1449/2
Mathematics
Paper 2
September
2008

NAME :……..

FORM: ……

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA

SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2008

MATHEMATICS

Paper 2

Two hours and thirty minutes

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *This question paper consist two section:* **Section A** *and* **Section B**
   Kertas soalan ini mengandungi dua bahagian : ***Bahagian A dan Bahagian B***
2. *Answer all question in* **Section A** *and* ***four*** *questions from* **Section B.**
2. *This question paper is bilingual.*
3. *Write your answers in the spaces provided in the question paper.*
4. *Working step must be written clearly.*
5. *Diagram given is not according to scale unless stated.*
6. *Marks for each question are given in bracket.*
7. *A list of formulae is given in pages 2 and 3.*
8. *Non programmable scientific calculator is allowed.*
9. *This question paper must be hand up at the end of the exam.*

Section	Question	Full mark	Marks obtained
A	1	3	
	2	4	
	3	4	
	4	3	
	5	5	
	6	5	
	7	6	
	8	5	
	9	6	
	10	7	
	11	4	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
Total			

This question paper consists of 28 printed pages.

MATHEMATICAL FORMULAE

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

RELATIONS

1 $a^m \times a^n = a^{m+n}$

2 $a^m \div a^n = a^{m-n}$

3 $(a^m)^n = a^{mn}$

4 $A^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

5 $P(A) = \frac{n(A)}{n(S)}$

6 $P(A') = 1 - P(A)$

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

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

9 Average speed $= \frac{\text{distance travelled}}{\text{time taken}}$

10 Mean $= \frac{\text{sum of data}}{\text{number of data}}$

11 Mean $= \frac{\text{sum of(class mark} \times \text{frequency)}}{\text{sum of frequencies}}$

12 Pythagoras Theorem
$c^2 = a^2 + b^2$

13 $m = \frac{y_2 - y_1}{x_2 - x_1}$

14 $m = -\frac{y - \text{int ercept}}{x - \text{int ercept}}$

[Lihat sebelah
SULIT

SHAPES AND SPACE

1 Area of trapezium $= \frac{1}{2} \times$ sum of parallel sides $\times$ height

2 Circumference of circle $= \pi d = 2\pi r$

3 Area of circle $= \pi r^2$

4 Curved surface area of cylinder $= 2\pi rh$

5 Surface area of sphere $= 4\pi r^2$

6 Volume of right prism = cross sectional area $\times$ length

7 Volume of cylinder $= \pi j^2 h$

8 Volume of cone $= \frac{1}{3}\pi r^2 h$

9 Volume of sphere $= \frac{4}{3}\pi r^3$

10 Volume of right pyramid $= \frac{1}{3}\times$ base area $\times$ height

11 Sum of interior angles of a polygon $= (n - 2) \times 180^o$

12 $$\frac{\text{arc length}}{\text{circumference of circle}} = \frac{\text{angle subtended at center}}{360^o}$$

13 $$\frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{angle subtended at centre}}{360^o}$$

14 Scale factor, k $= \frac{PA'}{PA}$

15 Area of image $= k^2 \times$ area of object

Section A

[52 *marks*]

Answer **all** *questions in this section.*

1 The Venn diagram in the answer space shows sets P, Q and R. Given the universal set $\xi = P \cup Q \cup R$.

Gambar rajah Venn di ruang jawapan menunjukkan set P, Q dan R. Diberi set semesta $\xi = P \cup Q \cup R$.

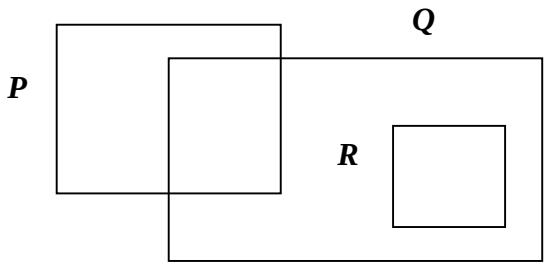
On the diagram provided in the answer spaces, shade
Pada rajah di ruang jawapan, lorekkan

(a) the set $(Q \cup R)' \cap P$,
b) the set $Q \cap (P \cup R)$.

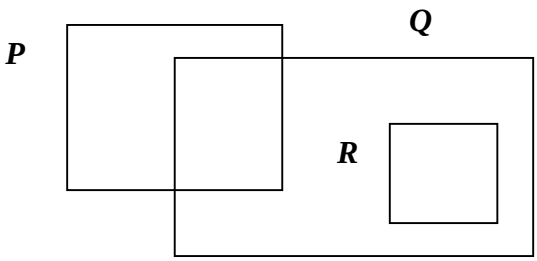
[3 *marks*]

Answer :

a)



(b)



2 Calculate the value of x and the value of y that satisfy the following simultaneous linear equations

Hitung nilai x dan nilai y yang memuaskan persamaan linear serentak berikut

$$2x + 3y = 9$$
$$\frac{1}{3}x - y = 2$$

[4 *marks*]

Answer :

---

3 Using factorization, solve the following quadratic equation :

Dengan menggunakan pemfaktoran, Selesaikan persamaan kuadratik berikut:

$$p^2 = \frac{1}{2}(3 - 5p)$$

[4 *marks*]

4 Diagram 1 shows a right prism. The base *ABCD* is a horizontal rectangle. Right- angled triangle *FAB* is the uniform cross-section of the prism. The rectangular surface *BCEF* is an inclined plane.

Rajah 1 menunjukkan sebuah prisma tegak. Tapak segiempat tepat ABCD adalah mengufuk. Segitiga FAB adalah keratan rentas seragam prisma itu. Segiempat tepat BCEF ialah satah condong.

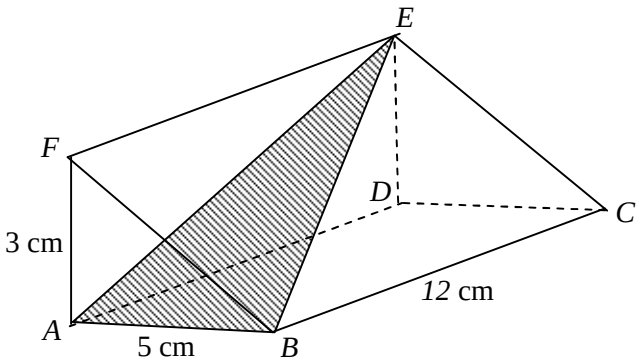


Diagram 1

Identify and calculate the angle between the plane *ABE* and the plane *ABCD*.
Kenalpasti dan hitung sudut di antara satah ABE dengan satah ABCD

[3 *marks*]

Answer :

5 In Diagram 2, *O* is the origin. The gradient of the straight line *MN* is $\frac{2}{3}$ .Given that straight line *PQ* is parallel to straight line *MN*

Dalam Rajah 2, O ialah asalan. Kecerunan garis lurus MN ialah $\frac{2}{3}$ *. Diberi bahawa garislurus PQ adalah selari dengan garis lurus MN*

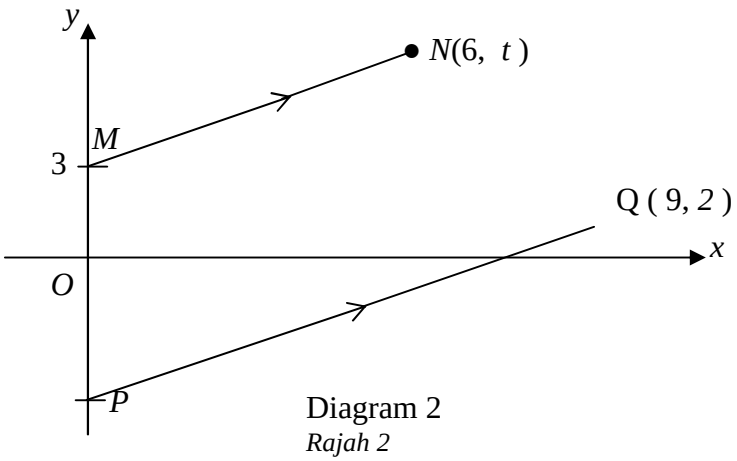


Diagram 2
Rajah 2

Find
Cari

(a) the value of *t*
nilai t

(b) the equation of straight line *PQ*
persamaan bagi garis lurus PQ

(c) the *y*-intercept of the straight line *PQ*.
pintasan-y bagi garis lurus PQ

[5 *marks*]

Answer :

(a)

(b)

(c)

6 Diagram 3 shows a circle *PQR* with center *O* and three semicircles .
Given that $\angle POQ = \angle QOR = \angle ROP$ and $OP = OQ = OR = 28$ cm .

Rajah 3 menunjukkan sebuah bulatan berpusat di O dan tiga buah separuh bulatan.
Diberi bahawa $\angle POQ = \angle QOR = \angle ROP$ *and* $OP = OQ = OR = 28$ *cm* .

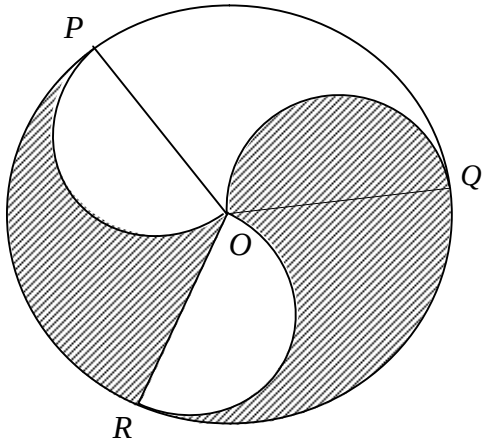


Diagram 3

Using $\pi = \frac{22}{7}$, calculate

Dengan menggunakan $\pi = \frac{22}{7}$, *hitung*

(a) the length of arc *PQR*
panjang lengkok PQR

(b) the area of the shaded regions
luas kawasan berlorek

[5 *marks*]

Answer :

(a)

(b)

7 (a) Combine the following statements using "and " or "or" to form a **true** compound statement.

Statement 1 : A regular hexagon has six equal sides.
Statement 2 : $\sqrt[3]{100} = 10$.

*Gabungkan pernyataan-pernyataan berikut dengan menggunakan "dan" atau "atau' untuk membentuk satu pernyataan baru yang **benar**.*

Pernyataan 1 : Sebuah heksagon sekata mempunyai enam sisi yang sama panjang.
Pernyataan 2 : $\sqrt[3]{100} = 10$.

(b) Write down the conclusion to complete the following argument.

Premise 1 : If m is a negative number, then $-2m$ is a positive number.
Premise 2 : $-2m$ is not a positive number.

Conclusion : …..……

Tulis Kesimpulan untuk melengkapkan hujah berikut :
Premis 1 : Jika m ialah nombor negatif, maka –2m ialah nombor positif.
Premis 2 : –2m bukan nombor positif.

Kesimpulan : ……

(c) State the **converse** of the following statement and hence determine whether the converse is true or false.

If $x < 5$, then $x < 7$.

*Nyatakan **akas** bagi pernyataan berikut dan nyatakan sama ada akas itu adalah benar atau palsu.*

Jika. $x < 5$, maka $x < 7$

(d) Write down two implications based on the following statements :
"$L \subset K$ if and only if $L \cap K = L$."

Tulis dua implikasi berdasarkan pernyataan berikut :
"$L \subset K$ jika dan hanya jika $L \cap K = L$."

[6 *marks*]

Answer :

(a) ……..

……..

(b) Conclusion / Kesimpulan :

……..

(c) ……..

……..

(d) Implication 1 / Implikasi 1 :

……..

Implication 2 / Implikasi 2 :

……..

8 Table 1 shows the probability of SMK Dato Onn winning a game in district tournament .

Jadual 1 menunjukkan kebarangkalian SMK Dato Onn.memenangi pertandingan di peringkat kawasan dalam beberapa pertandingan .

Players	Games		
	Volleyball	Hockey	Softball
Girls	$\frac{3}{10}$	$\frac{1}{5}$	$\frac{1}{2}$
Boys	$\frac{5}{12}$	$\frac{1}{3}$	$\frac{1}{4}$

Table 1

Find the probability that
Cari kebarangkalian bahawa

a) both boys and girls win the hockey game.
kedua – dua murid lelaki dan perempuan memenangi hoki

b) both boys and girls win the same game.
kedua – dua murid lelaki dan perempuan memenangi permainan yang sama

[5 *marks*]

Answer :

(a)

(b)

9 (a) Find the inverse matrix of $\begin{pmatrix} 1 & -2 \\ 5 & -8 \end{pmatrix}$.

Carikan matriks songsang bagi matriks $\begin{pmatrix} 1 & -2 \\ 5 & -8 \end{pmatrix}$.

(b) Using matrices, calculate the value of k and the value of m which satisfy the following simultaneous linear equations :

Menggunakan kaedah matriks, hitung nilai k dan nilai m yang memuaskan persamaan linear serentak berikut :

$$k - 2m = 1$$
$$5k - 8m = 11$$

[6 *marks*]

Answer :

(a)

(b)

10 Diagram 4 shows the speed-time graph of the movement of a particle for a period of 35 seconds.
Rajah 4 menunjukkan graf laju – masa pergerakkan sebuah zarah dalam masa 35 saat.

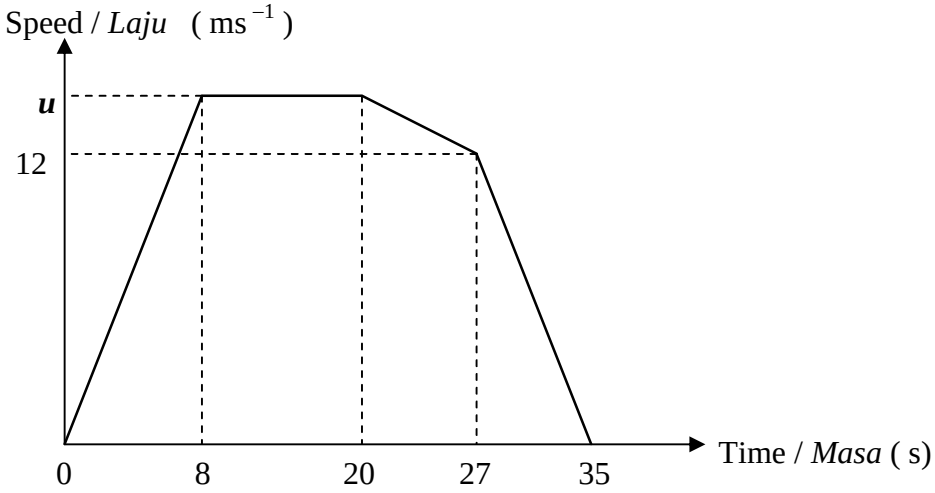


Diagram 4

Given the distance travelled in the first eight seconds is 72 meter.
Diberi jarak yang dilalui dalam 8 saat pertama ialah 72 meter .

Calculate
Hitung

(a) the value of u
nilai u

(b) the rate of change in speed , in ms^{-2} , of the particle in the last eight seconds.
kadar perubahan laju, dalam ms^{-2} , zarah itu dalam masa lapan saat terakhir

(c) the average speed , in ms^{-1} , of the particle for the whole journey.
laju purata, dalam ms^{-1},seluruh pergerakkan zarah itu

[7 *marks*]

Answer :

(a)

(b)

(c)

11 Diagram 5 shows a solid hemisphere with a radius of 8 cm. A cone with a radius of 6 cm is taken out from the solid.

Rajah 5 menunjukkan sebuah pepejal berbentuk hemisfera yang berjejari 8 cm. Sebuah kon yang berjejari 6 cm dikeluarkan daripada pepejal itu.

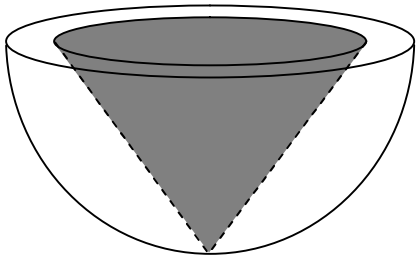


Diagram 5

Calculate the volume, in cm^3, of the remaining solid. (Use $\pi = 3.142$).
Hitungkan isipadu, dalam cm^3, pepejal yang tinggal. (Gunakan $\pi = 3.142$).

[4 *marks*]

Answer :

Section B

[48 *marks*]

Answer any **four** questions from this section.

*Jawab mana-mana **empat** soalan daripada bahagian ini.*

12 (a) Complete Table 2 in the answer space for the equation $y = -\frac{5}{x}$ by writing down the values of y when $x = -2$, $x = 0.5$ and $x = 2.5$.

Lengkapkan Jadual 2 pada ruang jawapan untuk nilai y bagi $y = -\frac{5}{x}$ *dengan menulis nilai – nilai y apabila* $x = -2$, $x = 0.5$ dan $x = 2.5$

x	-4	-2.5	-2	-1	0.5	1	2	2.5	4
y	1.25	2		5		-5	-2.5		-1.25

Table 2

[3 *marks*]

(b) *For this part of question, use the graph paper provided on page 18 . You may use a flexible curve rule.*
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan pada halaman 18 .Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 1 unit on the x – axis and 2 cm to 2 unit on y –axis, draw the graph the graph of $y = -\frac{5}{x}$. for $-4 \le x \le 4$.

D*engan menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2 cm kepada 2 unit pada paksi-y, lukiskan graf* $y = -\frac{5}{x}$ *bagi nilai x dalam julat* $-4 \le x \le 4$.

[4 *marks*]

(c) From your graph, find
Dari graf anda, carikan

(i) the value of y when $x = -1.8$
nilai y apabila $x = -1.8$

(ii) the value of x when $y = 1.5$
nilai x apabila $y = 1.5$

[2 *marks*]

(d) Draw suitable straight line on your graph to find values of x which satisfies the equation $x^2 - 5 = 0$ for $-4 \le x \le 4$.
State the values of x.
Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari satu nilai x yang memuaskan persamaan $x^2 - 5 = 0$ *bagi* $-4 \le x \le 4$.
Nyatakan nilai-nilai x itu.

[3 *marks*]

Answer :

(a)

x	– 4	–2.5	–2	–1	0.5	1	2	2.5	4
y	1.25	2		5		–5	–2.5		–1.25

Table 2

(b) Refer graph on page 18.
Rujuk graf pada halaman 18.

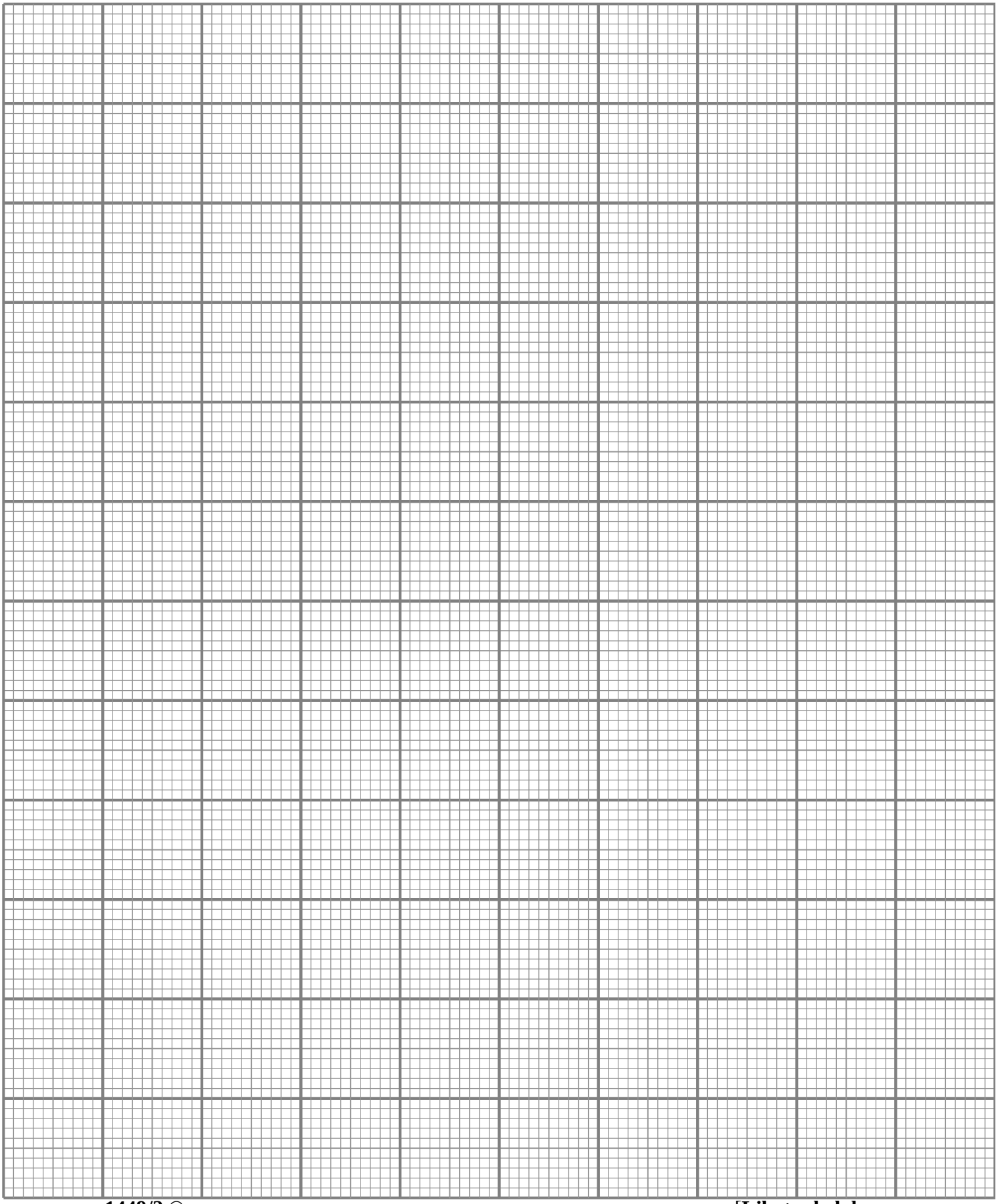
(c) (i) $y =$ …….

(i) $x =$ ……..

(d)

$x =$ …….
$x =$ …….

Graph For Question 12
Graf untuk soalan 12



13 (a) Diagram 6 (i) shows a solid consisting of two prisms which are joined at the plane *BCMJ*. Its base consists of rectangles *ABCD* and *BCLK* which are on a horizontal plane. *AF*, *BG*, *CH* and *DE* are vertical edges. *JKLM* is an inclined plane.
Given that *AB* = *EH* = 6 cm, *EF* = *JM*=*KL* = 8 cm, *BK* = 3 cm and *HM* = 4 cm.

Rajah 6 (i) menunjukkan sebuah pepejal yang terdiri daripada dua buah prisma yang dicantum pada satah BCMJ. Tapaknya terdiri daripada segiempat tepat ABCD dan BCLK yang terletak di atas permukaan mengufuk. AF, BG, CH dan DE adalah sisi- sisi mencancang. JKLM adalah satah condong.
Diberi bahawa AB = EH = 6 cm, EF = JM=KL = 8 cm, BK = 3 cm dan HM = 4 cm.

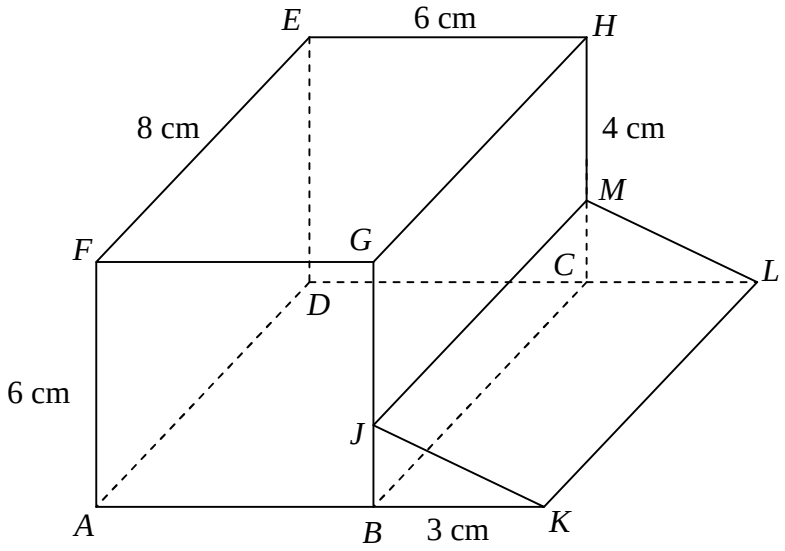


Diagram 6(i)

Draw to full scale the plan of the solid.
Lukis dengan skala penuh pelan pepejal itu.

[3 *marks*]

Answer :
(a)

(b) A cuboid is removed from the solid in Diagram 6 (i). The remaining solid is as shown in Diagram 6(ii). Rectangle *FPQR* is a horizontal plane.
RS = *ES* = 2 cm and *ST* = 3 cm.
Sebuah kuboid dikeluarkan dari pepejal dari Rajah 6(i). Pepejal yang tinggal adalah seperti dalam Rajah 6(ii). Segiempat FPQR ialah satah mengufuk. RS = ES = 2 cm dan ST = 3 cm

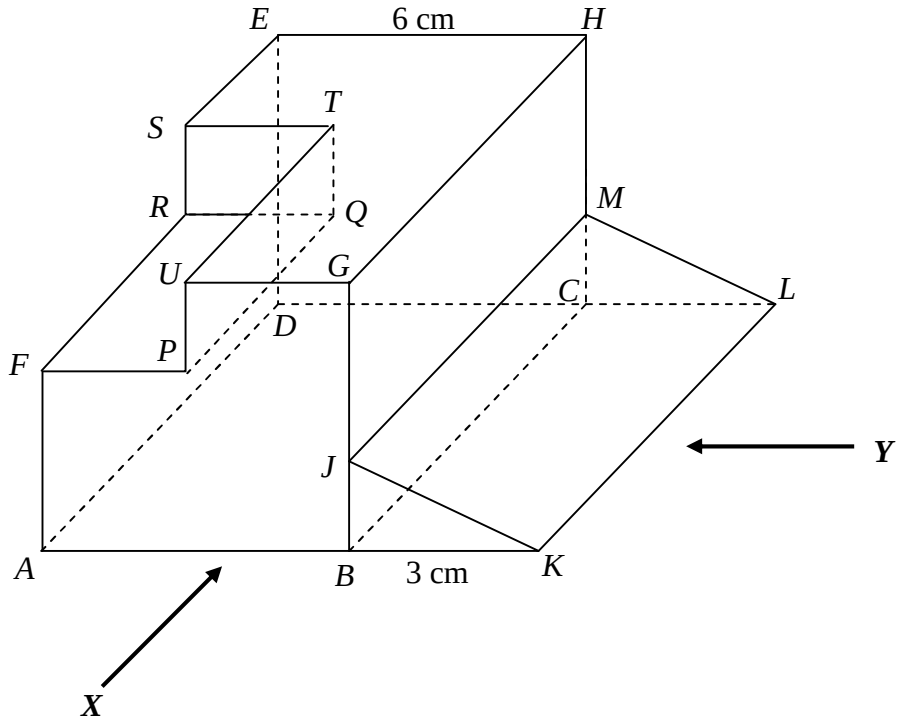


Diagram 6 (ii)

Draw to full scale,
Lukis dengan skala penuh,

(i) the elevation of the remaining solid on a vertical plane parallel to *AB* as viewed from *X*.
dongakan pepejal yang tinggal itu pada satah mencancang yang selari dengan AB sebagaimana dilihat dari X.

[4 *marks*]

(ii) the elevation of the remaining solid on a vertical plane parallel to *KL* as viewed from *Y*.
dongakan pepejal yang tinggal itu pada satah mencancang yang selari dengan *KL* sebagaimana dilihat dari *Y*.

[5 *marks*]

Answer :

(b) (i), (ii)

14 P (45 ^{0} N , 120 ^{0} W) , Q (45 ^{0} N , 15 ^{0} W) , F and H are four points on the surface of the earth and PF is the diameter of the earth .

P (45 ^{0} U , 120 ^{0} B) , Q (45 ^{0} U , 15 ^{0} B) , F dan H adalah empat titik pada permukaan bumi dan PF ialah diameter bumi .

(a) State the longitude of F.
Nyatakan longitude bagi F.

[2 *marks*]

(b) Calculate the distance , in nautical miles , of PQ measured along the common parallel of latitude .
Hitung jarak PQ dalam batu nautika diukur disepanjang selarian latitud sepunya .

[4 *marks*]

(c) Given that H is situated 4200 nautical miles due south of P . Find the latitude of H.
Diberi H terletak 4200 batu nautika kearah selatan P . Cari latitud H.

[3 *marks*]

(d) An aeroplane took off from H and flew to F via the South Pole with an average speed of 900 knots . Calculate the shortest time taken for the flight .
Sebuah kapal terbang berlepas dari H dan terbang ke arah F melalui Kutub Selatan dengan purata laju 900 knot . Hitung masa terpantas yang diambil oleh kapal terbang itu.

[3 *marks*]

Answer :

(a)

(b)

(c)

(d)

15 (a) Transformation *P* is a reflection in the straight line $y = -2$.

Transformation *T* is a translation $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$.

Penjelmaan P ialah satu pantulan pada garis lurus $y = -2$,

Penjelmaan T ialah satu translasi $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$

State the coordinates of the image of point (4, 3) under each of the following transformations:

Nyatakan koordinat imej bagi titik (4, 3) dibawah penjelmaan yang berikut.

(i) *T*,

(ii) *P*,

(iii) *TP*.

[4 *marks*]

(b) Diagram 7 shows a triangle *EFG*, *HJK* and *LMN* drawn on a Cartesian plane.

Rajah 7 menunjukkan segitiga EFG, HJK dan LMN yang dilukis pada satah Cartesan.

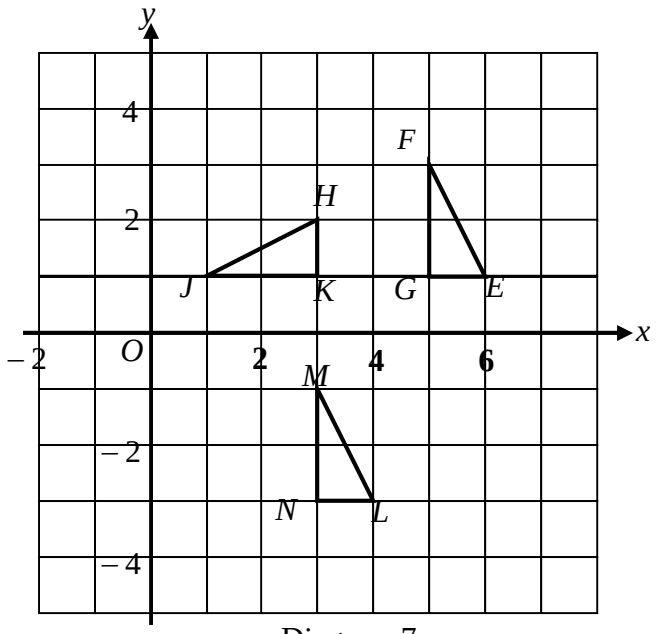


Diagram 7

Rajah 7

Triangle *HJK* is the image of triangle *EFG* under transformation ***V*** and triangle *LMN* is the image of triangle *HJK* under transformation ***W***.

Segitiga HJK ialah imej bagi segitiga EFG dibawah penjelmaan V dan segitiga LMN ialah imej bagi segitiga HJK dibawah penjelmaan W.

Describe in full

Huraikan selengkapnya

(i) transformation ***V***,

penjelmaan V ,

(ii) transformation ***W***,

penjelmaan W,

(iii) the single transformation that is equivalent to the combined transformation ***WV***.
satu penjelmaan tunggal yang setara dengan gabungan penjelmaan WV

[8 *marks*]

Answer :

(a) (i)

(ii)

(iii)

(b) (i) ……..

……..……

(ii) ……..

……..……

(iii)

16 Table 3 shows the distribution of the Mathematics marks of 45 students .
Jadual 3 menunjukkan taburan kekerapan markah Matematik bagi 45 orang murid..

Marks	Frequency	Midpoint
20 – 29	2	
30 – 39	6	
40 – 49	8	
50 – 59	10	
60 – 69	7	
70 – 79	5	
80 – 89	3	
90 – 99	4	

Table 3

(a) (i) Complete Table 3 on the answer space provided. [1 *mark*]
Lengkapkan Jadual 3 pada ruang jawapan yang disediakan.

(ii) State the modal class for the data in the Table 3.
Nyatakan kelas mod bagi data yang diberi dalan Jadual 3.
[1 *mark*]

(iii) Calculate the estimated mean marks of the group of the students.
Hitungkan min anggaran markah bagi kumpulan murid itu.
[3 *marks*]

(b) For this part of the question, use the graph paper provided on page 28.
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan di halaman 28.

(i) Using a scale of 2 cm to 10 cm on the *x*-axis and 2 cm to 2 students on the *y*-axis, draw a histogram for the above data.
Dengan menggunakan skala 2 cm kepada 10 unit pada paksi –x dan 2 cm kepada 2 orang murid pada paksi-y, lukiskan satu histogram bagi data di atas.
[4 *marks*]

(ii) Based on the histogram in (b)(i), state one piece of information about the marks.
Berdasarkan histogram di (b)(i), nyatakan satu maklumat tentang markah tersebut.
[2 *marks*]

(c) On the same graph, draw a frequency polygon for the above data.
Di atas graf yang sama, lukiskan sebuah poligon kekerapan.
[1 *mark*]

Answer :

(a) (i)

Marks	Frequency	Midpoint
20 – 29	2	
30 – 39	6	
40 – 49	8	
50 – 59	10	
60 – 69	7	
70 – 79	5	
80 – 89	3	
90 – 99	4	

Table 3

(ii)

(iii)

(b) (i) Refer graph on page 28.
Rujuk graf di halaman 28.

(ii) ……..

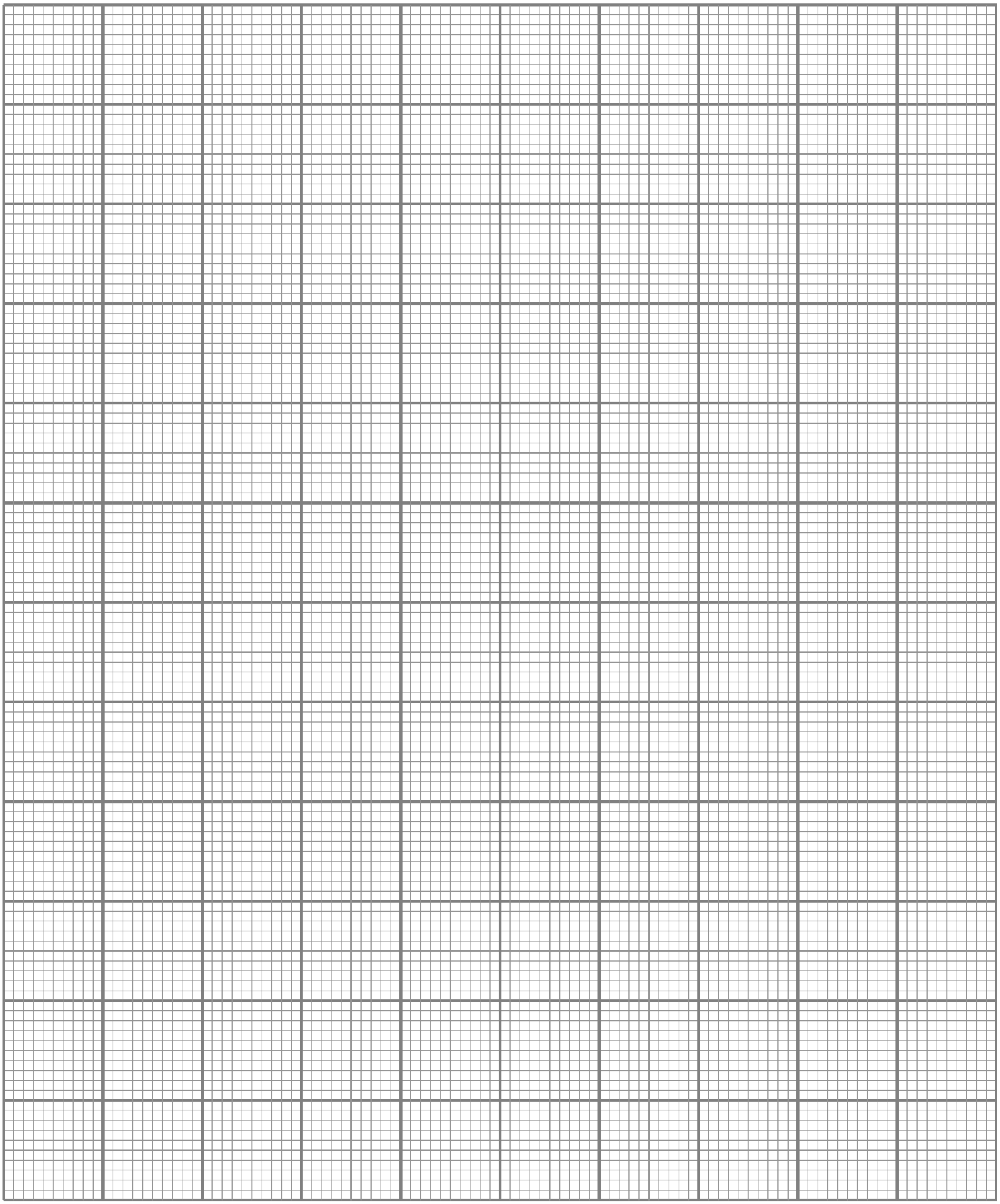
……..

……..

(c) Refer graph on page 28.
Rujuk graf di halaman 28.

Graph for Question 16

Graf untuk soalan 16



END OF QUESTION PAPER

PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA

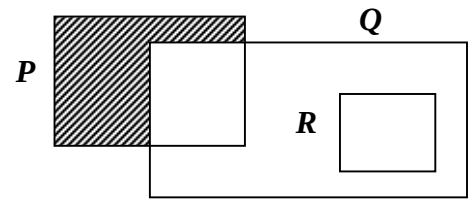
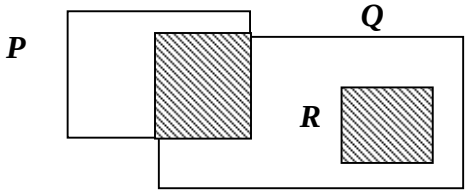
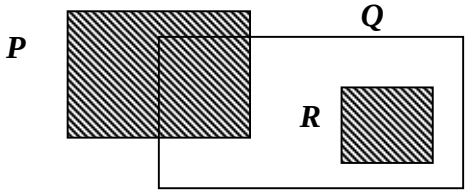
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA

PEPERIKSAAN PERCUBAAN 2008

MARKING SCHEME

MATHEMATICS
PAPER 2 1449/2

MARKAH MAKSIMUM BAGI KERTAS INI : 100 MARKAH

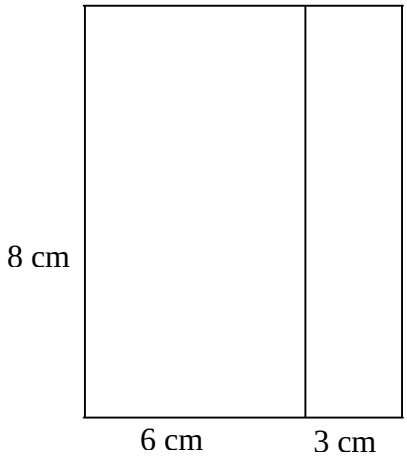
No	MARKING SCHEME	Mark	
1	(a) 	1	
	(b) 	2	
	Notes :  1 mark		**3**
2	$2x - 6y = 12$ or $x - 3y = 6$ or $x = \frac{9 - 3y}{2}$ or $y = \frac{1}{3}x - 2$ or equivalent $9y = -3$ or $3x = 15$ $x = 5$, $y = -\frac{1}{3}$	1 1 1, 1	
	OR $\begin{pmatrix} 2 & 3 \\ \frac{1}{3} & -1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 9 \\ 2 \end{pmatrix}$ 1 $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{-2-1}\begin{pmatrix} -1 & -3 \\ -\frac{1}{3} & 2 \end{pmatrix}\begin{pmatrix} 9 \\ 2 \end{pmatrix}$ 1 $x = 5$ 1 $y = -\frac{1}{3}$ 1 *Note* : If $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ -\frac{1}{3} \end{pmatrix}$ only give 1 mark		**4**

3	$2p^2 + 5p - 3 = 0$ $(2p - 1)(p + 3) = 0$ $p = \frac{1}{2}, \quad p = -3$	1 1 1,1	**4**
4	Identify $\angle EAD$ $\tan \angle EAD$ or $\tan \theta = \frac{3}{12}$ $\angle EAD = 14^o\, 2'$ or 14.04^o	1 1 1	**3**
5(a)	$\frac{t-3}{6-0} = \frac{2}{3}$ $t = 7$	1 1	
5(b)	$2 = \frac{2}{3}(9) + c = 2$ or $y - 2 = \frac{2}{3}(x - 9)$ $y = \frac{2}{3}x - 4$	1 1	
5(c)	-4	1	**5**
6 (a)	$\frac{240}{360} \times 2 \times \frac{22}{7} \times 28$ $117\frac{1}{3}$ or 117.33	1 1	
6(b)	$\frac{120}{360} \times \frac{22}{7} \times 28^2$ or $\frac{180}{360} \times \frac{22}{7} \times 14^2$ or $\frac{240}{360} \times \frac{22}{7} \times 28^2$ $\frac{240}{360} \times \frac{22}{7} \times 28^2$ - $\frac{180}{360} \times \frac{22}{7} \times 14^2$ or equivalent $1334\frac{2}{3}$ or 1334.67	1 1 1	**5**

7(a)	A regular hexagon has six equal sides **or** $\sqrt[3]{100} = 10$.	1	
7(b)	m is not a negative number.	1	
7(c)	If $x < 7$ then $x < 5$. False.	1 1	
7(d)	Imp. 1 : If $L \subset K$ then $L \cap K = L$. Imp. 2 : If $L \cap K = L$ then $L \subset K$.	1 1	**6**
8(a)	$\frac{1}{5} \times \frac{1}{3}$ $\frac{1}{15}$	1 1	
8(b)	$\frac{3}{10} \times \frac{5}{12} + \frac{1}{5} \times \frac{1}{3} + \frac{1}{2} \times \frac{1}{4}$ $\frac{23}{120}$	2 1	**5**
9(a)	$\begin{pmatrix} -4 & 1 \\ -\frac{5}{2} & \frac{1}{2} \end{pmatrix}$ Notes : 1. Accept $\frac{1}{2}\begin{pmatrix} -8 & 2 \\ -5 & 1 \end{pmatrix}$ for 2 marks 2. $\frac{1}{-8-(-10)}\begin{pmatrix} -8 & 2 \\ -5 & 1 \end{pmatrix}$ 1 mark	2	
9(b)	$\begin{pmatrix} 1 & -2 \\ 5 & -8 \end{pmatrix}\begin{pmatrix} k \\ m \end{pmatrix} = \begin{pmatrix} 1 \\ 11 \end{pmatrix}$ $\begin{pmatrix} k \\ m \end{pmatrix} = \frac{1}{2}\begin{pmatrix} -8 & 2 \\ -5 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 11 \end{pmatrix}$ $k = 7$ $m = 3$ *Note* : If $\begin{pmatrix} k \\ m \end{pmatrix} = \begin{pmatrix} 7 \\ 3 \end{pmatrix}$ only give 1 mark	1 1 1 1	**6**

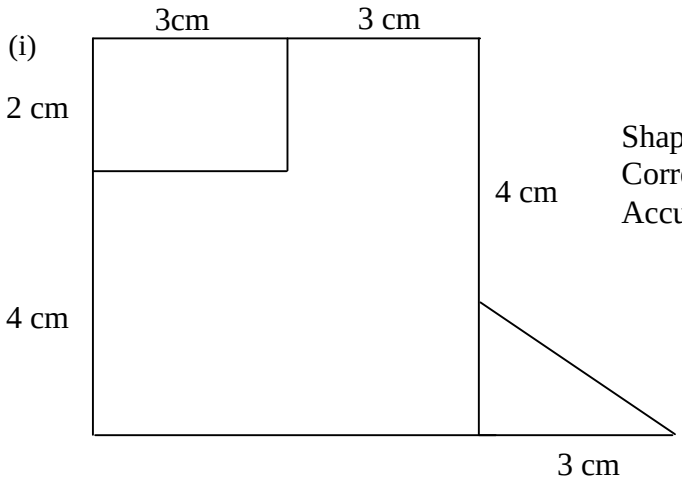
10(a)	$\frac{1}{2} \times 8 \times u = 72$ $u = 18$	1 1	
10(b)	$\frac{0-12}{35-27}$ $-\frac{3}{2}$	1 1	
10(c)	$72 + 12(18) + \frac{1}{2}(7)(18+12) + \frac{1}{2}(12)(8)$ $\frac{72 + 12(18) + \frac{1}{2}(7)(18+12) + \frac{1}{2}(12)(8)}{35}$ 12.6	1 1 1	**7**
11	$V_{cone} = \frac{1}{3}(3.142)(6)^2(8)$ $V_{h/sphere} = \frac{1}{2} \times \frac{4}{3}(3.142)(8)^3$ $V_{solid} = \frac{1}{2} \times \frac{4}{3}(3.142)(8)^3 - \frac{1}{3}(3.142)(6)^2(8)$ 770.84	1 1 1 1	**4**
12(a)	2.5, -10, -2	1,1,1	
12(b)	Both axes with uniform scales and in the right directions All points correctly plotted Smooth curves	1 2 1	
12(c)	(i) $2.75 \leq y \leq 2.85$ (ii) $-3.4 \leq x \leq -3.3$	1 1	
12(d)	$y = -x$ Draw line y = -x X = -1.5± 0.1 , 1.5 ± 0.1 both correct	1 1 1	**12**

13 (a)



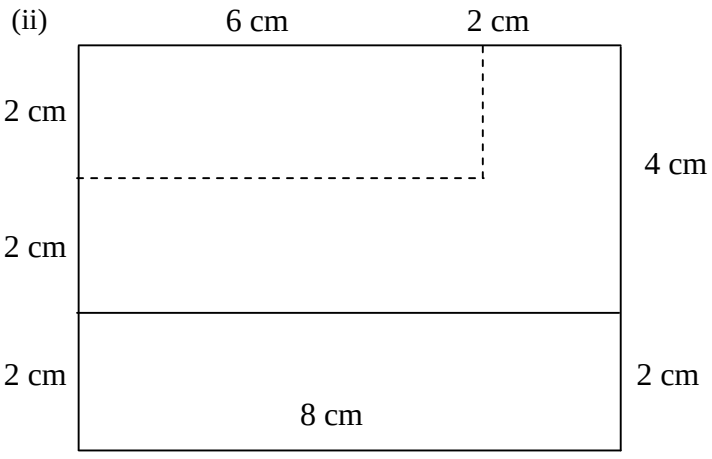
Shape	1
Correct dimensions	1
Accuracy ($\pm$ 2 mm, $\pm 1^o$)	1

13(b) (i)



Shape	1
Correct dimensions	1
Accuracy ($\pm$ 2 mm, $\pm 1^o$)	2

(ii)



Shape	1
Dashed lines	1
Dimensions correct	1
Accuracy ($\pm$ 2 mm, $\pm 1^o$)	2

12

14(a)	60^o E Note : 60^o or θ^o E give 1 mark	2	
14(b)	$120^o - 15^o$ or 105^o $105 \times 60 \times \cos 45^o$ Note : using $\cos 45^o$ give 1 mark 4454.77 n.m.	1 2 1	
14(c)	$\theta = \frac{4200}{60} = 70^o$ $70^o - 45° = 25^o$ 25^o S	1 1 1	
14(d)	110×60 $\frac{110 \times 60}{900}$ 7.33 hrs	1 1 1	**12**
15(a)	(i) (–2, 6) (ii) (4, –7) (iii) (–2, –4)	1 1 2	
15(b)	(i) ***V*** : Rotation 90^o anticlockwise about (4, 0) (ii) ***W*** : Rotation 90^o clockwise about (1, –1)	1 1 1 1 1 1	
15(c)	Translation $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$	1, 1	**12**

16(a) (i)

Marks	Frequency	Midpoint
20 – 29	2	24.5
30 – 39	6	34.5
40 – 49	8	44.5
50 – 59	10	54.5
60 – 69	7	64.5
70 – 79	5	74.5
80 – 89	3	84.5
90 – 99	4	94.5

1

16(b) (ii) 50 – 59 1

(iii)

$$\frac{2(24.5)+6(34.5)+8(44.5)+10(54.5)+7(64.5)+5(74.5)+3(84.5)+4(94.5)}{45}$$ 2

$$\frac{2612.5}{45}$$

58.06 1

(i) *Refer graph*

Both axes with correct uniform scales and directions 1

Using upper boundaries or midpoint or class intervals 1

All bars correct 2

(ii) Any correct information from histogram. 2

16(c) Polygon frequency drawn correctly 1

12

Graph for Question 13