LEMBAGA PEPERIKSAAN
KEMENTERIAN PELAJARAN MALAYSIA

MATHEMATICS
SIJIL PELAJARAN MALAYSIA 2009 (ULANGAN)
Paper 1
Jun
$1\frac{1}{4}$ jam

Satu jam lima belas 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 soalam ini*.

Kertas soalan ini mengandungi 28 halaman bercetak

INFORMATION FOR CANDIDATES

1. *This question paper consists of* **40** *questions.*

2. *Answer* **all** *questions.*

3. *Answer each question by blackening the correct space on the answer sheet .*

4. *Blacken only* **one** *space for each question.*

5. *If you wish to change your answer, erase the blackened mark that you have done. Then blacken the space for the new answer.*

6. *The diagrams in the questions provided are not drawn to scale unless stated .*

7. *A list of formulae is provided on pages 3 to 4.*

8. *A booklet of four-figure mathematical tables is provided.*

9. *You may use a non-programmable scientific calculator.*

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini mengandungi 40 soalan.*

2. *Jawab* ***semua*** *soalan.*

3. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan.*

4. *Bagi setiap soalan hitamkan satu ruangan sahaja.*

5. *Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*

6. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala kecuali dinyatakan*

7. *Satu senarai rumus disediakan di halaman 3 hingga 4.*

8. *Sebuah buku sifir matematik empat angka disediakan.*

9. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*

MATHEMATICAL FORMULAE

*The following formulae may be helpful in answering the questions. The symbols given are the o*nes 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 $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

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

12 Pythagoras Theorem

$c^2 = a^2 + b^2$

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

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

SHAPES AND SPACE

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

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

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 × length

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

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

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

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

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

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

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

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

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

Answer **all** question

1 Round off 7 216 correct to three significant figures .
Bundarkan 7 216 betul kepada tiga angka bererti.

A 721
B 722
C 7 210
D 7 220

2 Express 30 600 in standard form.
Ungkapkan 30 060 dalam bentuk piawai.

A 3.006×10^{5}
B 3.006×10^{4}
C 3.006×10^{-4}
D 3.006×10^{-5}

3 $\dfrac{0.0025}{4 \times 10^{-7}}$

A 6.25×10^{-12}
B 6.25×10^{-2}
C 6.25×10^{2}
D 6.25×10^{12}

4 It is given that the mass of the earth is 5.976×10^{24} kg and the mass of the moon is 7.350×10^{22}
Find the difference between the masses, in kg.
Diberi bahawa jisim bumi ialah 5.976×10^{24} kg *dan jisim bulan ialah* 7.350×10^{22} *kg.*
Cari beza antara jisim itu, dalam kg

A 1.374×10^{22}
B 1.374×10^{24}
C 5.9025×10^{22}
D 5.9025×10^{24}

5 State the value, in base 10, of the underlined digit n the number $10\underline{1}10_2$.
Nyatakan nilai, dalam asas 10, bagi digit yang digariskan dalam nombor $10\underline{1}10_2$

A 2
B 4
C 6
D 8

6 $11001_2 + 111_2 =$

A 11100_2
B 11110_2
C 100000_2
D 100101_2

7 In Diagram 1 *PQRST* is pentagon and *USV* is an equilateral triangle . WQR and RSV are straight lines .
Dalam Rajah 1, PQRST ialah pentagon dan . USV ialah segi tiga sama sisi . WQR dan RSV ialah garis lurus .

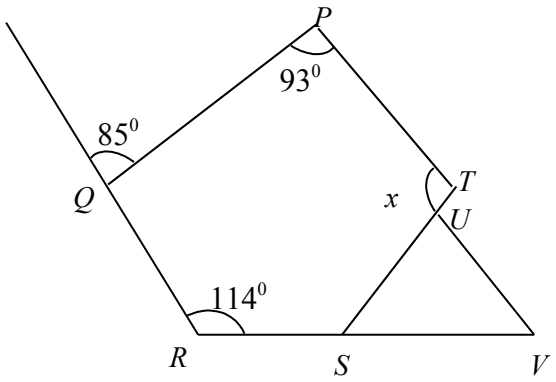


Diagram 1

Find the value of *x* .
Cari nilai x.

A 118
B 128
C 130
D 151

8 In Diagram 2 , *PQR* is the tangent to the circle with centre *O* , at point *Q* .*TOSR* is a straight line .
Dalam Rajah 2 , PQR ialah tangen kepada bulatan berpusat O , di titikQ . TOSR ialah garis lurus

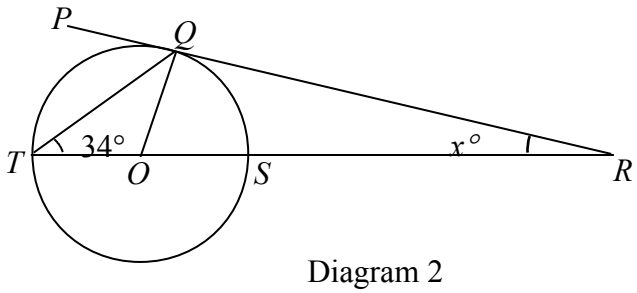


Diagram 2

Find the value of *x*.
Cari nilai x.

A 17
B 22
C 44
D 56

9 Diagram 3 shows seven points on a square grid . *P'* is the image of *P* under a reflection.

Rajah 3 menunjukkan tujuh titik pada grid segi empat sama .P' ialah imej bagi P di bawah satu pantulan

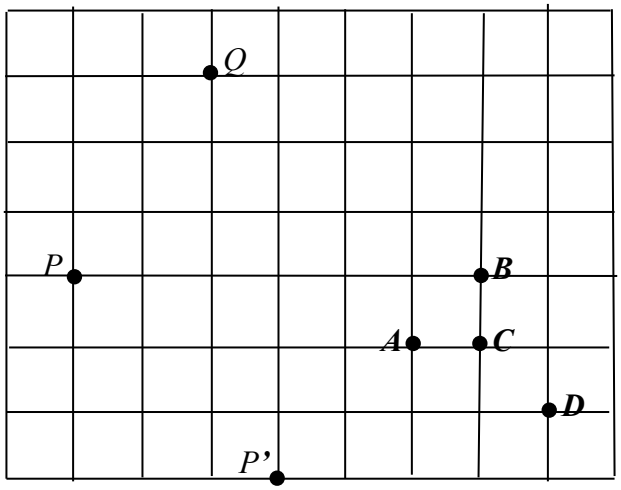


Diagram 3

Which of the points , A ,B ,C or D, is the image of point *Q* under the same reflection?

Antara titik A , B , C atau D , yang manakah imej bagi titik Q di bawah pantulan yang sama?

10 Diagram 4 shows two pentagons , *P* and *Q* , drawn on a Cartesian plane . *Q* is the image of *P* under an enlargement .

*Rajah 4 menunjukkan dua pentagon , **P** dan Q, dilukis di atas satah Cartesan. Q ialah imej bagi P di bawah suatu pembesaran .*

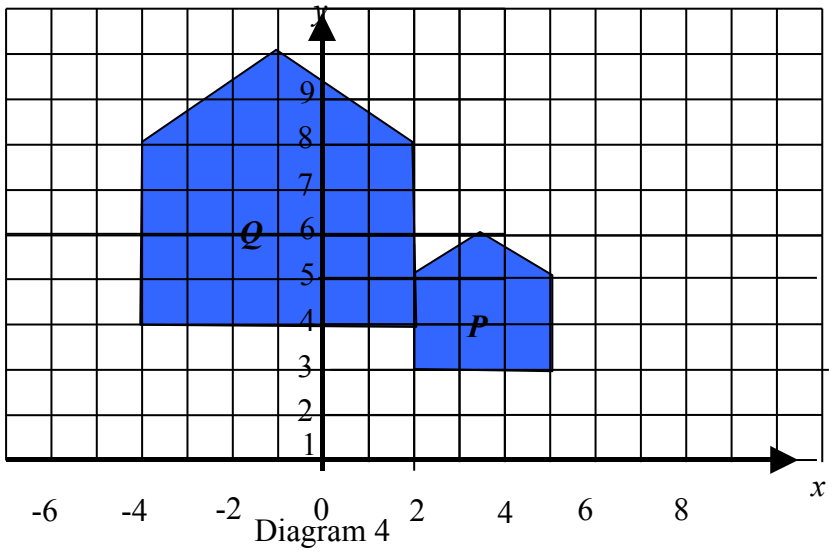


Diagram 4

Find the centre of the enlargement .

Cari pusat pembesaran itu .

A (2 , 3)
B (2 , 4)
C (5 , 2)
D (8 , 1)

11 In Diagram 5, *PQR* is a right-angle triangle and *QRS* is a straight line.
Dalam Rajah 5 , PQR ialah sebuah segi tiga bersudut tegak dan QRS ialah garis lurus..

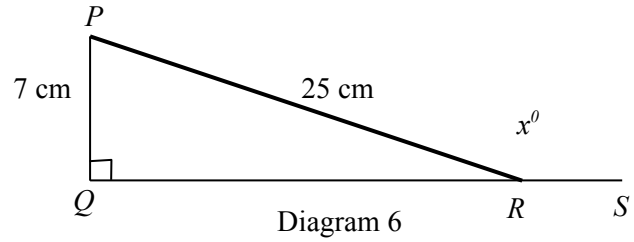


Diagram 6

Find the value of cos x^0
Cari nilao kos x^0

A $-\frac{24}{25}$

B $-\frac{7}{25}$

C $\frac{7}{25}$

D $\frac{24}{25}$

12 Diagram 6 shows the graphs $y = \sin x$ and $y = \cos x$ for $0^0 \leq x \leq 360^0$
Rajah 6 menunjukkan graf $y = \sin x$ *dan* $y = \cos x$ *for* $0^0 \leq x \leq 360^0$.

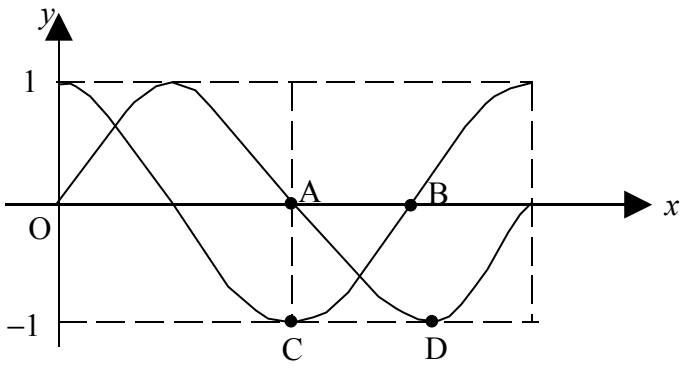


Diagram 7

P is a point on the graph y = cos x^o .The x-coordinate of P is 180^0
Which of the points , A , B , C or D , represent the point P ?
P ialah satu titik pada graf $y = \cos x^0$ *. koordinat-x bagi P ialah* 180^0 *. Antara titik-titik A , B , C atau* D *, yang manakah mewakili titik P ?*

13 Diagram 7.1 shows a cirle with centre *O* and radius 1 unit . Diagram 7.2 shows a right- angle triangle JKM .
Rajah 7.1 *menunjukkan satu bulatan dengan pusat O dan jejari* 1 *unit . Rajah* 7.2 *mmenunjukkan sebuah segi tiga bersudut tegak JKM*

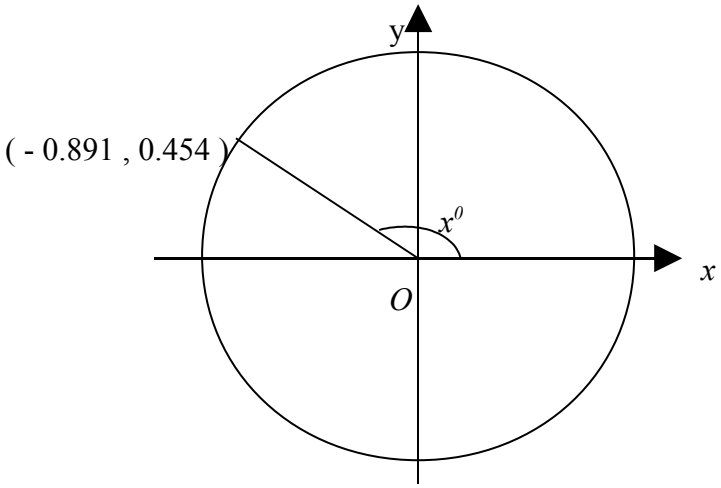


Diagram 17.1

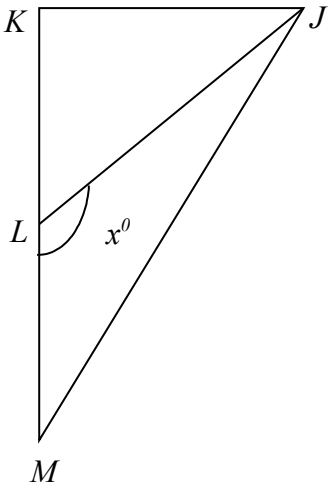


Diagram 17.2

KLM is a straight line , $KL = LM$ and $KM = 12$ cm . Using the information in Diagram 7.1 , find the length , in cm , of JL .
KLM ialah garis lurus , KL = LM dan KM = 12 cm . Dengan menggunakan maklunat di Rajah 7.1 cari panjang , dalam cm , bagi JL .

A 2.724

B 5.346

C 6.734

D 13.216

14 Diagram 8 shows a pyramid with an equilateral triangle *KLM* as the horizontal base. V is vertically above K . P , Q and R are the midpoints of KL , LM and MK respectively .
Rajah 8 *menunjukkan sebuah piramid dengan segi tiga sama sisi KLM sebagai tapak mengufuk . V berada tegak di atas K . P , Q dan R ialah masing-masing titik tengah bagi KL , LM dan MK .*

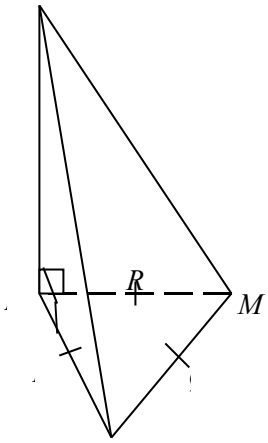


Diagram 8

Name the angle between the plane *VLM* and the base *KLM*
Namakan sudut di antara satah VLM dengan tapak KLM

A $\angle VMK$
B $\angle VMP$
C $\angle VQK$
D $\angle VQR$

15 Diagram 9 shows two vertical poles, *PQ* and a tree *EF* on a horizontal plane. A kite is tied to the pole at P . The edge of the kite is stuck on the top of the tree . The angle of elevation of E from P is 50^0 .
Rajah 9 menunjukkan sebatang tiang tegak, PQ dan sebatang pokok EF, yang terletak di atas satah mengufuk. Sebuah laying-layang diikat pada tiang itu di P . Hujung laying-layang itu tersangkut pada puncak pokok . Sudut dongakan E dari P ialah 50^0 .

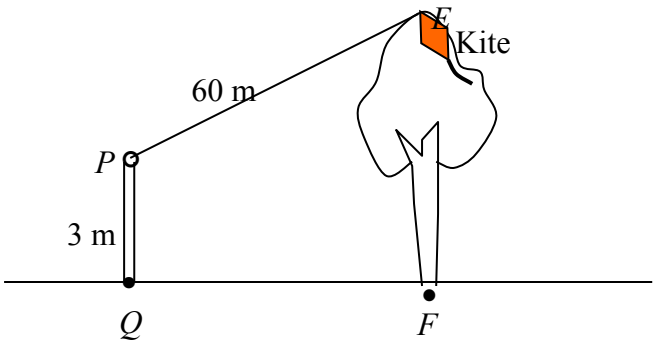


Diagram 9

Calculate the height , in m , of the tree from the horizontal plane .
Hitung tinggi , dalam m , *pokok itu dari satah mengufuk .*

A 38.57
B 41.57
C 45.96
D 48.96

16 In Diagram 10 , *PQ and RST* are two vertical poles on a horizontal plane.
Dalam Rajah 10 , PQ dan RST ialah dua batang tiang tegak yang terletak pada satah mengufuk.

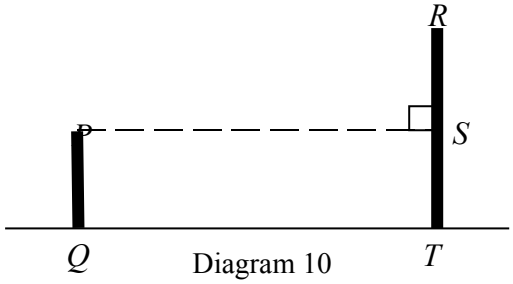


Diagram 10

State the angle of depression of point *Q* from point *S* .
Nyatakan sudut tunduk titik Q dari titik S .

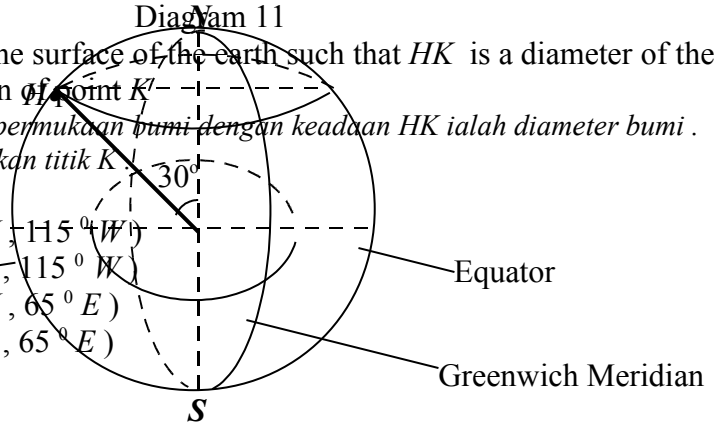
A $\angle QSP$
B $\angle QST$
C $\angle SQP$
D $\angle SQT$

17 The bearing of town P from town Q is 075°.
Find the bearing of town Q from town P.
Bearing Bandar P dari Bandar Q ialah 075°.
Cari bearing bandar Q dari bandar P.

A 165°
B 195°
C 255°
D 285°

18 Diagram 11 shows the location of point *H* on the surface of the earth with O as the centre of the earth .
Rajah 11,menunjukkan kedudukan titik H pada permukaan bumi dengan O sebagai pusat bumi.

Diagram 11



K is a point on the surface of the earth such that *HK* is a diameter of the earth .
State the location of point *K*.
K ialah titik pada permukaan bumi dengan keadaan HK ialah diameter bumi .
Nyatakan kedudukan titik K.

A (30 ^{0} *N* , 115 ^{0} *W*)
B (30 ^{0} *S* , 115 ^{0} *W*)
C (60 ^{0} *N* , 65 ^{0} *E*)
D (60 ^{0} *S* , 65 ^{0} *E*)

19 $3\,x\,(\,x+2\,)-4\,(\,3\,x\,+\,2\,)\,=$

A $3\,x^{\,2}-6\,x\,+\,2$
B $3\,x^{\,2}-6\,x\,-\,8$
C $3\,x^{\,2}-12\,x\,-6$
D $3\,x^{\,2}-12\,x\,+\,4$

20 Express $\frac{1}{5m} - \frac{5-7n}{15mn} =$

A $\frac{2n-1}{3mn}$

B $\frac{-2n-1}{3mn}$

C $\frac{5-4n}{15mn}$

D $\frac{10n-1}{15mn}$

21 Given $\frac{2\sqrt{n}-1}{\sqrt{n}+2} = 3k$, express n in the of k.

Diberi $\frac{2\sqrt{n}-1}{\sqrt{n}+2} = 3k$, *ungkapkan* n *dalam sebutan* k

A $n = \left(\frac{2-3k}{6k+1}\right)^2$

B $n = \left(\frac{2+3k}{6k-1}\right)^2$

C $n = \left(\frac{6k-1}{3k+2}\right)^2$

D $n = \left(\frac{6k+1}{2-3k}\right)^2$

22 Given $\frac{1}{3}(2-k) = 4k$, find the value of k.

Diberi $\frac{1}{3}(2-k) = 4k$, *carikan nilai* k.

A $\frac{2}{15}$

B $\frac{2}{13}$

C $\frac{2}{11}$

D $\frac{2}{9}$

23 Simplify $\frac{kp^{10} \times k^4}{(k^5 p^2)^3}$.

Permudahkan. $\dfrac{k\,p^{10} \times k^{4}}{\left(k^{5}\,p^{2}\right)^{3}}$

A $k^{-3}\,p^{5}$
B $k^{-4}\,p^{5}$
C $k^{-10}\,p^{4}$
D $k^{-11}\,p^{4}$

24 Given $p^{\frac{m}{n}} = \sqrt[3]{8^{2}}$, state the values of p , m and n .

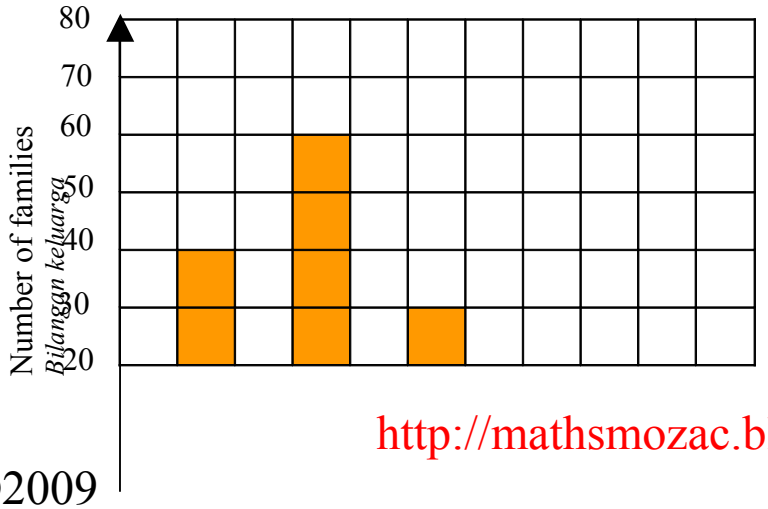
Diberi $p^{\frac{m}{n}} = \sqrt[3]{8^{2}}$, nyatakan nilai bagi p , m , dan n .

	p	m	n
A	8	2	3
B	8	3	2
C	2	3	8
D	3	2	8

25 Find the solution of $5 - 3x < 2x$.
Cari penyelesaian bagi $5 - 3x < 2x$

A $x < 1$
B $x > 1$
C $x < -5$
D $x > -5$

26 Diagram 12 is an incomplete bar chart representing the number of children in a group of families in a housing area . The bar representing the families that have four childrens is not shown .
Rajah 12 *ialah sebuah carta palang yang tidak lengkap mewakili bilangan anak dalam keluarga di suatu kawasan perumahan . Palang yang mewakili keluarga yang mempunyai empat orang anak tidak ditunjukkan .*



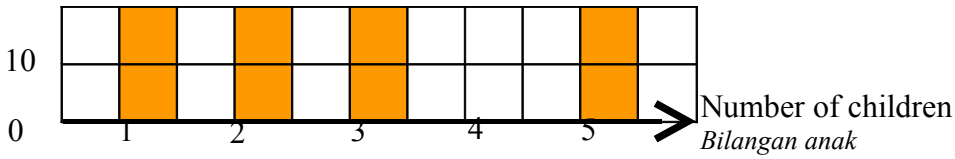


Diagram 12

It is given that the total number of families in the housing area is 200 .
Find the percentage of families that have four children .
Diberi bahawa jumlah bilangan keluarga di kawasan perumahan itu ialah 200 orang .
Cari peratusan keluarga yang mempunyai empat orang anak .

A 25
B 40
C 75
D 90

27 Diagram 13 is a pie chart which shows how Siti spend her time one day on various activities .
Rajah 13 ialah sebuah carta pai yang menunjukkan bagaimana Siti menggunakan masa sehari dengan pelbagai aktiviti ..

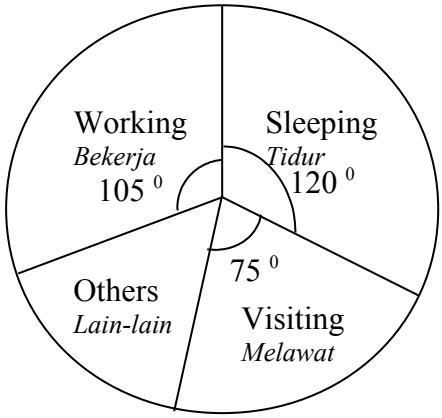


Diagram 13

How much more time , in hours , did she spend working compared to visiting ?
Berapakah lebihan masa , dalam jam , dia bekerja berbanding dengan melawat ?

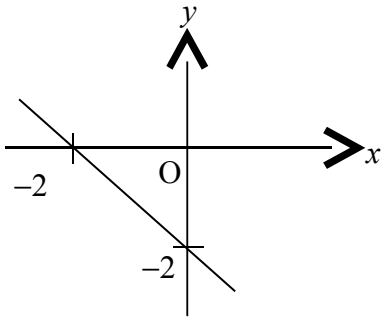
A 1
B 2
C 3
D 4

28 A set of data which consists of 6 numbers has a mean of 42 . when a number x is added , the mean becomes 38 . Find the value of x .
Satu set data yang terdiri daripada 6 nombor mempunyai min 42 .Apabila satu nombor x ditambah , min menjadi 38 . Cari nilai x .

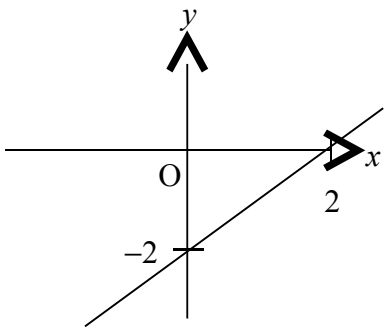
A 4
B 10
C 14
D 24

29 Which graph represents $y = -x - 2$?
Graf manakah yang mewakili $y = -x - 2$?

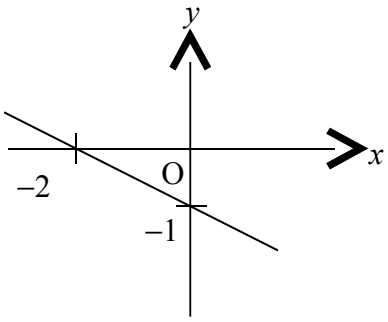
A



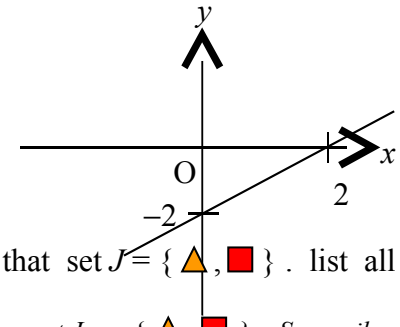
B



C



D



30 It is given that set J = { ▲ , ■ } . list all the subsets of the set J .

Diberi bahawa set J = { ▲ , ■ } . Senaraikan semua subset bagi set J

A { ▲ } , { ■ }
B { ▲ } , { ■ } , { ▲ , ■ }
C { } , { ▲ } , { ■ }
D { } , { ▲ } , { ■ } , { ▲ , ■ }

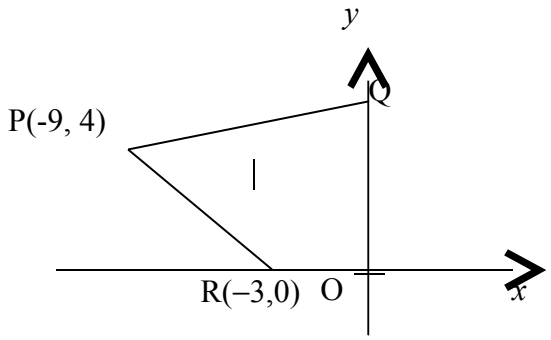
31 Diagram 14 is a Venn diagram showing the universal set ξ

Diberi set A set M dan set N dengan keadaan $L \cup M = L$ dan $M \subset (L \cap N)$. Gambar rajah Venn manakah yang mewakili keadaan di atas?

A $P' \cap Q'$
B $P' \cup Q'$
C $P \cup Q$
D $P \cap Q$

32 Diagram 15 shows two straight lines, PQ and PR, drawn on a Cartesian plane. Q lies on the y- axis.

Rajah 15 menunjukkan dua gris lurus, PQ dan PR, dilukis di atas satah Cartesan. Q terletak di atas paksi-y .



Given)Q = 2OR, find the gradient of PQ.

Diberi OQ = 2OR, cari kecerunan bagi PQ

A $\frac{2}{9}$

B $\frac{4}{15}$

C $\frac{15}{4}$

D $\frac{9}{2}$

33 Diagram 16 shows a straight line Kl on a Cartesian plane.
Rajah 16 menunjukkan garis lurus KL pada suatu satah Cartesan.

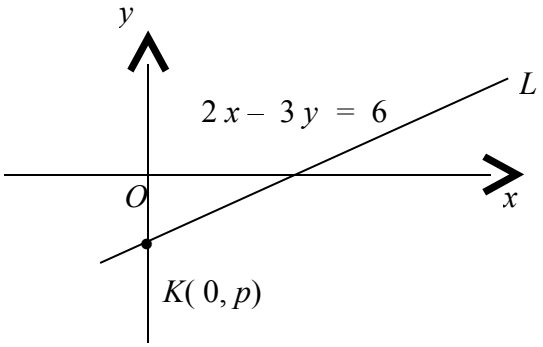


Diagram 16

Find the value of p.
Cari nilai p

A $-\frac{2}{3}$

B $-\frac{3}{2}$

C -2

D -6

34 The coordinates of S is $(0, -8)$ and the gradient of the straight line RS is $\frac{-2}{5}$.
Find the x- intercept of RS.
Koordinat bagi S ialah (0,– 8) dan kecerunan garis lurus RS ialah $\frac{-2}{5}$. *Cari pintasan-x bagi RS.*

A -20

B 20

C $\frac{16}{5}$

D $-\frac{16}{5}$

35 Diagram 17 shows a collection of letter cards.
Rajah 17 *menunjukkan suatu koleksi kad huruf.*

S	**A**	**V**	**E**	**E**	**L**	**E**	**C**	**T**	**R**	**I**	**C**	**I**	**T**	**Y**

A card is chosen at random from this collection . State the probability that the card chosen is a card with letter **E**
Sekeping kad dipilih secara rawak daripada koleksi ini . Nyatakan kebarangkalian bahawa kad yang dipilih ialah kad huruf **E**

A $\frac{1}{15}$

B $\frac{1}{10}$

C $\frac{1}{5}$

D $\frac{1}{3}$

36 A box contains 35 blue towels and some white towels . A towel is chosen at random from the box . The probability of choosing a blue towel is $\frac{5}{7}$. Find the number of white towels in the box .

Sebuah kotak mengandungi 35 helai tuala biru dan beberapa helai tuala putih . Sehelai tuala dipilih secara rawak daripada kotak itu .Kebarangkalian sehelai tuala biru dipilih ialah $\frac{5}{7}$ *. Cari bilangan tuala putih dalam kotak itu .*

A 10
B 14
C 21
D 25

37 It is given that y varies directly with x and $y = 4$ when $x = 12$. Calculate the value of y when $x = 21$.
Diberi bahawa y *berubah secara langsung dengan x dan* $y = 4$ *apabila* $x = 12$ *.Hitung nilai* y *apabila* $x = 21$ *..*

A $\frac{7}{16}$

B $\frac{17}{7}$

C 7

D 63

38 Table 1 shows some values of the variables x and y .
Jadual 1 menunjukkan beberapa nilai bagi pembolehubah x *dan* y *.*

x	1	2	3	4
y	4	1	$\frac{4}{9}$	$\frac{1}{4}$

Table 1

Find the relation between y and x .
Cari hubungan antara y *dengan* x *.*

A $y \propto x^{-3}$

B $y \propto x^{-2}$

C $y \propto x^{-1}$

D $y \propto x^{-\frac{1}{2}}$

39 $2(1 \quad 3 \quad 4) + (-2 \quad 7 \quad -5) =$

A $(0 \quad 13 \quad 3)$

B $(0 \quad 10 \quad -1)$

C $(-4 \quad 10 \quad -1)$

D $(-4 \quad 13 \quad -13)$

40 $\begin{pmatrix} 5 & 2 & 0 \\ 3 & -1 & 4 \end{pmatrix} - 2\begin{pmatrix} 7 & -1 & 3 \\ 4 & 0 & -2 \end{pmatrix} + 3\begin{pmatrix} 0 & 1 & 5 \\ 2 & -3 & 1 \end{pmatrix} =$

A $\begin{pmatrix} -2 & 4 & 2 \\ 1 & -4 & 7 \end{pmatrix}$

B $\begin{pmatrix} -2 & 2 & 2 \\ 1 & -4 & 3 \end{pmatrix}$

C $\begin{pmatrix} -9 & 3 & 9 \\ 1 & -10 & 3 \end{pmatrix}$

D $\begin{pmatrix} -9 & 7 & 9 \\ 1 & -10 & 11 \end{pmatrix}$

END OF QUESTION PAPER

SIJIL PELAJARAN MALAYSIA (U)2009

MATHEMATICS
PAPER 1 1449/1
ANSWER

1	**D**	11	**A**	21	**D**	31	**B**
2	**B**	12	**C**	22	**B**	32	**A**
3	**C**	13	**C**	23	**C**	33	**C**
4	**D**	14	**C**	24	**A**	34	**A**
5	**B**	15	**D**	25	**B**	35	**C**
6	**C**	16	**A**	26	**A**	36	**B**
7	**A**	17	**C**	27	**B**	37	**C**
8	**B**	18	**D**	28	**C**	38	**B**
9	**C**	19	**B**	29	**A**	39	**A**
10	**D**	20	**A**	30	**D**	40	**D**

1449/2
Mathematics
Paper 2
Jun
2009

NAME :……..

FORM: ……

LEMBAGA PEPERIKSAAN MALAYSIA

KEMENTERIAN PELAJARAN MALAYSIA

SIJIL PELAJARAN MALAYSIA (ULANGAN) 2009

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**
VV *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. 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	4	
	9	6	
	10	6	
	11	6	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
Total			

This question paper consists of 25 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 $\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

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

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

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

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

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

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

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

SHAPES AND SPACE

 [Lihat sebelah SULIT

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 $= \pi r^2 h$

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 $= (n - 2) \times 180^\circ$

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

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

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 A, B and C. Given the universal set $\xi = A \cup B \cup C$.

Gambar rajah Venn di ruang jawapan menunjukkan set A,B dan C. Diberi set semesta $\xi = A \cup B \cup C$.

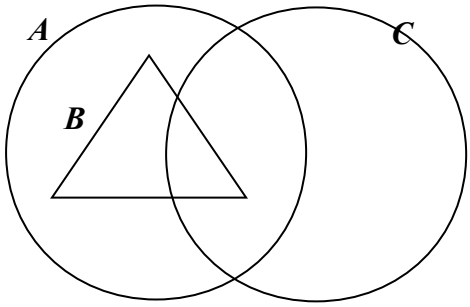
On the diagram provided in the answer spaces, shade
Pada rajah di ruang jawapan, lorekkan

(a) A'
b) $A \cap (B \cup C)$.

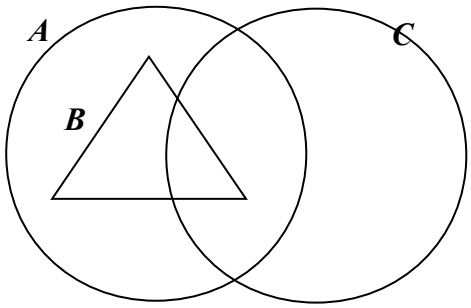
[3 *marks*]

Answer :

a)



(b)



2 Solve the quadratic equation :
Selesaikan persamaan kuadratikt:

$$2p^2 = 2(3-p)$$

[4 *marks*]

Answer :

---

3 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

$$2x+3y=1$$
$$4x-y=9$$

[4 *marks*]

4 Diagram 4 shows a right prism with a rectangle base *KLMN* on a horizontal plane. The right-angled triangle *LMQ* is the uniform cross-section of the prism.

Rajah 4 *menunjukkan sebuah prisma tegak dengan.tTapak segi empat tepat KLMN di atas satah mengufuk. Seg itiga bersudut tegak LMQ adalah keratan rentas seragam prisma itu.*

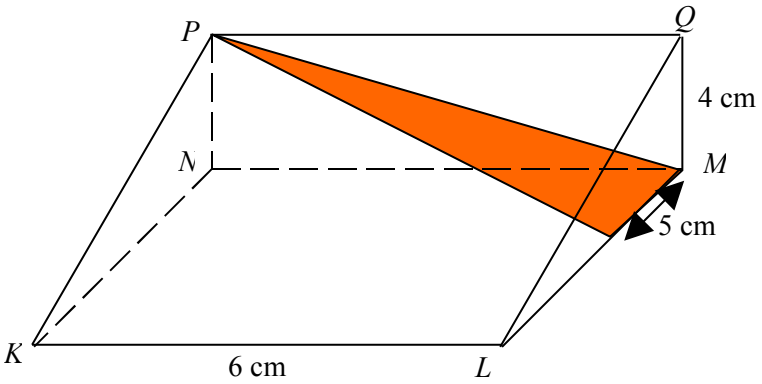


Diagram 1

a. Name the angle between the plane *PRM* and the plane *LMQ*.
Namakan sudut di antara satah PRM dengan satah LMQ

b. Calculate the angle between the plane PRM and the plane LMQ
Hitung sudut di antara satah PRM dengan satah LMQ

[3 *marks*]

Answer :

5 (a) State whether the following statement is true or false.
Nyatakan sama ada pernyataan berikut adalah benar atau palsu.

All triangle have sides of equal length *Semua segi tiga mempunyai sisi-sisi yang sama panjang*

(b) Write down two implications based on the following statements :
Tulis dua implikasi berdasarkan pernyataan berikut :

$m - 3 > 0$ if and only if $m > 3$ *$m - 3 > 0$ jika dan hanya jika $m > 3$*

(c) Make s general conclusion by induction for the sequence of numbers 5 , 8 , 11 , 14 ,….which follows the following pattern :
Buat satu kesimpulan umum secara aruhan untuk urutan nombor 5,8,11,14,.. yang mengikut pola berikut :

$5 = 3(1) + 2$
$8 = 3(2) + 2$
$11 = 3(3) + 2$
$14 = 3(4) + 2$
.

[6 *marks*]

Answer :

(a) ……..

(b) Implication 1 / *Implikasi 1*

……..

Implication 2 / *Implikasi 2*

……..

(c) ……..

……..

6 In Diagram 6, *PQRS* is a trapezium drawn on a Cartesian plane . PQ is parallel to SR.
The straight line SR is $y = \frac{1}{2}x + 1$

Dalam Rajah 6, PQRS ialah sebuah trapizium yang dilukis pada suatu satah Cartesan ,
PQ adalah selari dengan SR. Persamaan garis lurus SR ialah $y = \frac{1}{2}x + 1$

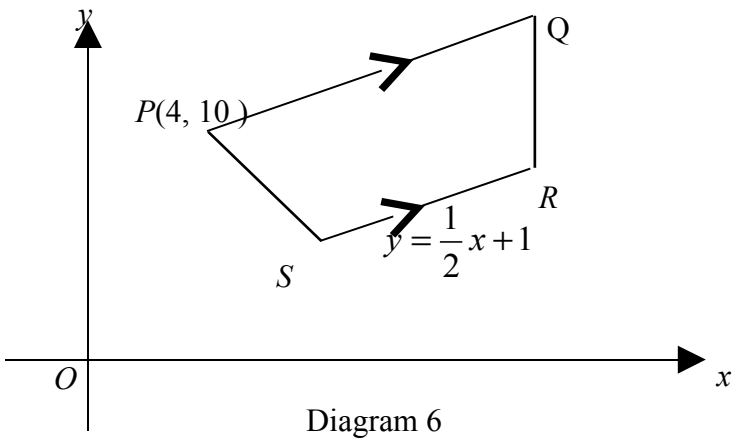


Diagram 6
Rajah 6

Find
Cari

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

(b) the *x*-intercept of the straight line *PQ*.
pintasan-x bagi garis lurus PQ

[5 *marks*]

Answer :

(a)

(b)

7 It is given that matrix P = $\begin{pmatrix} 8 & -5 \\ 7 & -4 \end{pmatrix}$

Diberi matriks P = $\begin{pmatrix} 8 & -5 \\ 7 & -4 \end{pmatrix}$.

(a) Find the inverse matrix of *P*
Cari matriks songsang bagi P

(b) Write the following simultaneous linear equations as matrix equation
Tulis persamaan linear serentak berikut dalam bentuk persamaan matriks :

Hence , by using matrix method ,calculate the value of *x* and the value of *y*
Seterusnya, menggunakan kaedah matriks , hitung nilai x dan nilai y.

$$8x - 5y = 2$$
$$7x - 4y = 1$$

[6 *marks*]

Answer :

(a)

(b)

8 Diagram 8 shows a solid cuboid. A half-cone solid ABCD is taken out from the cuboid.

Rajah 8 menunjukkan sebuah pepejal berbentuk kuboid. Sebuah pepejal berbentuk separuh kon dikeluarkan daripada kuboidl itu.

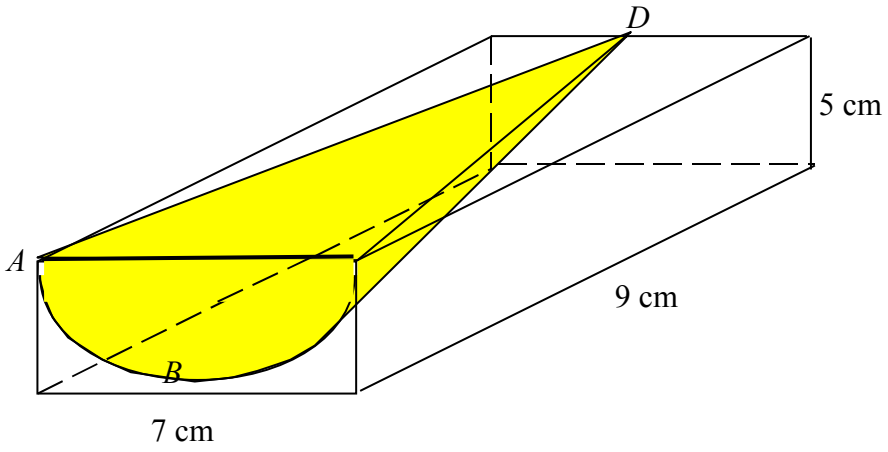


Diagram 8

Using $\pi = \frac{22}{7}$,calculate the volume, in cm^3, of the remaining solid.

Give the answer correct to two decimal places .

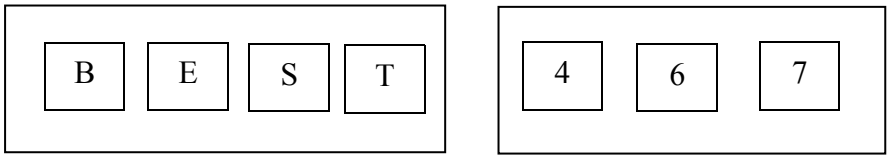
Menggunakan $\pi = \frac{22}{7}$ *, hitungkan isipadu, dalam* cm^3*, pepejal yang tinggal.*

Beri jawapan betul kepada dua tempat perpuluhan .

[4 *marks*]

Answer :

9 Diagram 9 shows two boxes , P and Q . Box P contains four cards labeled with letters and box Q contains three cards labeled with numbers.
Rajah 9 menunjukkan dua kotak , P dan Q . Kotak P mengandungi empat kad berlabel dengan huruf dan Kotak Q mengandungi tiga kad berlabel dengan nombor.



Box P Box Q

Diagram 9

Two cards are picked at random, a card from box *P* and another card from box *Q* . .
Dua keeping kad dipilih secara rawak , satu kad daripada kotak P dan satu lagi daripada kotak Q.

a) List the sample space and the outcomes of the events .
Senaraikan ruang sample dan kesudahan peristiwa .

b) Hence , find the probability that
Seterusnyab, cari kebarangkalian bahawa

(i) a card labeled with letter E and a card labelled with an even number are picked
satu kad yang berlabel dengan huruf E dan satu kad yang berlabel dengan nombor genap dipilih

(ii) a card lebelled with letter E or a card labelled with an even number are picked
satu kad yang berlabel dengan huruf E atau satu kad yang berlabel dengan nombor genap dipilih

[5 *marks*]

Answer :

(a)

(b) (i)

(ii)

10 In diagram 10 , OQRS is a square . *OPQS* is a sector of a circle with center *O* ..
Dalam rajah 10 , OQRS ialah segi empat sama . OPQS ialah sector bagi sebuah bulatan berpusat di O

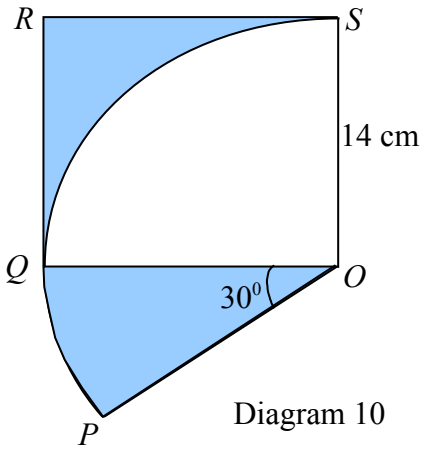


Diagram 10

Using $\pi = \frac{22}{7}$ and give the answer correct to two decimal places . Calculate

Dengan menggunakan $\pi = \frac{22}{7}$ *dan beri jawapan betul kepada dua tempat perpuluhan . Hhitung*

(a) the perimeter , in cm , of the whole diagram ,
perimeter , dalam cm , seluruh rajah ,

(b) the area , in cm ^{2} , of the coloured regions .
luas , dalam cm ^{2} *. kawasan yang berwarna .*

[6 *marks*]

Answer :

(a)

(b)

11 Diagram 11 shows the speed-time graph for the movement of a particle for a period of 15 seconds.
Rajah 11 *menunjukkan graf laju – masa pergerakkan sebuah zarah dalam masa 15 saat.*

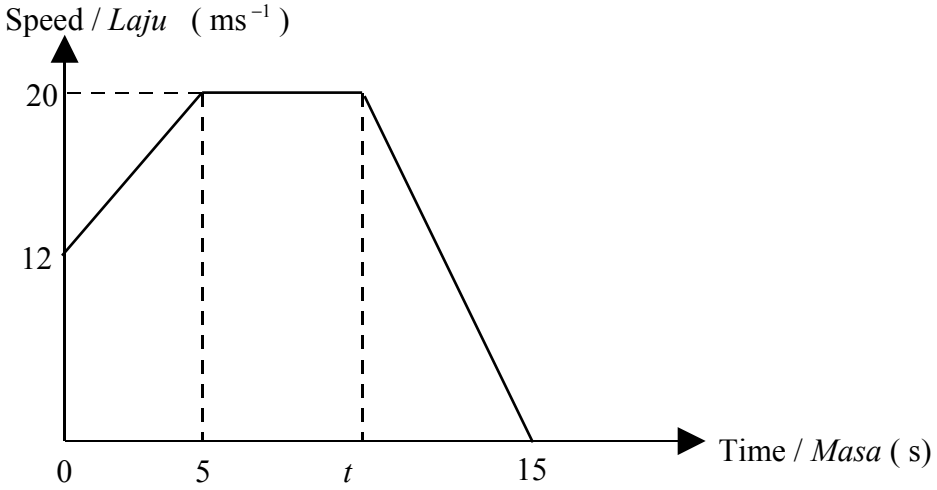


Diagram 11

(a) state the uniform speed , in ms $^{-1}$, of the particle .
Nyatakan laju seragam , dalam ms -1- , zarah itu .

(b) calculate the rate of change in speed , in ms^{-2} , in the first 5 seconds.
Hitung kadar perubahan laju, dalam ms^{-2} *dalam tempoh5 saat yang pertama .*

(c) calculate the value of *t*, if the distance traveled in the last 10 seconds is 140 m.
Hitung nilai t , jika jarak yang dilalui dalam tempoh 10 *saat terakhir itu ialah 140 m .*

[6 *marks*]

Answer :

(a)

(b)

(c)

Section B

[48 *marks*]

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

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

12 (a) Table 12 in the answer space shows the values of x and of y for the equation $y = 2x^2 + 3x - 10$. Find the value of r and of s
Jadual1 2 di ruang jawapan menunjukkan nila-nilai x dan y persamaan $y = 2x^2 + 3x - 10$
Cari nilai bagi r dan s [2 *marks*]

(b) *For this part of question, use the graph paper provided on page* 21 . *You may use a flexible curve rule.*
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan pada halaman 21 .*Anda boleh menggunakan pembaris fleksibel.*

By using a scale of 2 cm to 1 unit on the x – axis and 2 cm to 5 units on y –axis, draw the graph the graph of $y = 2x^2 + 3x - 10$ for $-4 \le x \le 3$.
D*engan menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2 cm kepada 5 unit pada paksi-y, lukiskan graf* $y = 2x^2 + 3x - 10$ *bagi nilai x dalam julat* $-4 \le x \le 3$.
[4 *marks*]

(c) Using the graph drawn in 12 (*b*) , find
Menggunakan graf yang dilukis di 12 *(b) , carikan*

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

(ii) the values of x when $y = 0$
nila-nilai x apabila $y = 0$ [3 *marks*]

(d) Draw suitable straight line on your graph to find value of x which satisfies the equation $2x^2 + 8x - 5 = 0$ for $-4 \le x \le 3$.
State the value of x.
Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari nilai x yang memuaskan persamaan $2x^2 + 8x - 5 = 0$ *bagi* $-4 \le x \le 3$.
Nyatakan nilai x itu.
[3 *marks*]

Answer :

(a)

x	– 4	–3	–2	–1	0	1	2	2.5	3
y	10	r	–8	–11	–10	s	4	10	17

Table 12

r = ……. s = …….

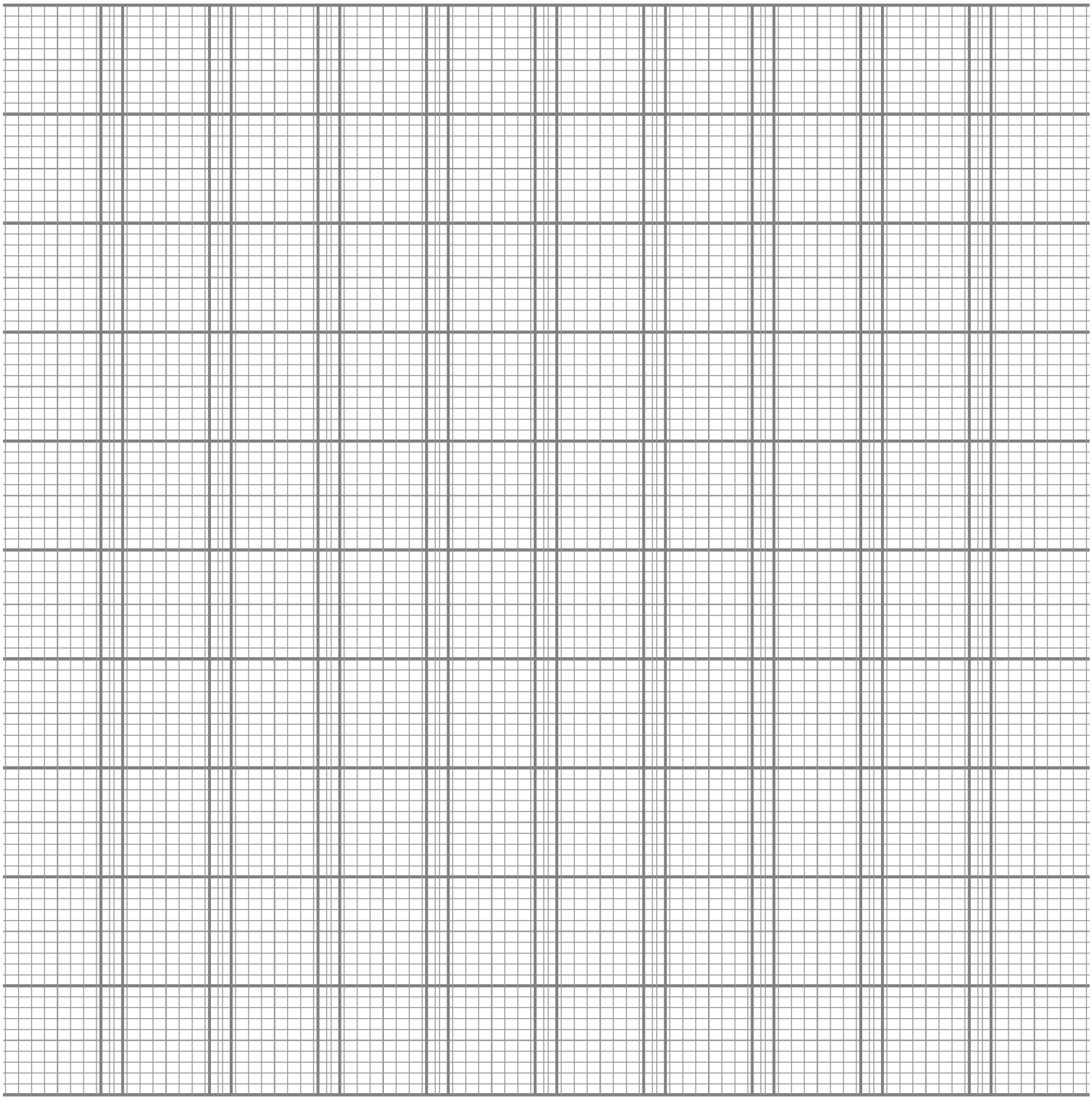
(b) Refer graph on page 21.
Rujuk graf pada halaman 21.

(c) (i) y = …….

(i) x = ……..

(d) x = ……

Graph For Question 12
Graf untuk soalan 12



13 Diagram 13.1 shows the point (4 , – 1) and the straight line $y = -x$ drawn on a Cartesian plane .

Rajah 13.1 *menunjukkan titik (4 , – 1) dan garis lurus* $y = -x$ *dilukis pada suatu satah Cartesan*

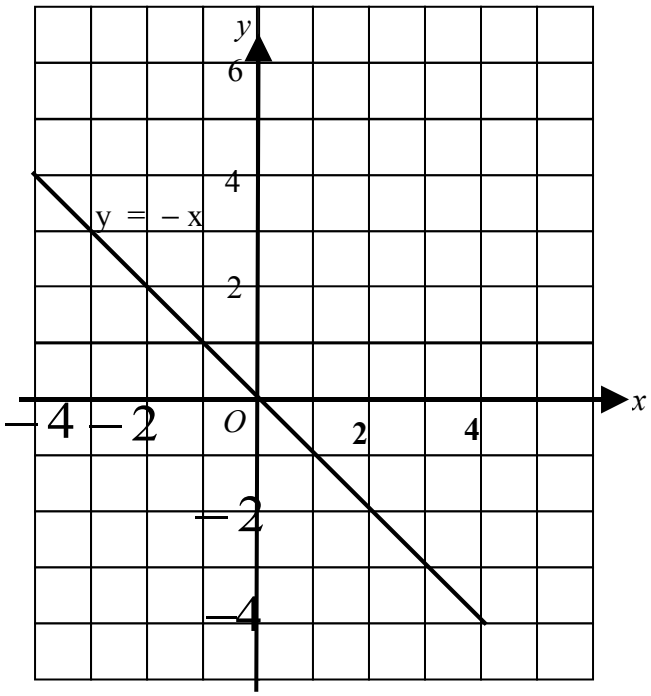


Diagram 13.1

(a) Transformation T is a translation $\begin{pmatrix} -1 \\ 5 \end{pmatrix}$. Transformation R is a reflection in the straight line $y = -x$. State the coordinates of the image of point (4 , – 1) under the following transformations :

Penjelmaan T ialah satu translasi $\begin{pmatrix} -1 \\ 5 \end{pmatrix}$ *Penjelmaan P ialah satu pantulan pada garis lurus* $y = -x$ *, Nyatakan koordinat imej bagi titik (4,–13) dibawah penjelmaan yang berikut.*

(i) T,

(ii) TR.

[3 *marks*]

Answer :

(a) (i)

(ii)

(b) Diagram 13.2 shows three quadrilaterals *KLMN*, *PQM* and *HJMG* drawn on a square grid.
Rajah 13.2 menunjukkan tiga sisi empat KLMN , PQM dan HJMG yang dilukis pada grid segi empat sama .

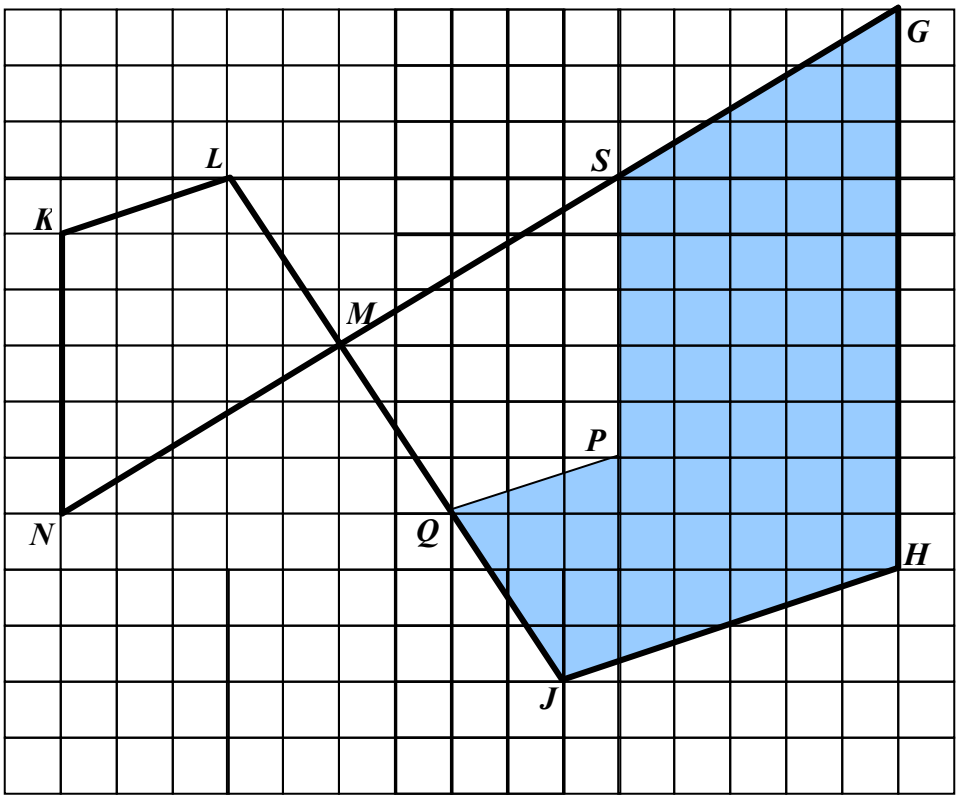


Diagram 13.2

(i) *HJMG* is the image of *KLMN* under the combined transformations **VU** . Describe in full , the transformation :
HJMG ialah imej bagi KLMN dibawah gabungan penjelmaan VU. *Huraikan selengkapnya penjelmaan*

(a) U

(b) W

(ii) It is given that quadrilateral KLMN represents a region of 24 m ^{2} . Calculate the area , in m ^{2} , of the region represented by the coloured region .
Diberi bahawa sisi empat KLMN mewakili suatu kawasan yang mempunyai luas 24 m ^{2} . *Hitung luas , dalam* m ^{2} , *kawasan yang mewakili oleh kawasan yang berwarna .*

[9 *marks*]

Answer :
(b)(i) (a)

(b)

(ii)

14 Table 14.1 shows the frequency distribution of marks obtained by a group of 48 students in a test.
Jadual 14.1 menunjukkan taburan kekerapan markah yang diperolehi sekumpulan 48 orang murid dalam satu ujian.

Marks	Frequency
65 – 69	2
70 – 74	6
75 – 79	8
80 – 84	12
85 – 89	10
90 – 94	7
95 – 99	3

Table 14.1

(a) Based on Table 14.1 ,complete Table 14.2 in the answer space . [1 *mark*]
Berdasarkan Jadual 14.1 lengkapkan Jadual 14.2 di ruang jawapan..

(b) Calculate the estimated mean mark 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 29.
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan di halaman 29.

Using the scale of 2 cm to 5 marks on the horizontal axis and 2 cm to 5 students on the vertical axis, draw an ogive for the data.
Dengan menggunakan skala 2 cm kepada 5markah pada paksi mengufuk dan 2 cm kepada 5 murid pada paksi mencanvang, lukiskan satu ogif bagi data tersebut.

[4 *marks*]

(d) Using the ogive drawn in 14(c)
menggunakan ogif yang dilukis di 14 (c)

(i) find the third quartile
cari kuartil ketiga ,

(ii) state one information regarding the third quartile .
nyatakan satu maklumat tentang kuartil ketiga . [2 *marks*]

Answer :
(a)

Marks	Frequency	Midpoint	Upper boundary	Cumulative frequency
65 – 69	2	62	64.5	0
70 – 74	6			
75 – 79	8			
80 – 84	12			
85 – 89	10			
90 – 94	7			
95 – 99	3			

Table 14.2

(b)

(c) Refer graph on page 29.
Rujuk graf di halaman 2.

(d) (i)

(ii)

Graph for Question 14
Graf untuk soalan 14

15 You are **not** allowed to use graph paper to answer this question .
Anda **tidak** *dibenarkan menggunakan kertas graf untuk menjawab soalan ini .*

(a) Diagram 15.1 shows a solid right prism with a rectangular base *ABHG* on a horizontal plane . The surface *ABCDE* is the uniform cross-section of the prism . *AE* and *BC* are vertical edges . Rectangle *EDKF* is a horizontal plane and rectangle *DCJK* is an inclined plane .

Rajah 15.1 *menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segi empat tepat ABHG terletak pada suatu satah mengufuk . Permukaan ABCDE ialah keratin rentas seragam prisma itu . Tepi AE dan BC adalah tegak . Segi empat tepat EDKF ialah satah mengufuk dan segi empat tepat DCJK ialah satah condong .*

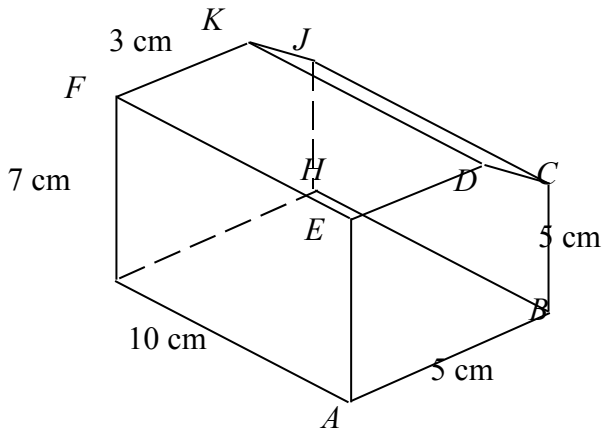


Diagram 15.1

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

[3 *marks*]

Answer :
(a)

(b) Another solid right prism with trapezium AGUV as the uniform cross-section is joined to the prism in Diagram 15.1 at the vertical plane ARSG . The composite solid

is as shown in Diagram 15.2 . The base ABHGUV lies on a horizontal plane . VQ and UP are vertical edges and $\angle AGU = \angle GUV = 90^0$

Sebuah pepejal lain berbentuk prisma tegak dengan trapezium AGUV sebagai keratin rentas seragamnya dicantumkan kepada prisma dalam Rajah 15.1 *pada satah mencancang ARSG . Gabungan pepejal adalah seperti yang ditunjukkan dalam Rajah* 15.2 *. Tapak ABHGUV terletak pada suatu saatah mengufuk . Tepi VQ dan UP adalah tegak dan* $\angle AGU = \angle GUV = 90^0$

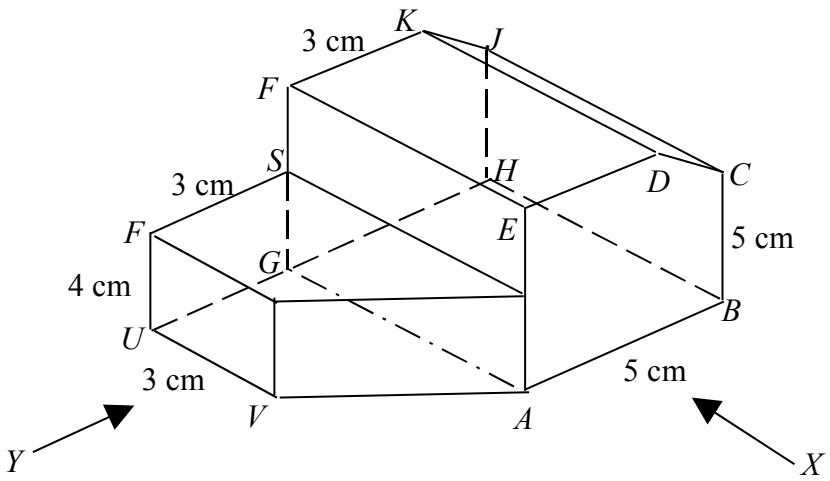


Diagram 15.2

Draw full scale,
Lukis dengan skala penuh,

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

[4 *marks*]

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

[5 *marks*]

Answer :
(b) (i), (ii)

13 Diagram 16 shows the locations of point P (58^0 S , 100^0 E) , and point V (58^0 N , 30^0 E) on the surface of the earth . O is the centre of the earth . PQ is the diameter of the common parallel of latitude 58^0 S .

Rajah 16 menunjukkan kedudukan titik P (58^0 U , 100^0 T) dan titik V (58^0 S , 30^0 T) pada permukaanbumi , O ialah pusat bumi . PQ ialah diameter selarian latitude sepunya 58^0 S .

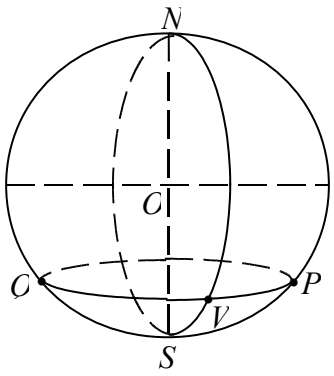


Diagram 16

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

[2 *marks*]

(b) Calculate the shortest distance , in nautical miles , from P *to* Q measured along the surface of the earth .
Hitung jarak terpendek,,dalam batu nautika, ,dari P ke Q diukur disepanjang permukaan bumi .

[2 *marks*]

(c) Calculate the distance , in nautical mile , from V due east to P measured along the common parallel of latitude .
hitung jarak , dalam batu nautika , dari V arah ke timur ke P diukur sepanjang selarian latitude sepunya .

[3 *marks*]

(d) Point R lies 3960 nautical miles due north of P . An aeroplane took off from P and flew due north to R . The flight took 8 hours .
Titik R terletak 3960 batu nautika ke utara P . Sebuah kapal terbang berlepas dari P arah ke utara ke R . Tempoh penerbangan ialah 8 *jam .*

(i) Calculate the latitude of R
Hitung latitude bagi R .

(ii) Calculate the average speed , in knot , of the aeroplane from P to R .
Hitung purata laju , dalam knot , kapal terbang itu dari P ke R .

[5 *marks*]

Answer :

(a)

(b)

(c)

(d)

END OF QUESTION PAPER

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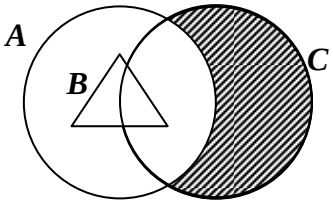
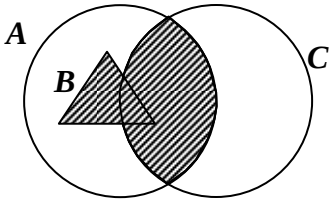
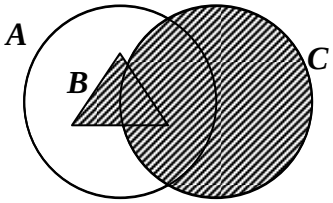
PEPERIKSAAN SPM (ULANGAN) 2009

MARKING SCHEME

MATHEMATICS
PAPER 2 (1449/2)

MARKAH MAKSIMUM BAGI KERTAS INI : 100 MARKAH

No	MARKING SCHEME	Mark	
1	(a) 	1	
	(b) 	2	
	Note: $B \cup C$ correctly shaded, 1 mark 		**3**
2	$2p^2 + 5p - 3 = 0$ $(2p-1)(p+3) = 0$ $p = \frac{1}{2}, \quad p = -3$	1 1 1,1	**4**
3	$12x - 3y = 27$ or $4x + 6y = 2$ or $x = \frac{1-3y}{2}$ or $y = 4x - 9$ or equivalent $-7y = 7$ or $14x = 28$ $x = 2, \quad y = -1$ **OR** $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{(2)(-1)-(3)(4)} \begin{pmatrix} -1 & -3 \\ -4 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ 9 \end{pmatrix}$ 2 $x = 2$ 1 $y = -1$ 1 *Note* : $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$ as final answer, award 1 mark	1 1 1, 1	**4**

4	(a) $\angle PMQ$ or $\angle QMP$ (b) $\tan\theta = \frac{6}{4}$ $56.31°$ or $56°\ 19'$ or 56.3 0r $56°\ 18'$	1 1 1	**3**
5(a)	False // Palsu	1	
5(b)	If $m-3>0$ then $m>3$ // Jika $m-3>0$ maka $m>3$ If $m>3$ then $m-3>0$ // Jika $m>3$ maka $m-3>0$	1 1	
5(c)	$3n+2,\ n=1,2,3,4,...$ <u>Note</u> : $3n+2$ only, award 1 mark	2	**5**
6 (a)	$m_{PQ}=\frac{1}{2}$ $\frac{y-10}{x-4}=\frac{1}{2}$ or $10=\frac{1}{2}(4)+c$. $y=\frac{1}{2}x+8$ or equivalent	1 1 1	
6(b)	$0=\frac{1}{2}x+8$ -16 .	1 1	**5**
7 (a)	$\begin{pmatrix} -\frac{4}{3} & \frac{5}{3} \\ -\frac{7}{3} & \frac{8}{3} \end{pmatrix}$ Note: 1. Accept $\frac{1}{3}\begin{pmatrix} -4 & 5 \\ -7 & 8 \end{pmatrix}$ for 2 marks 2. $\frac{1}{(8)(-4)-(-5)(7)}\begin{pmatrix} -4 & 5 \\ -7 & 8 \end{pmatrix}$ or $\frac{1}{3}\begin{pmatrix} -4 & 5 \\ -7 & 8 \end{pmatrix}$ award 1 mark	2	
7(b)	$\begin{pmatrix} 8 & -5 \\ 7 & -4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=\begin{pmatrix} 2 \\ 1 \end{pmatrix}$	1	**6**

	$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{(8)(-4)-(-5)(7)}\begin{pmatrix} -4 & 5 \\ -7 & 8 \end{pmatrix}\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ $x = -1$ $y = -2$	1 1 1	
8	$5 \times 7 \times 9$ $\frac{1}{2} \times \frac{1}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 9$ $5 \times 7 \times 9 - \frac{1}{2} \times \frac{1}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 9$ $\frac{1029}{4}$ or $257\frac{1}{4}$ or $257.25 - 257.30$	1 1 1 1	**4**
9(a)	{(B, 4), (B, 6), (B, 7), (E, 4), (E, 6), (E, 7), (S, 4), (S, 6), (S, 7), (T, 4), (T, 6), (T, 7)} Notes : 1. Accept 8 correct listings for 1 mark	2	
(b) (i)	{(E, 4), (E, 6)} $\frac{2}{12}$ or $\frac{1}{6}$	1 1	
(ii)	{(E, 4), (E, 6), (E, 7), (B, 4), (B, 6), (S, 4), (S, 6), (T, 4), (T, 6)} $\frac{9}{12}$ or $\frac{3}{4}$	1 1	
			6

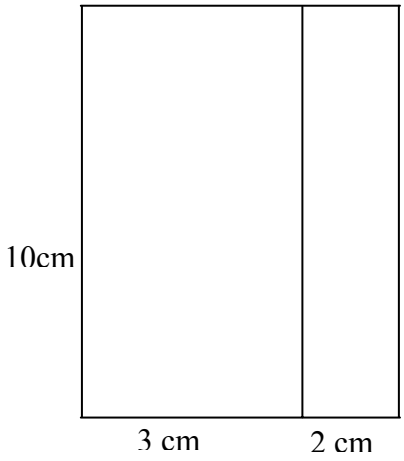
10(a)	$\frac{30}{360}\times 2\times\frac{22}{7}\times 14$	1	
	$\frac{30}{360}\times 2\times\frac{22}{7}\times 14+14+14+14+14$ or equivalent	1	
	$\frac{190}{3}$ or $63\frac{1}{3}$ or 63.28 – 63.33	1	
10(b)	$\frac{90}{360}\times\frac{22}{7}\times 14\times 14$ or $\frac{30}{360}\times\frac{22}{7}\times 14\times 14$ or $\frac{120}{360}\times\frac{22}{7}\times 14\times 14$	1	
	$14\times 14+\frac{30}{360}\times 2\times\frac{22}{7}\times 14$ – $\frac{90}{360}\times\frac{22}{7}\times 14\times 14$ or equivalent	1	
	$\frac{280}{3}$ or $93\frac{1}{3}$ or 93.28 – 93.47	1	
			6
11(a)	20	1	**1**
(b)	$\frac{20-12}{5-0}$ or equivalent	1	
	$\frac{8}{5}$ *or* $1\frac{3}{5}$ *or* 1.6	1	**2**
(c)	$20(t-5)+\frac{1}{2}(15-t)\times 20=140$ or	2	
	$\frac{1}{2}[(t-5)+(15-5)]\times 20=140$	1	
	$t=9$		**3**
			6

12(a)	– 1 – 5	1 1	
12(b)	Both axes with uniform scales and in the right directions for $-4 \le x \le 3$ and $-11 \le y \le 17$ All 7 points and *2 points correctly plotted or curve passes through all the points for $-4 \le x \le 3$ and $-11 \le y \le 17$ Smooth curves and continuous curve without any straight line and passes all 9 correct points using the given scales for $-4 \le x \le 3$ and $-11 \le y \le 17$	1 2 1	
12(c)	(i) $-10.5 \le y < -9.5$ (ii) $-3.2 \le x \le -3.1$, $1.5 < x \le 1.7$ Identify equation $y = -5x + 15$ or $2x^2 + 3x - 10 = -5x + 15$ Straight line $y = -5x + 15$ correctly drawn $2.0 < x \le 2.1$	1 1,1 1 1 1	**12**
13(a)	(i) (3, 4) (ii) (0, 1)	1 2	
(b)	(i) (a) U : Rotation 180° Centre M (b) ***V*** : Enlargement Scale factor 2 Centre M OR U : Enlargement scale factor – 1 centre M V : Enlargement scale factor 2 centre M OR U : Enlargement scale factor 2 centre *x* V : Rotation 180° centre *y* (ii) 24×2^2 $24 \times 2^2 - 24$ OR $\frac{24}{18}$ or $\frac{24}{18} \times 72$	3 3 1 1	

	$\frac{24}{18}\times 54$ or $\frac{24}{18}\times 72-24$ 72	1	**3** **12**
14	(a) (b) $\frac{2(67)+6(72)+8(77)+12(82)+10(87)+7(92)+3(97)}{48}$ 82.73 (c) *Refer graph on page 11* Both axes with correct uniform scales and directions for $64.5 \le x \le 99.5$ and $0 \le y \le$ *48 Using upper boundaries or midpoint or class intervals *8 points correctly plotted (64.5, 0) correctly plotted or ogive starts from (64.5,0) and a smooth and continuous curve without any straight line and passes all 8 correct points for $64.5 \le x \le 99.5$ (d)(i) $88 \le$ third quartile ≤ 89 (ii) less than 10 students obtained mark more than 90 Or Any correct information valid.	1 1 1 2 1 1 2 1 1 1	**3** **3** **4** **2** **12**

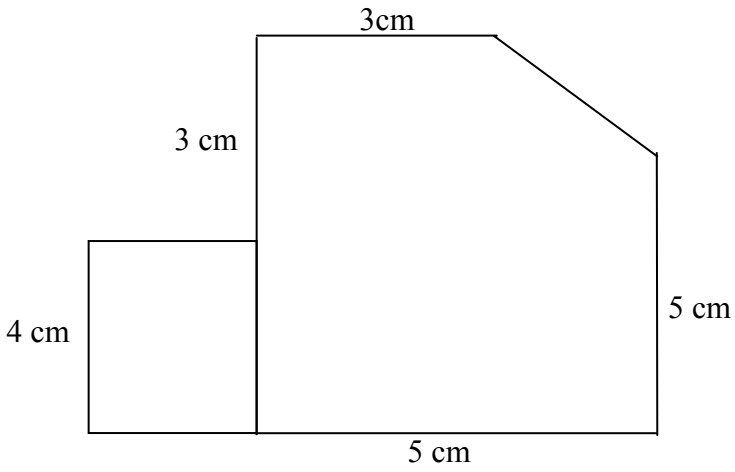
Marks	Frequency	M. point	U.B	C.F
60 – 64	0	62	64.5	0
65 – 69	2	67	69.5	2
70 – 74	6	72	74.5	8
75 – 79	8	77	79.5	16
80 – 84	12	82	84.5	28
85 – 89	10	87	89.5	38
90 – 94	7	92	94.5	45
95 – 99	3	97	99.5	48

15 (a)



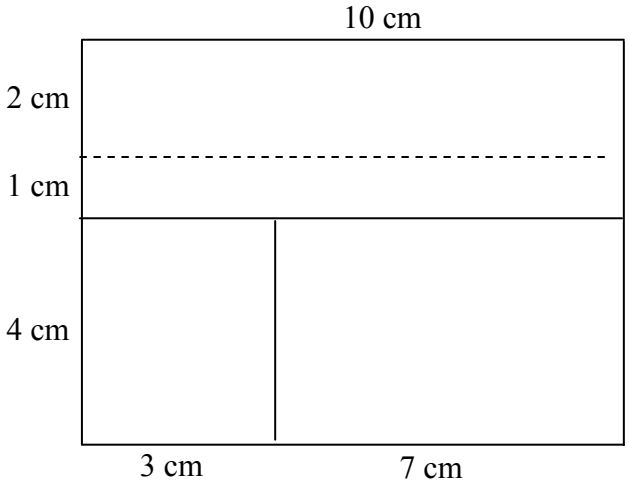
3

15(b) (i)



4

(ii)



5

12

16(a)	80^{o} W Note : 80^{o} or θ^{o} W , give 1 mark	2 1	**2**
16(b)	2 x (90 – 58) x 60 or equivalent 3840	1 1	**2**
16(c)	(100 – 30) x 60 x cos 58 Note (100 – 30) or using cos 58 correctkly award 1 mark 2226	2 1	**3**
16(d)	(i) $\frac{3960}{60}$ or 66 $\frac{3960}{60} \sim 58$ 8 ° N (ii) $\frac{3960}{8}$ 495	1 1 1 1 1	**5**
			12

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Graph for Question 12