

Analysis

[1449/1]

[1449/2]

Mathematics

TOPIC		PAPER 1					PAPER 2					
		06	07	08	09	10	06	07	08	09	10	
F O R M	1	Polygon I, II	7	6, 7	7	6, 7	7					
	2	Transformations I, II	9, 10	9, 10	9, 10	9, 10	9, 10					
	3	Trigonometry I	13		11							
	4	Algebraic Expressions I, II, III	20			19	19					
	5	Algebraic Formulae	21	21	21	20	21					
	6	Algebraic Fractions	19	20	20	21	20					
	7	Linear Equations	22	22	22	22	22	5	2	4	2	2
	8	Indices	23, 24	23, 24	23	23, 24	23, 24					
	9	Linear Inequalities	25, 26	25	24	25	25		3			
	10	Graph of Functions I										
	11	Solid Geometry I, II, III						2	6	5	11	4
	12	Circles I, II						9	7	8	6	7
	13	Statistics I, II	27, 28	27	25, 26, 27	26, 27	26, 27					
F O R M	1	Standard Form	1, 2, 3, 4	1, 2, 3	1, 2, 3, 4	1, 2, 3	1, 2, 3, 4					
	2	Quadratic Expressions and Equations		19	19			7	1	3	3	3
	3	Sets	30, 31, 32	29, 30, 31	29, 30, 31	29, 30, 31	29, 30, 31	1		1		1
	4	Mathematics Reasoning						4	8	6	7	5
	5	The Straight Lines	33, 34	32, 33	32, 33	32, 33	32, 33	6	5	10	5	6
	6	Statistics III		26				14	14	14	16	14
	7	Probability I				34, 35	34, 35		9			
	8	Circles III	8	8	8	8	8					
	9	Trigonometry II	11, 12	11, 12, 13	12, 13	11, 12, 13	11, 12, 13					
	10	Angles of Elevation and Depression	15, 16	15	15, 16	15	15, 16					
	11	Lines and Planes in 3-Dimensions	14	14	14	14	14	3	4	2	4	11
F O R M	1	Number Base	5, 6	4, 5	5, 6	4, 5	5, 6					
	2	Graph of Function II	28	28	28	28	28	12	12	13	1, 12	12
	3	Transformations III						13	13	12	15	13
	4	Matrices	40	39, 40	39, 40	39, 40	39, 40	8	11	11	9	8
	5	Variations	38, 39	36, 37, 38	36, 37, 38	36, 37, 38	36, 37, 38					
	6	Gradient and the Area under a Graph						11	10	9	10	9
	7	Probability II	35, 36, 37	34, 35	34, 35			10		7	8	10
	8	Bearing	18	16	17	16	17					
	9	The Earth as a Sphere	17	17, 18	18	17, 18	18	16	16	16	14	16
	10	Plan and Elevation						15	15	15	13	15
Total			40	40	40	40	40	16	16	16	16	16

*Question no.

Mathematic Paper 1

[1449/1]

Answer all questions.

1 Round off 70.48 correct to three significant figures.

- A 70.4
- B 70.5
- C 70.40
- D 70.50

2 $\frac{0.042 \times 10^{-7}}{2.1} =$

- A 2×10^{-5}
- B 2×10^{-6}
- C 2×10^{-8}
- D 2×10^{-9}

3 Given that $0.000\ 054 = m \times 10^n$, where $m \times 10^n$ is a number in standard form. State the value of m and of n.

- A $m = 5.4, n = -5$
- B $m = 5.4, n = -6$
- C $m = 54, n = -5$
- D $m = 54, n = -6$

4 Express 516_8 as a number in base 5.

- A 314_5
- B 334_5
- C 2314_5
- D 3214_5

5 Evaluate $11011_2 - 101_2$.

- A 110_2
- B 110_2
- C 10110_2
- D 11010_2

6 Express $8(8^2 + 7)$ as a number in base eight..

- A 1007_8
- B 1070_8
- C 7010_8
- D 7001_8

7 Diagram 1 shows a triangle PQR and quadrilateral RSTU. PRS is a straight line.

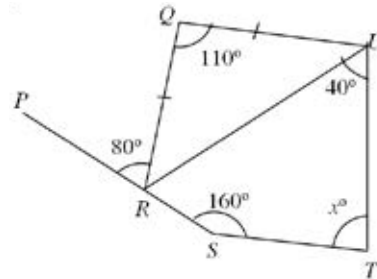


Diagram 1

Find the value of x.

- A 90°
- B 95°
- C 100°
- D 105°

8 Diagram 2 shows a regular pentagon PQRST and quadrilateral TUVW. PTUN is a straight line.

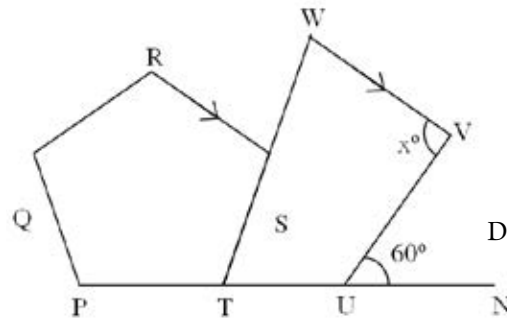
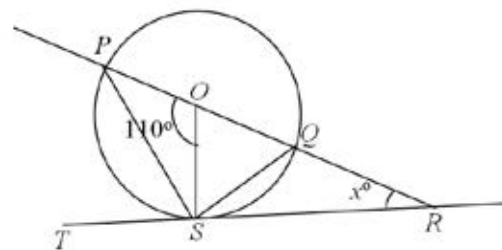


Diagram 2

Find the value x,

- A 72
- B 84
- C 96
- D 108

9 Diagram 3 shows a circle with centre O and TSR as a tangent to the circle at S. Given that POQR is a straight line.



Find the value of x, in degree, is.

- A 20
- B 35
- C 55
- D 70

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10 Diagram 4 shows two quadrilaterals, P and Q.

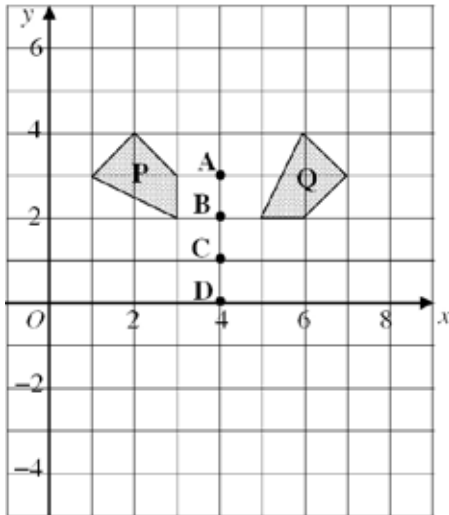


Diagram 4

Quadrilateral Q is the image of quadrilateral P under a clockwise rotation of 90° .

Which of the point A, B, C or D is the centre of that rotation?

11 Diagram 5 shows a Cartesian plane.

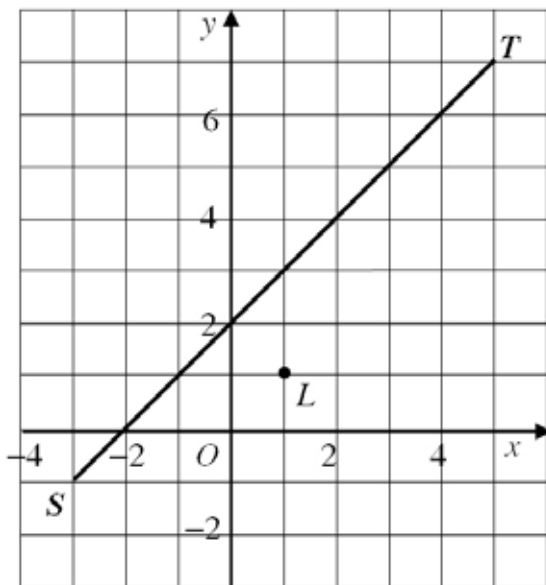


Diagram 5

Point P is the image of point L under a reflection in the line ST. Coordinate P is

- A (-3, 1)
- B (-2, 2)
- C (-1, 3)
- D (1, 5)

12 In Diagram 6, point P and point Q lie on the arc of a unit circle with centre O.

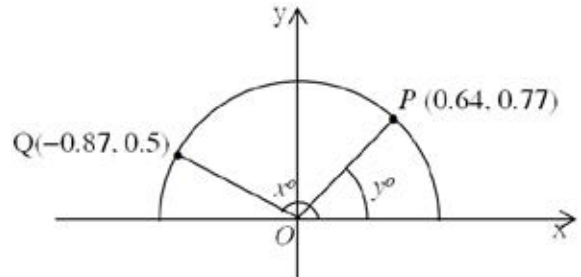
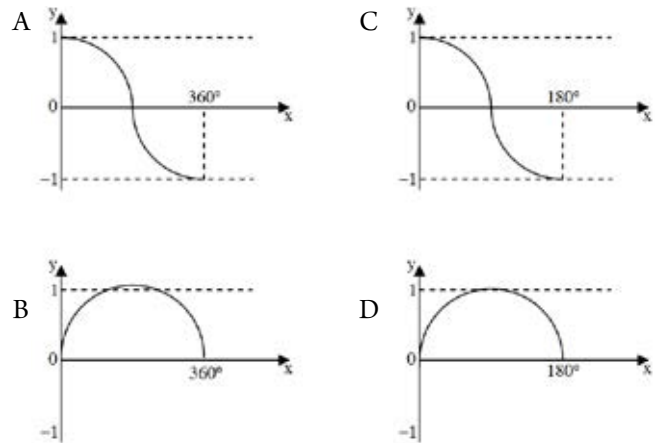


Diagram 6

Find the value of $\cos x^\circ + \sin y^\circ$.

- A -0.23
- B -0.10
- C 1.14
- D 1.27

13 Which graph represents part of the graph $y = \cos x$?



14 Diagram 8 shows the graph of function.

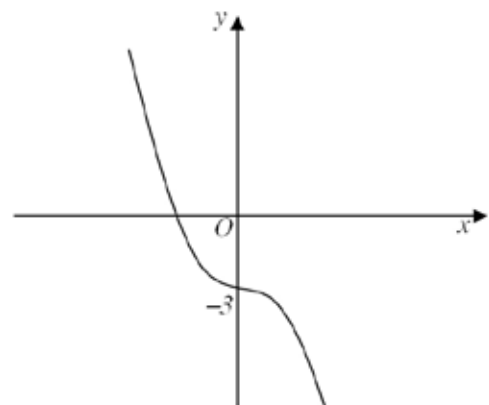


Diagram 8

Which of the following functions represent the graph?

- A $y = -3 - x^3$
- B $y = 3 - x^3$
- C $y = x^3 - 3$
- D $y = x^3 + 3$

15 Diagram 9 shows three points P, Q and R, on a horizontal plane. Q lies due north of R and bearing of P from Q is 100° .

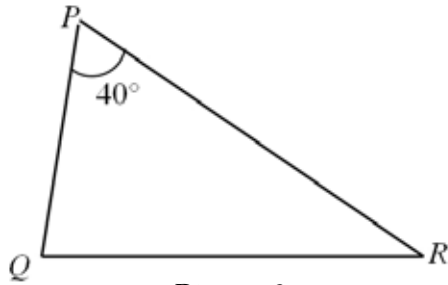


Diagram 9

Find the bearing of R from P.

- A 60°
- B 80°
- C 220°
- D 240°

16 Diagram 10 shows a cuboid KLMNPQRS with a rectangular base, KLMN.

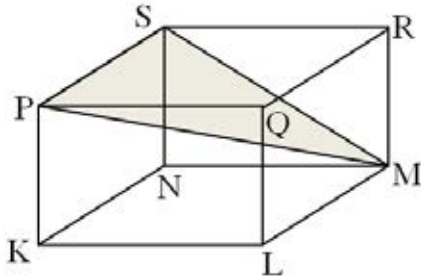


Diagram 10

Name the angle between the plane PMS and the plane PQRS.

- A $\angle MPQ$
- B $\angle RSM$
- C $\angle MSN$
- D $\angle RPM$

17 In Diagram 10, P is a point on the earth. N is the North Pole, S is the South Pole and NOS is the axis of the earth.

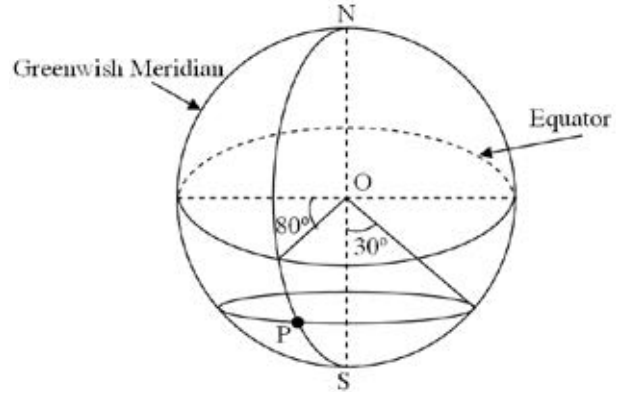


Diagram 10

Find the location of point P

- A $(30^\circ\text{S}, 80^\circ\text{E})$
- B $(30^\circ\text{S}, 100^\circ\text{E})$
- C $(60^\circ\text{S}, 80^\circ\text{E})$
- D $(60^\circ\text{S}, 100^\circ\text{E})$

18 Diagram 12 shows Ahmad observing a balloon which is flying vertically above point Q. The horizontal distance between him at point P and point Q is 300 m.



Given that the angle of elevation of the kite from Ahmad is 55° . Find the vertical height, h, in m, of the kite.

- A 172.07
- B 210.06
- C 245.75
- D 428.44

19 Express $\frac{m+4n}{3n} - \frac{m-n}{2n}$ as a single fraction in its simplest form.

- A $\frac{5n - m}{6n}$
- B $\frac{11n - m}{6n}$
- C $\frac{5m + 11n}{6n^2}$
- D $\frac{3n - m}{6n^2}$

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20 $(x - y)^2 - (x - y)(x + y) =$

- A $-2xy$
- B $-2y^2$
- C $-2xy + 2y^2$
- D $-2xy + y^2$

21 Given that $y = 7x^2 - 3$, then $x =$

- A $\sqrt{\frac{y+3}{7}}$
- B $\sqrt{\frac{y-3}{7}}$
- C $\frac{\sqrt{y-3}}{7}$
- D $\frac{\sqrt{y+3}}{7}$

22 Given that $2(x + 1) - \frac{3(x - 4)}{2} = 5$, calculate the value of x .

- A -9
- B -6
- C 5
- D 18

23 $\frac{1}{\sqrt{7^3}} =$

- A $\left(\frac{1}{7}\right)^{\frac{2}{3}}$
- B $\left(\frac{1}{7}\right)^{\frac{3}{2}}$
- C $7^{\frac{2}{3}}$
- D $7^{\frac{3}{2}}$

24 Simplify $\frac{(2p^2)^3}{6q^2} \times 3pq^3$.

- A $4p^7q$
- B $4p^6q^5$
- C p^7q^3
- D p^6q

25 List all the integers x that satisfy the inequality $-5 < 1 - 2x \leq 3$.

- A $-4, -3, -2, -1, 0, 1, 2, 3$
- B $-2, -1, 0, 1, 2, 3$
- C $-2, -1, 0, 1, 2$
- D $-1, 0, 1, 2$

26 Find the solution for $3 + 2x \leq 3x - 7$

- A $x \geq 10$
- B $x \geq 4$
- C $x \leq -10$
- D $x \leq 2$

27 Diagram 13 is a bar chart which shows the scores of a group of pupils in a test.

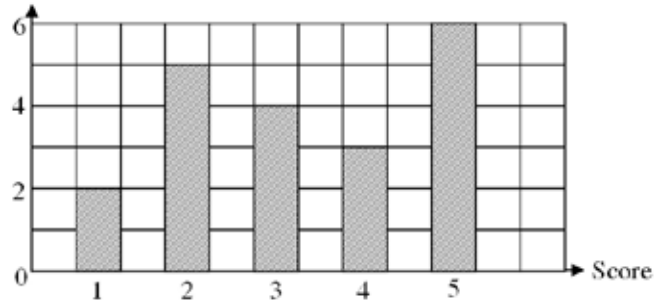


DIAGRAM 13

Find the percentage of pupils who score more than 3.

- A 35
- B 45
- C 55
- D 65

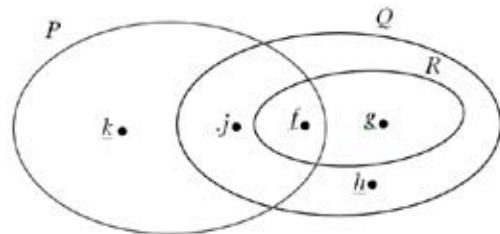
28 Table 1 shows the number of pencils brought by a group of students to school.

Number of pencils	1	2	3	4	5
Frequency	10	14	9	5	2

If a pie chart is drawn to represent all the given information, find the angle of the sector representing the number of students from group who brought three pencils.

- A 45
- B 81
- C 90
- D 126

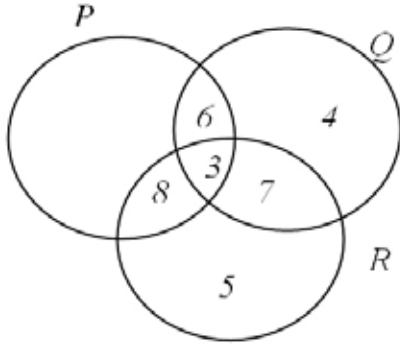
29 Diagram 14 shows the universal set, $\xi = P \cup Q \cup R$.



List all elements of set, $(Q \cap R) \cup P$

- A $\{j, h\}$
- B $\{j, h, k\}$
- C $\{f, j, h, k\}$
- D $\{f, g, h, j, k\}$

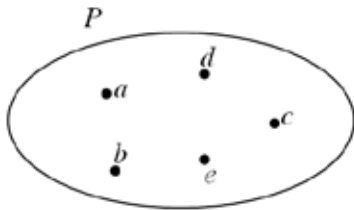
30 Diagram 15 is a Venn diagram which shows the number of element of set P, Q and R.



It is given that the universal set $\xi = P \cup Q \cup R$ and $n(P) = n(Q)$. Find $n[(P \cap R) \cup Q]$

- A 11
- B 15
- C 18
- D 19

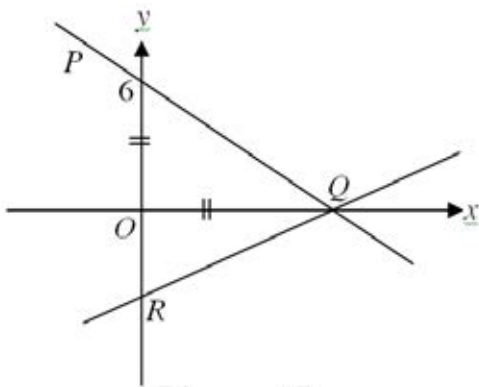
31 Diagram 16 is a Venn diagram which shows set P.



The number of subsets of set P is

- A 5
- B 16
- C 25
- D 32

32 Diagram 17 shows two straight lines, PQ and RQ, on a Cartesian plane.



It is given that the gradient of RQ is $\frac{3}{2}$. Find the y-intercept of RQ.

- A $\frac{4}{3}$
- B 3
- C $\frac{9}{2}$
- D 9

33 The gradient of the straight line $2y + \frac{2}{3}x = 6$ is

- A $-\frac{2}{3}$
- B $-\frac{1}{3}$
- C 3
- D 4

34 A bag contains 51 balls. If a ball is chosen at random from the bag, the probability of choosing a red ball is $\frac{8}{17}$.

Find the number of balls in the bag which are not red balls.

- A 24
- B 25
- C 26
- D 27

35 A box contains 24 blue marbles and a number of yellow marbles. A marble is picked at random from the box. Probability of getting yellow marble is $\frac{3}{7}$. 6 yellow marbles

were taken away from the box. If a marble is picked at random from the box, what is the probability of getting yellow marble?

- A $\frac{1}{3}$
- B $\frac{4}{7}$
- C $\frac{1}{2}$
- D $\frac{5}{6}$

36 $\begin{pmatrix} -2 & 3 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} 5 \\ 4 \end{pmatrix} - \begin{pmatrix} 6 \\ -3 \end{pmatrix} =$

- A $\begin{pmatrix} 2 \\ 11 \end{pmatrix}$
- B $\begin{pmatrix} -1 \\ 7 \end{pmatrix}$
- C $\begin{pmatrix} -4 \\ 14 \end{pmatrix}$
- D $\begin{pmatrix} 5 \\ 5 \end{pmatrix}$

37 Given $\begin{pmatrix} 6 \\ p \end{pmatrix} - 3 \begin{pmatrix} -p \\ -8 \end{pmatrix} = \begin{pmatrix} 15 \\ 27 \end{pmatrix}$, calculate the value of p.

- A 2
- B 3
- C 8
- D 9

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- 38 P (12°N, 20°E), Q and R are three points on the earth's surface. Q is due south of P.
The difference in latitude between P and Q is 40°. R is due west of Q. The difference in longitude between Q and R is 60°. The position of R is
- A (25°S, 40°W)
B (25°S, 80°E)
C (55°N, 40°W)
D (55°N, 80°E)

- 39 P varies inversely as the cube of Q. The relation between P and Q is

- A $P \propto Q^{\frac{1}{3}}$
B $P \propto Q^3$
C $P \propto \frac{1}{Q^{\frac{1}{3}}}$
D $P \propto \frac{1}{Q^3}$

- 40 Table 2 shows some values of p, q, and r.

p	18	48
q	3	6
r	8	m

table 2

Given that $p \propto \frac{q^2}{\sqrt[3]{r}}$, calculate the value of m.

- A 3
B 6
C 9
D 27

END OF QUESTION PAPER

Section A

[52 marks]

Answer all questions in this section.

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

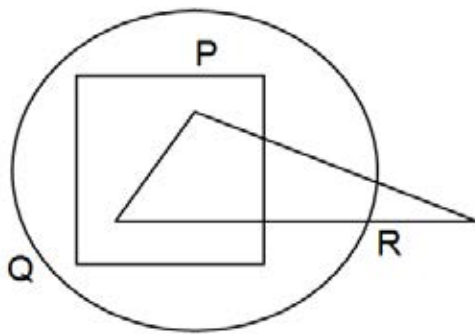
(i) $P \cap R'$

(ii) $P' \cup (Q \cap R)$

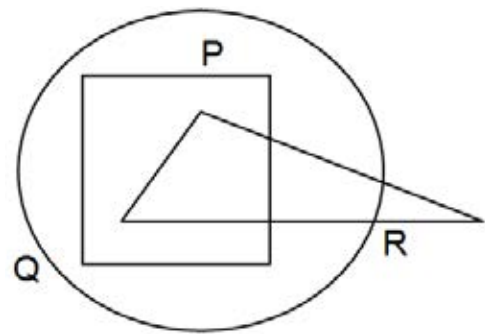
[3 marks]

Answer:

(i)



(ii)



- 2 Using factorisation, solve the following quadratic equation $5x(x+2) = x^2 + 3x + 2$

[4 marks]

Answer :

- 3 Calculate the value of p and q that satisfy the following simultaneous linear equations:

$$3m - 2n = 8$$

$$m + 4n = -2$$

[4 marks]

Answer :

4. Diagram 2 shows a cuboid.

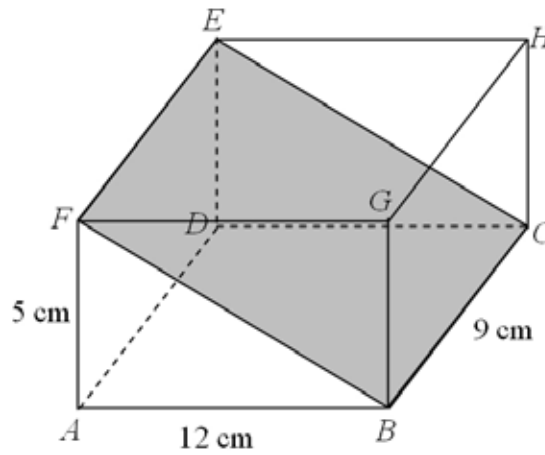


DIAGRAM 2

Identify and calculate the angle between the line BCEF and the plane ABCD.

[3 marks]

Answer :

5 (a) State whether the following statement is true or false. $r \subset \{p, q, r, s\}$ or $-4 > -5$

[1 mark]

(b) Write down Premise 2 to complete the following argument:

Premise 1 : If a quadrilateral is a rhombus, then it has two parallel sides.

Premise 2 : _____

Conclusion : KLMN is not a rhombus

[2 marks]

(c) Make a general conclusion by induction for the number sequence 7, 13, 23, 37, ... which follows the following pattern.

$$7 = 2(1)^2 + 5$$

$$13 = 2(2)^2 + 5$$

$$23 = 2(3)^2 + 5$$

$$37 = 2(4)^2 + 5$$

[2 marks]

Answer :

(a) _____

(b) _____

(c) _____

- 6 Diagram 1 shows a solid that was formed by joining a right prism and a right pyramid.

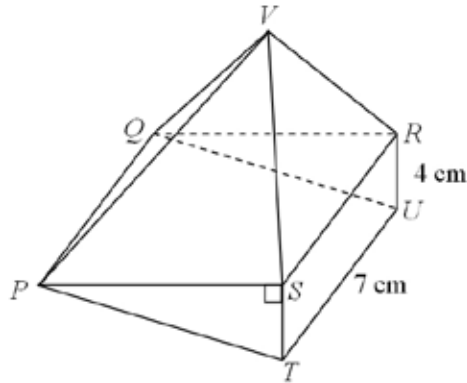


DIAGRAM 1

The right angled triangle PST is the uniform cross-section of the prism. PQRS is a square and the height of the pyramid is 6 cm. Calculate the volume, in cm^3 , of the solid.

[4 marks]

Answer :

- 7 In diagram 3, O is the origin and PQRS is a trapezium. PS is parallel to QR. The straight line RS is parallel to the y-axis. The points Q and S lie on the x-axis.

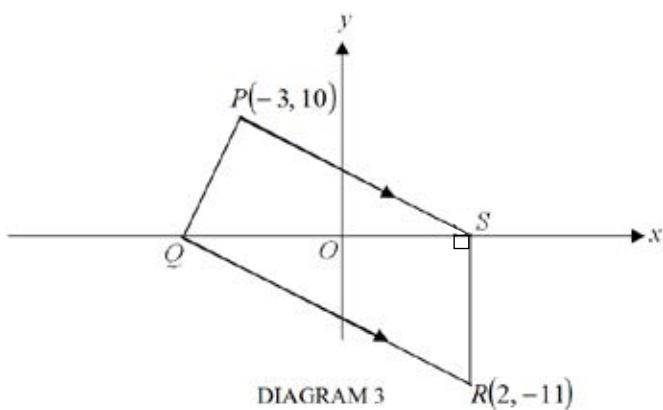


DIAGRAM 3

Answer :

(a)

(b)

Find

- (a) the equation of the straight line QR,
 (b) the x-intercept of the straight line QR. [5 marks]

- 8 (a) Q is a 2×2 matrix such that $\begin{bmatrix} 3 & 4 \\ 3 & -2 \end{bmatrix} Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. Find matrix Q .
- (b) Write the following simultaneous linear equations as a matrix equation.
 $3x + 4y = -6$
 $3x - 2y = 4$

Hence using matrices, calculate the value of x and of y .

[6 marks]

Answer :

(a)

(b)

- 9 In diagram 4, RS and QT are arcs of two circles, with common centre P and quadrant PRS . PQR is a straight line.

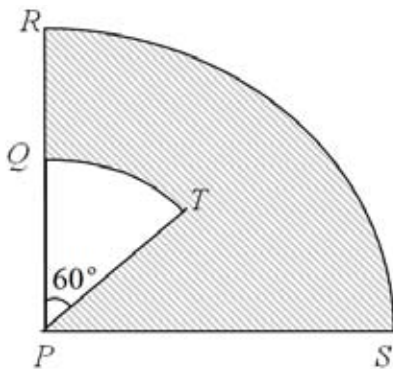


DIAGRAM 4

Answer :

(a)

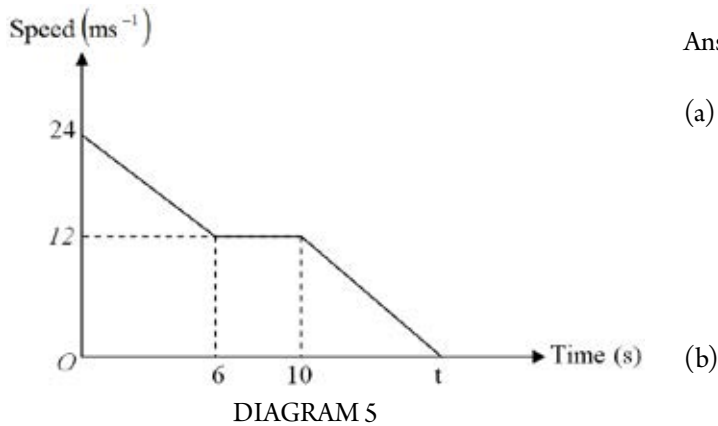
It is given that PUS is a straight line, $PQ = 14$ cm and $PS = 24$ cm.

(b)

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

- (a) the area, in cm^2 , of the shaded region,
 (b) the perimeter, in cm, of the shaded region. [6 marks]

10 Diagram 5 shows the speed-time graph for the movement of a particle for a period of t seconds.



Answer :

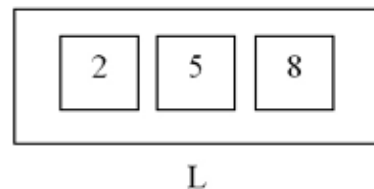
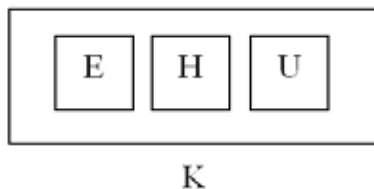
(a)

(b)

- (a) State the uniform speed, in ms^{-1} , of the particle.
 (b) Calculate the rate of change of speed, in ms^{-2} , in the first 6 seconds.
 (c) The total distance travelled in t seconds is 204 metres. Calculate the value of t .

[6 marks] (c)

11 Diagram 11 shows three cards labeled with letters in box K and three numbered cards in box L.



A card is picked at random from box K and then a card is picked at random from box L. By listing the sample of all the possible outcomes of the event, find the probability that

Answer :

(a)

- (a) a card labeled H and the card with an even number are picked,
 (b) a card labeled with vowel or the card with prime number are picked,

[5 marks]

(b)

Section B
 [48 marks]

Answer any four questions in this section.

- 12 (a) Complete table 12 in the answer space for equation $y = -x^3 + 9x + 5$ by writing the values of y when $x = -3$ and $x = 2$. [2 marks]
- (b) For this part of the question, use the graph paper provided. You can use a flexible curve rule.
 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 $y = -x^3 + 9x + 5$ for $-4 \leq x \leq 4$. [4 marks]
- (c) From your graph, find
 (i) the value of y when ,
 (ii) the value of x when $y = -10$. [2 marks]
- (d) Draw a suitable straight line on your graph to find all the values of x which satisfy the equation $-x^3 + 11x + 2$ for $-4 \leq x \leq 4$. State these values of x . [4 marks]

Answer:

(a)

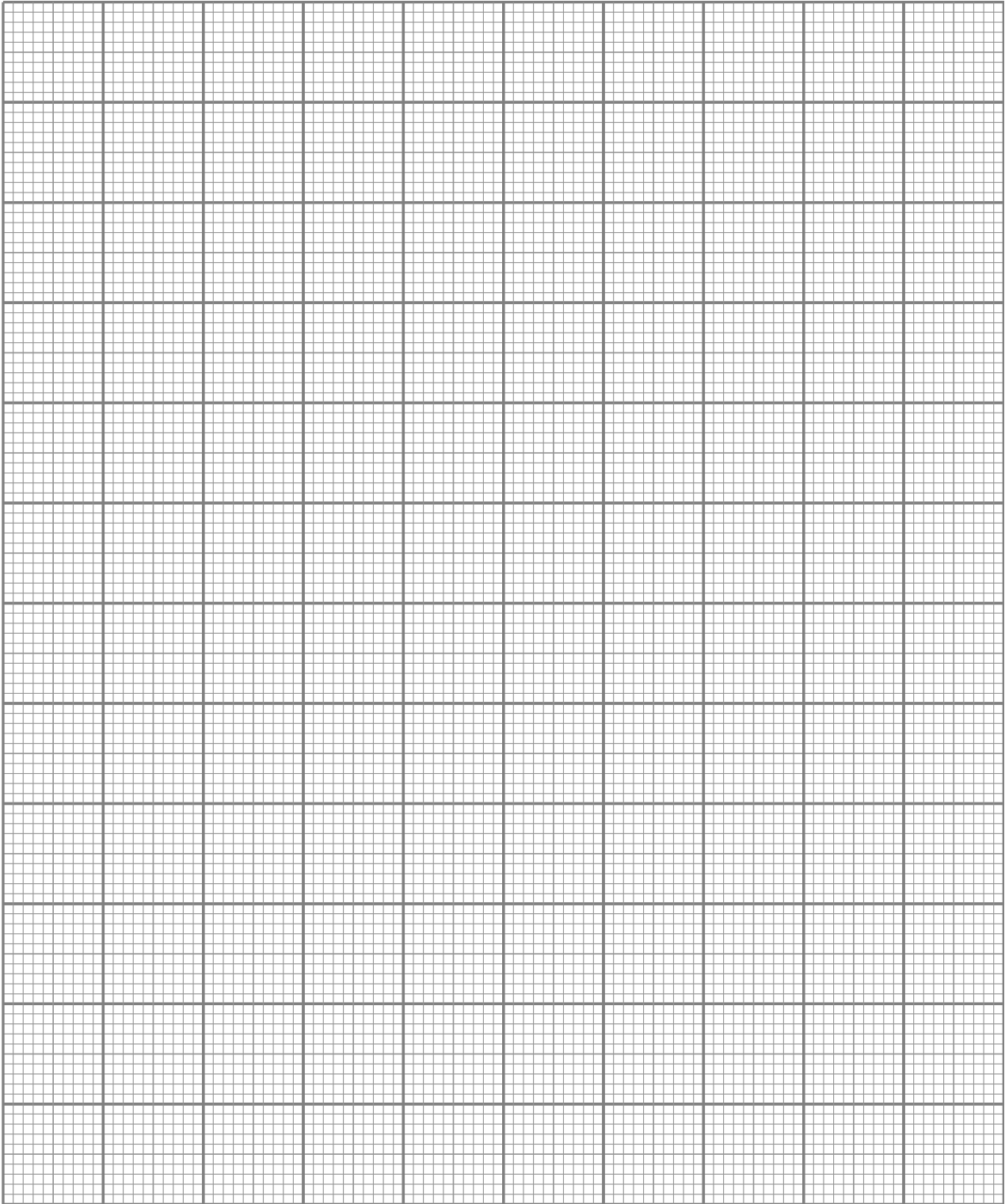
x	-4	-3	-2	-1	0	1	2	3	4
y	33		-5	-3	5	13		5	-23

k = _____
 m = _____

- (b) Refer to graph paper
- (c) (i) $y =$ _____
 (ii) $x =$ _____
- (d) $x =$ _____

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Graph for Question 12



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13 Diagram 6 shows quadrilaterals ABCD, PQRS and PTUV drawn on a Cartesian plane.

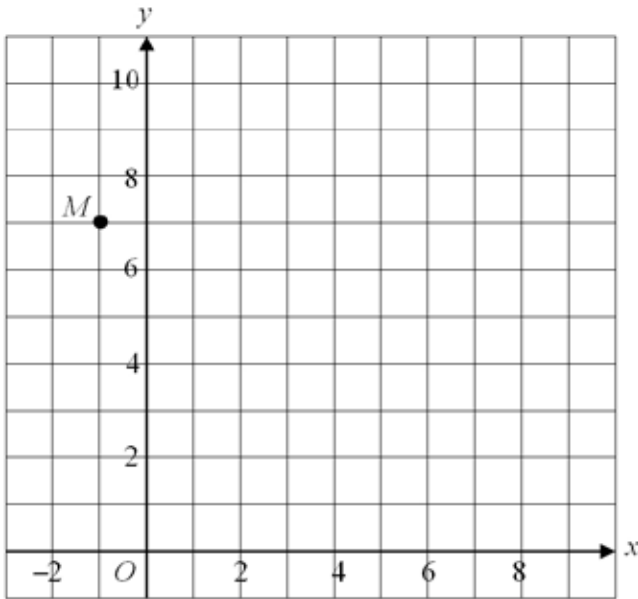


Diagram 6

(a) Transformation T is a translation $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$
 Transformation R is a reflection in the line $y = 5$
 State the coordinates of the image of point M under each of the following transformations :

- (i) T,
- (ii) TR.

[4 marks]

Answer:

(a) (i)

(ii)

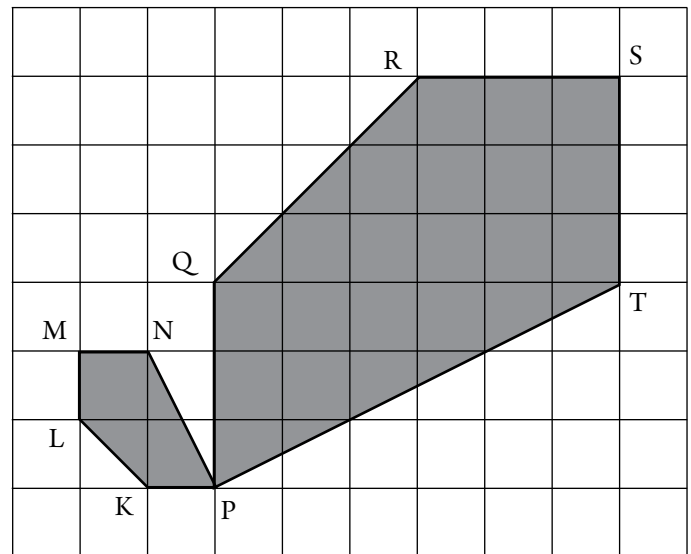
(b) Diagram 13.2 shows two pentagons, KLMNP and PQRST drawn on square grids.

(i) PQRST is the image of KLMNP under the combined transformation JK.

Describe in full, transformation:

- (a) K
- (b) J. [6 marks]

(ii) It is given that area of pentagon PQRST is 171m^2 .
 Calculate the area, in cm^2 , of the region represented by KLMNP. [3 marks]



Answer :

(b) (i) K :

(ii)

J :

14 The data in Diagram 14 shows the time, in minute, taken by 40 students to solve some algebraic problems.

44	54	53	60	46	64	61	66
58	71	51	45	56	54	58	47
57	45	64	55	53	49	53	59
61	63	43	49	47	52	48	63
48	68	49	64	68	46	46	52

- (a) Using data in Diagram 14 and a class interval of 5 minutes, complete Table 14 in the answer space. [3 marks]
- (b) Based on table 3,
 (i) find the modal class,
 (ii) calculate the mean time taken by the students. [4 marks]
- (c) For this part of the question, use the graph paper provided on the next page.
 By using a scale of 2 cm to 10 minutes on the horizontal axis and 2 cm to 1 students on the vertical axis, draw a frequency polygon based on Table 14. [5 marks]

Answer :

(a)

Time(minutes)	frequency	Midpoint
40 – 45		
46 – 50		

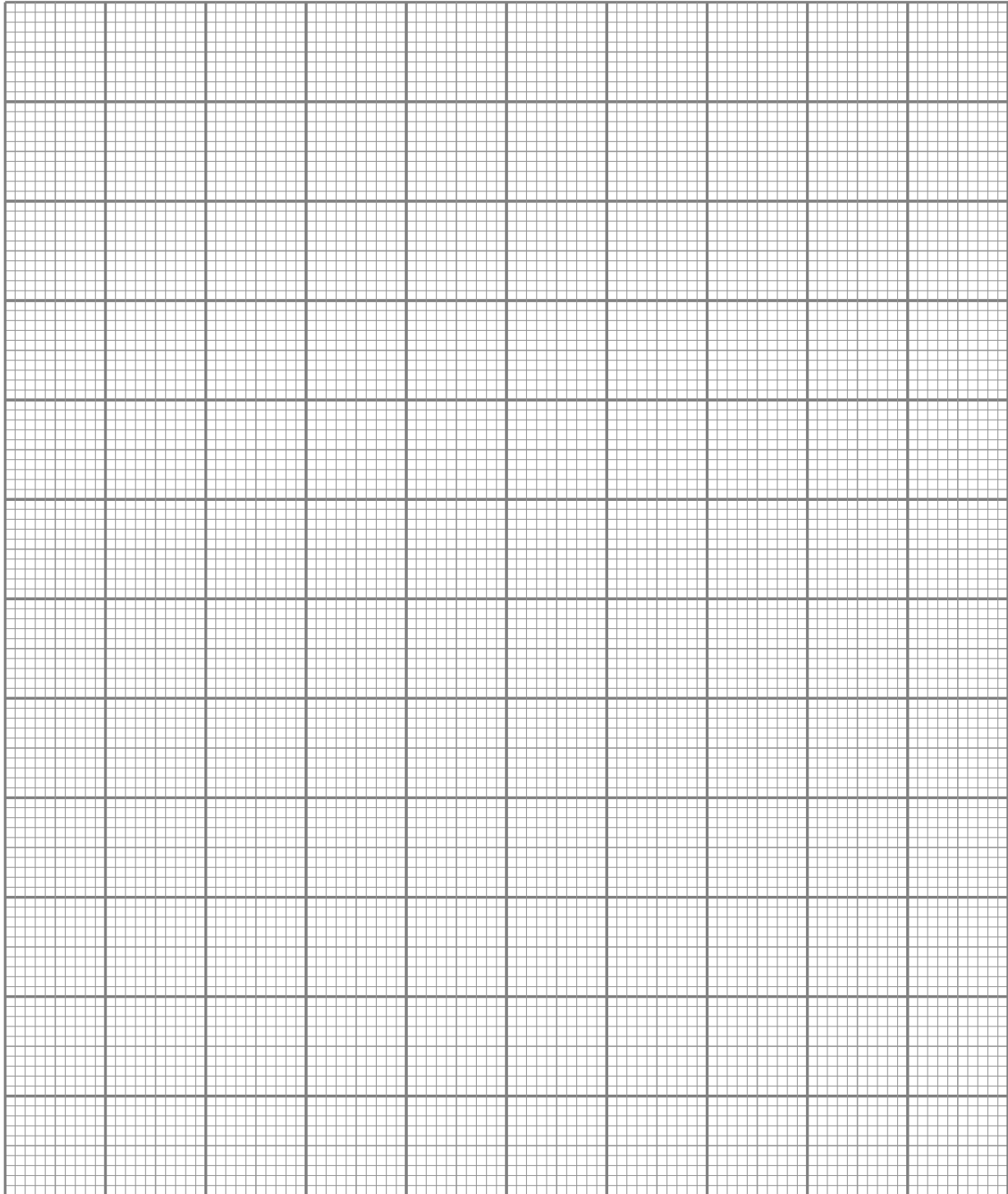
Table 14

(b) (i)

(ii)

(c) Refer graph on the next page.

Graph for Question 14



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

- (a) Diagram 15(i) shows a right prism with rectangular base ABHG on a horizontal plane. The surface ABCDE is its uniform cross-section. The rectangle CJKD is an inclined plane. The rectangle EDKF is a horizontal plane. The edges AE and BC are vertical edges. Given $ED = BC = 3$ cm.

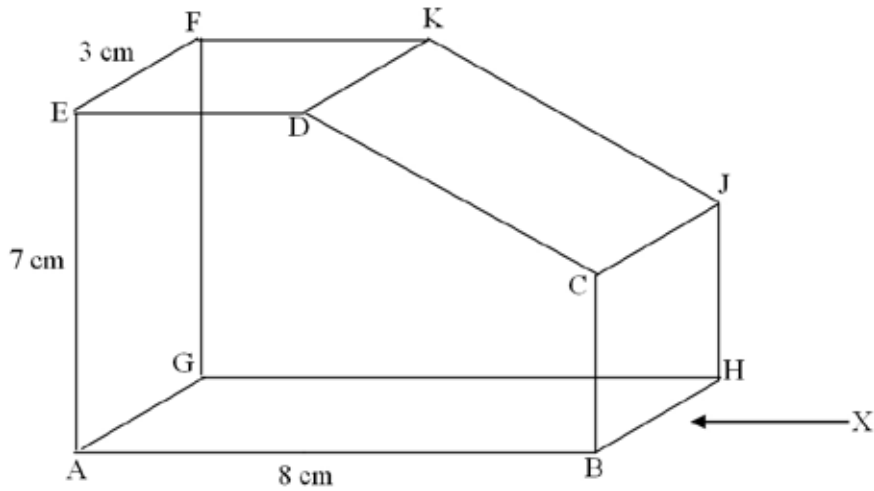


Diagram 15(i)

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

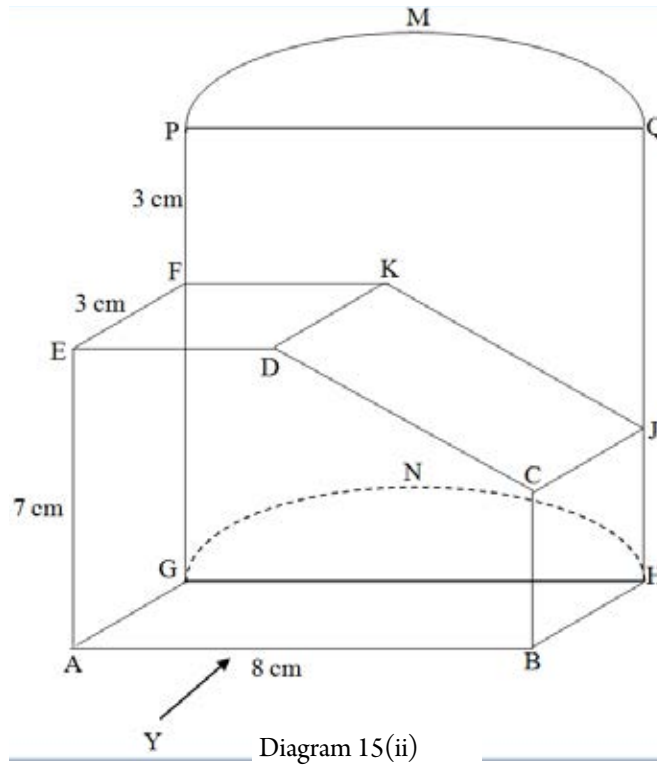
[4 marks]

Answers :

- (a)

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- (b) A half-cylinder is joined to the solid in the Diagram 15(i) at the plane GHJKF to form a combined solid as shown in Diagram 15(ii).



Draw to full scale,

- (i) the plan of the combined solid, [4 marks]
 (ii) the elevation of the combined solid on a vertical plane parallel to AB as viewed from Y. [4 marks]

Answer :

- (b) (i) (ii)

16 P (43°N , 50°E), Q and R are two points on the surface of the earth such that PR is the diameter of the earth and PQ is the diameter of a parallel of latitude.

- (a) Mark the position of Q and R in Diagram 16. [2 marks]
 (b) State the position of Q. [2 marks]
 (c) Calculate the shortest distance, in nautical miles, from P to Q measured along the surface of the earth. [3 marks]
 (d) A jet plane took off from P due east to Q and then flew due south to R.
 The average speed for the whole flight was 900 knots.
 Calculate
 (i) the distance, in nautical miles, from P to Q measured along the parallel of latitude,
 (ii) the total time, in hours, taken for the whole flight. [5 marks]

Answer:

- (a)  (d) (i)

- (b) (ii)

(c)

END OF QUESTION PAPER

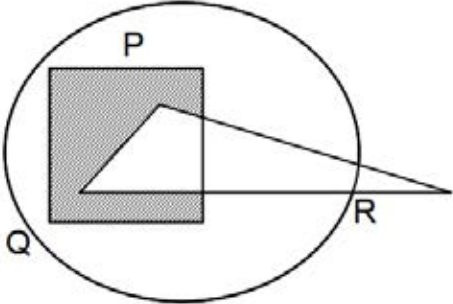
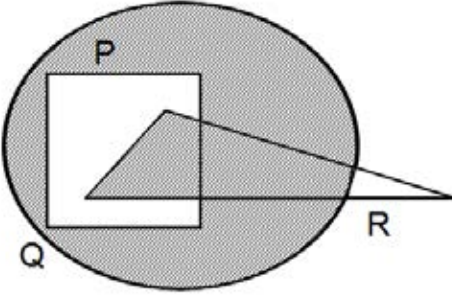
Jawapan

Mathematic

Mathematic Paper 1

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	B	11	C	21	A	31	D	41	
2	D	12	B	22	B	32	D	42	
3	A	13	C	23	D	33	B	43	
4	C	14	A	24	A	34	D	44	
5	C	15	C	25	D	35	A	45	
6	B	16	B	26	A	36	C	46	
7	B	17	C	27	B	37	B	47	
8	C	18	D	28	B	38	C	48	
9	A	19	A	29	C	39	B	49	
10	C	20	D	30	D	40	D	50	

Mathematic Paper 2

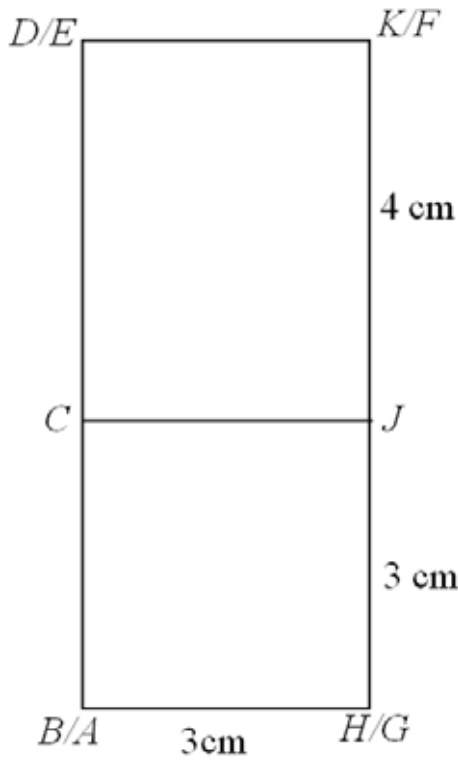
1	<p>i) </p> <p>ii) </p>	(i) 1 M (ii) 2 M	3																	
2	$4x^2 + 7x - 2 = 0$ $(4x - 1)(x + 2) = 0$ $x = \frac{1}{4}, \text{ or } -2$	1 M 1 M 1 M 1 M	4																	
3	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">$6m - 4n = 16$</td> <td rowspan="2" style="padding: 5px;">$m = -4n - 2$</td> <td rowspan="2" style="padding: 5px;">$\begin{pmatrix} 3 & -2 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$</td> </tr> <tr> <td style="padding: 5px;">$7m = 14$</td> </tr> <tr> <td style="padding: 5px;">or</td> <td></td> <td></td> </tr> <tr> <td style="padding: 5px;">$3m - 2n = 8$</td> <td rowspan="2" style="padding: 5px;">$-14n = 14$</td> <td rowspan="2" style="padding: 5px;">$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{14} \begin{pmatrix} 4 & 2 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 8 \\ -2 \end{pmatrix}$</td> </tr> <tr> <td style="padding: 5px;">$14n = -14$</td> </tr> <tr> <td style="padding: 5px;">$m = 2$</td> <td style="padding: 5px;">$m = 2$</td> <td style="padding: 5px;">$m = 2$</td> </tr> <tr> <td style="padding: 5px;">$n = -1$</td> <td style="padding: 5px;">$n = -1$</td> <td style="padding: 5px;">$n = -2$</td> </tr> </tbody> </table>	$6m - 4n = 16$	$m = -4n - 2$	$\begin{pmatrix} 3 & -2 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$	$7m = 14$	or			$3m - 2n = 8$	$-14n = 14$	$\begin{pmatrix} m \\ n \end{pmatrix} = \frac{1}{14} \begin{pmatrix} 4 & 2 \\ -1 & 3 \end{pmatrix} \begin{pmatrix} 8 \\ -2 \end{pmatrix}$	$14n = -14$	$m = 2$	$m = 2$	$m = 2$	$n = -1$	$n = -1$	$n = -2$	1 M 1 M 1 M 1 M	4
$6m - 4n = 16$	$m = -4n - 2$	$\begin{pmatrix} 3 & -2 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$																		
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or																				
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$14n = -14$																				
$m = 2$	$m = 2$	$m = 2$																		
$n = -1$	$n = -1$	$n = -2$																		
4	<p>$\angle FBA$ or $\angle ECD$</p> $\tan \angle FBA = \frac{5}{12}$ <p>$\angle FBA = 22^\circ 37'$ or 22.62°</p>	1 M 1 M 1 M	3																	
5	<p>(a) True</p> <p>(b) KLMN has no two parallel sides</p> <p>(c) $2n^2 + 5, n = 1, 2, 3, 4 \dots$</p>	1 M 1 M 1 M 2 M	5																	
6	$V_{\text{pyramid}} = \frac{1}{3} \times 7 \times 7 \times 6$ $V_{\text{prism}} = \frac{1}{2} \times 7 \times 4 \times 7$ $\frac{1}{3} \times 7 \times 7 \times 6 + \frac{1}{2} \times 7 \times 4 \times 7$ <p>196</p>																			

7	<p>a) $m_{QR} = m_{PS} = -2$</p> $\frac{y+11}{x-2} = -2 \quad \text{or} \quad -11 = -2(2) + c$ $y = -2x - 7$ <p>b) $0 = -2x - 7$</p> $x = -\frac{7}{2}$	1 M 1 M 1 M 1 M 1 M	5
8	<p>a) $Q = \frac{1}{3 \times (-2) - (3) \times 4} \begin{pmatrix} -2 & -4 \\ -3 & 3 \end{pmatrix}$</p> $= \frac{1}{6} \begin{pmatrix} -2 & -4 \\ -3 & 3 \end{pmatrix}$ <p>b) $\begin{pmatrix} 3 & 4 \\ 3 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$</p> $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{6} \begin{pmatrix} -2 & -4 \\ -3 & 3 \end{pmatrix} \begin{pmatrix} -6 \\ 4 \end{pmatrix}$ $x = \frac{3}{2}$ $y = 5$ <p>Note: $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{3}{2} \\ 5 \end{pmatrix}$ accept for 1 M</p>	1 M 1 M 1 M 1 M 1 M 1 M	6
9	<p>a) $\frac{60}{360} \times \frac{22}{7} \times 14 \times 14$ or $\frac{90}{360} \times \frac{22}{7} \times 24 \times 24$</p> $\frac{90}{360} \times \frac{22}{7} \times 24 \times 24 - \frac{60}{360} \times \frac{22}{7} \times 14 \times 14$ $= 349 \frac{19}{21}$ <p>b) $\frac{60}{360} \times 2 \times \frac{22}{7} \times 14$ or $\frac{90}{360} \times 2 \times \frac{22}{7} \times 24$</p> $10 + \frac{60}{360} \times 2 \times \frac{22}{7} \times 14 + 14 + \frac{90}{360} \times 2 \times \frac{22}{7} \times 24$ $= 100 \frac{8}{21}$	1 M 1 M 1 M 1 M 1 M	6
10	<p>a) 12</p> <p>b) $\frac{24-12}{0-6} = -2$</p> <p>c) $\frac{1}{2}(24+12) \times 6 + 4 \times 12 + \frac{1}{2} \times 12 \times (t-10) = 204$</p> $t = 18$	1 M 2 M 2 M 1 M	6

11	<p>(a) $S = \{(E, 2), (E, 5), (E, 8), (H, 2), (H, 5), (H, 8), (U, 2), (U, 5), (U, 8)\}$ $A = \{(H, 2), (H, 8)\}$ $= 2/9$</p> <p>(b) $B = \{(E, 2), (E, 5), (E, 8), (U, 2), (U, 5), (U, 8), (H, 2), (H, 5)\}$ $= 8/9$</p>	<p>1 M 1 M 1 M</p> <p>2 M 1 M</p>	6																								
12	<p>(a) 5 15</p> <p>(b) Uniform scales All 9 points plotted correctly. Smooth curve and passed all 9 correct points.</p> <p>Refer to the graph.</p> <p>(c) $x = 14.9 \ 0.1$ $y = 3.6 \ 0.5$</p> <p>(d) $y = -2x + 3$ Straight line $y = -2x + 3$ drawn $x = 3.2 \ 0.1, -0.2 \ 0.1, 3.4 \ 0.1$</p>	<p>1 M 1 M</p> <p>1 M 2 M 1 M</p> <p>1 M 1 M 2 M</p>	12																								
13	<p>(a) (i) (1, 4) (ii) (1, 0)</p> <p>(b) (i) K : Clockwise rotation of 90° about the centre P (ii) W : enlargement at centre P and scale factor 3</p> <p>(c) $171 = 3^2$ Area of KLMNP Area of KLMNP = $(171/9) \text{ cm}^2$ $= 19 \text{ cm}^2$</p>	<p>1 M 2 M</p> <p>3 M 3 M</p> <p>1 M 1 M 1 M</p>																									
14	<p>a)</p> <table border="1" data-bbox="167 1256 624 1554"> <thead> <tr> <th>Time</th> <th>Frequency</th> <th>Mid point</th> </tr> </thead> <tbody> <tr> <td>40 – 44</td> <td>2</td> <td>42</td> </tr> <tr> <td>45 – 49</td> <td>12</td> <td>47</td> </tr> <tr> <td>50 – 54</td> <td>8</td> <td>52</td> </tr> <tr> <td>55 – 59</td> <td>6</td> <td>57</td> </tr> <tr> <td>60 – 64</td> <td>8</td> <td>62</td> </tr> <tr> <td>65 – 69</td> <td>3</td> <td>67</td> </tr> <tr> <td>70 – 74</td> <td>1</td> <td>72</td> </tr> </tbody> </table> <p>(b) (i) 45 - 49 $\frac{2(42)+12(47)+8(52)+6(57)+8(62)+3(67)+1(72)}{2+12+8+6+8+3+1}$ $= 54.375$</p> <p>(c) • Uniform scale on the x-axis and on the y – axis • 7 points plotting corecctly • plotting (37, 0) and (77, 0) • all lines completely drawn correctly</p> <p>frequency polygon – refer to the graph.</p>	Time	Frequency	Mid point	40 – 44	2	42	45 – 49	12	47	50 – 54	8	52	55 – 59	6	57	60 – 64	8	62	65 – 69	3	67	70 – 74	1	72	<p>(i) all frequency correct (ii) all mid-point correct</p> <p>2 M 1 M</p> <p>1 M 2 M 1 M</p> <p>1 M 2 M 1 M 1 M</p>	
Time	Frequency	Mid point																									
40 – 44	2	42																									
45 – 49	12	47																									
50 – 54	8	52																									
55 – 59	6	57																									
60 – 64	8	62																									
65 – 69	3	67																									
70 – 74	1	72																									

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a)



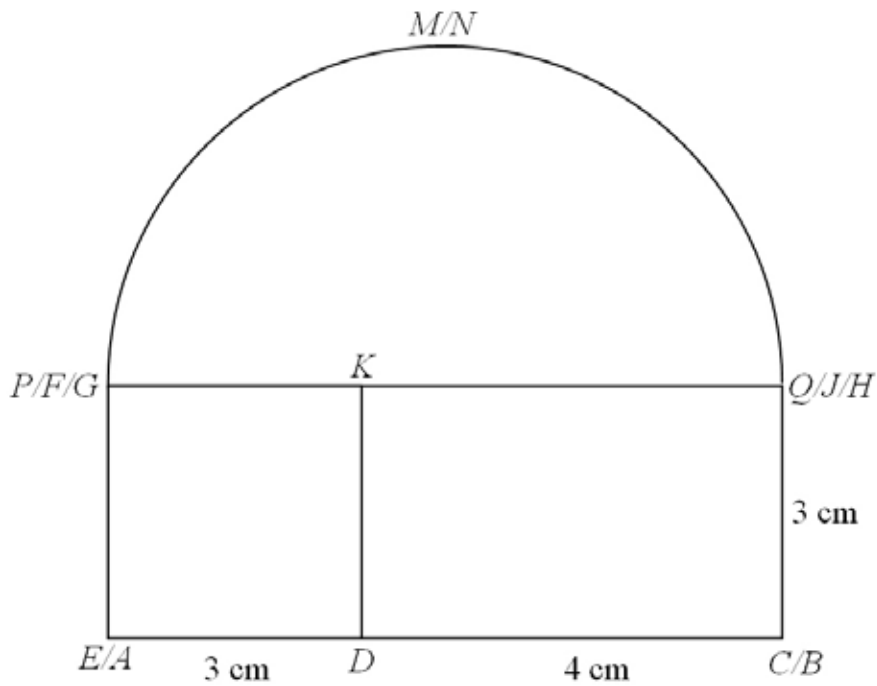
Correct shape with rectangle $CJKD$ and square $BHJC$. All solid lines.
 $BH = HJ < KJ$
 Correct measurement 0.2

15

1 M
 1 M
 1 M

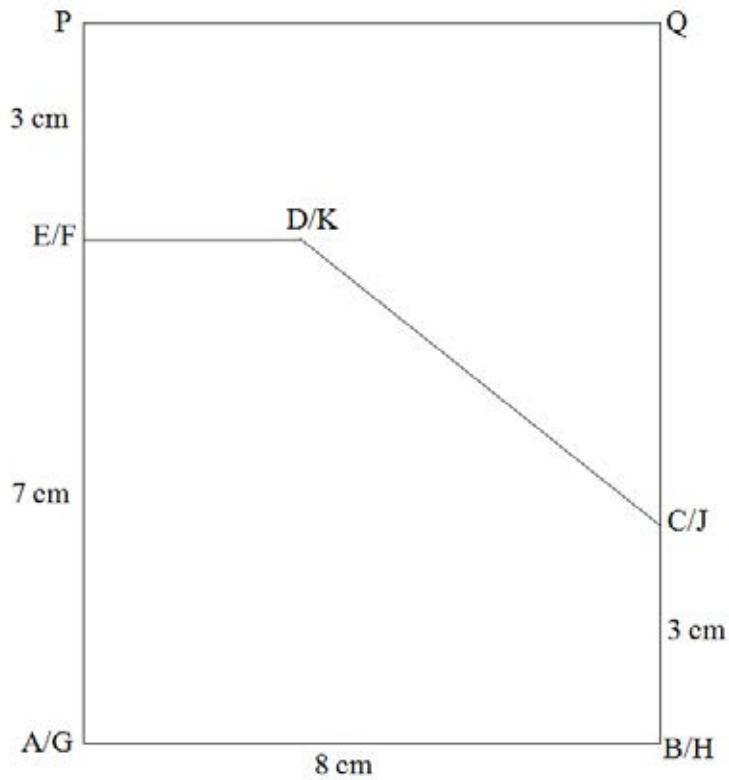
12

b)



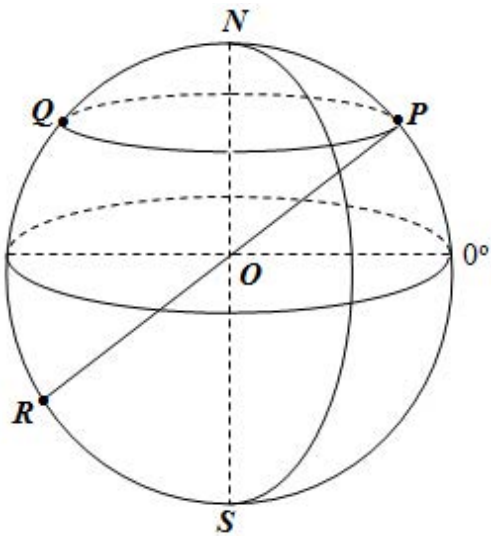
Correct shape with rectangle, square and half circle.
 $DC > ED = PE$
 Correct measurement 0.2

1 M
 1 M
 2 M



Correct shape with pentagon ABCDE and rectangle ABQP.
 $PE = ED = BC < AE = CQ < AB$
 Correct measurement 0.2

1 M
 1 M
 2 M

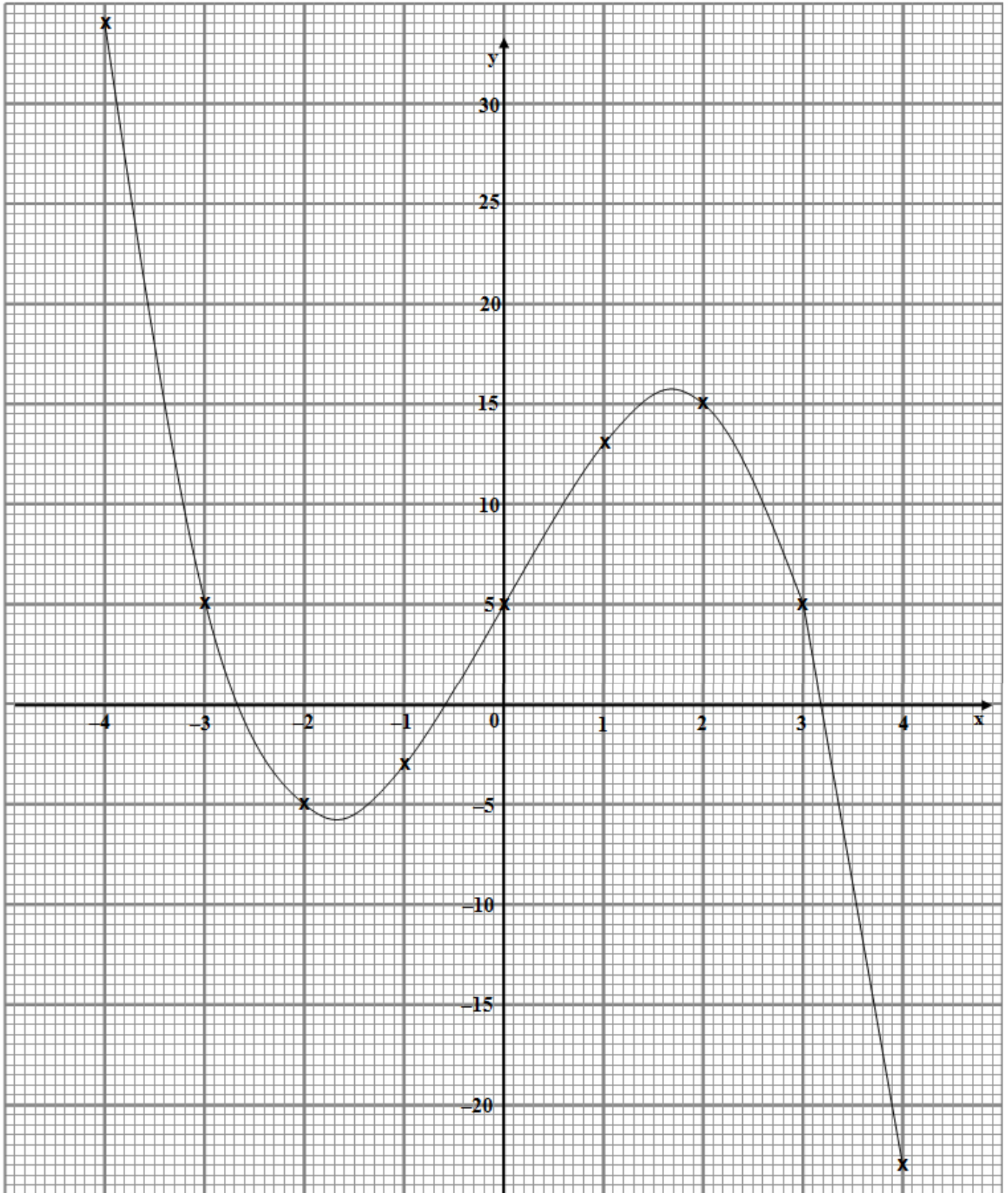


16

- (b) (43oN, 130oW)
- (c) $(180 - 2 \times 43) \times 60$
5640 n.m.
- (d) (i) $180 \times 60 \times \cos 43$
7898.62 n.m.
- (ii) $\frac{7868.62 + (86 \times 60)}{90^\circ}$
14.51 hrs

12

Graph for Question 14



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Graph for Question 14

