

SULIT
1449/2
Matematik
Kertas 2
Mei 2007
 $2\frac{1}{2}$ jam

1449/2

NAMA :

TINGKATAN :



SEKTOR SEKOLAH BERASRAMA PENUH
BAHAGIAN SEKOLAH
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERTENGAHAN TAHUN
TINGKATAN LIMA 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.*

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

Kertas soalan ini mengandungi 23 halaman bercetak dan 1 halaman tidak bercetak

MATHEMATICAL FORMULAE

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

RELATIONS

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

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

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

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

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

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

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

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

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

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

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

$$12 \quad \text{Pythagoras Theorem} \\ c^2 = a^2 + b^2$$

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

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

SHAPES AND SPACE

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

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 \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 = $\frac{1}{3} \times \text{base area} \times \text{height}$

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 = $k^2 \times \text{area of object}$

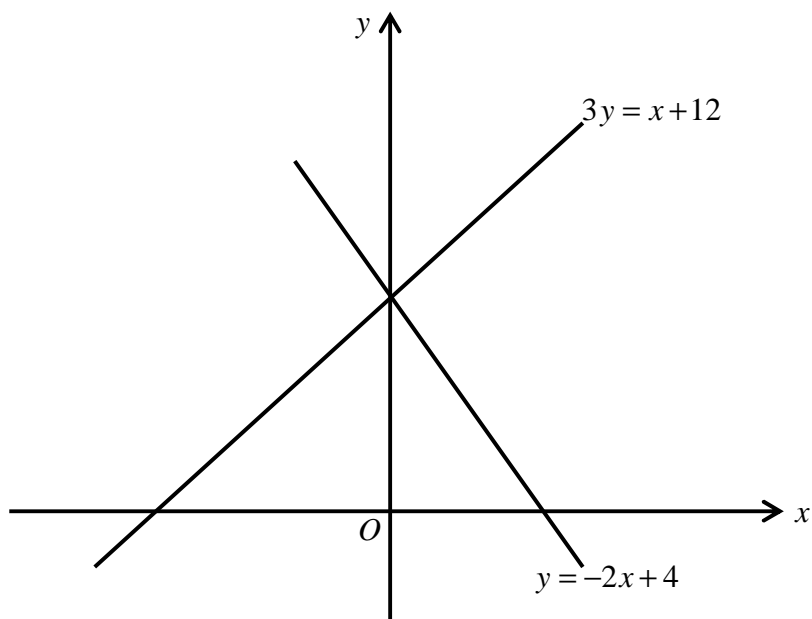
Section A
[52 marks]

Answer **all** questions in this section.

- 1** On the graph in the answer space, shade the region which satisfies the three inequalities $3y \leq x + 12$, $y \geq -2x + 4$ and $x < 2$.

[3 marks]

Answer :



2 If $\xi = \{x : 1 \leq x \leq 10, x \text{ is an integer}\}$

$$E = \{x : x \text{ is a multiple of } 4\}$$

$$F = \{x : x \text{ is a factor of } 20\}$$

- (a) List all the elements in set E ,
- (b) Find $n(E \cup F)$.

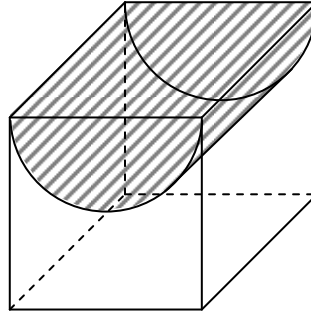
[3 marks]

Answer :

(a)

(b)

- 3** Diagram 1 shows a solid cube. A part of the cube in the shape of a half-cylinder is removed from its upper surface.



10 cm

DIAGRAM 1

Calculate the total surface area of the remaining solid.
[Use $\pi = 3.142$]

[4 marks]

Answer :

- 4 Diagram 2 shows a right prism with a horizontal rectangular base $PQRS$. $VUQR$ is a trapezium. M and N are the midpoints of PS and QR respectively.

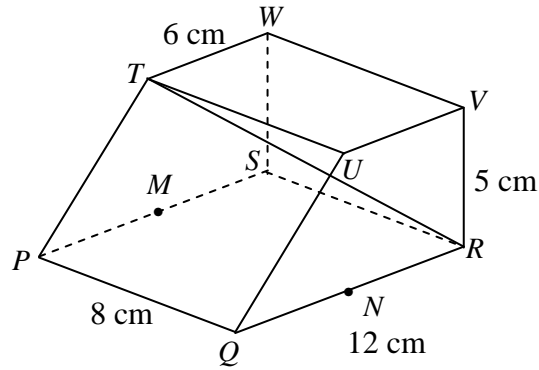


DIAGRAM 2

Calculate the angle between the line TR and the base $PQRS$.

[4 marks]

Answer :

- 5** (a) State whether the following statement is true or false.

$$“3^3 = 9 \text{ or } \sqrt[3]{8} = 2”$$

- (b) Write down two implications based on the sentence below.

“The inverse matrix of a 2×2 matrix exists if and only if the determinant is $\neq 0$ ”

- (c) Given the number sequence 3, 8, 15, 24, and

$$3 = 1^2 + 2(1)$$

$$8 = 2^2 + 2(2)$$

$$15 = 3^2 + 2(3)$$

$$24 = 4^2 + 2(4)$$

Make a general conclusion by using the induction method for the numerical sequence above.

[5 marks]

Answer :

(a)

(b)

(c)

- 6** Calculate the value of v and of w that satisfy the following simultaneous linear equations:

$$3v + 4w = 8$$

$$\frac{2}{3}v - 8w = 4$$

Answer :

[4 marks]

7 In Diagram 3, PQ and RS are parallel to the x -axis and PS is parallel to RT .

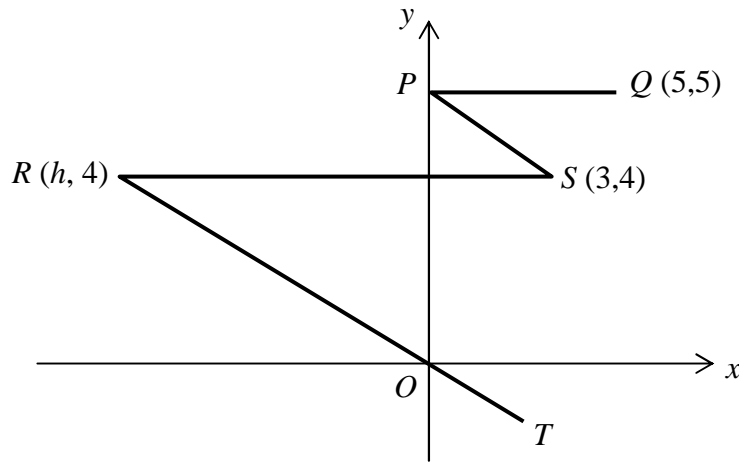


DIAGRAM 3

Find the

- (a) equation of the line PQ ,
- (b) gradient of the line PS ,
- (c) value of h , hence, find the equation of line RT .

[7 marks]

Answer:

(a)

(b)

(c)

8 Solve the quadratic equation $\frac{3x(x-3)}{2} + x = 2(1+x)$

[4 marks]

Answer :

- 9 (a) Given that the inverse matrix for $H = \begin{pmatrix} 5 & -8 \\ 1 & -2 \end{pmatrix}$ is $\begin{pmatrix} m & -4 \\ \frac{1}{2} & n \end{pmatrix}$.

Find the value of m and of n .

- (b) Using matrices, calculate the value of x and of y that satisfy the simultaneous linear equations:

$$5x - 8y = 9$$

$$x - 2y = 3$$

[6 marks]

Answer :

(a)

(b)

10 In Diagram 4, ABD is an arc of a sector with the centre O and BCD is a quadrant.

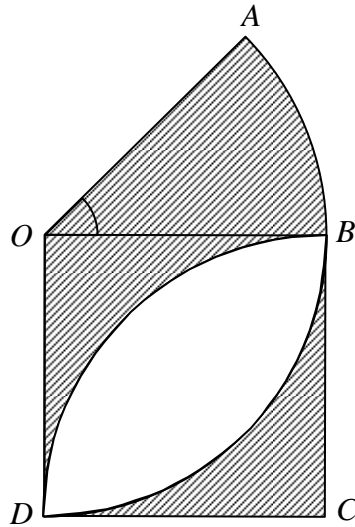


DIAGRAM 4

$OD = OB = 14$ cm and $\angle AOB = 45^\circ$.

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)

11 Diagram 5 shows the speed-time graph of a motorcyclist in a period of 30 seconds.

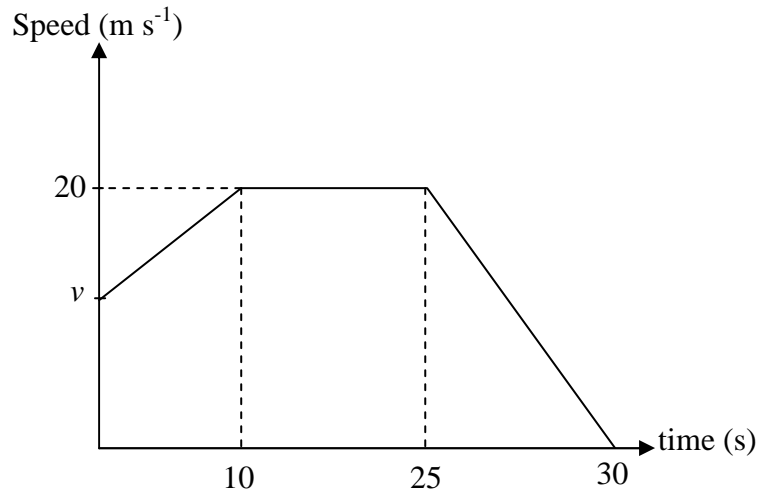


DIAGRAM 5

Given that the total distance travelled by the motorcyclist is 525 m.

Calculate,

- (a) the rate of change of speed in the last 5 second,
- (b) the duration of uniform speed,
- (c) the value of v .

[6 marks]

Answer :

(a)

(b)

(c)

Section B

[48 marks]

Answer **all** questions in this section.

- 12 (a) Complete Table 1 in the answer space for the equation $y = x^3 - 10x + 16$ by writing down the values of y when $x = -3, 1$ and 2 .

[3 marks]

Answer:

(a)	x	-3	-2	-1	0	1	2	3	4
	y		28	25	16			13	40

TABLE 1

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

By using a scale of 2 cm to represent 1 unit on the x -axis and a scale of 2 cm to represent 5 units on the y -axis, draw the graph of $y = x^3 - 10x + 16$ for $-3 \leq x \leq 4$.

[4 marks]

Answer:

- (b) Refer graph on page 16.
- (c) From your graph, find the value of y when $x = -0.6$.

[1 mark]

Answer:

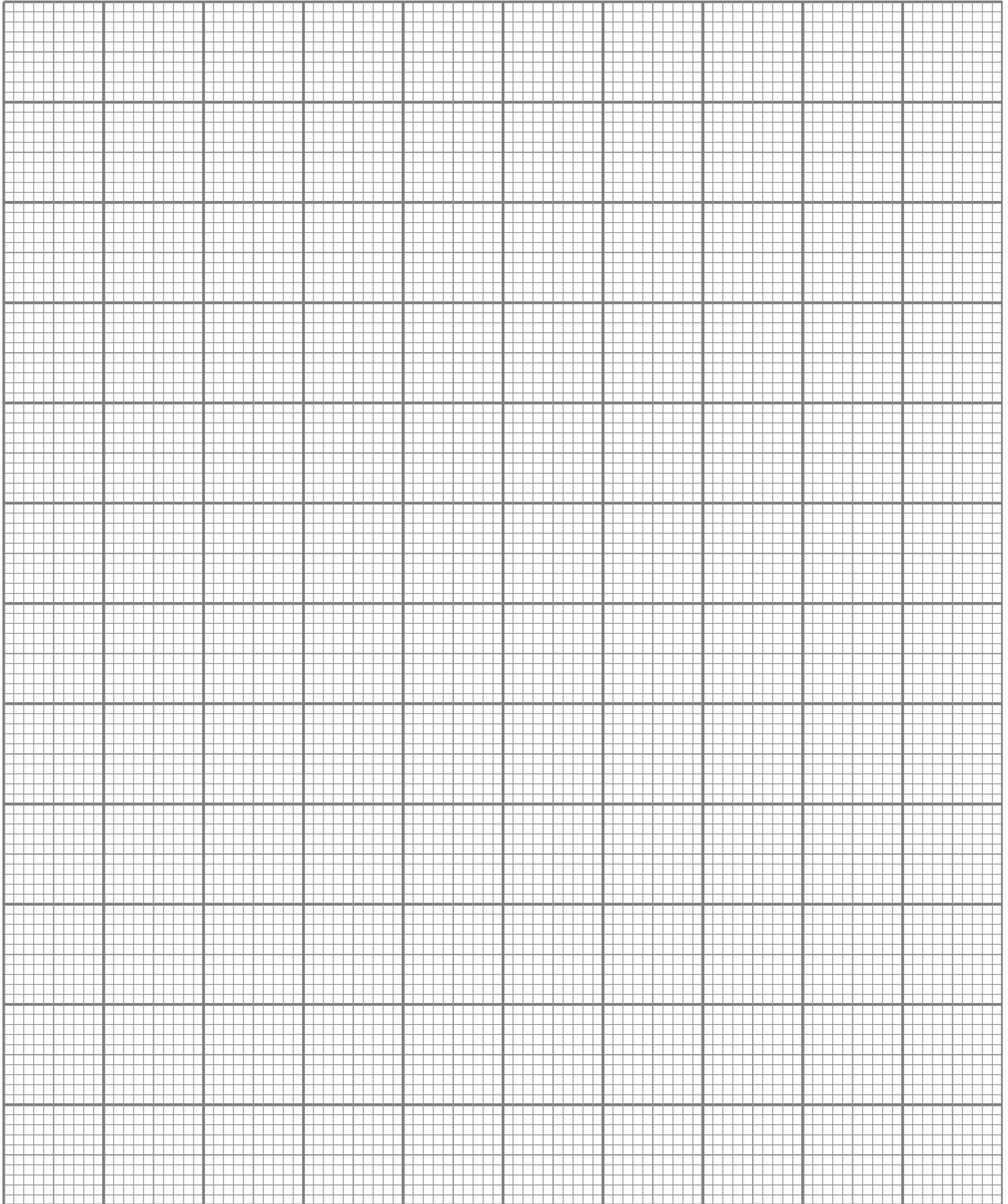
- (c) $y = \dots\dots\dots$

- (d) Draw a suitable straight line on the same axes to find the values of x which satisfy the equation $x^3 - 15x + 11 = 0$ for $-3 \leq x \leq 4$. State these values of x .

[4 marks]

Answer:

- (d) $x = \dots\dots\dots, \dots\dots\dots$



- 13** (a) The transformation **R** represents a 90^0 anticlockwise rotation about the center (3, 2).

The transformation **T** represents a translation $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$. State the coordinates of the image of the point (-1, 1) under the following transformations.

- (i) **R**
(ii) **RT**

[3 marks]

Answer:

(a) (i)

(ii)

- (b) Diagram 6 shows three quadrilateral $EFGH$, $ABCD$ and $OFJK$ on a Cartesian plane. $EFGH$ is the image of $ABCD$ under the transformation U and $OFJK$ is the image of $EFGH$ under the transformation V .

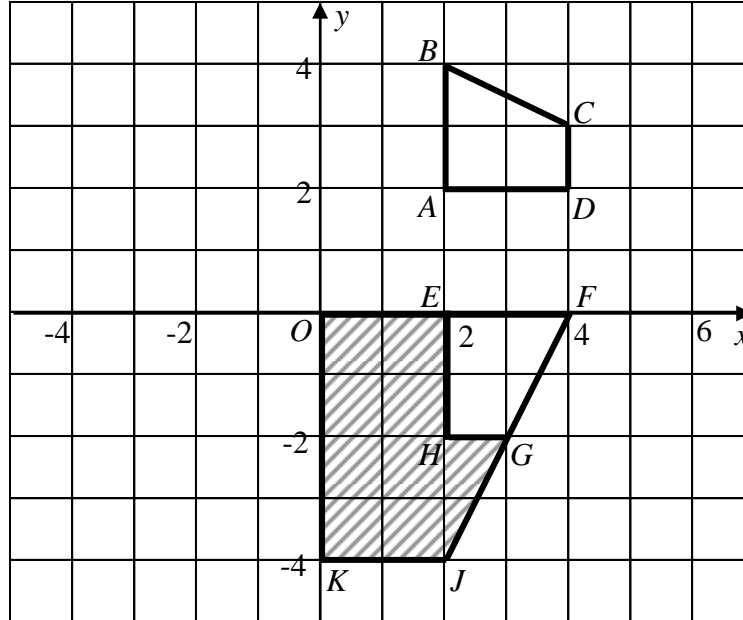


DIAGRAM 6

Describe completely the transformation,

- (i) U ,
- (ii) V .

[6 marks]

- (c) Given that the shaded area is 120 unit^2 , find the area of $ABCD$.

[3 marks]

Answer:

- (b) (i)
- (ii)
- (c)

14 The data in Table 2 shows the mass, in kg, for 50 students.

49	54	76	59	55	50	70	70	65	62
45	76	51	63	58	51	63	55	68	67
53	79	46	69	76	64	57	71	63	63
64	45	57	72	55	71	61	60	70	65
56	66	67	52	65	75	60	57	67	54

TABLE 2

- (a) Construct a grouped frequency table for the data using class intervals 45 – 49, 50 – 54 and so on.

[3 marks]

Answer:

(a)

Mass(kg)	Midpoint	Frequency
45 – 49		
50 – 54		

- (b) Using a scale of 2 cm to 5 kg on the horizontal axis and 2 cm to 1 student on the vertical axis, draw a frequency polygon for the above data.

[5 marks]

- (c) Use the frequency polygon to
 (i) find the modal class
 (ii) calculate the mean mass of the students.

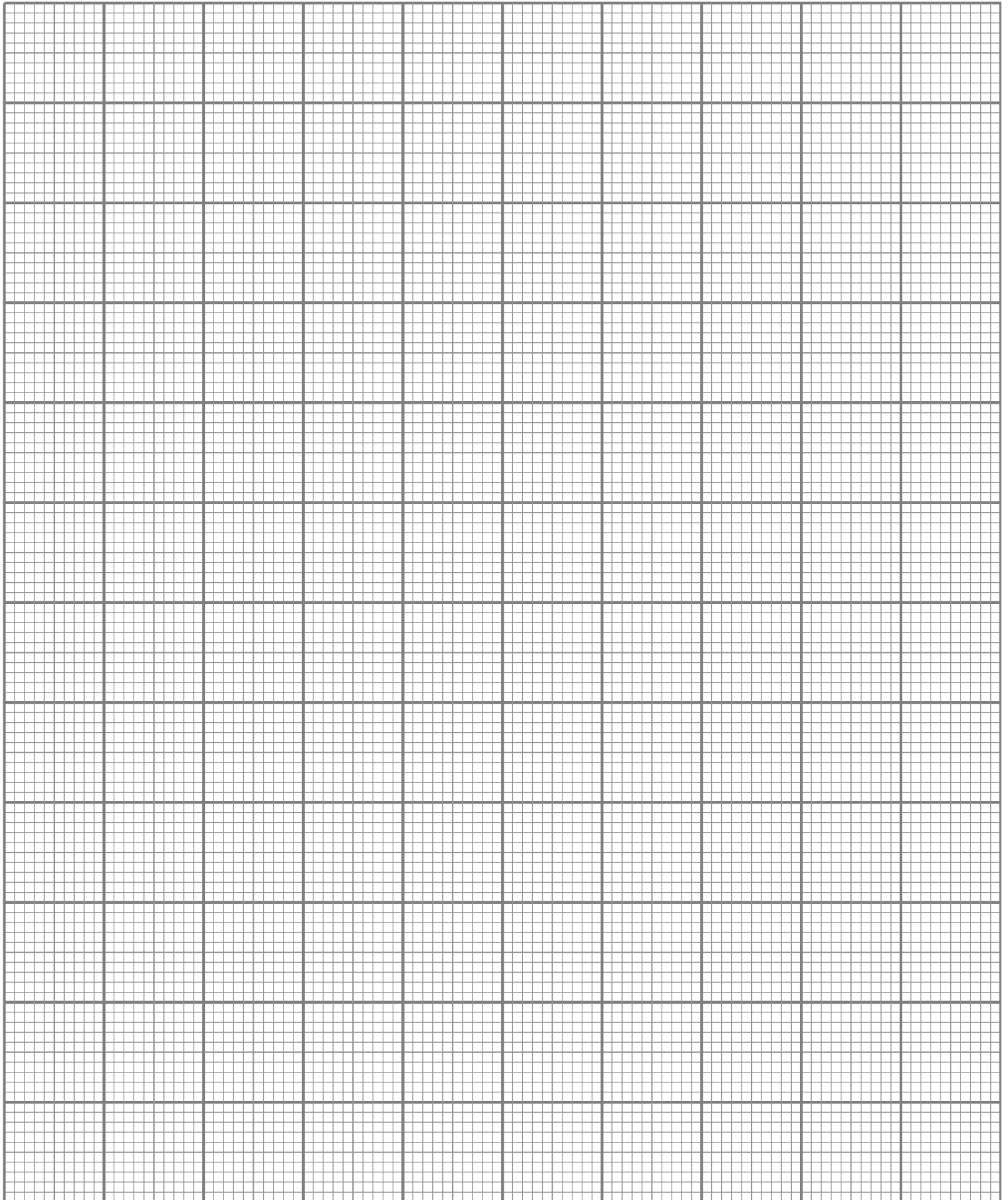
[4 marks]

Answer:

(b) *Refer graph on page 20*

(c) (i)

(ii)



- 15 (a) Table 3 shows the number of books read by 45 students in a class.

Books read by the student	0	1	2	3	4	5	6	7	8
No of students	16	5	6	5	6	4	0	1	2

TABLE 3

Find

- (i) the median,
(ii) the mean.

[4 marks]

Answer:

- (a) (i)

- (ii)

- (b) Table 4 in the answer space shows the marks scored by 200 candidates in a test.

- (i) Complete Table 4 by filling in the cumulative frequencies.

[2 marks]

- (ii) By using a scale of 2 cm to 10 marks on the x -axis and 2 cm to 20 candidates on the y -axis, draw an ogive for the given data.

[4 marks]

- (iii) Candidates in the first quartile must sit for the examination again. What is the highest mark for the candidates who reseated the examination?

[2 marks]

Answer:

(b) (i)

Marks	Candidates	Cumulative Frequency
11 – 20	18	
21 – 30	22	
31 – 40	35	
41 – 50	43	
51 – 60	30	
61 – 70	23	
71 – 80	21	
81 – 90	8	

TABLE 4

(ii) *Refer graph on page 23.*

(iii)

