Centre Number

Candidate Number

**Rewarding Learning**

**General Certificate of Secondary Education**
**January 2013**

# 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.
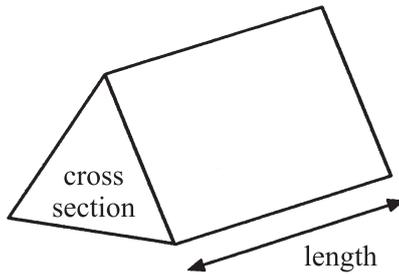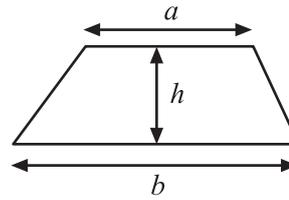The Formula Sheet is on page 2.

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*12GMT6101*

# Formula Sheet

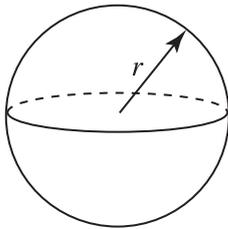**Volume of prism** $=$ area of cross section $\times$ length
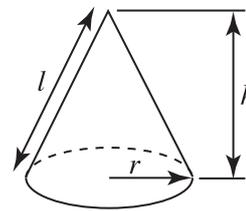


**Area of trapezium** $= \frac{1}{2}(a+b)h$



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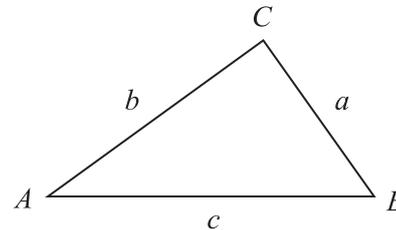
**Curved surface area of cone** $= \pi r l$



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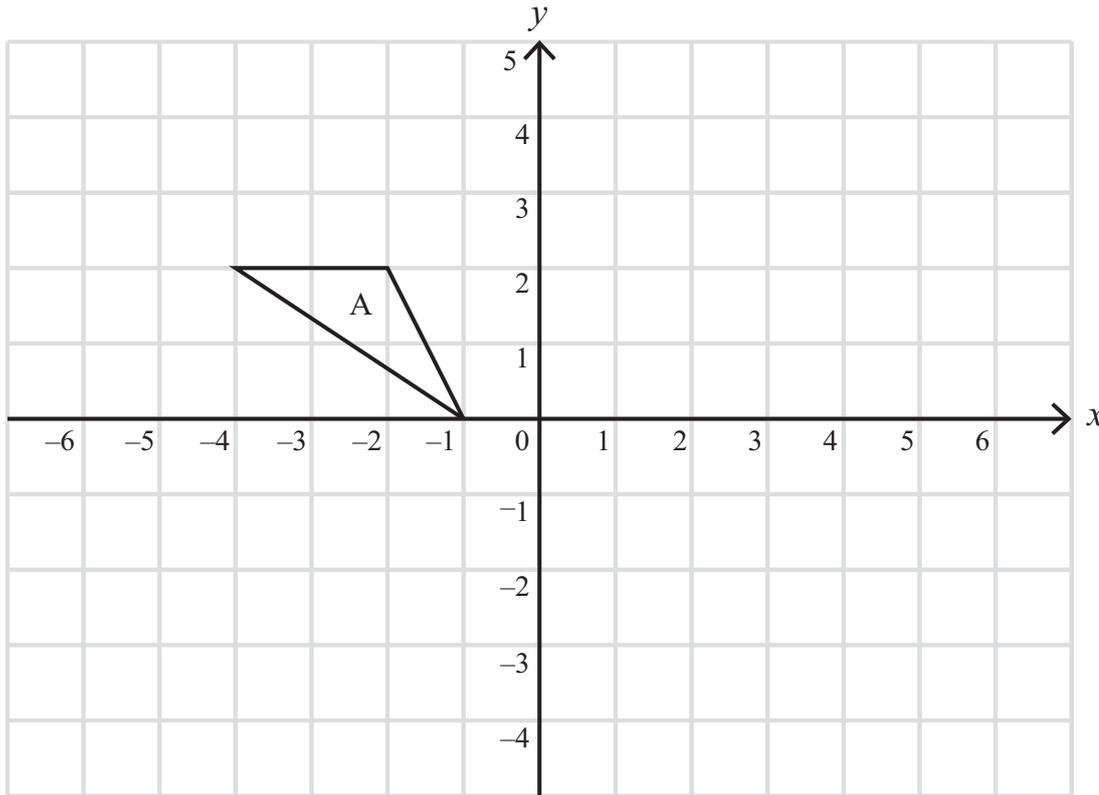
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

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

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

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

[2]

**(b)** Translate triangle A by $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$. [2]

Total Question 1

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

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

Answer W = _____ [3]

Total Question 2

**[Turn over**

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**Examiner Only**

| Marks | Remark |
|-------|--------|

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

Answer _____ [1]

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

Total Question 3

Answer _____ , _____ [1]

**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.

Total Question 4

Answer _____

because _____ [1]

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| | Examiner Only |
|---|---|
| | Marks | Remark |

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

(a) an integer which will always be odd,        Answer _____ [1]

Total Question 5

(b) an integer which could be odd or even.      Answer _____ [1]

**6** Calculate the area of this shape.
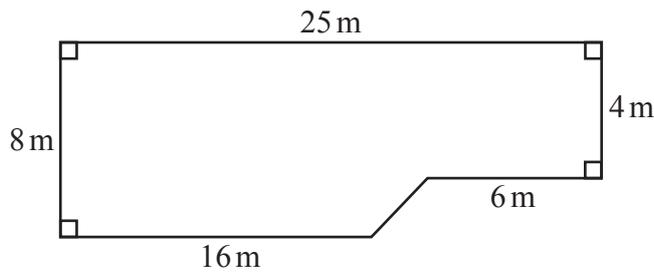


Diagram not drawn accurately

Total Question 6

Answer _____ m$^2$ [3]

**7** Simplify

(a) $(p^4)^2$

Answer _____ [1]

(b) $\dfrac{r^5 \times r}{r^2}$

Answer _____ [2]

Total Question 7

**[Turn over**

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

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 $\dfrac{1}{140}$
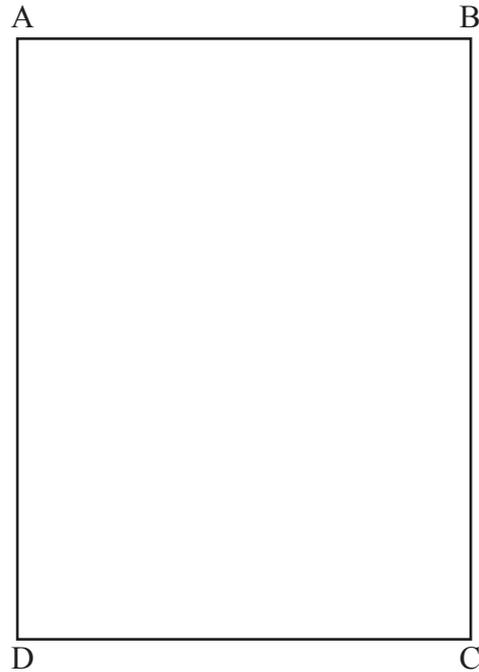
How many tickets does Rachel buy?

Total Question 9

Answer _____ [2]

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

Answer _____ [3]

Total Question 10

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

A                            B

D                            C

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]

Total Question 11

**[Turn over**

*12GMT6107*

**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.

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

Formula Z = $\dfrac{\pi ab}{3c}$

Answer: Formula _____

because _____ [2]

**13 (a)** Write 0.0000000719 in standard form.

Answer _____ [1]

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

$$\frac{7}{8}, \ \frac{3}{16}, \ \frac{5}{11}, \ \frac{3}{15}$$
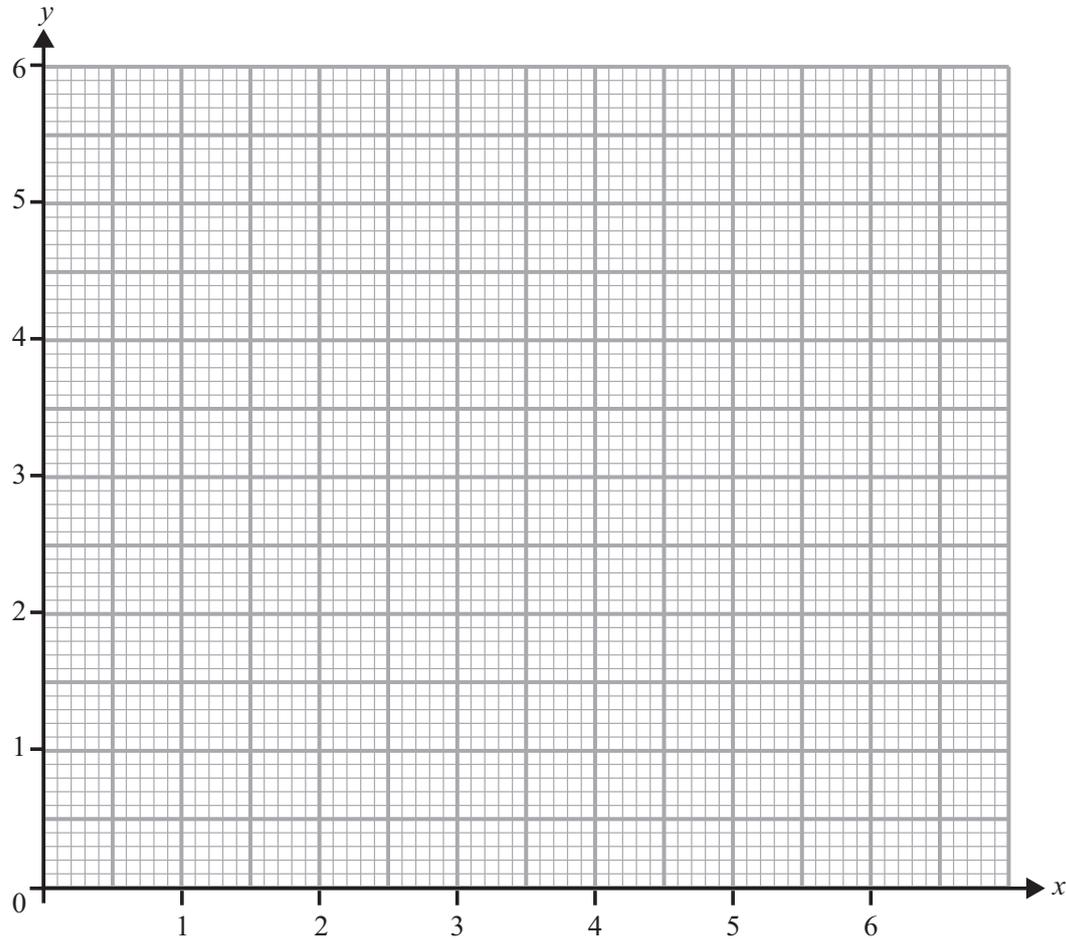
Answer _____ [1]

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

$$x + y \leqslant 6$$
$$x \geqslant 2$$
$$2y \geqslant x$$



[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**

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

Answer $x =$ _____ [4]

Total Question 15

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

Answer _____ [2]

Total Question 16

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

Answer $x =$ _____ [3]

Total Question 17

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**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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Total Question 18

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**DO NOT WRITE ON THIS PAGE**

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