



General Certificate of Secondary Education
January 2019

Centre Number

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Candidate Number

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Mathematics

Unit T6 Paper 1
(Non-calculator)

Higher Tier



MV18

[GMT61]

THURSDAY 10 JANUARY, 9.15am–10.30am

Time

1 hour 15 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write on blank pages or tracing paper.

Complete in black ink only.

Answer **all fifteen** questions.

All working should be clearly shown in the spaces provided.

Marks may be awarded for partially correct solutions.

You must not use a calculator for this paper.

Information for Candidates

The total mark for this paper is 50.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Functional Elements will be assessed in this paper.

Quality of written communication will be assessed in Question 15.

You should have a ruler, compasses and a protractor.

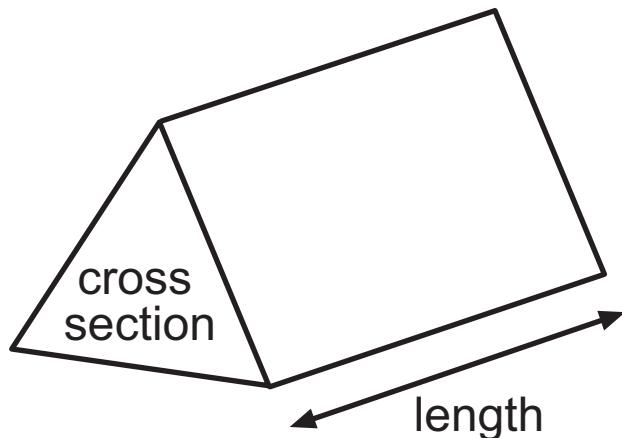
The Formula Sheet is on pages 4 and 5.

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(Questions start on page 6)

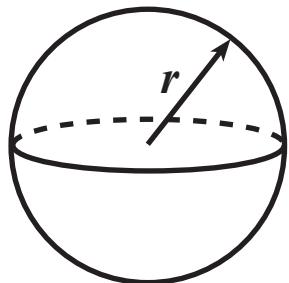
Formula Sheet

Volume of prism = area of cross section \times length



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

Surface area of sphere = $4 \pi r^2$



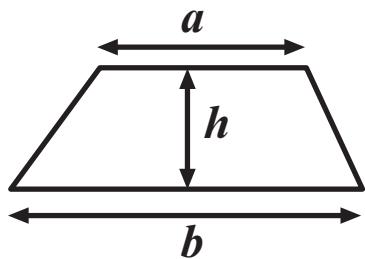
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

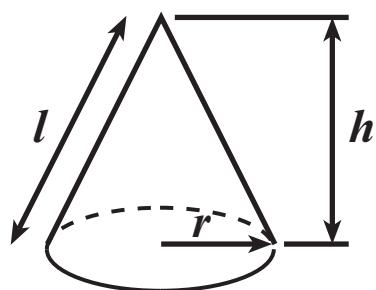
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Area of trapezium = $\frac{1}{2} (a + b)h$

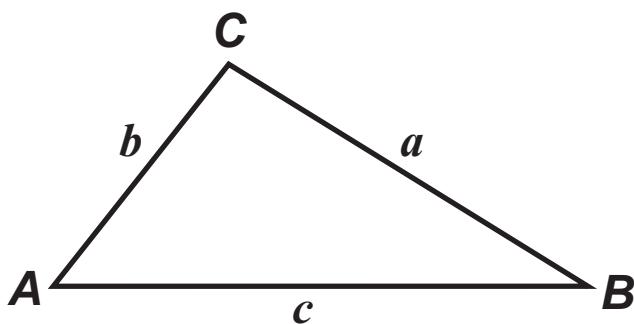


Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$

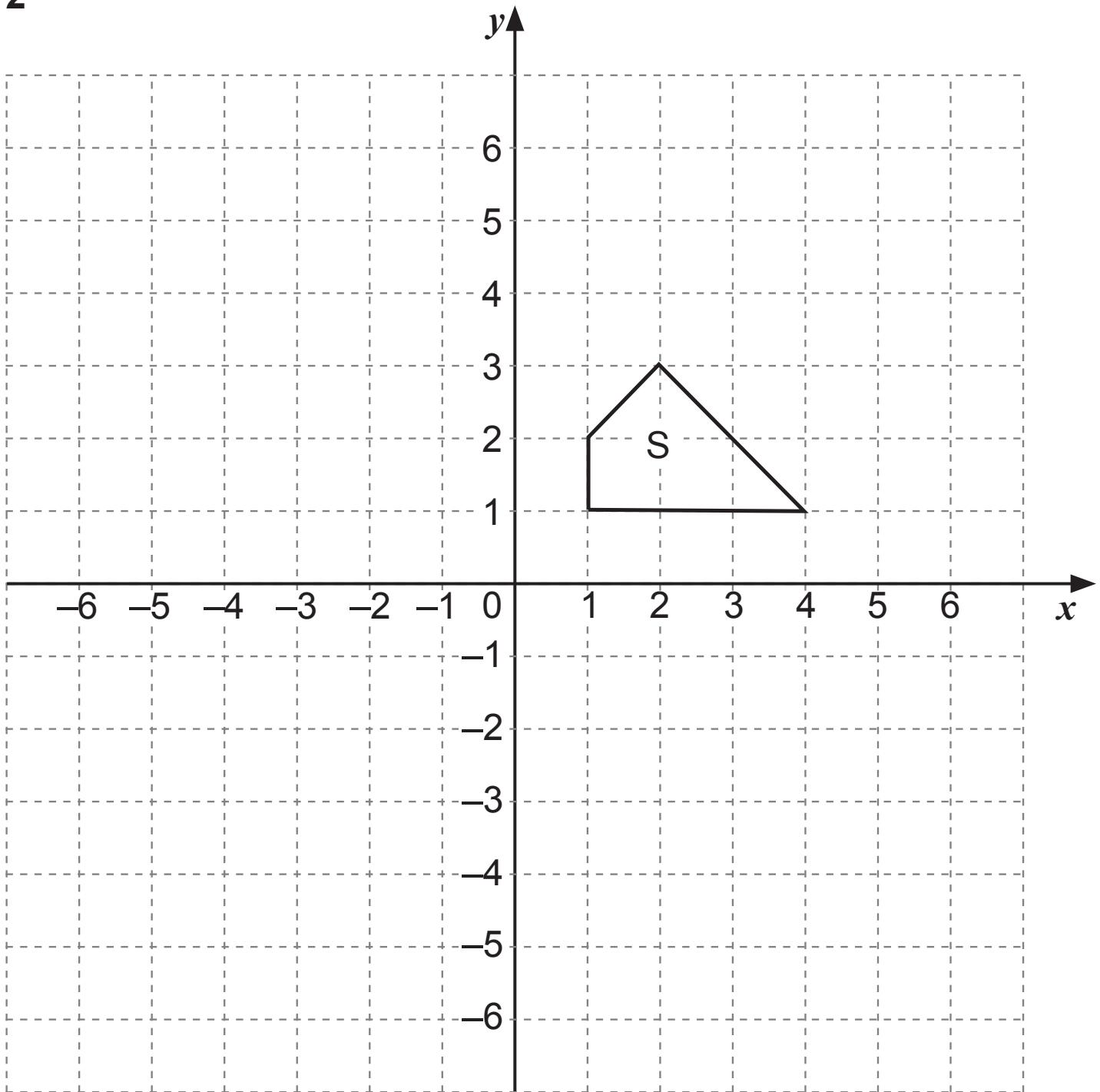
1 W and X are **whole numbers**.

$W \leq 18$ and $X > 20$

What is the largest possible value for $W - X$? [2 marks]

Answer _____

2



(a) Draw the image of the shape S after the translation $\begin{pmatrix} -5 \\ -6 \end{pmatrix}$. [2 marks]

(b) Enlarge the shape S by a scale factor of 2 using the centre of enlargement (5, 3). [3 marks]

3

	Small	Medium	Large
Black	10	14	12
White	13	18	19
Red	3	6	5

The table shows information about 100 T-shirts in a shop.

(a) One T-shirt was taken at random.

(i) What is the probability that the T-shirt taken was large and red? [1 mark]

Answer _____

(ii) If the T-shirt taken was white, what is the probability that it was medium? [2 marks]

Answer _____

(b) The T-shirt was replaced.

Two large T-shirts were then taken at random.

What is the probability that they were both red?
[2 marks]

Answer _____

4 Given that $6.7 \times 459 = 3075.3$

(a) write down the value of 6.7×0.459 [1 mark]

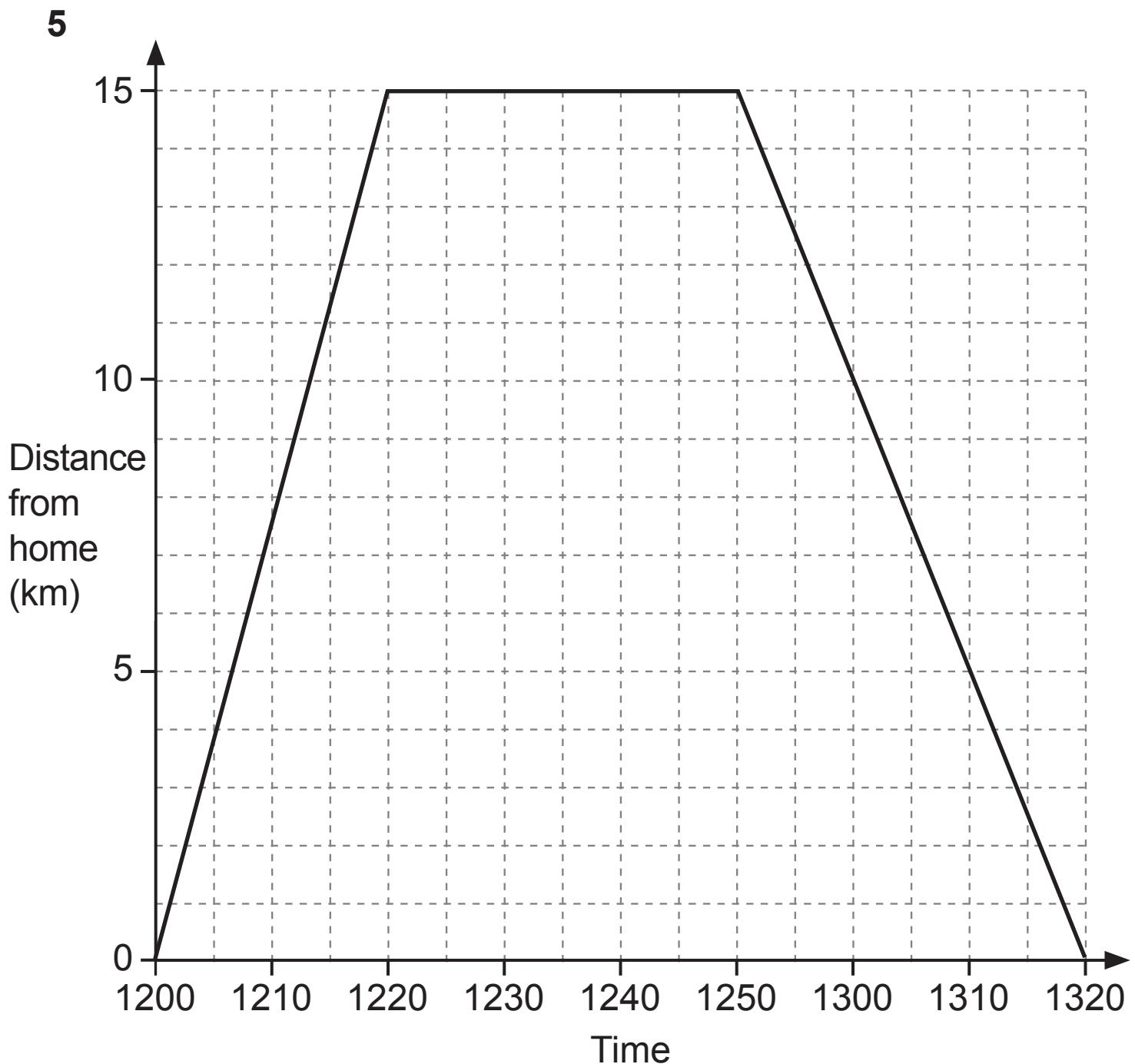
Answer _____

(b) write down the value of $\frac{307530}{45.9}$ [1 mark]

Answer _____

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(Questions continue overleaf)



The graph opposite represents David's journey from home to a shopping centre and home again.

(a) What was his average speed when travelling to the shopping centre? [2 marks]

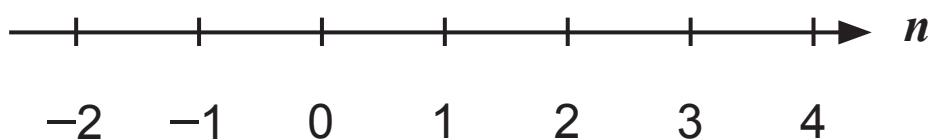
Answer _____ km/hr

(b) Was his average speed travelling home faster, slower or the same as going to the shopping centre? [1 mark]

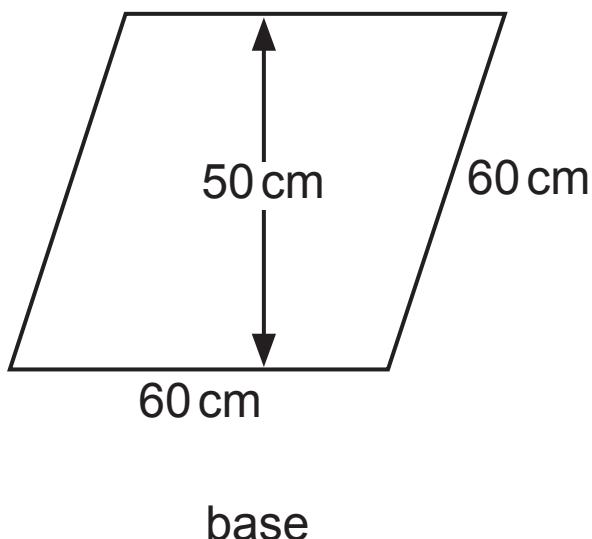
Answer _____

6 Solve $2n - 5 \leq -2$ where n is an integer.

Mark the values of n on this section of the number line.
[3 marks]



7 A tall pillar, in the shape of a rhombus-based prism, has a base as shown.



The height of the pillar is 12 metres.

Work out the volume of the pillar in m^3 [3 marks]

Answer _____ m^3

8 The Rugby Championship is a competition contested annually by Argentina, Australia, New Zealand and South Africa.

The table below gives the probabilities of winning the Rugby Championship for 3 of the teams.

Argentina	Australia	New Zealand	South Africa
0.09	0.13		0.16

(a) What is the probability of New Zealand winning the Rugby Championship? [2 marks]

Answer _____

(b) What is the probability of either Argentina or Australia winning the Rugby Championship? [2 marks]

Answer _____

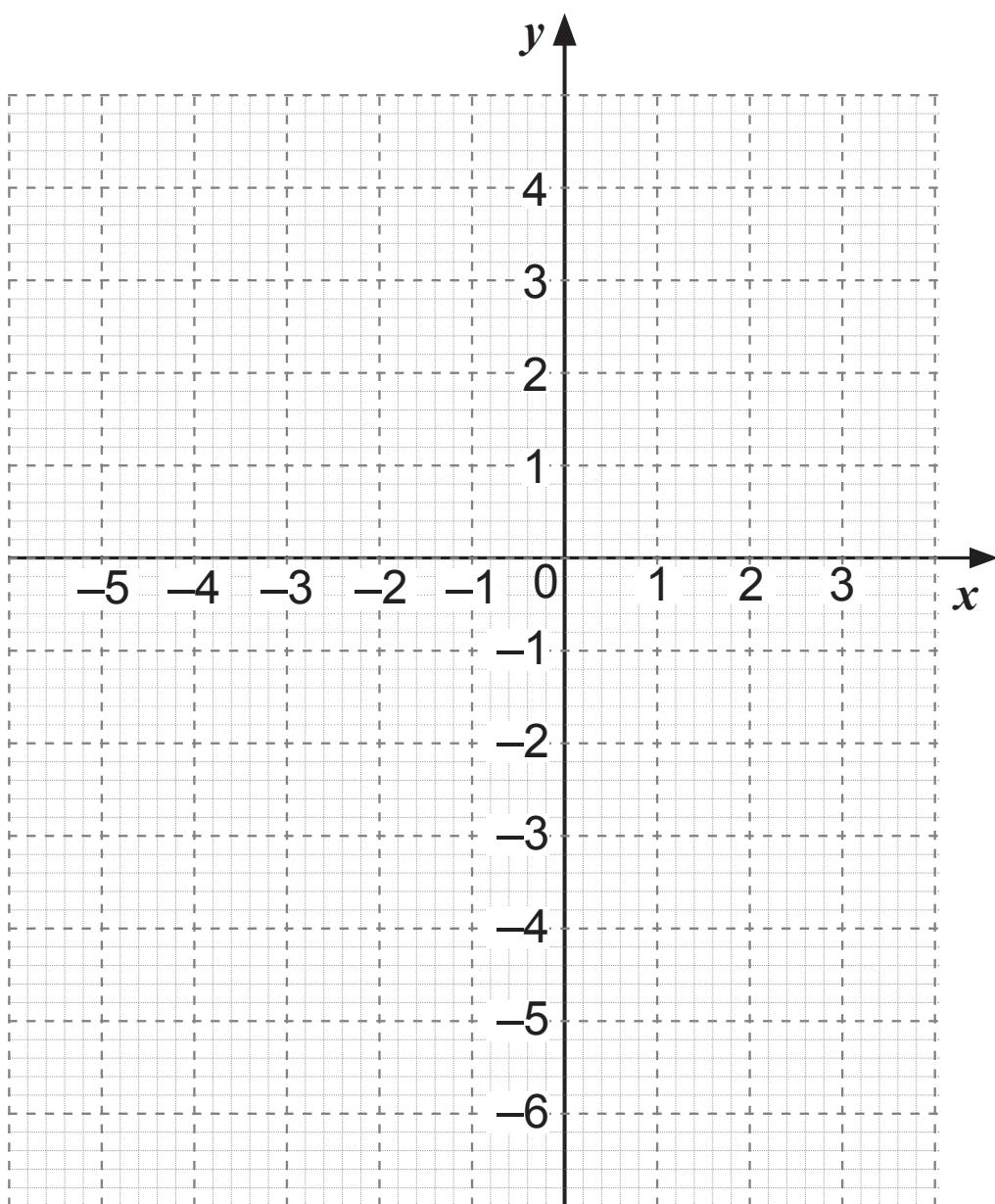
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(Questions continue overleaf)

9 (a) Complete the table of values for $y = 2 - 2x - x^2$
 [2 marks]

x	-4	-3	-2	-1	0	1	2
y	-6	-1	2		2	-1	

(b) Draw the graph of $y = 2 - 2x - x^2$ on the grid below. [2 marks]



(c) By drawing a suitable straight line on your graph, find the solutions to the equation $3 - x - x^2 = 0$
[3 marks]

Answer _____

10 A reel contains 5 metres of ribbon.

The ribbon has a width of 4.5×10^{-3} metres.

Work out the area of ribbon on the reel in m^2 , giving your answer in standard form. [2 marks]

Answer _____ m^2

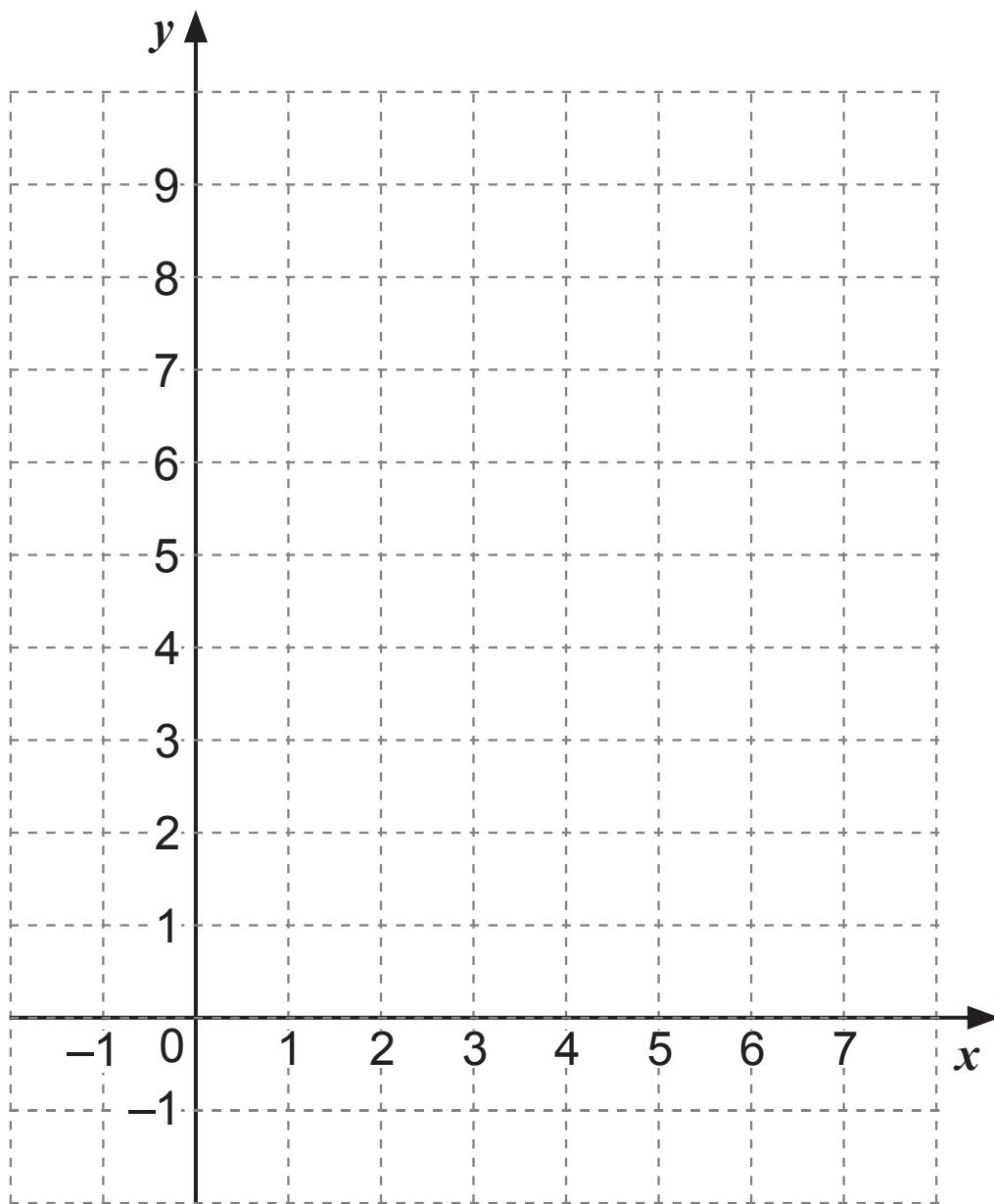
11 (a) On the grid, show clearly the region satisfying the three inequalities

$$y \geq 3$$

$$y \leq 2x + 3$$

$$4x + 3y \leq 24$$

Indicate the region with the letter R. [3 marks]



(b) For integers x and y satisfying the inequalities in part (a),
find the maximum value of $x + 2y$ [2 marks]

Answer _____

12 Write $0.\dot{1}\dot{3}\dot{5}$ as a fraction in its lowest terms. [2 marks]

You must show your working.

Answer _____

13 Given that $e^2 = \frac{1}{48}$ work out the value of e in the form $a\sqrt{3}$ [2 marks]

Answer _____

14 Write $(6 - \sqrt{6})^2$ in the form $a + b\sqrt{6}$ [2 marks]

You must show all your working.

Answer _____

Quality of written communication will be assessed in this question.

15 Given that $\frac{n^2+4}{1-n^2} - \frac{4-n}{1+n} \equiv \frac{Kn}{1-n^2}$, find the value of K .
[3 marks]

You must show all your working.

Answer $K =$ _____

THIS IS THE END OF THE QUESTION PAPER

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Total Marks	

Examiner Number

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