NAMA :

TINGKATAN :

SEKTOR SEKOLAH BERASRAMA PENUH
BAHAGIAN SEKOLAH
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SELARAS SBP
SIJIL PELAJARAN MALAYSIA 2007

MATEMATIK

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini mengandungi dua bahagian :* **Bahagian A** *dan* **Bahagian B**. *Jawab* **semua** *soalan daripada* **Bahagian A** *dan* **empat** *soalan dalam* **Bahagian B**.

2. *Jawapan hendaklah ditulis dengan jelas dalam ruang yang disediakan dalam kertas soalan. Tunjukkan langkah-langkah penting. Ini boleh membantu anda untuk mendapatkan markah.*

3. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*

4. *Satu senarai rumus disediakan di halaman 2 & 3.*

5. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.*

Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	4	
	2	4	
	3	3	
	4	4	
	5	5	
	6	4	
	7	6	
	8	5	
	9	5	
	10	6	
	11	6	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
Jumlah			

Kertas soalan ini mengandungi 26 halaman bercetak.

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

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

SHAPES AND SPACE

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

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

3 Area of circle = πr^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 × 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 = $\frac{1}{3}$ × base area× height

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

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

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 × area of object

Untuk Kegunaan Pemeriksa

Section A
[52 *marks*]

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

1 Solve the quadratic equation $5 - \frac{3}{2x} = 4x - 2$. [4 *marks*]

Answer :

Untuk Kegunaan Pemeriksa

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

$$5x - 3y = -8$$

$$x + \frac{1}{2}y = 5$$

[4 *marks*]

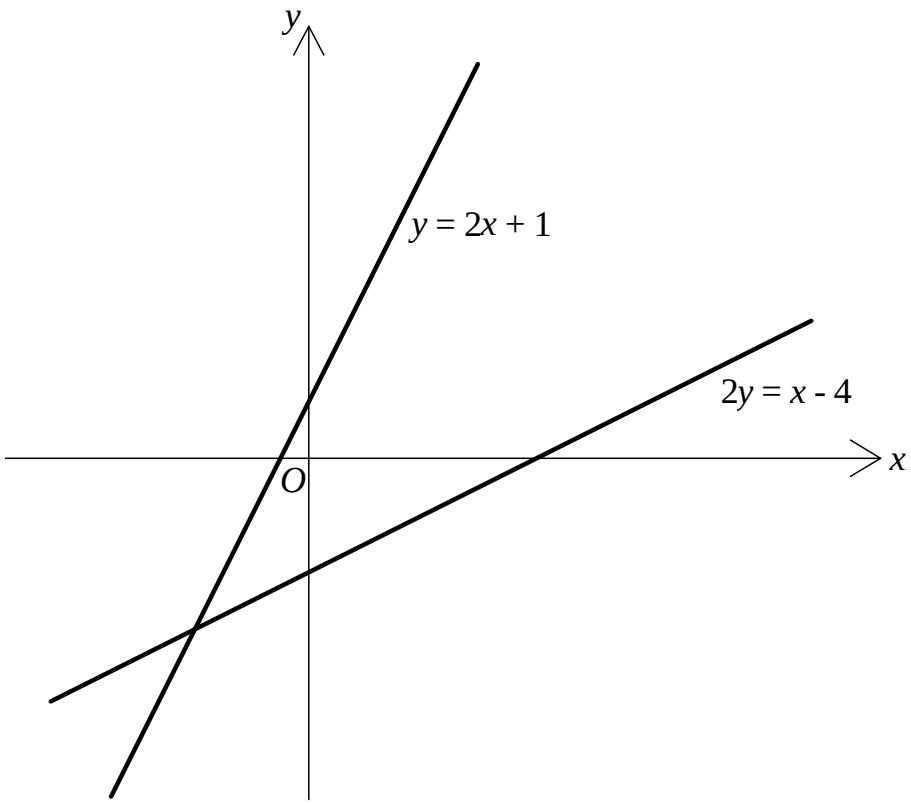
Answer :

Untuk Kegunaan Pemeriksa

3 On the graph in the answer space, shade the region which satisfies the three inequalities $2y \geq x - 4$, $y \leq 2x + 1$ and $y < 1$.

[3 *marks*]

Answer :



Untuk Kegunaan Pemeriksa

4 Diagram 1 shows a right prism with a horizontal rectangular base *JKLM*. Trapezium *JKQP* is the uniform cross-section of the prism. The rectangular surface *QRLK* is inclined.

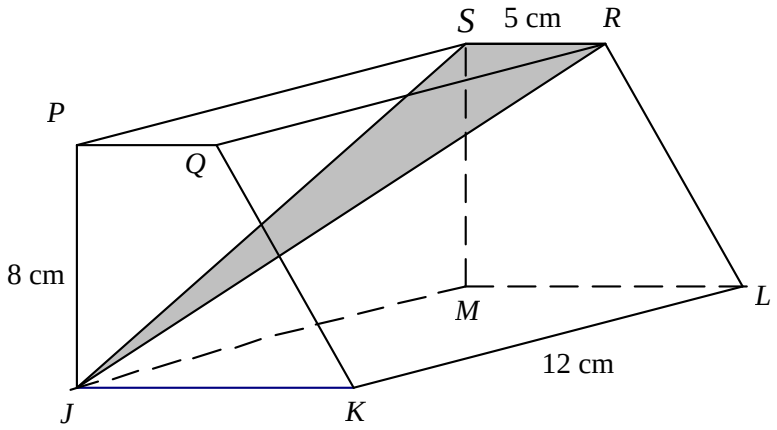


DIAGRAM 1

Calculate the angle between the plane *RSJ* and the vertical plane *RSML*.

[4 *marks*]

Answer :

Untuk Kegunaan Pemeriksa

5 In Diagram 2, *O* is the origin. *JK*, *KL* and *LM* are straight lines. *JK* is parallel to *LM* and *KL* is parallel to the x-axis.

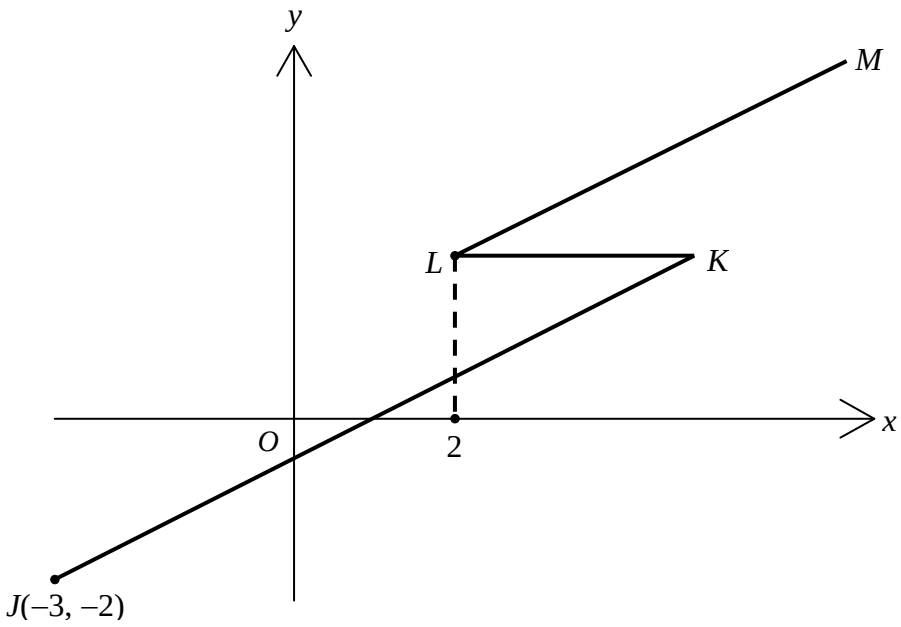


DIAGRAM 2

The equation of *LM* is $2y = x + 4$.

(a) State the equation of the straight line *KL*.

(b) Find the equation of the straight line *JK* and hence, state its *y*-intercept.

[5 *marks*]

Answer :

(a)

(b)

6 Diagram 3 shows a solid that is a combination of a pyramid *VPQRS* and a semi cylinder with diameter 7 cm. *VS* = 8 cm, *PS* = *QR* = 6 cm. Using $\pi = \frac{22}{7}$, find the volume, in cm^3 of the solid.

Untuk Kegunaan Pemeriksa

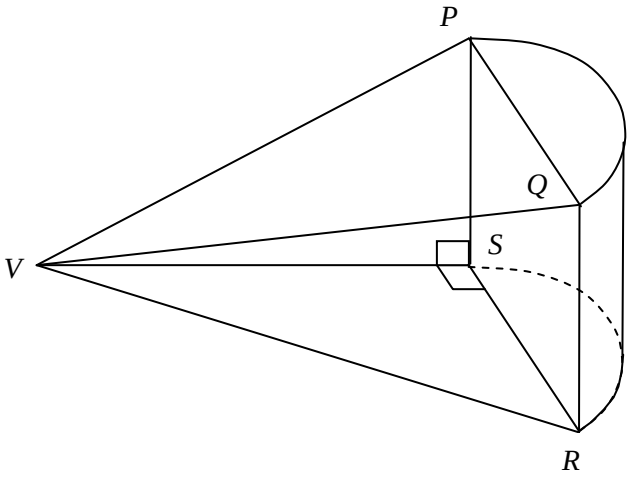


DIAGRAM 3

[4 *marks*]

Answer :

Untuk Kegunaan Pemeriksa

7 Diagram 4 shows two semicirles *AOBCE* and *OBCD*, with the centre *O* and *B* respectively.

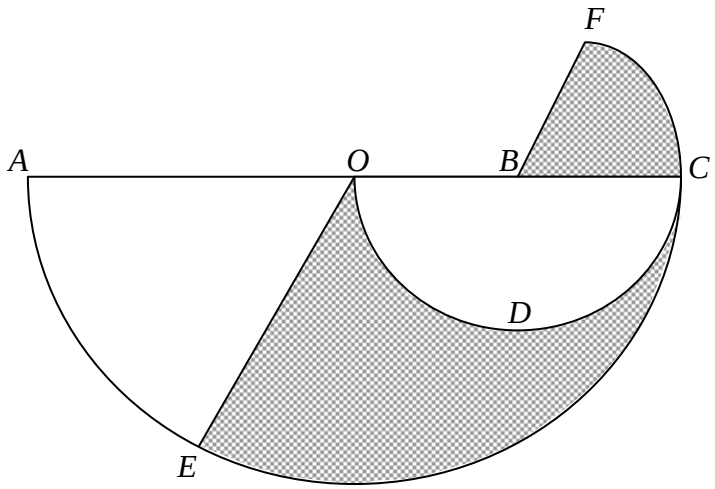


DIAGRAM 4

BFC is a sector with the centre *B*. *AOBC* is a straight line and $AO = 2OB$.
$BC = 3.5$ cm and $\angle FBC = \angle AOE = 60°$. Using $\pi = \frac{22}{7}$, calculate

(a) the perimeter, in cm, of the whole diagram,

(b) the area, in cm^2, of the shaded region.

[6 *marks*]

Answer:

(a)

(b)

Untuk Kegunaan Pemeriksa

8 *(a)* Determine whether the following sentence is a statement.

" 7 is not a factor of 40 "

(b) Write two implications from the following statement.

" $P \subset R$ if and only if $P \cap R = P$ "

(c) Make a general conclusion by induction for the following number pattern.

$5 = 4(1) + 1^3$
$16 = 4(2) + 2^3$
$37 = 4(3) + 3^3$
$80 = 4(4) + 4^3$
……. [5 *marks*]

Answer :

(a) ……..

(b) Implication 1 : ……..

…….

Implication 2 : …….

…… …….

(c) Conclusion : ……

Untuk Kegunaan Pemeriksa

9 Table 1 shows the results of a survey. The survey is on the mode of transport to SMK Shahbandar on a particular day involving 200 students.

	Boys	**Girls**
Bus	60	30
Car	28	36
Bicycle	32	14

TABLE 1

(a) If a student is picked at random, find the probability that the student went to school by car.

(b) If two boys are picked at random, find the probability that both boys went to school by bus.

[5 *marks*]

Answer :

(a)

(b)

10 Diagram 5 shows the speed-time graph of a particle for a period of 10 seconds. Given that the total distance travelled in the first 6 seconds is twice of the total distance travelled in the last 4 seconds.

Untuk Kegunaan Pemeriksa

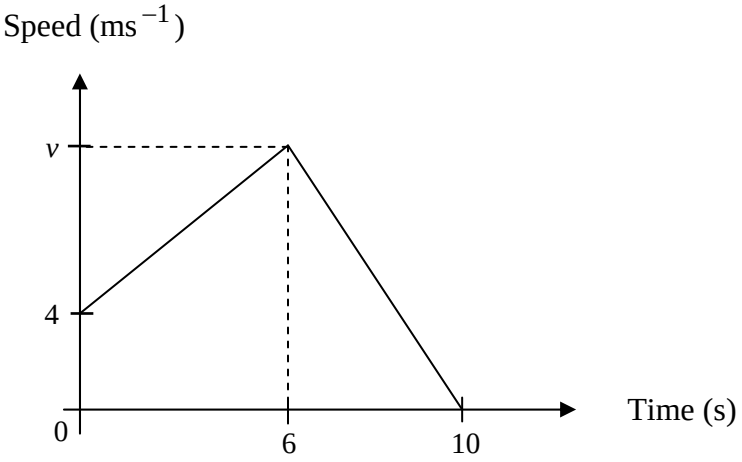


DIAGRAM 5

(a) Calculate the value of *v*.

(b) Calculate the rate of change of speed, in ms^{-2}, in the first 3 seconds.

[6 *marks*]

Answer :

(a)

(b)

Untuk Kegunaan Pemeriksa

11 *(a)* Given that $\frac{1}{k}\begin{pmatrix}1 & -3\\ 2 & 4\end{pmatrix}\begin{pmatrix}4 & p\\ -2 & 1\end{pmatrix}=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}$. Find the value of k and p.

(b) Write the following simultaneous equations as a matrix equation:

$$m-3n=-6$$
$$2m+4n=3$$

Hence, using matrices, calculate the value of m and n.

[6 *marks*]

Answer :

(a)

(b)

Untuk Kegunaan Pemeriksa

Section B
[48 *marks*]

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

12 *(a)* Complete Table 2 in the answer space for the equation $y = x^3 - 4x - 2$.

[2 *marks*]

(b) *For this part of question, use the graph paper provided on page* 16. *You may use a flexible curve ruler.*

By using a scale of 2 cm to 1 unit on the *x*-axis and 2 cm to 5 units on the *y*-axis, draw the graph of $y = x^3 - 4x - 2$ for $-2{\cdot}5 \le x \le 4$.

[4 *marks*]

(c) From your graph, find

(i) the value of x when $y = 5$

(ii) the value of y when $x = 3.3$ [2 *marks*]

(d) Draw a suitable straight line on your graph to find the positive values of x which satisfy the equation $x^3 - 10x + 3 = 0$ for $-2{\cdot}5 \le x \le 4$.

State the values of *x*.

[4 *marks*]

Answer :

(a)

x	–2.5	–2	–1	0.5	1	2	3	4
y		–2	1	– 3.9	–5		13	46

TABLE 2

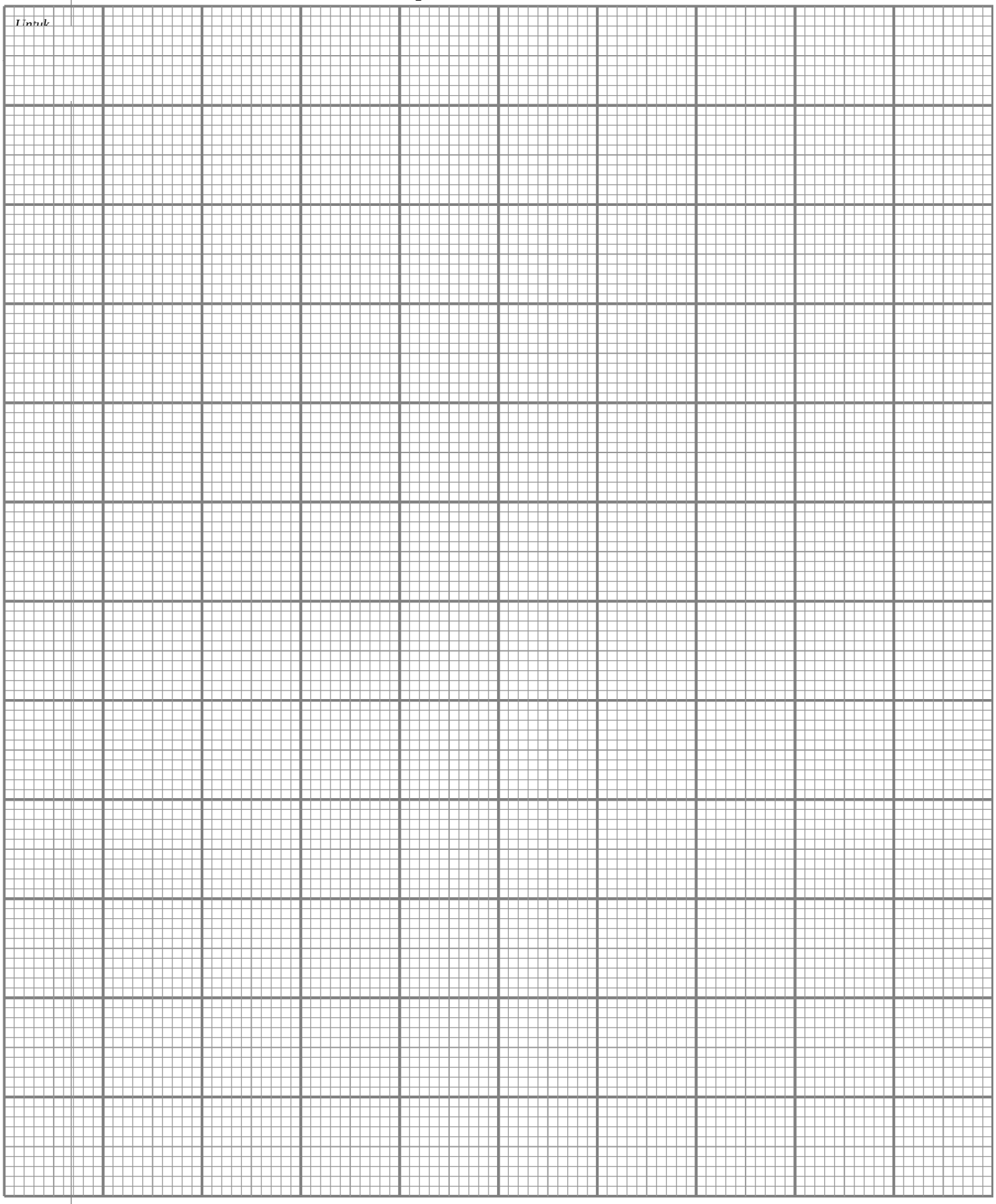
(b) *Refer graph on page 16*

(i) *y* = ……

(ii) *x* = ……

(c) *x* = …… , ……

Graph for Question 12



Untuk Kegunaan Pemeriksa

13 *(a)* Transformation **R** is a rotation 90^o anticlockwise at (5, 5) and transformation **T** is a translation $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$.

State the coordinates of the image of point (1, 4) under each of the following transformations:

(i) Translation **T**,

(ii) Combined transformations **TR**.

[3 *marks*]

(b) Diagram 6 shows three quadrilaterals, *JKLM*, *PQRS* and *TUVW* drawn on a Cartesian plane.

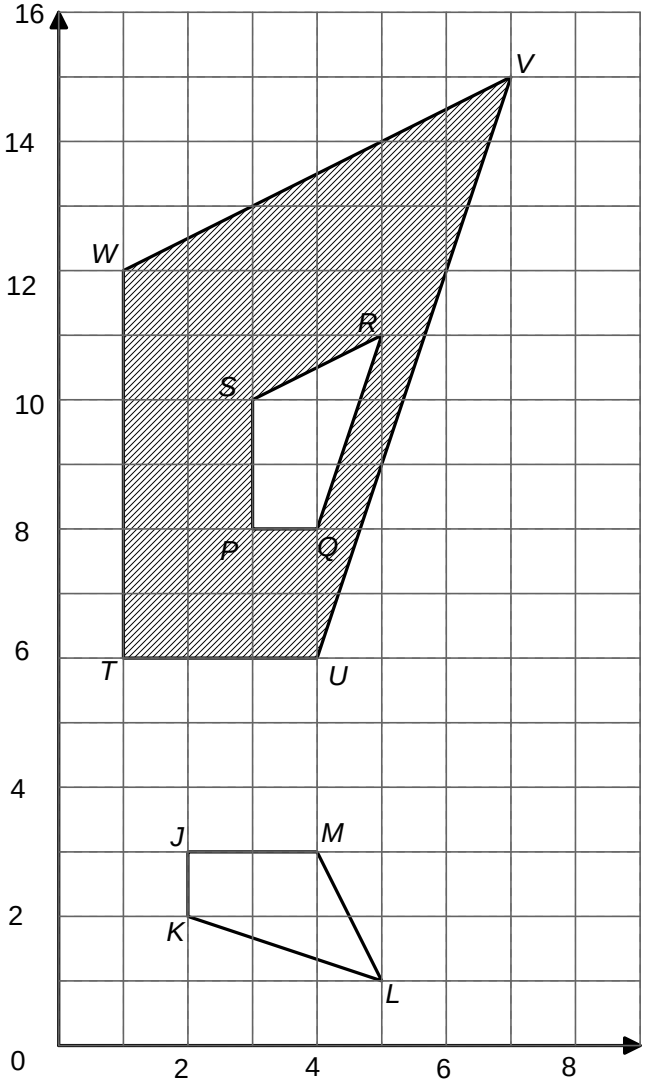


DIAGRAM 6

Untuk Kegunaan Pemeriksa

PQRS is the image of *JKLM* under transformation **Q**.
TUVW is the image of *PQRS* under transformation **M**.

(i) Describe in full the transformation:

(a) **Q**,

(b) **M**.

[6 *marks*]

(ii) Given that quadrilateral *JKLM* represents a region of area 343 cm^2. Calculate the area, in cm^2, of the shaded region.

[3 *marks*]

Answer :

(a) *(i)*

(ii)

(b) *(i)* *(a)* **Q** :

(b) **M** :

(ii)

Untuk Kegunaan Pemeriksa

14 The data in Diagram 7 shows the number of telephone calls made by 40 students in a month.

28	22	34	26	22	37	35	38
23	20	22	33	39	17	45	28
21	39	35	14	38	24	27	35
19	34	31	26	40	32	28	44
30	32	29	27	32	40	33	30

DIAGRAM 7

(a) Using data in Diagram 7 and a class interval of 5 telephone calls, complete Table 3 in the answer space.

[4 *marks*]

(b) *For this part of the question, use the graph paper provided on page 21.*

By using a scale of 2 cm to 5 telephone calls on the horizontal axis and 2 cm to 5 students on the vertical axis, draw an ogive based on Table 3.

[5 *marks*]

(c) Find the interquartile range from your ogive in *(b)*, [3 *marks*]

Untuk Kegunaan Pemeriksa

Answer :

(a)

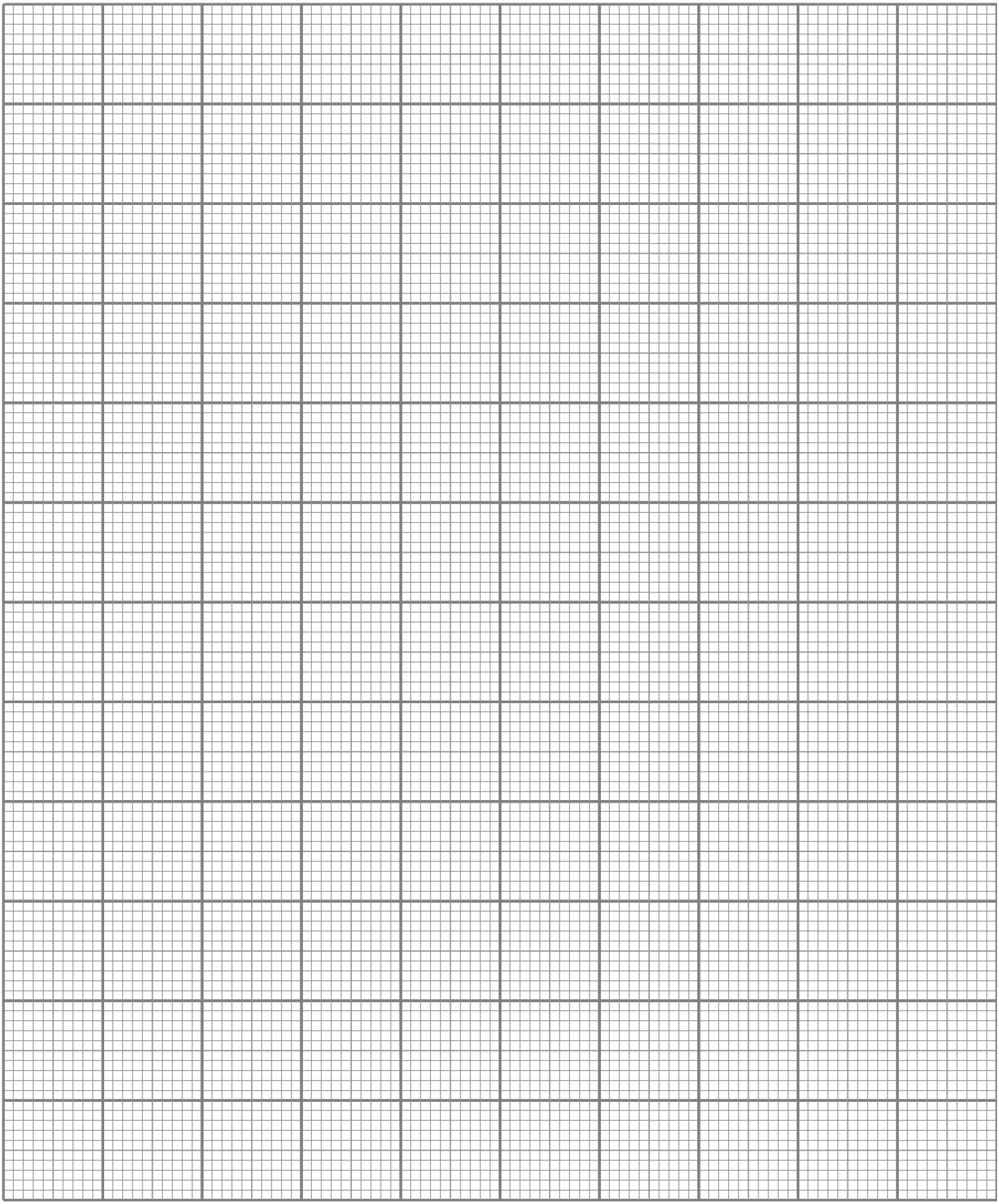
Number of telephone calls	Upper Boundary	Frequency	Cumulative Frequency
6 – 10	10.5	0	0
11 – 15			
16 – 20			

TABLE 3

(b) *Refer graph on page* 21

(c)

Graph for Question 14



Untuk Kegunaan Pemeriksa

15 *You are* **not** *allowed to use graph paper to answer this question.*

(a) Diagram 8(i) shows a solid right prism with rectangular base *PQMN* on a horizontal table.The surface *PSTN* is its uniform cross-section.
The rectangle *RSTU* is an inclined plane. The edges *UM*, *TN* , *SP* and *RQ* are vertical edges.

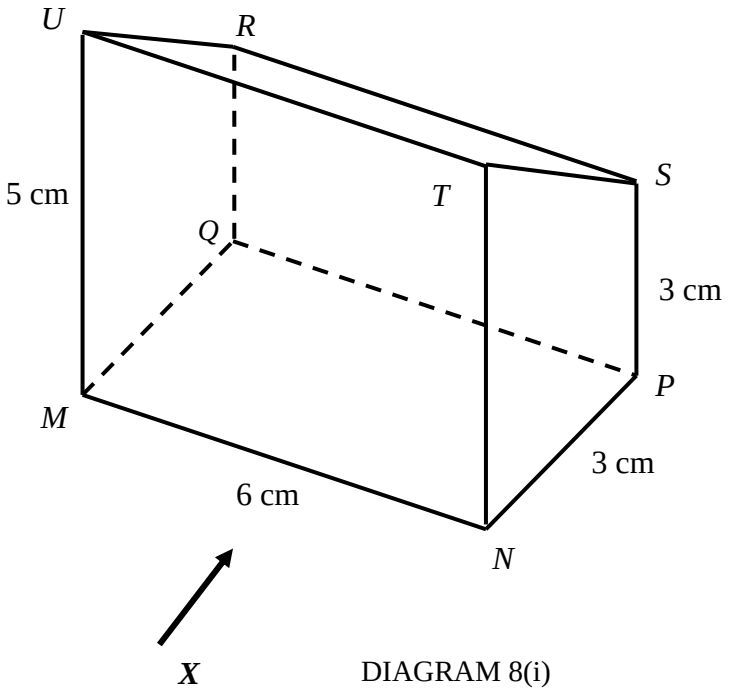


DIAGRAM 8(i)

Draw to full scale, the elevation of the solid on a vertical plane parallel to *MN* as viewed from ***X***.

[4 *marks*]

Answers :

15 *(a)*

Untuk Kegunaan Pemeriksa

(b) Another solid right prism is joined to the solid in the Diagram 8 (i) at the vertical plane *MNWVU* to form a combined solid as shown in Diagram 8 (ii).

The surface *DEFGJ* is its uniform cross-section and *GFNW* is an inclined plane.
The rectangle *DJKL* is a horizontal plane.
The base *EFNPQM* is on a horizontal plane.
DE and *JG* are vertical.
JG = *KW* = 5 cm.

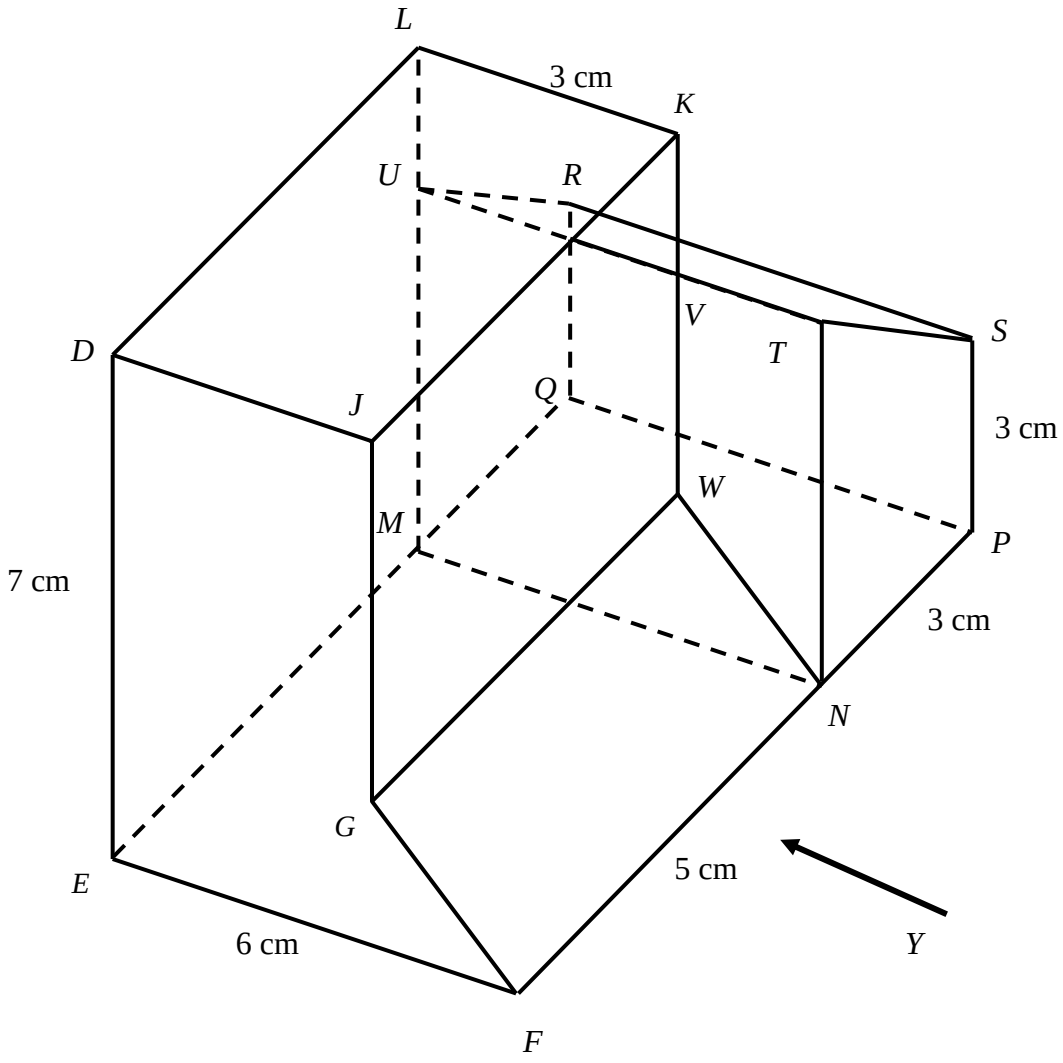


DIAGRAM 8 (ii)

Draw to full scale,

(i) the elevation of the combined solid on a vertical plane parallel to *FP* as viewed from *Y*,

[4 *marks*]

(ii) the plan of the combined solid. [4 *marks*]

Untuk Kegunaan Pemeriksa

Answer :

(b) *(i)*

(ii)

16 Diagram 9 shows five points, A (63^o S , 125^o W), B, C, D and E , on the surface of the earth. AB is the diameter of the earth. X is the centre of parallel of latitude passing through B and $\angle BXC = 30^0$.

Untuk Kegunaan Pemeriksa

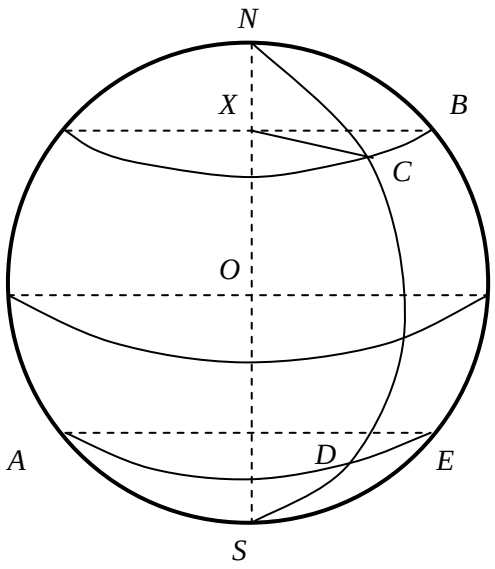


DIAGRAM 9

(a) Find the position of points B and C.

[3 *marks*]

(b) Calculate the shortest distance, in nautical miles, from A to E measured along the surface of the earth.

[3 *marks*]

(c) Calculate the distance, in nautical miles, from B to C, measured along the parallel of latitude.

[2 *marks*]

(d) An aeroplane took off from B and flew due south towards E, along the surface of the earth, and then flew due west towards D along the parallel of latitude with an average speed of 510 knots.

Calculate the total time taken, in hours, for the whole flight.

[4 *marks*]

Untuk Kegunaan Pemeriksa

Answer:

(a)

(b)

(c)

(d)

END OF QUESTION PAPER