

SULIT

NAMA :

TINGKATAN :



SEKTOR SEKOLAH BERASRAMA PENUH
BAHAGIAN SEKOLAH
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN PERCUBAAN SELARAS SBP 2008
SIJIL PELAJARAN MALAYSIA
MATHEMATICS

1449/2

Kertas 2

Ogos

2½ jam

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	3	
	2	4	
	3	4	
	4	4	
	5	5	
	6	4	
	7	5	
	8	6	
	9	6	
	10	5	
	11	6	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
Jumlah			

Kertas soalan ini mengandungi 26 halaman bercetak.

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

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

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

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

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

10 Pythagoras Theorem

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

11 $P(A) = \frac{n(A)}{n(S)}$

12 $P(A') = 1 - P(A)$

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 = $\frac{1}{2} \times \text{sum of parallel sides} \times \text{height}$
- 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** The Venn diagram below shows sets P , Q , and R . Given that the universal set $\xi = P \cup Q \cup R$. Shade the region representing

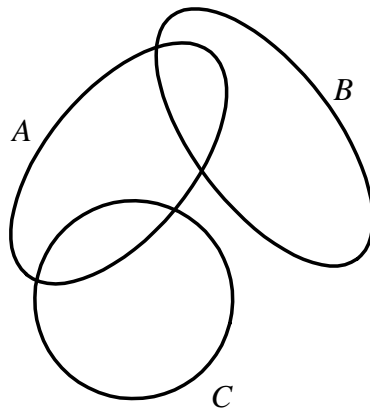
(i) $A \cap B'$

(ii) $A' \cap (B \cup C)$

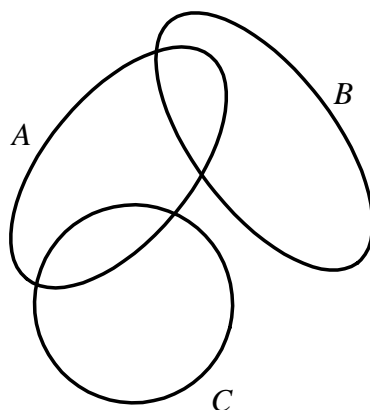
[3 marks]

Answer:

(i)



(ii)



- 2 Using factorisation, solve the following quadratic equation $x^2 - 4 = \frac{1}{2}(x + 7)$.

[4 marks]

*For
Examiner's
Use*

Answer :

- 3 Calculate the value of m and n that satisfy the following simultaneous linear equations:

$$2m + n = 3$$

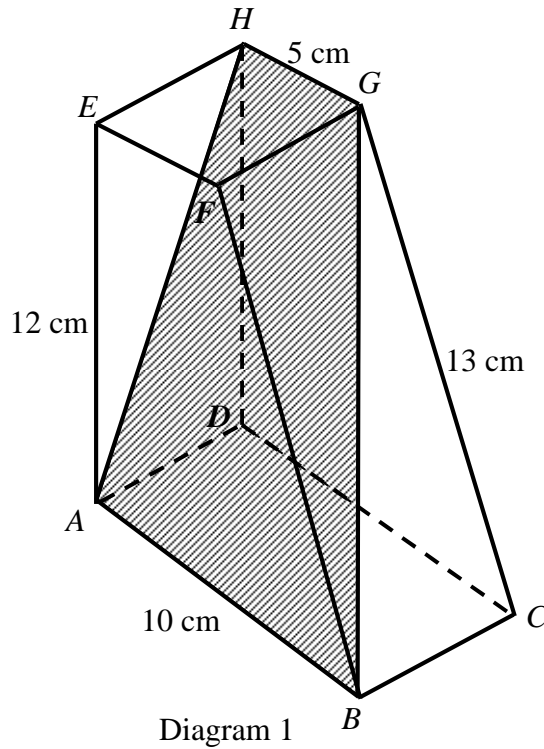
$$m - \frac{1}{2}n = 1$$

[4 marks]

Answer :

For
Examiner's
Only

- 4 Diagram 1 shows a right prism with a horizontal rectangular base $ABCD$. $EFGH$ is a square. The plane $AEHD$ is vertical and the uniform cross-section of the prism is the trapezium $AEFB$.



[4 marks]

Calculate the angle between the plane $AHGB$ and the plane $ABFE$.

Answer :

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

$$a \in \{ a, b, c \} \text{ and } -3 > -7$$

[1 marks]

(b) Complete the following argument.

Premise 1 : _____

Premise 2 : $x^n + x$ is not a quadratic expression.

Conclusion : $n \neq 2$.

[2 marks]

(c) Make a general conclusion by induction for the number sequence 11, 23, 43, 71, ... which follows the following pattern.

$$11 = 4(1^2) + 7$$

$$23 = 4(2^2) + 7$$

$$43 = 4(3^2) + 7$$

$$71 = 4(4^2) + 7$$

.....

[2 marks]

Answer :

(a)

(b)

(c)

For
Examiner's
Only

- 6 Diagram 2 shows a right prism. Trapezium $PQRS$ is the uniform cross section of the prism. PQ and SR are parallel sides. PS is perpendicular to PQ and SR . A cylinder of diameter 14 cm and height 15 cm is taken out of the solid as shown.

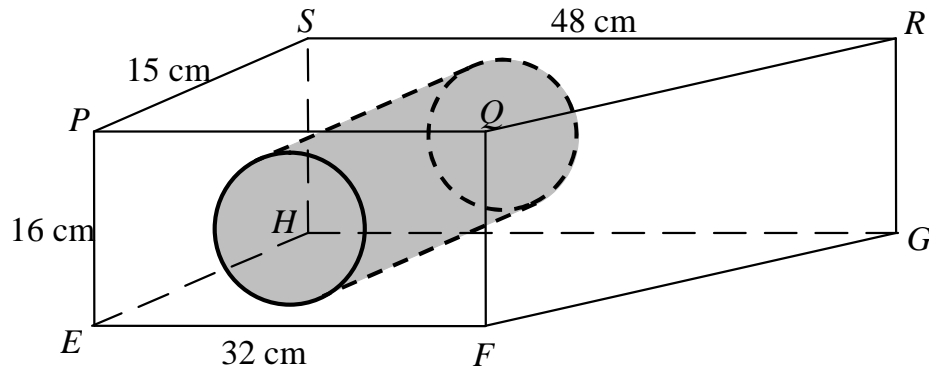


Diagram 2

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

[4 marks]

7 In Diagram 3, O is the origin. $PQRS$ is a parallelogram.

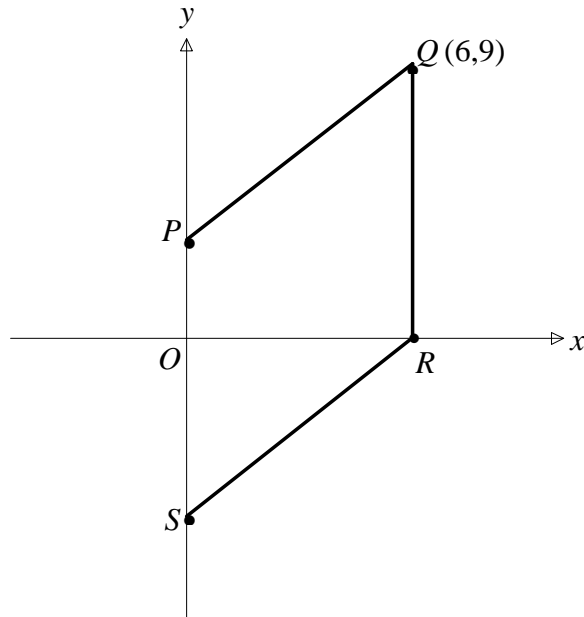


Diagram 3

Given $OS = 2OP$.

- (a) State the equation of the straight line QR . [1 marks]
- (b) Find the equation of the straight line PQ and hence, state its x -intercept. [4 marks]

Answer :

(a)

(b)

For
Examiner's
Only

8 (a) A is a 2×2 matrix. Given that $A \begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, find matrix A . [2 marks]

(b) Hence, using matrices, find the value of r and s which satisfy the simultaneous linear equations below.

$$-r + 2s = 6$$

$$-3r + 4s = 8$$

[4 marks]

Answer:

(a)

(b)

- 9 In Diagram 4, $ABCD$ is a rectangle. Given that AC is the diameter of a semicircle $AFBGC$. $CDHE$ is a quadrant with centre C .

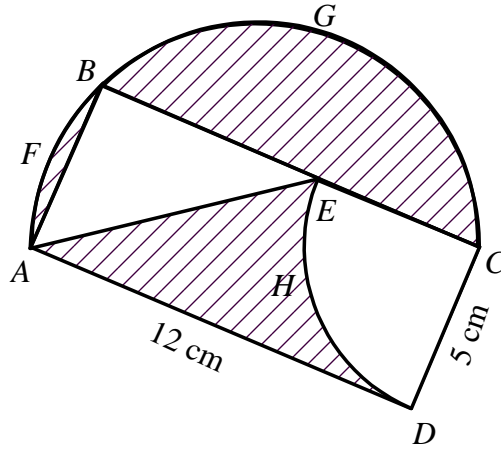


Diagram 4

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

- (a) the perimeter, in cm, of the whole diagram. [3 marks]
- (b) the area, in cm^2 , of the shaded region. [3 marks]

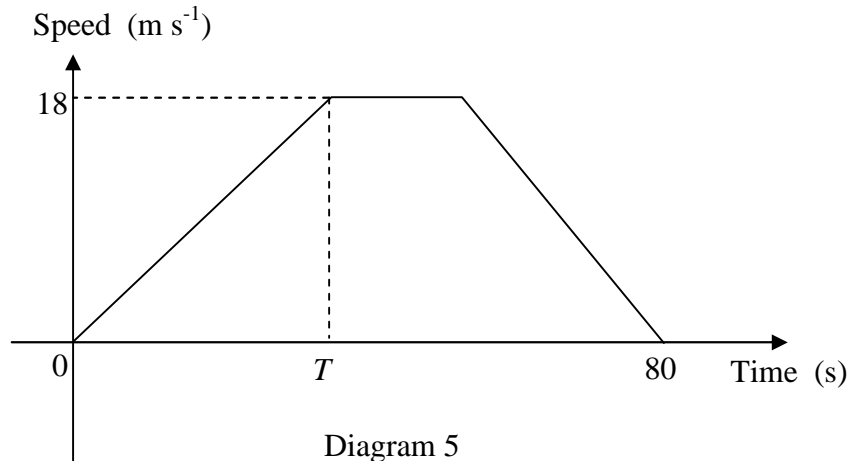
Answer:

(a)

(b)

For
Examiner's
Only

10 Diagram 5 shows the speed-time graph of an object over a period of 80 seconds.



The object started from rest, attained a speed of 18 m s^{-1} then travelled at a constant speed before slowing down until it came to rest at 80 seconds.

- (a) Given that the rate of change of speed during the first part of the motion was 0.5 m s^{-2} , calculate the value of T . [2 marks]
- (b) The total distance travelled during the 80 seconds was 855 metres. Calculate the period of time taken by the object to travel at uniform speed. [3 marks]

Answer :

(a)

(b)

- 11 Table 1 shows the probability of two classmates, Swee Lin and Faizah spending their leisure time.

Students	Probability		
	Gardening	Fishing	Shopping
Swee Lin	$\frac{1}{6}$	$\frac{3}{4}$	
Faizah	$\frac{2}{5}$	$\frac{1}{10}$	$\frac{1}{2}$

Table 1

Calculate the probability that

- (a) Swee Lin goes shopping,
 (b) both are doing the same activities,
 (c) both are doing different activities.

[1 marks]

[3 marks]

[2 marks]

Answer:

(a)

(b)

(c)

Section B
[48 marks]

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

- 12 (a) Complete Table 2 in the answer space for the equation $y = -\frac{15}{x}$. [2 marks]
- (b) For this part of the question, use the graph paper provided on page 15. You may 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 $y = -\frac{15}{x}$ for $-4.5 \leq x \leq 4.5$. [4 marks]
- (c) From your graph, find
(i) the value of x when $y = 7$,
(ii) the value of y when $x = 1.5$. [2 marks]
- (d) Draw a suitable straight line on your graph to find the positive values of x which satisfy the equation $3x^2 = 5x + 15$ for $-4.5 \leq x \leq 4.5$.
State the values of x . [4 marks]

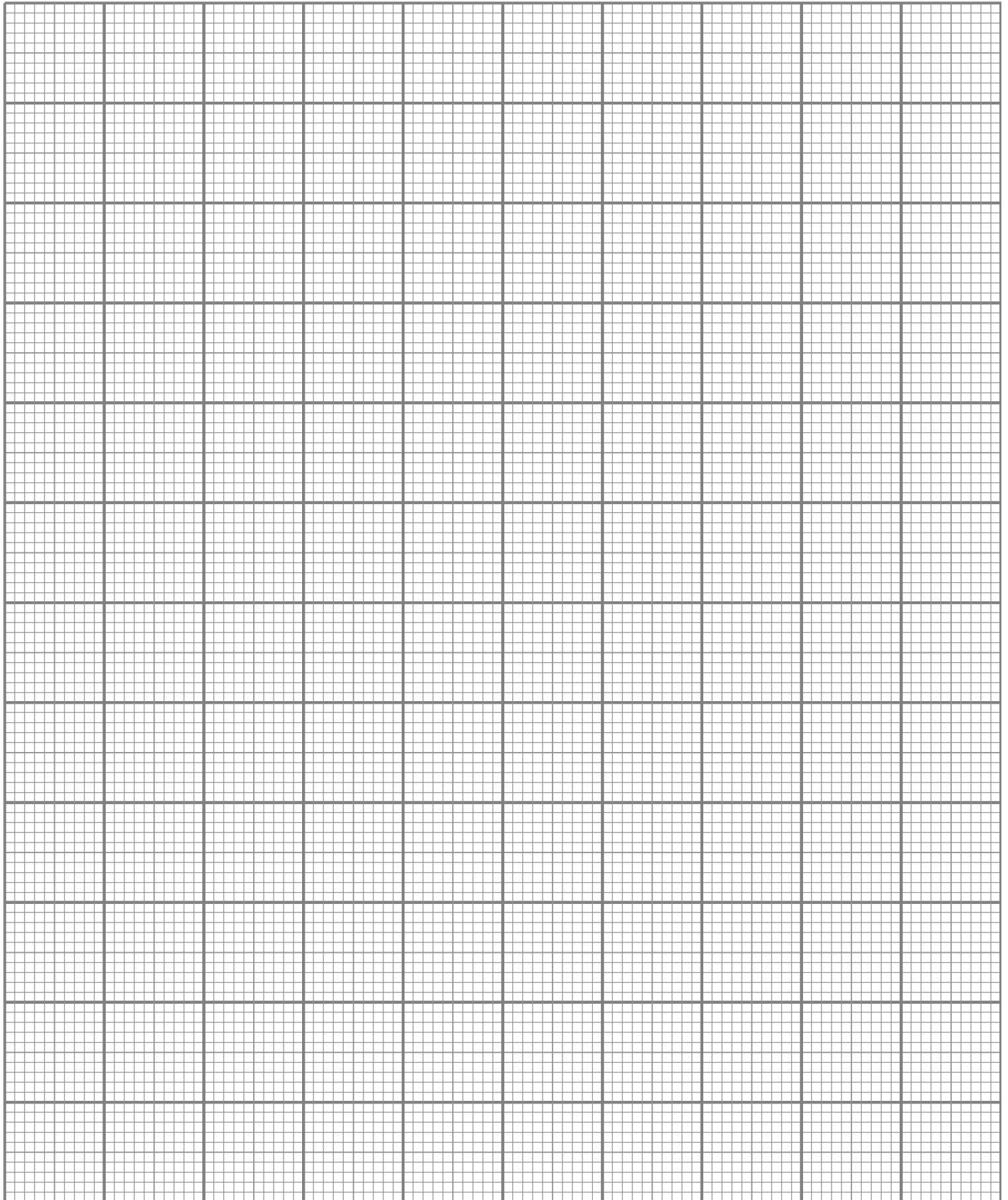
Answer :

(a)

x	-4.5	-3	-1.5	-1	-0.5	0.5	1	2.5	3	4.5
y	3.3	5.0		15.0	30.0	-30.0	-15.0		-5.0	-3.3

Table 2

- (b) Refer graph on page 15.
(i) $x = \dots\dots\dots$
(ii) $y = \dots\dots\dots$
- (c) $x = \dots\dots\dots$, $\dots\dots\dots$



For
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Only

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

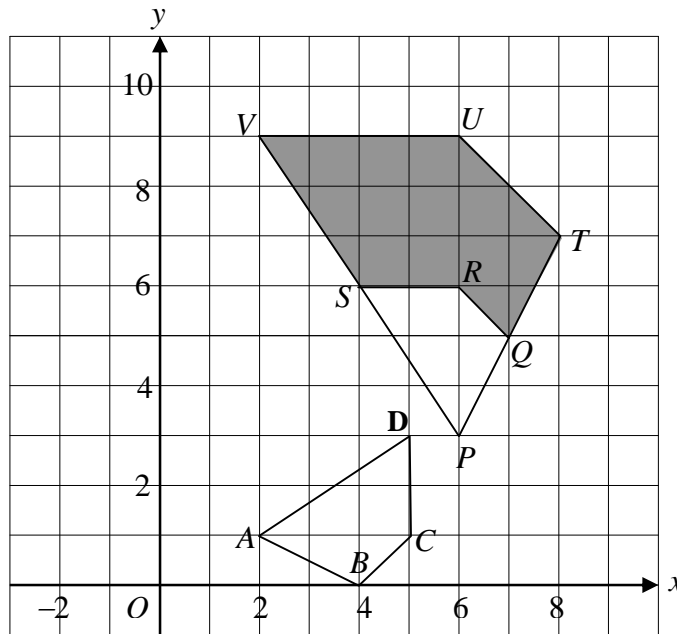


Diagram 6

- (a) Transformation \mathbf{M} is a translation $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$.

Transformation \mathbf{N} is a reflection in the line $y = x$.

State the coordinates of the image of point D under each of the following transformations :

- (i) \mathbf{M} ,
- (ii) \mathbf{NM} .

[3 marks]

- (b) (i) $PTUV$ is the image of $ABCD$ under the combined transformation \mathbf{JK} . Describe in full, transformation \mathbf{K} and transformation \mathbf{J} .

[6 marks]

- (ii) Given the shaded region $QTUVSR$ represents a region with an area of 78 cm^2 , calculate the area, in cm^2 , of the region represented by $PQRS$. [3 marks]

Answer :

(a) (i)

(ii)

(b) (i) **K :**

J :

(ii)

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Use*

- 14 The data in Diagram 7 shows the time, in minute, taken by 30 students to solve some trigonometry problems.

43	50	49	54	60	65
47	35	56	61	66	56
47	55	51	58	41	48
62	52	40	57	58	63
72	52	53	36	67	54

Diagram 7

- (a) Using data in Diagram 7 and a class interval of 5 minutes, complete Table 3 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 page 20.*

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 3.

[5marks]

Answer :

(a)

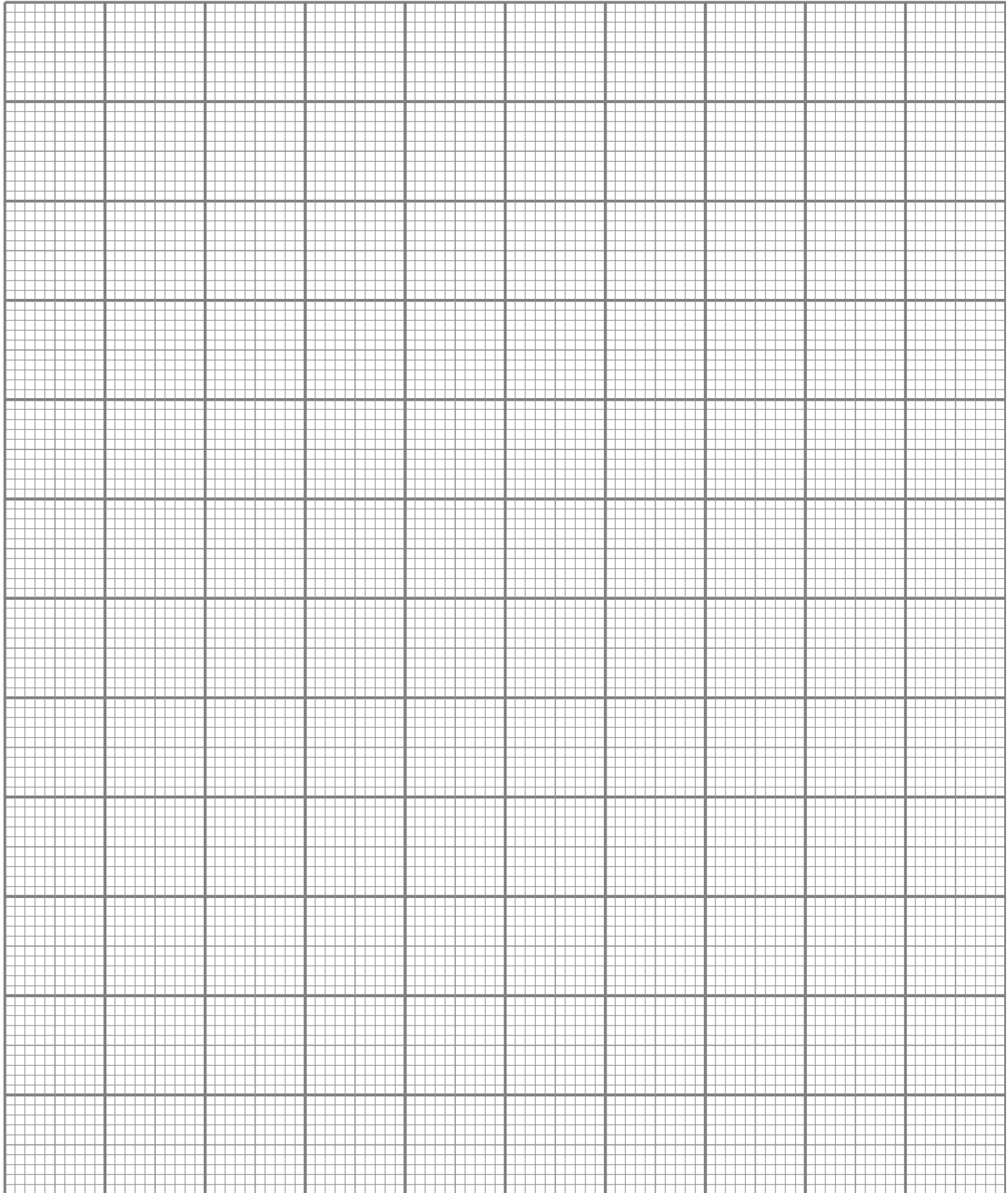
Time(minutes)	frequency	Midpoint
35 – 39		
40 – 44		

Table 3

(b) (i)

(ii)

(c) Refer graph on page 20.



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

- (a) Diagram 8(i) shows a right prism with rectangular base $ABCD$ on a horizontal table. The surface $AEHILD$ is its uniform cross-section. The rectangle $IJKL$ is an inclined plane. The rectangle $EFGH$ is a horizontal plane. The edges AE , BF , CK , DL , GJ and HI are vertical edges. Given $EH = FG = 3$ cm.

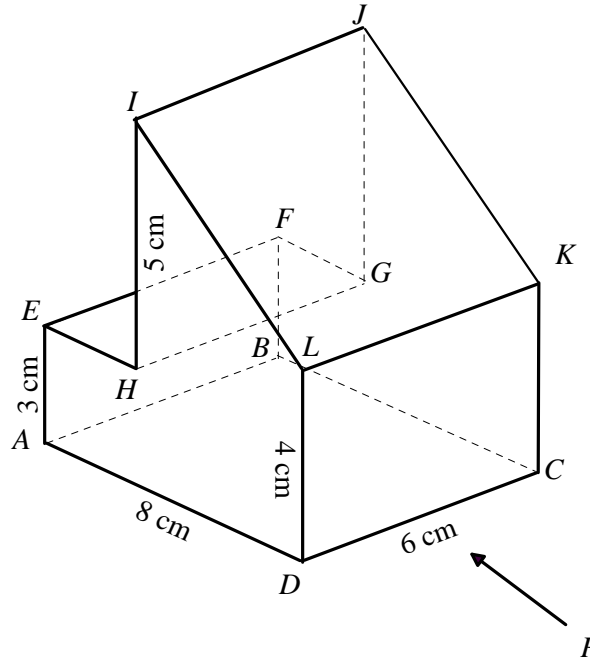


Diagram 8(i)

Draw in full scale, the elevation of the solid on a vertical plane parallel to DC as viewed from P . [4 marks]

Answers :

(a)

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- (b) A half-cylinder is joined to the solid in the Diagram 8(i) at the plane $CDLK$ to form a combined solid as shown in Diagram 8(ii).

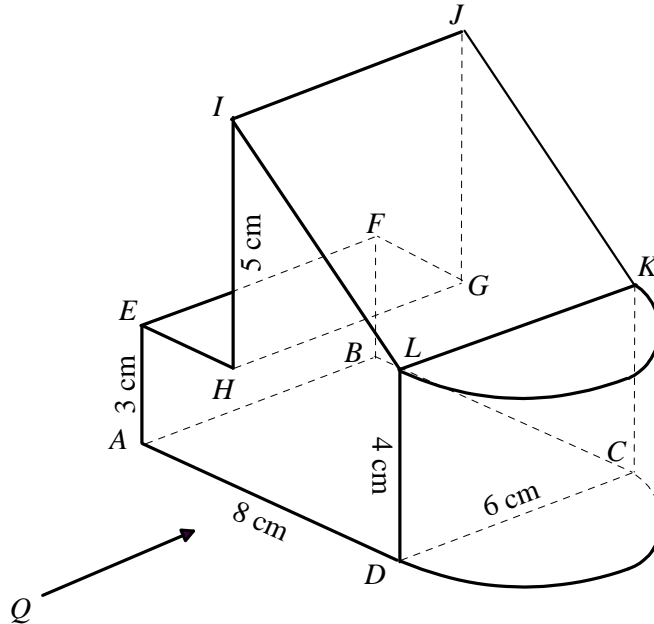


Diagram 8(ii)

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 AD as viewed from Q . [4 marks]

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Answer :

(b) (i)

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(ii)

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23

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- 16 $J (77^{\circ}S, 70^{\circ}E)$ and K are two points on the surface of the earth such that JK is the diameter of the earth and JL is the diameter of a parallel of latitude.
- (a) Mark the position of K and L in Diagram 9. [2 marks]
- (b) State the position of K . [2 marks]
- (c) Calculate the shortest distance, in nautical miles, from J to L measured along the surface of the earth. [3 marks]
- (d) A jet plane took off from J due west to L and then flew due north to K . The average speed for the whole flight was 1500 knots.
Calculate
- (i) the distance, in nautical miles, from J to L measured along the parallel of latitude,
- (ii) the total time, in hours, taken for the whole flight. [5 marks]

Answer:

(a)

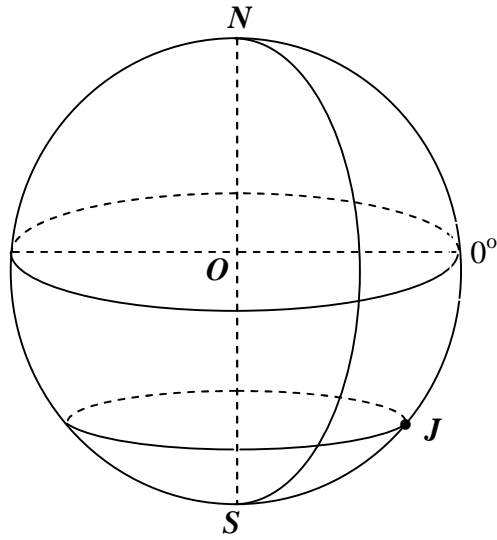


Diagram 9

(b)

(c)

(d) (i)

(ii)

END OF QUESTION PAPER

INFORMATION FOR CANDIDATES

1. This question paper consists of two sections: **Section A** and **Section B**.
2. Answer **all** questions in **Section A** and **four** questions from **Section B**.
3. Write your answers in the spaces provided in the question paper.
4. Show your working. It may help you to get marks.
5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
6. The diagrams in the questions provided are not drawn to scale unless stated.
7. The marks allocated for each question and sub-part of a question are shown in brackets.
8. A list of formulae is provided on page 2 to 3.
9. A booklet of four-figure mathematical tables is provided.
10. You may use a non-programmable scientific calculator.
11. Hand in this question paper to the invigilator at the end of the examination.

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**PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2008**

MATEMATIK

Kertas 2

PERATURAN PEMARKAHAN

$$\text{Jumlah Markah} = \frac{\text{Kertas1} + \text{Kertas2}}{140} \times 100\%$$

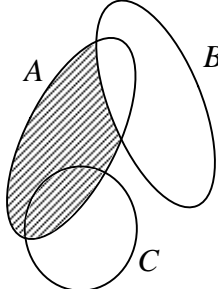
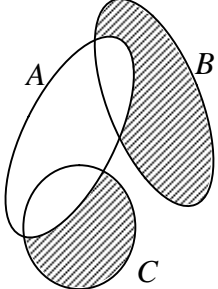
Peraturan pemarkahan ini mengandungi 8 halaman.

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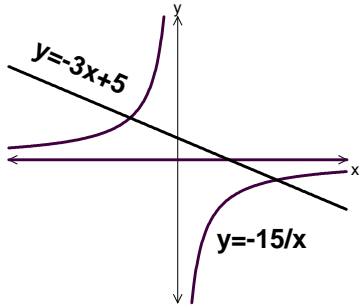
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Section A
[52 marks]

No	Marking Scheme	Marks	
1	<p>(i) </p> <p>(ii) </p>	P1, P2	3
2.	$2x^2 - x - 15 = 0$ $(2x + 5)(x - 3) = 0$ $x = -\frac{5}{2}, 3$	K1 K1 N1N1	4
3.	$2m - n = 2 \quad \text{or} \quad m = 1 + \frac{1}{2}n$ $2n = 1 \quad \text{or} \quad 4m = 5$ $n = \frac{1}{2}$ $m = \frac{5}{4}$	K1 K1 N1 N1	4
4.	$\angle HAE$ $\tan \angle HAE = \frac{5}{12}$ $\angle HAE = 22.62^\circ \text{ or } 22^\circ 37'$	P1 K2 N1	4
5.	<p>(a) False</p> <p>(b) If $n = 2$, then $x^n + x$ is a quadratic expression</p> <p>(c) $4n^2 + 7, n = 1, 2, 3, \dots$</p>	P1 P2 P1, P1	5

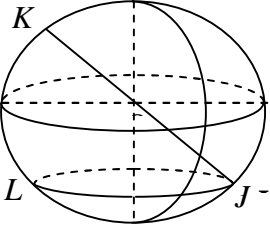
No	Marking Scheme	Marks	
6.	$\frac{1}{2} \times (32 + 48) \times 15 \times 16$ $\frac{22}{7} \times 7 \times 7 \times 15$ $\frac{1}{2} \times (32 + 48) \times 15 \times 16 - \frac{22}{7} \times 7 \times 7 \times 15$ 7290	K1	
		K1	
		K1	
		N1	4
7.	<p>(a) $x = 6$</p> <p>(b) $P(0,3)$</p> <p>$m_{PQ} = 1$</p> <p>$y = x + 3$</p> <p>$x = -3$</p>	P1	
		P1	
		K1	
		N1	
		P1	5
8.	<p>(a) $A^{-1} = \frac{1}{-4 - (-6)} \begin{pmatrix} 4 & -2 \\ 3 & -1 \end{pmatrix}$</p> $= \frac{1}{2} \begin{pmatrix} 4 & -2 \\ 3 & -1 \end{pmatrix}$ <p>(b) $\begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} r \\ s \end{pmatrix} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$</p> $\begin{pmatrix} r \\ s \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 4 & -2 \\ 3 & -1 \end{pmatrix} \begin{pmatrix} 6 \\ 8 \end{pmatrix}$ <p>$r = 4$</p> <p>$s = 5$</p> <p>Note: $\begin{pmatrix} r \\ s \end{pmatrix} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ accept for P1</p>	K1	
		N1	
		P1	
		K1	
		N1	
		N1	6

No	Marking Scheme	Marks					
9.	<p>(a) $\frac{180}{360} \times 2 \times \frac{22}{7} \times \frac{13}{2}$ $\frac{180}{360} \times 2 \times \frac{22}{7} \times \frac{13}{2} + 5 + 12$ $37\frac{3}{7}$ or 37.43</p> <p>(b) $\frac{180}{360} \times \frac{22}{7} \times \left(\frac{13}{2}\right)^2$ or $\frac{90}{360} \times \frac{22}{7} \times 5^2$ or $\frac{1}{2} \times 5 \times 7$ or $\frac{1}{2} \times 5 \times 12$ $\left(\frac{180}{360} \times \frac{22}{7} \times \left(\frac{13}{2}\right)^2 + \frac{1}{2} \times 5 \times 12\right) - \left(\frac{90}{360} \times \frac{22}{7} \times 5^2 + \frac{1}{2} \times 5 \times 7\right)$ $= 59\frac{1}{4}$ or 59.25</p>	K1	K1	N1	6		
10	<p>(a) $\frac{18}{T} = 0.5$ $T = 36$</p> <p>(b) $\frac{1}{2} \times (x + 80) \times 18 = 855$ $x = 15$</p>	K1	N1	K2		N1	5
11	<p>(a) $\frac{1}{12}$</p> <p>(b) $\frac{1}{6} \times \frac{2}{5} + \frac{3}{4} \times \frac{1}{10} + \frac{1}{12} \times \frac{1}{2}$ $\frac{11}{60}$*</p> <p>(c) $1 - \frac{11}{60}$ $\frac{49}{60}$</p>	P1	K2	N1	K1	N1	6

No	Marking Scheme	Marks							
12	<p>(a) <table border="1" data-bbox="423 226 751 310"> <tr> <td>x</td> <td>-1.5</td> <td>2.5</td> </tr> <tr> <td>y</td> <td>10</td> <td>-6</td> </tr> </table></p> <p>(b) Uniform scales $-4.5 \leq x \leq 4.5$ and $-30 \leq y \leq 30$ All 10 points plotted correctly . Smooth curve and passed all 10 correct points .</p>  <p>(c) $x = -2.1 \pm 0.1$ $y = -10.3 \pm 0.5$</p> <p>(d) $y = -3x + 5$ Straight line $y = -3x + 5$ drawn $x = -1.6 \pm 0.1, 3.2 \pm 0.1$</p>	x	-1.5	2.5	y	10	-6	<p>K1K1</p> <p>P1 K2 N1</p> <p>P1 P1</p> <p>K1 K1 N1N1</p>	<p>12</p>
x	-1.5	2.5							
y	10	-6							
13	<p>(a) (i) (1, 6) (ii) (6, 1)</p> <p>(b) (i) K : rotation 90° anticlockwise by the centre (3,4) (ii) J :enlargement at centre P or (6,3) and scale factor 2</p> <p>(c) $A + 78 = 2^2 \times A$ $A = 26 \text{ cm}^2$</p>	<p>P1 P2</p> <p>P3 P3</p> <p>K2 N1</p>	<p>12</p>						

No	Marking Scheme	Marks																											
14	<p>(a)</p> <table border="1" data-bbox="350 264 1015 646"> <thead> <tr> <th>Time(minutes) (i)</th> <th>Frequency (ii)</th> <th>Midpoints (iii)</th> </tr> </thead> <tbody> <tr><td>35 – 39</td><td>2</td><td>37</td></tr> <tr><td>40 – 44</td><td>3</td><td>42</td></tr> <tr><td>45 – 49</td><td>4</td><td>47</td></tr> <tr><td>50 – 54</td><td>7</td><td>52</td></tr> <tr><td>55 – 59</td><td>6</td><td>57</td></tr> <tr><td>60 -64</td><td>4</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>(i) all class interval correct (ii) all frequencies correct (iii) all midpoints correct</p> <p>(b). (i) 50 – 54 (ii) $\frac{2(37) + 3(42) + 4(47) + 7(52) + 6(57) + 4(62) + 3(67) + 1(72)}{2 + 3 + 4 + 7 + 6 + 4 + 3 + 1}$ 53.83</p> <p>(c)</p> <ul style="list-style-type: none"> Uniform scale on the x-axis and on the y – axis Mid - points on horizontal axis 8 points plotted corecctly points (32,0) and (76,0) plotted correctly frequency polygon pass through all 8 points correctly, (32,0) and (76,0) <div data-bbox="683 1245 1117 1598" data-label="Figure"> </div>	Time(minutes) (i)	Frequency (ii)	Midpoints (iii)	35 – 39	2	37	40 – 44	3	42	45 – 49	4	47	50 – 54	7	52	55 – 59	6	57	60 -64	4	62	65 – 69	3	67	70 - 74	1	72	<p>P1 P1 P1 P1 K2 N1 K1 K1 K1 K1 N1</p>
Time(minutes) (i)	Frequency (ii)	Midpoints (iii)																											
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		12																											

No	Marking Scheme	Marks
15	<div data-bbox="373 252 714 619" data-label="Diagram"> </div> <p data-bbox="349 661 990 766">Correct shape with two rectangle $IJLK$ and $LKAB$. Dotted line HG. Correct measurement ± 0.2.</p> <div data-bbox="349 808 876 1060" data-label="Diagram"> <p>(b)</p> </div> <p data-bbox="349 1102 1071 1207">Correct shape with rectangle $ABCD$ and semicircle CD. Straight line GH and semicircle CD by using compasses. Correct measurement ± 0.2.</p> <div data-bbox="349 1281 1047 1680" data-label="Diagram"> <p>(c)</p> </div> <p data-bbox="365 1732 1063 1837">Coreect shape with hexagon $AEHILD$ and a rectangle. The length of the sides must be in correct proportion Correct measurement ± 0.2</p>	<p data-bbox="1323 672 1372 777">P1 P1 Q2</p> <p data-bbox="1323 1113 1372 1218">P1 P1 Q2</p> <p data-bbox="1323 1732 1372 1837">P1 P1 Q2</p> <p data-bbox="1421 1795 1469 1837">12</p>

No	Marking Scheme	Marks	
16	<p>(a)</p>  <p>(b) $(77^\circ N, 110^\circ W)$</p> <p>(c) $(90 - 77) \times 2$ $(90 - 77) \times 2 \times 60$ 1560 n.m.</p> <p>(d) (i) $\cos 77^\circ$ $180 \times 60 \times \cos 77^\circ$ 2429.47*</p> <p>(e) $T = \frac{2429.47^* + 154 \times 60}{1500}$ 7.78 hours or 7 hr 47 min</p>	P1P1	
		P2 K1 K1 N1	
		K1 K1 N1	
		K1 N1	
			12

