari nilai k.*

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

(*b*) Hence, find P(48 < X < k). [2 *marks*]
Seterusnya, cari P (48 < X < k). [2 *markah*]

(*c*) (*i*) In school A, there are 200 form five students. If X represents the mass, in kg, of the form five students, calculate the number of form five students who have mass less than 56 kg.

Dalam sebuah sekolah A, terdapat 200 *pelajar tingkatan lima. Jika X mewakili jisim, dalam kg, bagi pelajar tingkatan lima itu, hitung bilangan pelajar tingkatan lima yang mempunyai jisim yang kurang daripada* 56 *kg.*

(*ii*) If 5% of the form five students are considered overweight, find the minimum mass of the form five students who are considered overweight in the school. [5 *marks*]

Jika 5% *daripada pelajar tingkatan lima dianggap sebagai melebihi berat, cari jisim yang minimum bagi pelajar tingkatan lima sekolah itu yang dianggap melebihi berat.* [5 *markah*]

Section *C*
Bahagian C

[20 *marks*]
[20 *markah*]
Answer **two** *questions from this section.*
Jawab ***dua*** *soalan daripada bahagian ini.*

12 A particle *P* moves along a straight line and passes through a fixed point O. Its velocity, v ms^{-1}, is given by $v = 8 - 10t + 3t^2$ 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 ms^{-1}, *diberi oleh* $v = 8 - 10t + 3t^2$, *dengan keadaan t ialah masa, dalam saat, selepas melalui O.*

[Assume motion to the right is positive].
[Anggapkan gerakan ke kanan ialah positif].

Find
Cari

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

(*b*) the values of *t* when the particle stops instantaneously, [2 *marks*]
nilai-nilai t bila zarah berhenti seketika, [2 *markah*]

(*c*) the displacement when the particle stops at the second time, [2 *marks*]
sesaran bila zarah berhenti kali kedua, [2 *markah*]

(*d*) the total distance traveled by the particle in 4 seconds. [3 *marks*]
Jumlah jarak yang dilalui oleh zarah dalam masa 4 *saat.* [3 *markah*]

13 Diagram 7 shows a triangle *ABD*. *C* is a point on line *AB* such that *AC* : *AB* = 2 : 3.

Rajah 7 *menunjukkan sebuah segitiga ABD. C ialah satu titik di atas garis AB dengan keadaan AC* : *AB* = 2 : 3.

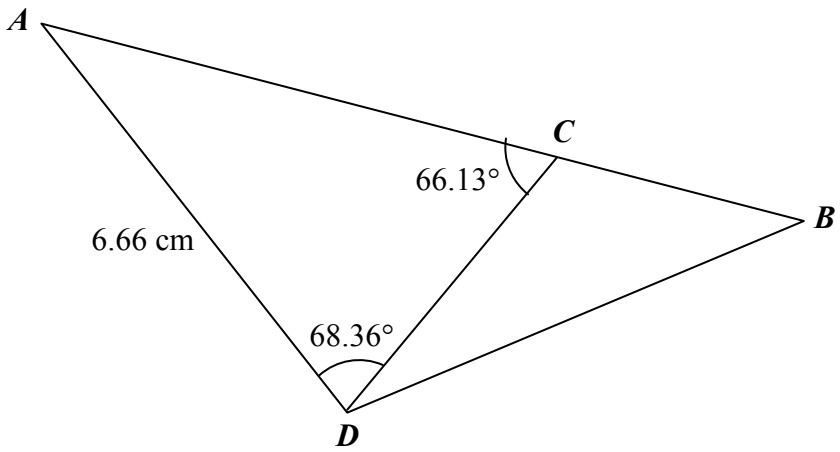


Diagram 7
Rajah 7

Calculate
Hitung

(*a*) the length of *CB*, [4 *marks*]
panjang CB, [4 *markah*]

(b) the length of *BD*, [4 *marks*]
panjang BD, [4 *markah*]

(c) the area of Δ *ABD*. [2 *marks*]
luas Δ *ABD*. [2 *markah*]

14 Use graph paper to answer this question.

Gunakan kertas graf untuk menjawab soalan ini.

Pn. Mary makes two types of cake, *P* and *Q*. A cake of type *P* needs 50 gm of flour and 10 gm of sugar. A cake of type *Q* needs 40 gm of flour and 30 gm of sugar. Pn. Mary intends to make *x* cakes of type *P* and *y* cakes of type *Q*.

Pn. Mary membuat dua jenis kek, P dan Q. Kek jenis P memerlukan 50 *gm tepung dan* 10 *gm gula. Kek jenis Q pula memerlukan* 40 *gm tepung dan* 30 *gm gula. Pn. Mary ingin menghasilkan x biji kek jenis P dan y biji kek jenis Q.*

The production of cakes is based on the following constraints:

Penghasilan kek-kek adalah berdasarkan kekangan berikut:

I : Maximum flour can be used is 4000 gm.

Maksimum tepung yang boleh digunakan ialah 4000 *gm.*

II : The cakes need at least 600 gm of sugar.

Semua kek memerlukan sekurang-kurangnya 600 *gm gula.*

III : Three times the number of cakes of type *Q* must exceed four times the number of cakes of type *P* at most 60.
Tiga kali bilangan kek jenis Q mesti melebihi empat kali bilangan kek jenis P paling banyak 60.

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

(*b*) Using a scale of 2 cm to 10 cakes on both axes, construct and shade the region *R* which satisfies all of the above constraints.

Menggunakan skala 2 *cm kepada* 10 *biji kek pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.*

[3 marks]
[3 *markah*]

(*c*) Use your graph in **14**(*b*), find
Gunakan graf anda di **14***(b), cari*

(i) the range of the number of cakes of type *P* can be produced when the number of cakes of type *Q* is 40.

julat bilangan kek jenis P yang boleh dihasilkan jika bilangan kek jenis Q ialah 40.

(ii) the maximum profit she can get if the profit from the sale of a cake of type *P* is RM 10 and the profit of a cake *Q* is RM 30.

keuntungan maksimum yang boleh didapati jika keuntungan jualan sebiji kek P ialah RM10 *dan keuntungan jualan sebiji kek jenis Q ialah* RM 30.

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

15 Table 3 shows the price indices and percentage of usage of four items, *A, B, C* and *D*, which are the main components in the production of a type of toy.

Jadual 3 *menunjukkan indeks harga dan peratus penggunaan bagi empat barangan A, B, C dan D, yang merupakan komponen utama dalam penghasilan sejenis alat mainan*.

Item ***Barangan***	**Price index for the year 2008 based on the year 2003** ***Indeks harga pada tahun* 2008 *berasaskan tahun* 2003**	**Percentage of usage (%)** ***Peratus penggunaan (%)***
A	140	35
B	110	25
C	120	*x*
D	*y*	10

Table 3
Jadual 3

(*a*) Calculate
Hitung

(i) the price of *A* in the year 2003 if its price in the year 2008 is RM56.00,

harga barangan A pada tahun 2003 *jika harganya pada tahun* 2008 *ialah* RM56.00,

(ii) the price index of *B* in the year 2008 based on the year 2000 if its price index in the year 2003 based on the year 2000 is 105.

indeks harga barangan B pada tahun 2008 *berasaskan tahun* 2000 *jika indeks harga pada tahun* 2003 *berasaskan tahun* 2000 *ialah* 105.

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

(*b*) The composite index for the production cost of toys in the year 2008 based on the year 2003 is 123.

Nombor indeks gubahan bagi kos penghasilan alat mainan pada tahun 2008 *berasaskan tahun* 2003 *ialah* 123.

Calculate
Hitung

(*i*) the value of *x*,
nilai x,

(*ii*) the value of *y,*
nilai y,

(*iii*) the price of a toy in the year 2008 if the corresponding price in the year 2003 is RM252.00.

harga alat mainan pada tahun 2008 *jika harganya yang sepadan pada tahun* 2003 *ialah* RM252.00

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

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Nama : _____Tingkatan : _____

NO. KAD PENGENALAN

ANGKA GILIRAN

Arahan Kepada Calon

1 Tuliskan **nombor kad pengenalan** 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		6	
	4		7	
	5		7	
	6		8	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
Jumlah Markah				

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****,* ***empa****t 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 ceraian soalan ditunjukkan dalam kurungan.

6. A list of formulae is provided on pages 2 to 4. The Standard Normal Probability Distribution Table is provided on page 5.

   Satu senarai rumus disediakan di halaman 2 *hingga* 4. *Jadual Kebarangkalian Bagi Taburan Normal Piawai diberi pada halaman 5.*

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.

JABATAN PELAJARAN
WILAYAH PERSEKUTUAN KUALA LUMPUR

PEPERIKSAAN PERCUBAAN SPM 2009 3472/1

ADDITIONAL MATHEMATICS

Kertas 1

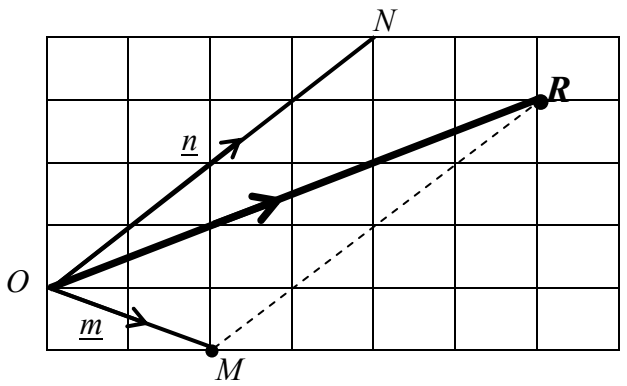
September

2 jam **Dua jam**

PERATURAN PEMARKAHAN

Question	Solutions	Sub Mark	Total Mark
1	(*a*) 1, –2	1	**2**
	(*b*) –1	1	
2	(*a*) $f(7-3x) = 7-3(7-3x)$	1	**4**
	$= 9x - 14$	1	
	(*b*) $2x-k=4$ or $2x-k=-4$ } (*either*) $2-k=4$ or $2-k=-4$ }	1	
	$k = -2\ ,\ 6$ (*both*)	1	
3	(*a*) $y = \frac{5}{2x-1}$ *using the correct method*	1	**4**
	$g^{-1}(x) = \frac{x+5}{2x}\ ,\ x \neq 0$	1	
	(*b*) $h(x) = 2-3\left(\frac{x+5}{2x}\right)$	1	
	$= \frac{x-15}{2x}\ ,\ x \neq 0$	1	
4	$2(x^2+2px+p^2)-1=0$ or $2x^2+4px+2p^2-1=0$	1	**3**
	SOR: $-\frac{4p}{2}=7$	1	
	$p = -\frac{7}{2}$	1	
5	$x^2-7x+6>0$	1	**3**
	$(x-1)(x-6)>0$	1	
	$x<1\ ,\quad x>6$ (*both*)	1	
6	(*a*) $h=4$	1	**3**
	(*b*) $k=-5$	1	
	(*c*) y-intercept = 43	1	

Question	Solutions	Sub Mark	Total Mark
7	$(2x-p)-2 = 3x^2 - x + 5p$ $3x^2 - 3x + 6p + 2 = 0$ $(-3)^2 - 4(3)(6p+2) > 0$ $9 - 72p - 24 > 0$ $P < -\frac{5}{24}$	1 1 1	**3**
8	$\frac{2^x}{2^2}\ 3^x = 4$ *OR* $(x-2)\log 2 + x\log 3 = \log 4$ $2^x 3^x = 16$ $(6)^x = 16$ $x \log_{10} 6 = \log_{10} 16$ *OR* $x(\lg 2 + \lg 3) = \lg 4 + 2\lg 2$ $x = 1.547$	1 1 1	**3**
9	$\log_9 2 = \frac{\log_3 2}{\log_3 9}$ or $\log_3 2 = \frac{\log_9 2}{\log_9 3}$ $\log_3 14 = \log_3 7 + \log_3 2$ $= m + 2n$	1 1 1	**3**
10	(*a*) $2m - 3 = 5$ $m = 4$	 1	**3**
	(*b*) $103 = 3 + (n-1)(5)$ $103 = 3 + 5n - 5$ $21 = n$	1 1	
11	$S_\infty = \frac{a}{1-r} = -8$, or $S_5 = \frac{a(1-r^5)}{1-r} = -\frac{31}{4}$ $-8(1-r^5) = -\frac{31}{4}$ $r^5 = \frac{1}{32} \rightarrow r = \frac{1}{2}$	1 1 1	**3**
12	(*a*) $\log_{10} y = \log_{10} p + 2k \log_{10} x$	1	**4**
	(*b*) $2k = \frac{6-2}{5-0}$ $k = \frac{2}{5}$ $\log_{10} p = 2 \rightarrow p = 100$	1 1 1	

Question	Solutions	Sub Mark	Total Mark
13	$A = \frac{1}{2}\begin{vmatrix} 4 & 1 & h & 4 \\ 0 & 5 & -1 & 0 \end{vmatrix} = 29$ $\frac{1}{2}\lvert(4)(5)+1(-1)+h(0)-0(1)-5(h)-(-1)4\rvert = 29$ $5h = 23 - 58$ *or* $5h = 23 + 58$ $h = -7$, $\frac{81}{5}$ → $h = -7$	1 1 1	**3**
14	$3 = \frac{3(0)+x}{1+3}$, $1 = \frac{3(-1)+y}{1+3}$ $B(12, 7)$	1, 1 1	**3**
15	 *Without arrow* (1 *mark*)	2	**2**
16	(*a*) $\underline{u}+\underline{v} = \begin{pmatrix}7\\1\end{pmatrix}+\begin{pmatrix}2\\-3\end{pmatrix}$ $= \begin{pmatrix}9\\-2\end{pmatrix}$ $\lvert\underline{u}+\underline{v}\rvert = \sqrt{9^2+(-2)^2}$ $= \sqrt{85} = 9.220$	1 1 1	**4**
	(*b*) $\frac{9\mathbf{i}-2\mathbf{j}}{\sqrt{85}}$	1	

Question	Solutions	Sub Mark	Total Mark
17	$\frac{dy}{dx} = 6x^2 - 12x = 0$ $6x(x-2) = 0$ $x = 0,\ x = 2$ $\frac{d^2y}{dx^2} = 12x - 12$ When $x = 0$, $\frac{d^2y}{dx^2} = -12 < 0$ $\rightarrow y$ max when $x = 0$	1 1 1	**3**
18	$\frac{dA}{dt} = 16\pi$, $r = 4$ $\quad$ A = πr^2 $\frac{dA}{dr} = 2\pi r$ $\frac{dA}{dt} = \frac{dA}{dr} \times \frac{dr}{dt}$ $16\pi = 2\pi r \times \frac{dr}{dt}$ $\frac{dr}{dt} = \frac{16\pi}{2\pi(4)} = 2\ \text{cm s}^{-1}$	 1 1 1	**3**
19	$\int_1^4 2g(x)\,dx + \int_k^4 10\,dx = 29$ $2(7) + 10x\Big\vert_k^4 = 29$ $10(4) - 10k = 15$ $k = 2.5$	1 1 1	**3**
20	$2\cos 2x - \cos x - 1 = 0$ $2(2\cos^2 x - 1) - \cos x - 1 = 0$ $4\cos^2 x - \cos x - 3 = 0$ $(4\cos x + 3)(\cos x - 1) = 0$ $\cos x = -\frac{3}{4}$, $\quad \cos x = 1$ $x = 0°, 138.59°, 221.41°, 360°$	 1 1 1 1	**4**

Question	Solutions	Sub Mark	Total Mark
21	$A_{ORS} = A_{OAB}$ $\frac{1}{2}(12)^2\theta = \frac{1}{2}(8)^2(\frac{\pi}{2})$ $\theta = 0.6982$ rad	1, 1 1	**3**
22	(*a*) 0, 1 , 2	1	**3**
	(*b*) $\sigma = \sqrt{\frac{0^2(1)+1^2(2)+2^2(3)+4^2(2)}{8} - (2)^2}$ $= 1.323$	1 1	
23	(*a*) ${}^6P_5 = 720$ ways	1,1	**4**
	(*b*) $4 \times (2! \times {}^4P_3)$ $= 192$	1 1	
24	(*a*) $\frac{1}{3} \times \frac{4}{5}$ $= \frac{4}{15}$	1	**3**
	(*b*) $\left(\frac{2}{3} \times \frac{4}{5}\right) + \left(\frac{1}{3} \times \frac{1}{5}\right) + \left(\frac{2}{3} \times \frac{1}{5}\right)$ *or* $1 - \frac{4}{15}$ $= \frac{11}{15}$	1 1	
25	(*a*) $P(X=6) = {}^{10}C_6 (0.85)^6 (0.15)^4$ $= 0.04010$	1 1	**4**
	(*b*) variance = $n\,p\,q$ $5.355 = n(0.85)(0.15)$ $n = 42$	1 1	

END OF MARK SCHEME

JABATAN PELAJARAN WILAYAH PERSEKUTUAN KUALA LUMPUR

PEPERIKSAAN PERCUBAAN

SIJIL PELAJARAN MALAYSIA 2009

PERATURAN PEMARKAHAN

MATEMATIK TAMBAHAN

Kertas 2

SECTION A

Question	Solution	Sub Mark	Full Mark
1.	$x = 5 - 2y$ $3(5-2y)^2 + y(5-2y) = 1$ $10y^2 - 55y + 74 = 0$ $y = \dfrac{-(-55) \pm \sqrt{(-55)^2 - 4(10)(74)}}{2(10)}$ $y = 3.153,\quad 2.347$ $x = -1.306,\quad 0.306$ $y = \dfrac{5-x}{2}$ …… $3x^2 + x\left(\dfrac{5-x}{2}\right) = 1$ …….. $5x^2 + 5x - 2 = 0$ $x = \dfrac{-5 \pm \sqrt{5^2 - 4(5)(-2)}}{2(5)}$ $x = 0.306\ ,\ -1.306$..... $y = 2.347\ ,\ 3.153$.....	1 1 1 1 1 1	5
2.	(a) $\dfrac{2(5.5)+5(15.5)+11(25.5)+h(35.5)+6(45.5)}{2+5+11+h+6} = 30.25$ ..... $h = 16$ ..... (b) $\sum fx^2 = 2(5.5^2)+5(15.5^2)+11(25.5^2)+16(35.5^2)+6(45.5^2)$ ..... $\sigma = \sqrt{\dfrac{41000}{40} - 30.25^2}$ ..... $= 10.485$ ..... (c) 10.485	1, 1 1 1 1 1 1	7
3.	*(a)* P(-8, 0) **and** Q(0, 4) …… S(-4, 2) …… *(b)* Area of OQSR $= \dfrac{1}{2}\begin{vmatrix} 0 & 0 & -4 & -2 & 0 \\ 0 & 4 & 2 & 0 & 0 \end{vmatrix}$ $= \dfrac{1}{2}\lvert(0+0+0+0)-(0-16-4+0)\rvert$ …….. $= 10$ …… (c) $\dfrac{3(-2)+2x}{5} = -4,\quad or\quad \dfrac{3(0)+2y}{5} = 2$ …… T =(-7, 5) ……	1 1 1 1 1 1	6

4.	(a) List of perimeters ; $4x$, $8x$, $16x$, $\frac{T_2}{T_1} = \frac{T_3}{T_2} = 2$ …… This is Geometric Progression and $r = 2$ …….. (b) $10240 = 4x(2)^9$ ..... $x = 5$..... (c) List of numbers of squares: 1, 4, 16, Find $S_4 = \frac{1(4^4-1)}{4-1}$ *or* $S_5 = \frac{1(4^5-1)}{4-1}$ *or* $S_{10} = \frac{1(4^{10}-1)}{4-1}$ ..... $S_{10} - S_4 = \left(\frac{4^{10}-1}{4-1}\right) - \left(\frac{4^4-1}{4-1}\right)$ ..... $= 349440$.....	1 1 1 1 1 1 1	7
5.	(i) $\frac{dy}{dx} = 8x - 3$ …….. $8x - 3 = 13$..... $x = 2$ $A(2, 5)$ …… (ii) $13(5) + 2 = k$ …… $k = 67$ …….. (iii) $y - 5 = 13(x - 2)$ *or* $c = -21$ …….. $y = 13x - 21$ …….	1 1 1 1 1 1 1	7
6.	(a) $\cos 2x = 1 - 2\sin^2 x$ *or* $\cos 2x = 2\cos^2 x - 1$ …….. $\frac{-2\sin^2 x}{2\cos^2 x}$ *or* $\frac{-\sin^2 x}{\cos^2 x}$ } and …….. $= -\tan^2 x$	1 1	

SECTION B			
Question	*Solution*	*Sub Mark*	*Full Mark*
8.			
	(a) (i) $\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$ or …….	1	
	$= -8\underline{y} + 4\underline{x}$ ……	1	
	(ii) $\overrightarrow{BC} = \overrightarrow{BD} + \overrightarrow{DC}$		
	$= -8\underline{y} + 4\underline{x} + 4\underline{y}$		
	$= -4\underline{y} + 4\underline{x}$ ……	1	3
	(*b*) (i) $\overrightarrow{AP} = \overrightarrow{AK} + \overrightarrow{KP}$		
	$= \frac{1}{3}\overrightarrow{AB} + n\overrightarrow{AD}$ ……	1	
	$= \frac{8}{3}\underline{y} + 4n\underline{x}$ ……	1	
	(ii) Let $\overrightarrow{AP} = m\overrightarrow{AC}$		
	$\frac{8}{3}\underline{y} + 4n\underline{x} = m(\overrightarrow{AB} + \overrightarrow{BC})$ *OR* $m(\vec{AD} + \vec{DC})$ ……	1	
	$= m\left(4\underline{y} + 4\underline{x}\right)$ ……	1	
	Then $4m = \frac{8}{3}$ *and* $4m = 4n$ ……	1	7
	$m = \frac{2}{3}$ *and* $n = \frac{2}{3}$ ……	1,1	**10**
9.			
	(a) $\angle KML = 2\sin^{-1}\left(\frac{5}{8}\right)$ ……	1	
	$\angle KML = 2(0.6751)$		
	$= 1.3503$ rad ……	1	2
	(b) Arc $LAK = 8(\angle KML)$ ……	1	
	$= 10.8024$ cm		
	Arc $KBL = 5(\pi)$ ……	1	
	Perimeter $= 10.8 + 5\pi$		
	$= 26.51$ cm ……	1	3

	(c) Find area of segment LOKA $=\frac{1}{2}(8)^2\,(1.3503-\sin 1.3503)$ ……..…….....….	1, 1	
	$=11.9844\,\text{cm}^2$ or Area of sector *MKAL* - Area Δ *KML* $=\frac{1}{2}(8)^2(1.3503) - \frac{1}{2}(10)(\sqrt{8^2-5^2}$ ……..……..... $= 43.21\ \text{cm}^2 - 31.225\ \text{cm}^2$ $= 11.985\ \text{cm}^2$	1, 1	
	Area of semicircle $KBLO = \frac{1}{2}(5^2)(\pi)$ ……..…….....….	1	
	$= 39.27\ \text{cm}^2$		5
	Area of shaded region = (area of semicircle) – (area of segment) $= 27.29\ \text{cm}^2$ ……	1 1	**10**
10.	*(a)* $x(3x-5)=0$ …… $Q\left(\frac{5}{3},\frac{4}{9}\right)$ ……	1 1	2
	(b) $\frac{1}{2}\left(1+\frac{4}{9}\right)\left(\frac{5}{3}\right) - \int_0^{\frac{5}{3}}(x-1)^2\,dx$ ……..……..... OR $\int_0^{\frac{5}{3}}\left(-\frac{x}{3}+1\right) - (x^2-2x+1)dx$ ……..……..... $=\int_0^{\frac{5}{3}}\left(-x^2+\frac{5}{3}x\right)dx$	1, 1 1, 1	
	$=\left[-\frac{x^3}{3}+\frac{5}{6}x^2\right]_0^{\frac{5}{3}}$ ……..…….....….	1	
	$=-\frac{\left(\frac{5}{3}\right)^3}{3}+\frac{5\left(\frac{5}{3}\right)^2}{6}$ ……..…….....….	1	
	$=\frac{125}{162}$ / 0.7716 ……..…….....….	1	5

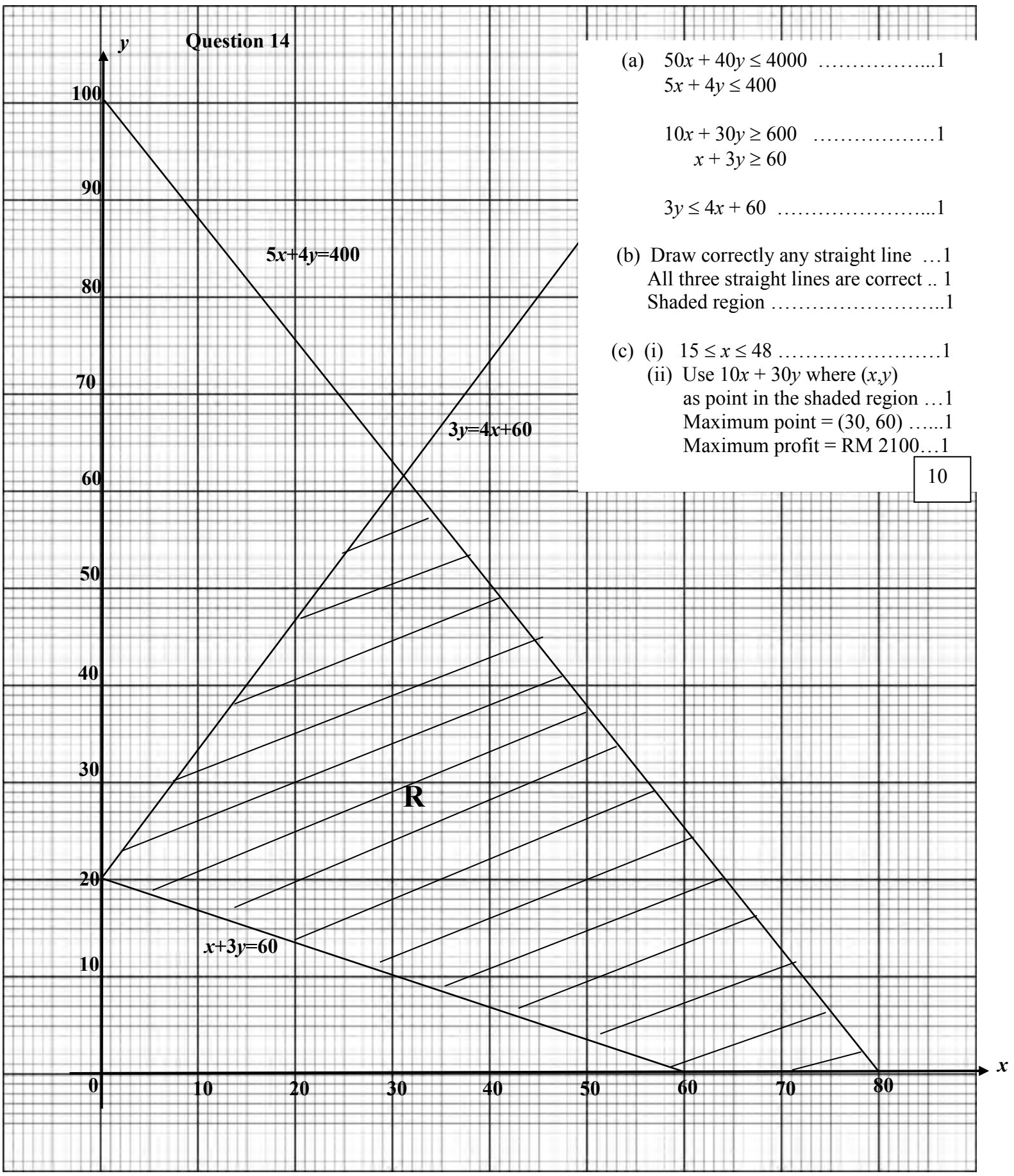
	(c) $V = \pi\int_0^1 (x-1)^4\,dx$ ……..……..……	1	
	$V = \pi\left[\frac{(x-1)^5}{5}\right]_0^1$ ……..……..……	1	3
	$=\frac{1}{5}\pi$ ……..……..……..……	1	**10**
11.	(a) (i) h = 52 ……	1	
	(ii) $\frac{k-52}{5} = 1.2$ ……..……..……..……	1	
	$k = 58$ ……..……..……..……	1	3
	(b) $P(\frac{48-52}{5} \le z \le 1.2)$ } or …….....……	1	
	$= P(-0.8 \le z \le 1.2)$ }		2
	$= 0.6731$ ……..……..……..……	1	
	(c) (i) $P(X \le 56)$		
	$= P(z \le 0.8)$		
	$= 0.7881$ ……..……..……..……	1	
	No of students = 200 (0.7881)		
	= 158 …….....……	1	
	(ii) $P(X \ge m) = 0.05$		
	$\frac{m-52}{5} = 1.645$ …….....……	1,1	
	$m = 60.225$		5
	$m = 60$ / 61 …….....……	1	
			10

	SECTION C		
12.	(a) $a = \frac{dv}{dt} = -10 + 6t$		
	$-10 + 6t = 0$	1	
	$t = \frac{5}{3}$		
	Then $v = 8 - 10\left(\frac{5}{3}\right) + 3\left(\frac{5}{3}\right)^2$	1	
	$v = -\frac{1}{3}$	1	3

	(b) When $v = 0$, $8 - 10t + 3t^2 = 0$ …… $(3t - 4)(t - 2) = 0$ $t = 2 \quad or \quad \frac{4}{3}$ ……	1 1	2
	(c) $s = \int v\,dt = 8t - 5t^2 + t^3$ …….. When t=2, $s = 8(2) - 5(2)^2 + (2)^3$ $= 4m.$	1 1	2
	(d) *When* $t = 4, s = 8(4) - 5(4)^2 + (4)^3$ $s = 16m$ *When* $t = \frac{4}{3}, s = 8\left(\frac{4}{3}\right) - 5\left(\frac{4}{3}\right)^2 + \left(\frac{4}{3}\right)^3$ } Either one $s = \frac{112}{27} // 4.148m$ $Total\ dis\tan ce = 4.148 + (4.148 - 4) + 16 - 4$ ..... $= 16.296m // 16.3 // \frac{440}{27}$	 1 1 1	3 **10**
13.	(a) $\frac{AC}{\sin 68.36} = \frac{6.66}{\sin 66.13}$ …… $AC = 6.770\,cm$ …… $AB = \frac{3}{2} \times AC = \frac{3}{2} \times 6.770 = 10.155\,cm$ $CB = \frac{1}{2} \times 6.770 = 3.385\ cm$ $CB = \frac{1}{3} \times 10.155 = 3.385\ cm$ } OR……	1 1 1,1	4
	(b) $\angle BAD = 45.51^o$ or $\angle BCD = 113.87^0$ …… $\frac{CD}{\sin 45.51} = \frac{6.66}{\sin 66.13} \quad \therefore \quad CD = 5.1955\,cm$ …… $BD^2 = 3.385^2 + 5.1955^2 - 2(3.385)(5.1955)\cos 113.87$ ….. $BD = 7.2584\,cm$ ……	1 1 1 1	4
	(c) Area $= \frac{1}{2}(6.66)(10.155)\sin 45.51$ …….. $= 24.124\ cm^2$ ……	1 1	2 **10**

15	(a) (i) Price $A = \frac{100}{140} \times 56 = RM\,40$	1, 1	
	$\frac{I_{08}}{I_{00}} = \frac{I_{08}}{I_{03}} \times \frac{I_{03}}{I_{00}}$		
	(ii) $I_{08} = \frac{110}{100} \times \frac{105}{100} \times 100$	1	
	$= 115.5$	1	4
	(b) (i) $x = 30$	1	
	(ii) $123 = \frac{(140 \times 35) + (110 \times 25) + (120 \times 30) + (10y)}{100}$	1,1	
	$y = 105$	1	
	(iii) Price of toy = $\frac{123}{100} \times 252$	1	6
	$= 309.96$	1	
			10

Question 14



(a) $50x + 40y \leq 4000$ ……...1
$5x + 4y \leq 400$

$10x + 30y \geq 600$ ……1
$x + 3y \geq 60$

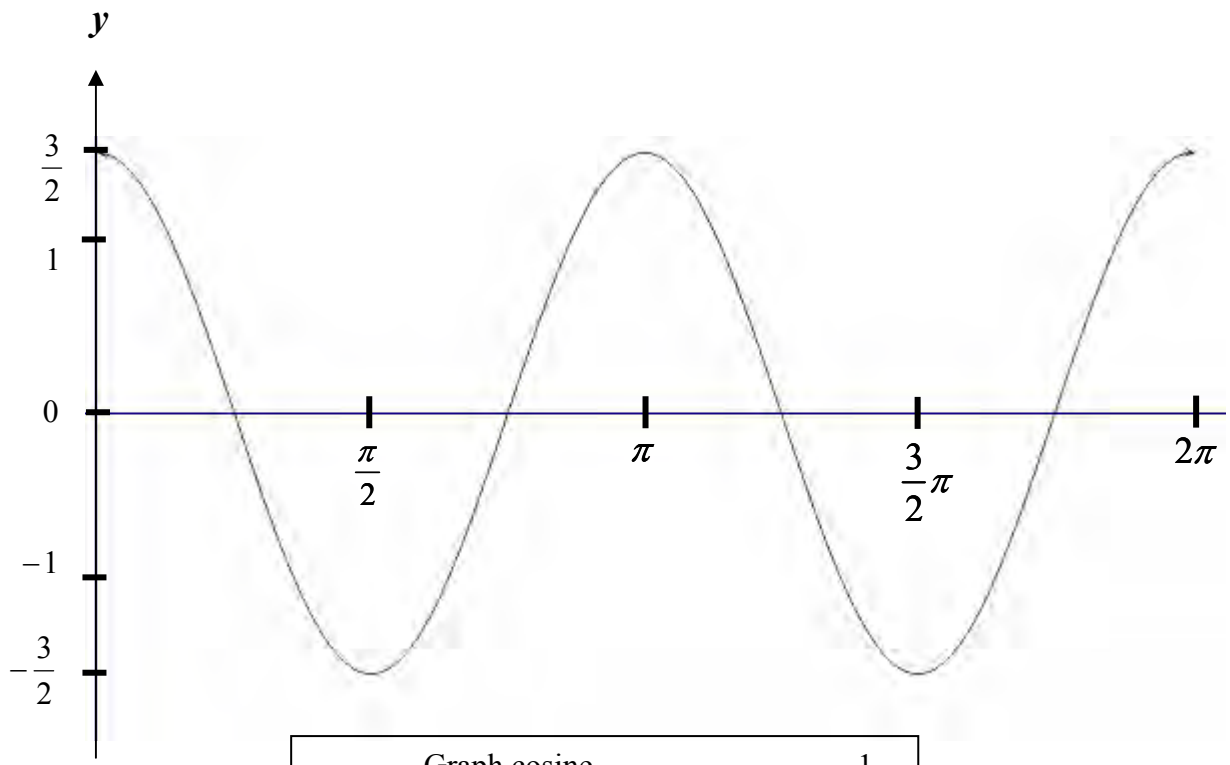
$3y \leq 4x + 60$ ……...1

(b) Draw correctly any straight line …1
All three straight lines are correct .. 1
Shaded region ……..1

(c) (i) $15 \leq x \leq 48$ ……1
(ii) Use $10x + 30y$ where (x,y)
as point in the shaded region …1
Maximum point = (30, 60) …...1
Maximum profit = RM 2100…1

10

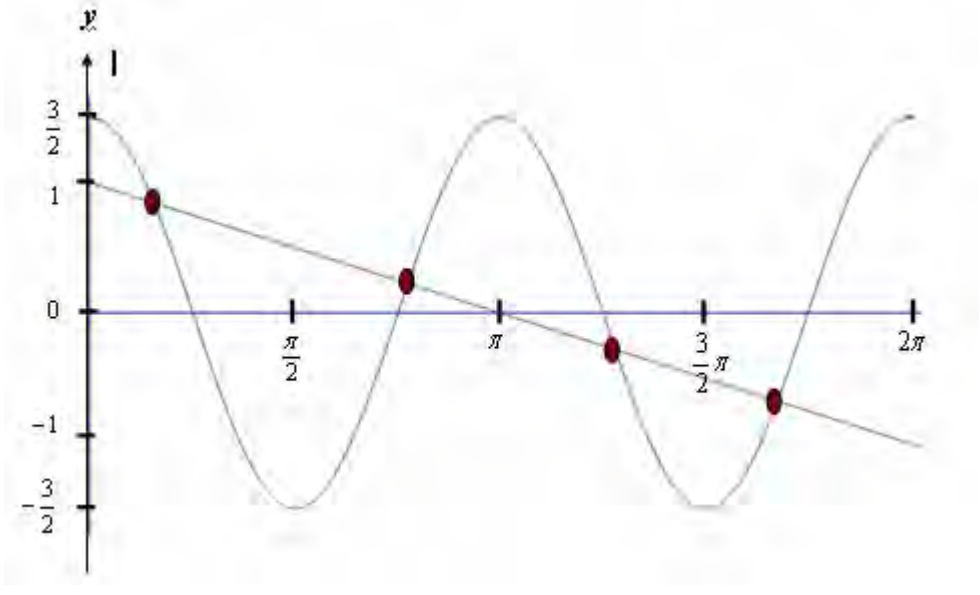
Question 6(b)



Graph cosine……1
2 cycle between 0 to 2π……1
Maximum and minimum values….1

$\frac{3}{2}\cos 2x + \frac{x}{\pi} = 1$

$\frac{3}{2}\cos 2x = 1 - \frac{x}{\pi}$



The equation of straight line is $y = 1 - \frac{x}{\pi}$ ……...1

Draw the straight line, correct gradient or passing through y-intercept at 1, x-intercept at π ……1

No of solutions = 4……..1

Question 7

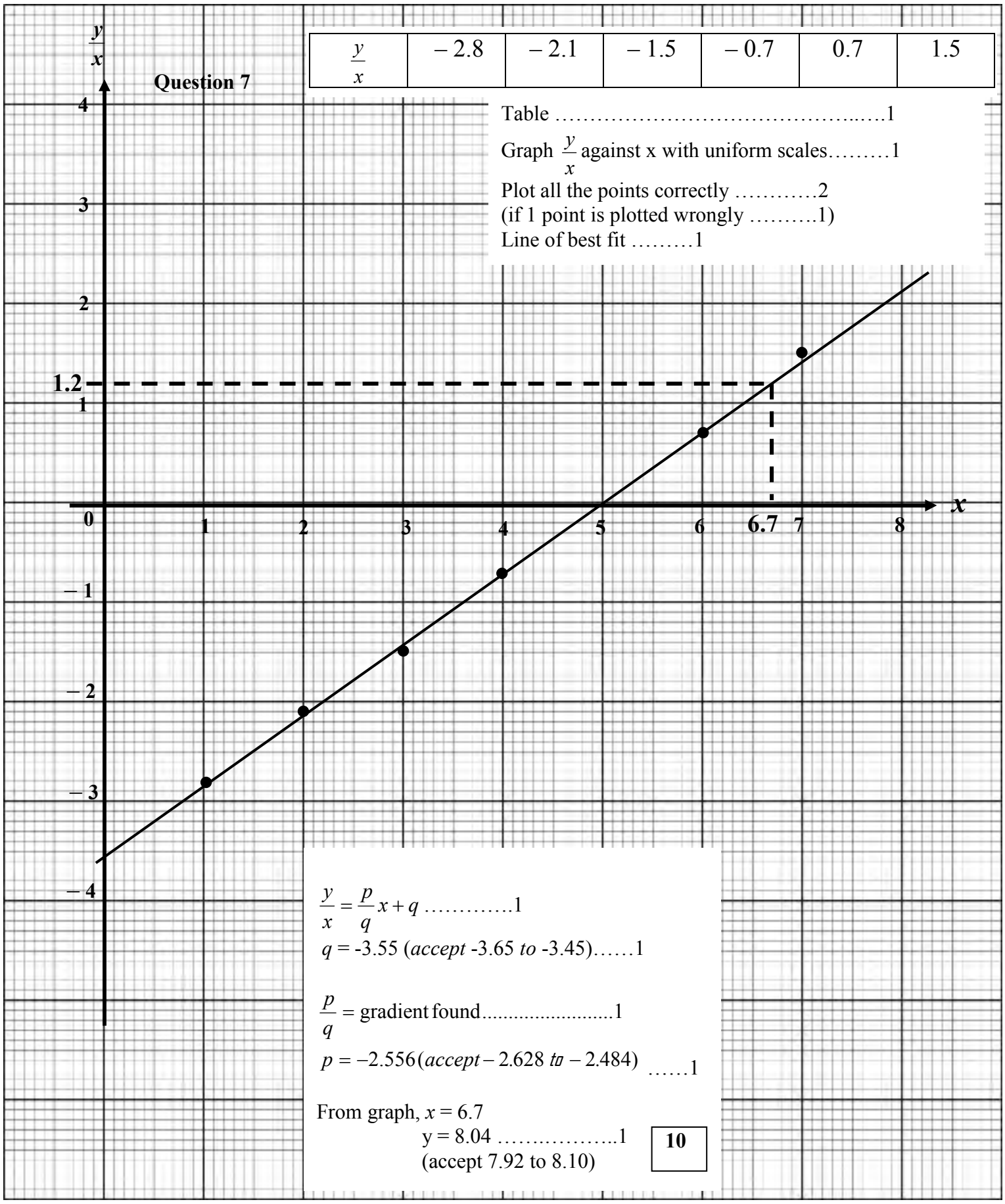
$\frac{y}{x}$	– 2.8	– 2.1	– 1.5	– 0.7	0.7	1.5

Table ……..….1

Graph $\frac{y}{x}$ against x with uniform scales……1

Plot all the points correctly ……2
(if 1 point is plotted wrongly …….1)

Line of best fit ……1



$\frac{y}{x} = \frac{p}{q}x + q$ ……1

q = -3.55 (*accept* -3.65 *to* -3.45)……1

$\frac{p}{q}$ = gradient found.....1

$p = -2.556$ (*accept* – 2.628 *to* – 2.484) ……1

From graph, x = 6.7

y = 8.04 ……..……..1
(accept 7.92 to 8.10)

10

