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General Certificate of Secondary Education  
January 2013

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Candidate Number

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## Mathematics

Unit T6 Paper 1

(Non-calculator)  
Higher Tier



[GMT61]

\*GMT61\*

TUESDAY 15 JANUARY, 1.30 pm–2.45 pm

### 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 box, around each page, on blank pages or tracing paper.**

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

Answer **all eighteen** questions.

Any working should be clearly shown in the spaces provided since 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 4**

You should have a ruler, compasses and a protractor.

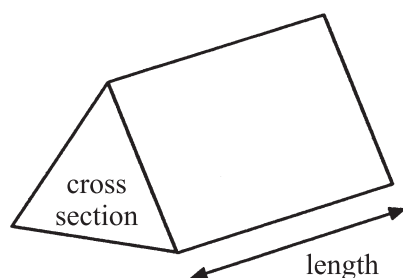
The Formula Sheet is on page 2.

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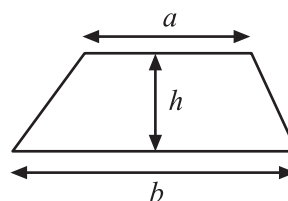


# Formula Sheet

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

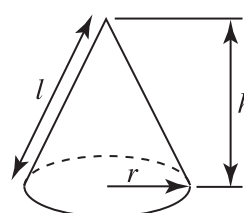


**Area of trapezium** =  $\frac{1}{2}(a + b)h$



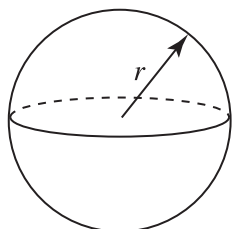
**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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

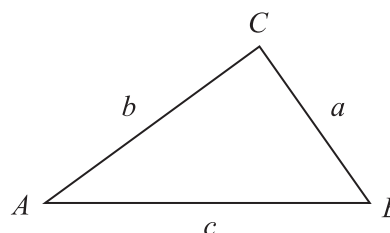


**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



**In any triangle ABC**



**Quadratic Equation**

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

where  $a \neq 0$ , are given by

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

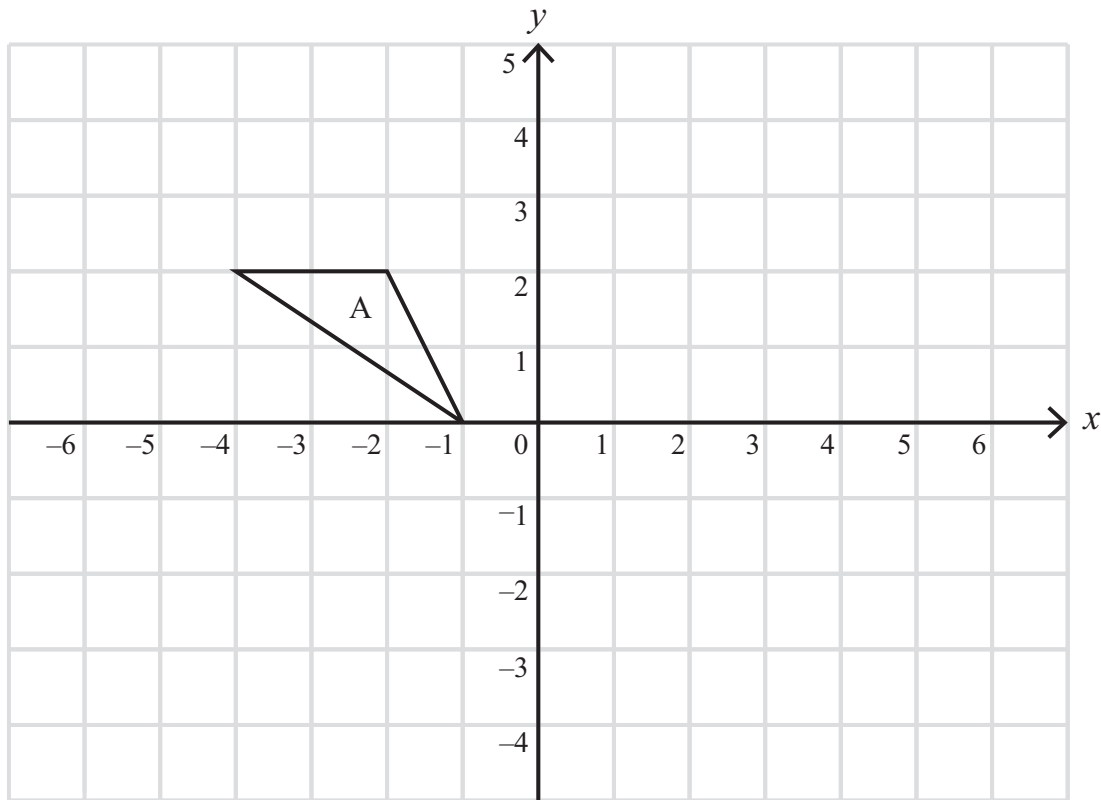
**Sine Rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



1 (a) Reflect triangle A in the line  $x = 1$



[2]

(b) Translate triangle A by  $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$ .

[2]

Examiner Only

Marks	Remark
Total Question 1	
Total Question 2	

2  $W = \frac{Y(X - 2)}{4}$

Find the value of W when  $X = 8$  and  $Y = -2$

Answer W = \_\_\_\_\_ [3]

[Turn over



3 (a) Given that  $72 \times 451 = 32472$ , find  $\frac{32472}{7.2}$

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

(b) Write down the two numbers which are the square roots of  $\frac{1}{9}$

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

Examiner Only

Marks Remark

Total Question 3

**Quality of written communication will be assessed in this question.  
Show your working.**

4 (a) Jayne says, “When you multiply any number by 10, the answer is always greater than or equal to 10.”

Is Jayne correct? Give a reason for your answer.

Answer \_\_\_\_\_

because \_\_\_\_\_ [1]

(b) Linda says, “When you add any number to 3 the answer is always greater than or equal to 3.”

Is Linda correct? Give a reason for your answer.

Answer \_\_\_\_\_

because \_\_\_\_\_ [1]

Total Question 4



5  $n$  is an integer.  
Write an **expression in terms of  $n$** , for

- (a) an integer which will always be odd,      Answer \_\_\_\_\_ [1]  
 (b) an integer which could be odd or even.      Answer \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
Total Question 5	

6 Calculate the area of this shape.

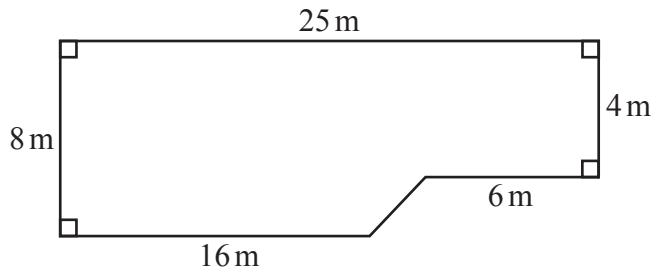


Diagram not drawn accurately

Answer \_\_\_\_\_ m<sup>2</sup> [3]

Total Question 6	

7 Simplify

- (a)  $(p^4)^2$       Answer \_\_\_\_\_ [1]  
 (b)  $\frac{r^5 \times r}{r^2}$       Answer \_\_\_\_\_ [2]

Total Question 7	

[Turn over



8 Estimate  $\frac{703 \times 3.82}{0.91 - 0.69}$

Examiner Only	
Marks	Remark
Total Question 8	

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

9 560 tickets are sold in a club raffle with a car as first prize.

Rachel buys some tickets.

The probability that she wins the car is  $\frac{1}{140}$

How many tickets does Rachel buy?

Total Question 9	

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

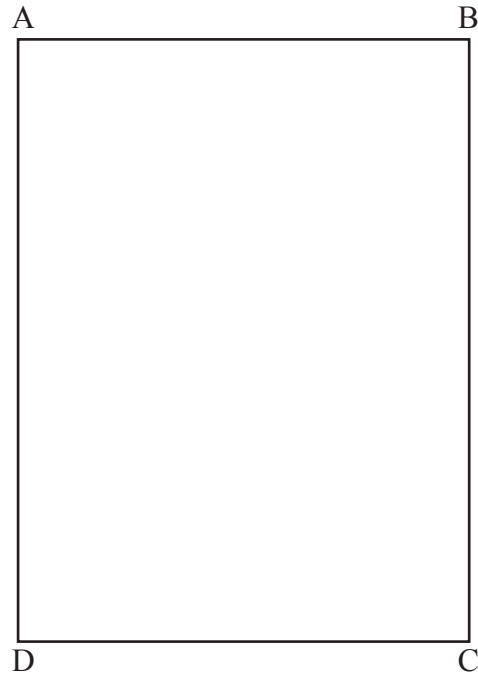
10 Solve  $-5 \leq 3n < 9$ , where  $n$  is an integer.

Total Question 10	

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



- 11 The diagram shows a scale drawing of a corn field using a scale of 1 cm to 50 m.



A scarecrow is positioned in the field 325 m from corner A and 200 m from corner B

Using a ruler and compasses, find and mark the position of the scarecrow.

**Leave all construction lines.** [2]

Examiner Only

Marks Remark

Total Question 11

[Turn over



- 12** Roy has been given 4 formulae, one of which is correct and will allow him to calculate the volume of a pyramid.  $a$ ,  $b$ ,  $c$  represent lengths. Which of the following is correct?  
Explain your choice.

$$\text{Formula W} = \frac{\sqrt{(ab)}c}{3} \quad \text{Formula X} = \frac{1}{3}ab^2c \quad \text{Formula Y} = \frac{abc}{3}$$

$$\text{Formula Z} = \frac{\pi ab}{3c}$$

Answer: Formula \_\_\_\_\_

because \_\_\_\_\_ [2]

Examiner Only

Marks	Remark
Total Question 12	

- 13 (a)** Write 0.000000719 in standard form.

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

- (b)** Which of the following numbers is a recurring decimal?

$$\frac{7}{8}, \frac{3}{16}, \frac{5}{11}, \frac{3}{15}$$

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

Total Question 13



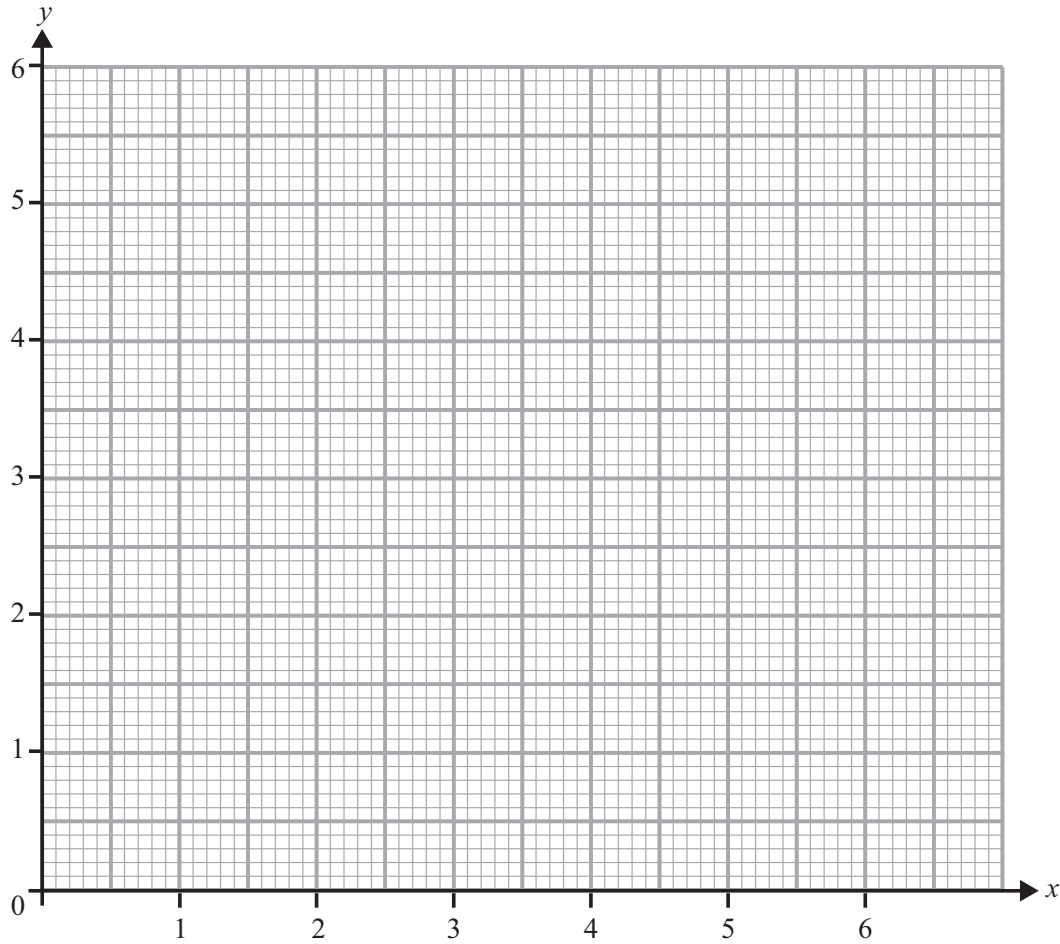


14 (a) On the grid below show by shading **and the letter R**, the region represented by the inequalities.

$$x + y \leq 6$$

$$x \geq 2$$

$$2y \geq x$$



[3]

(b) Find the maximum value of  $2x + 3y$ , where  $x$  and  $y$  are integers, from a point in the region R.

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

Examiner Only	
Marks	Remark
Total Question 14	

[Turn over



15 Rewrite  $\frac{ax - c}{x} = b$  to make  $x$  the subject.

Examiner Only

Marks Remark

Answer  $x =$  \_\_\_\_\_ [4]

Total Question 15

16 Simplify  $3\sqrt{5} + 2\sqrt{45} + \sqrt{125}$

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

Total Question 16

17 Solve  $\frac{2}{7} = \frac{3}{x^2}$  giving your answer in the form  $a\sqrt{b}$ , where  $b$  is an integer.

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

Total Question 17



18 The volume  $V$  of a cone is  $200 \text{ cm}^3$ .

Another cone has a height 6 times bigger with a base radius half as long.

What is the volume of this cone?

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

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

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Examiner Only	
Marks	Remark

Total Question 18	



**DO NOT WRITE ON THIS PAGE**

For Examiner's use only	
Question Number	Marks
1	
2	
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<b>Total Marks</b>	
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Examiner Number

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