



Rewarding Learning

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



[GMT61]

\*GMT61\*

**THURSDAY 10 JANUARY, 9.15am–10.30am**

## TIME

1 hour 15 minutes.

## 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 outside the boxed area on each page, on blank pages or tracing paper.**

Complete in black ink only. **Do not write with a gel pen.**

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 down the right-hand side of pages 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 page 2.

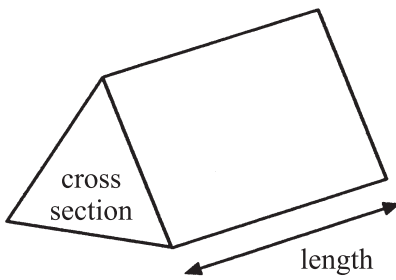
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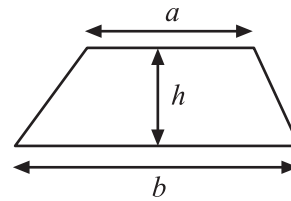
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# Formula Sheet

**Volume of prism** = area of cross section  $\times$  length

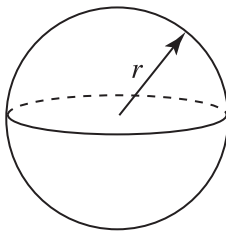


**Area of trapezium** =  $\frac{1}{2}(a + b)h$



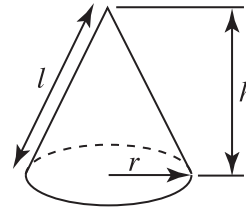
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

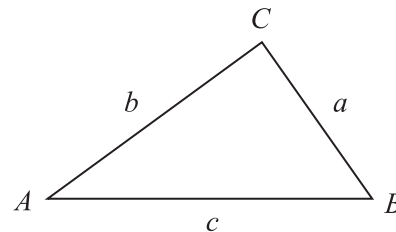


## Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$   
where  $a \neq 0$ , are given by

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

**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** =  $\frac{1}{2} ab \sin C$





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**(Questions start overleaf)**



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

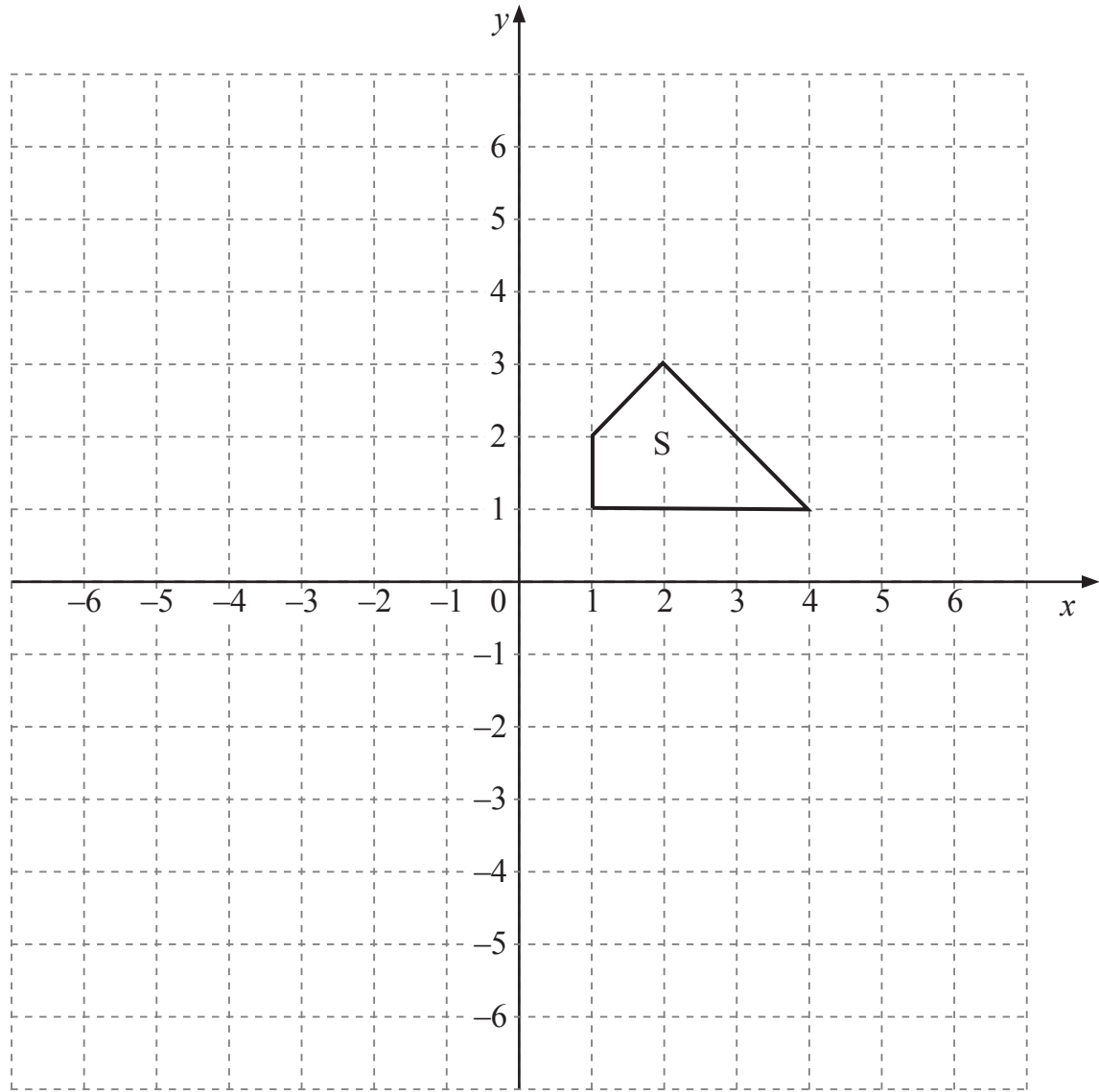
$$W \leq 18 \text{ and } X > 20$$

What is the largest possible value for  $W - X$ ?

Answer \_\_\_\_\_ [2]



2



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

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

[Turn over



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?

Answer \_\_\_\_\_ [1]

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

Answer \_\_\_\_\_ [2]

(b) The T-shirt was replaced.

Two large T-shirts were then taken at random.

What is the probability that they were both red?

Answer \_\_\_\_\_ [2]



4 Given that  $6.7 \times 459 = 3075.3$

(a) write down the value of  $6.7 \times 0.459$

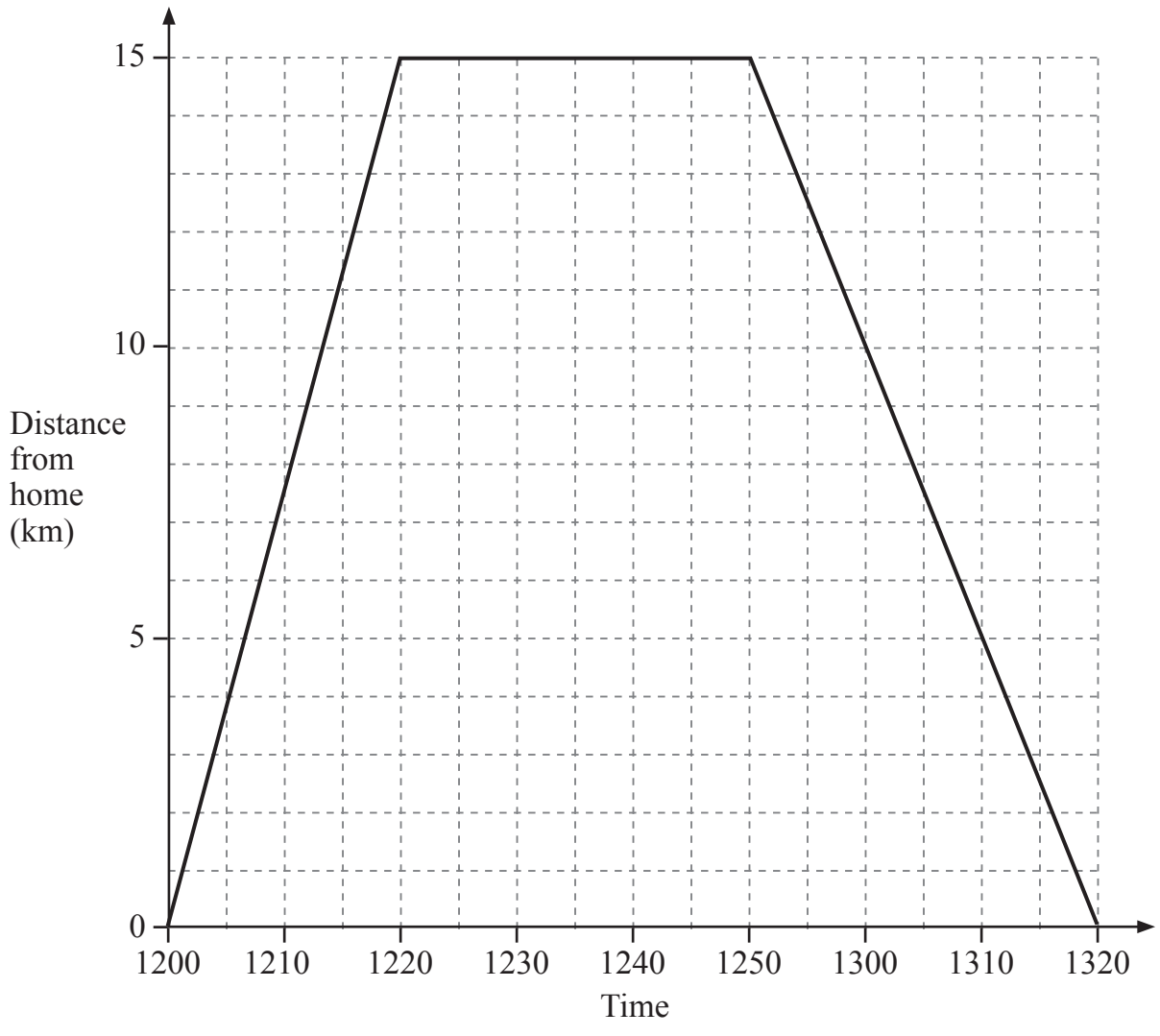
Answer \_\_\_\_\_ [1]

(b) write down the value of  $\frac{307530}{45.9}$

Answer \_\_\_\_\_ [1]



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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?

Answer \_\_\_\_\_ km/hr [2]

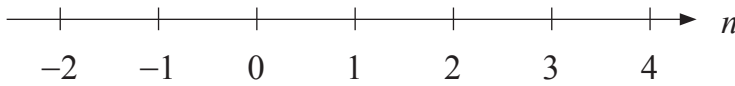
(b) Was his average speed travelling home faster, slower or the same as going to the shopping centre?

Answer \_\_\_\_\_ [1]



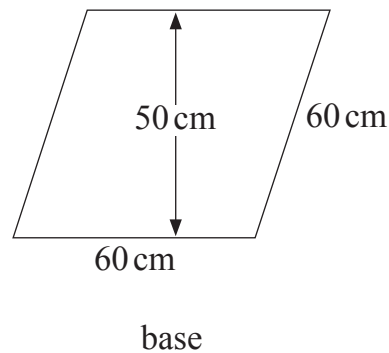
6 Solve  $2n - 5 \leq -2$  where  $n$  is an integer.

Mark the values of  $n$  on this section of the number line.



[3]

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  $\text{m}^3$

Answer \_\_\_\_\_  $\text{m}^3$  [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?

Answer \_\_\_\_\_ [2]

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

Answer \_\_\_\_\_ [2]

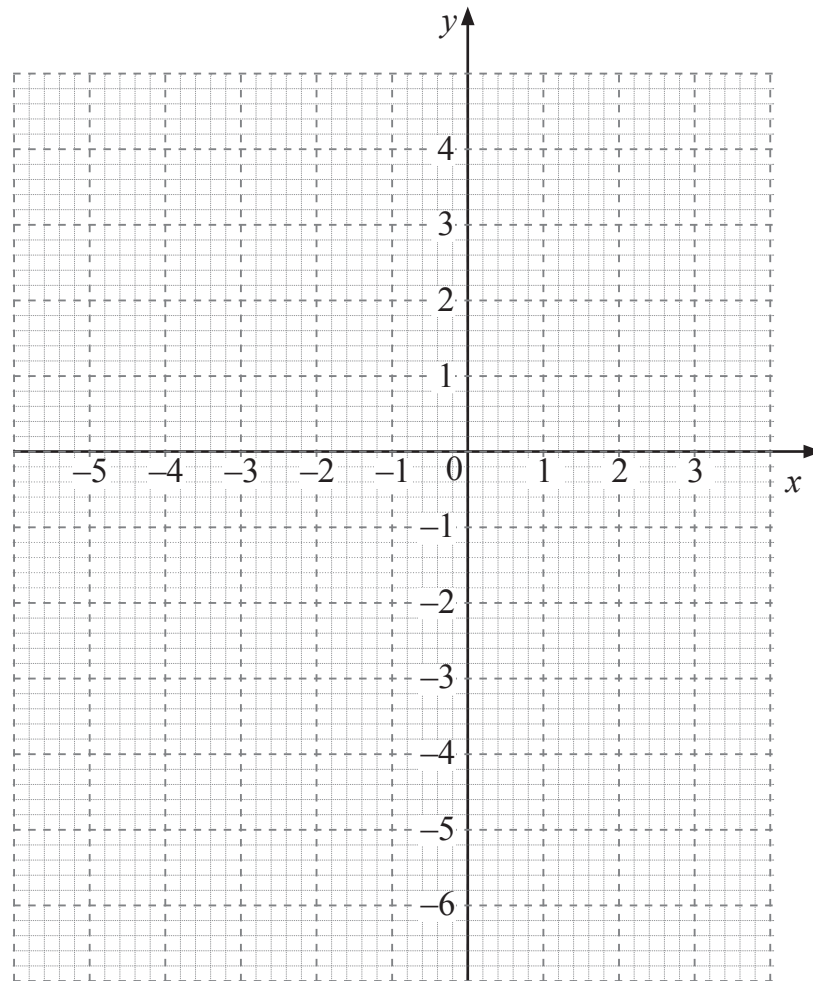


9 (a) Complete the table of values for  $y = 2 - 2x - x^2$

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

[2]

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



[2]

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

Answer \_\_\_\_\_ [3]



10 A reel contains 5 metres of ribbon.

The ribbon has a width of  $4.5 \times 10^{-3}$  metres.

Work out the area of ribbon on the reel in  $\text{m}^2$ , giving your answer in standard form.

Answer \_\_\_\_\_  $\text{m}^2$  [2]



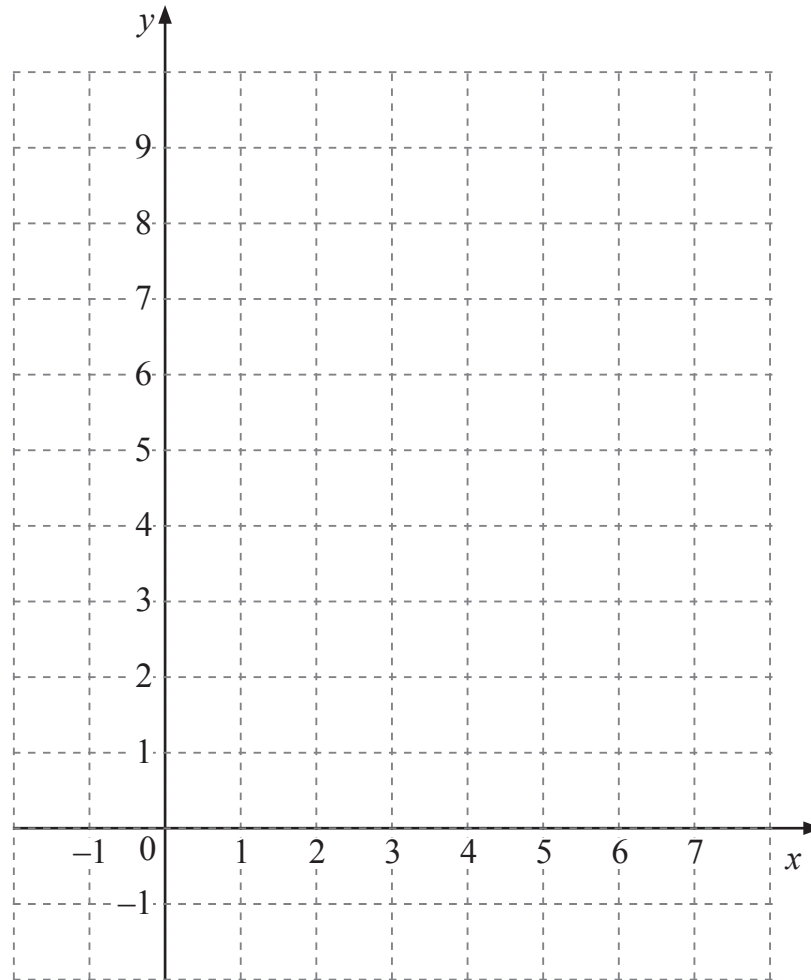
11 (a) On the grid, show clearly the region satisfying the three inequalities

$$y \geq 3$$

$$y \leq 2x + 3$$

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

Indicate the region with the letter R.



[3]



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

Answer \_\_\_\_\_ [2]

12 Write  $0.\dot{1}3\ddot{5}$  as a fraction in its lowest terms.

You must show your working.

Answer \_\_\_\_\_ [2]

[Turn over



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

Answer \_\_\_\_\_ [2]

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

You must show all your working.

Answer \_\_\_\_\_ [2]





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  $K$ .

You must show all your working.

Answer  $K =$  \_\_\_\_\_ [3]

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**THIS IS THE END OF THE QUESTION PAPER**

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Question Number	Marks
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<b>Total Marks</b>	
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Examiner Number

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