



General Certificate of Secondary Education
January 2016

Centre Number

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Candidate Number

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Mathematics

Unit T6 Paper 1
(Non-calculator)

Higher Tier



[GMT61]

GMT61

WEDNESDAY 13 JANUARY, 9.15 am–10.30 am

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

Answer **all eighteen** questions.

All 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 Questions **3** and **18**.

You should have a ruler, compasses and a protractor.

The Formula Sheet is on page 2.

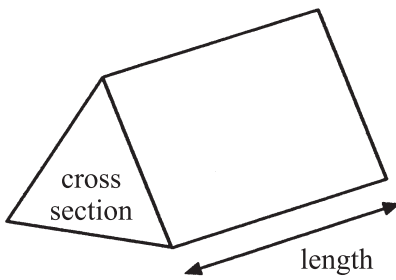
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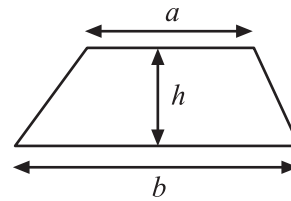
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Formula Sheet

Volume of prism = area of cross section \times length

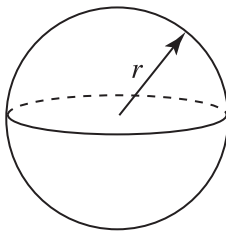


Area of trapezium = $\frac{1}{2}(a + b)h$



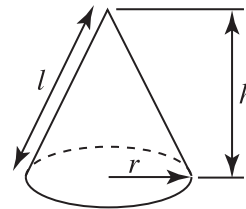
Volume of sphere = $\frac{4}{3}\pi r^3$

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

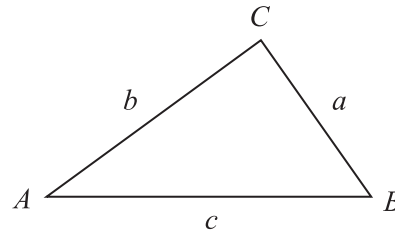


Volume of cone = $\frac{1}{3}\pi r^2 h$

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



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 $d = \frac{e - f}{g}$

Calculate the value of d when $e = -8$, $f = 12$ and $g = 4$

Answer $d =$ _____ [2]

2 Given that $79 \times 684 = 54036$, find

(a) $\frac{54036}{7.9}$

Answer _____ [1]

(b) $\frac{540.36}{68.4}$

Answer _____ [1]

[Turn over



Quality of written communication will be assessed in this question.

3 (a) Mark says, "Every number has a reciprocal".

Is Mark correct?

Give a reason for your answer.

Answer _____ because _____
_____ [1]

(b) Mandy says, "With your calculator you can find the square root of every number".

Is Mandy correct?

Give a reason for your answer.

Answer _____ because _____
_____ [1]

4 Estimate $\frac{604 \times 2.91}{7.9 - 3.76}$

Show all your working.

Answer _____ [2]



5 In a game at a fairground, each of 300 people pays 50p to play.

Forty of the 300 people each win a prize worth £1.80 There were no other prize-winners.

What profit does the game make?

Answer £ _____ [2]

6 The probability for the number of goals scored in a league match during the season is given in the table below.

Number of goals	0	1	2	3	4	5 or more
Probability	0.15	0.23	0.13	0.28	0.12	0.09

What is the probability of at least 3 goals being scored in a league match?

Answer _____ [2]

[Turn over



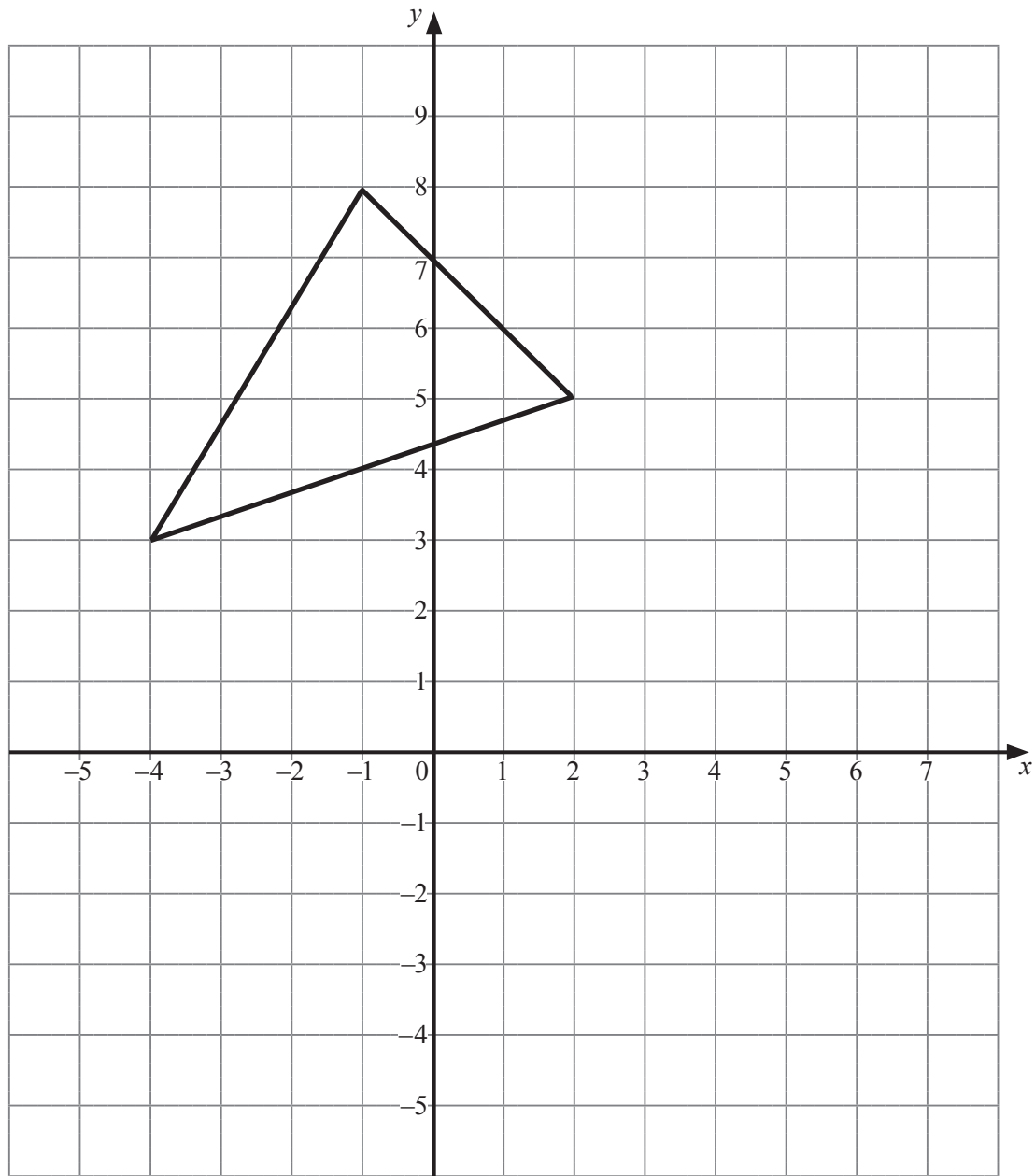
- 7 In one section of the Circuit of Ireland rally the winning car travelled a distance of 297 miles in $4\frac{1}{2}$ hours.

Calculate the winning car's average speed for this section of the rally.

Answer _____ mph [3]



8



(a) On the diagram above, reflect the given triangle in the line $y = 2$

Label your answer A.

[2]

(b) On the same diagram, translate the given triangle by $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$

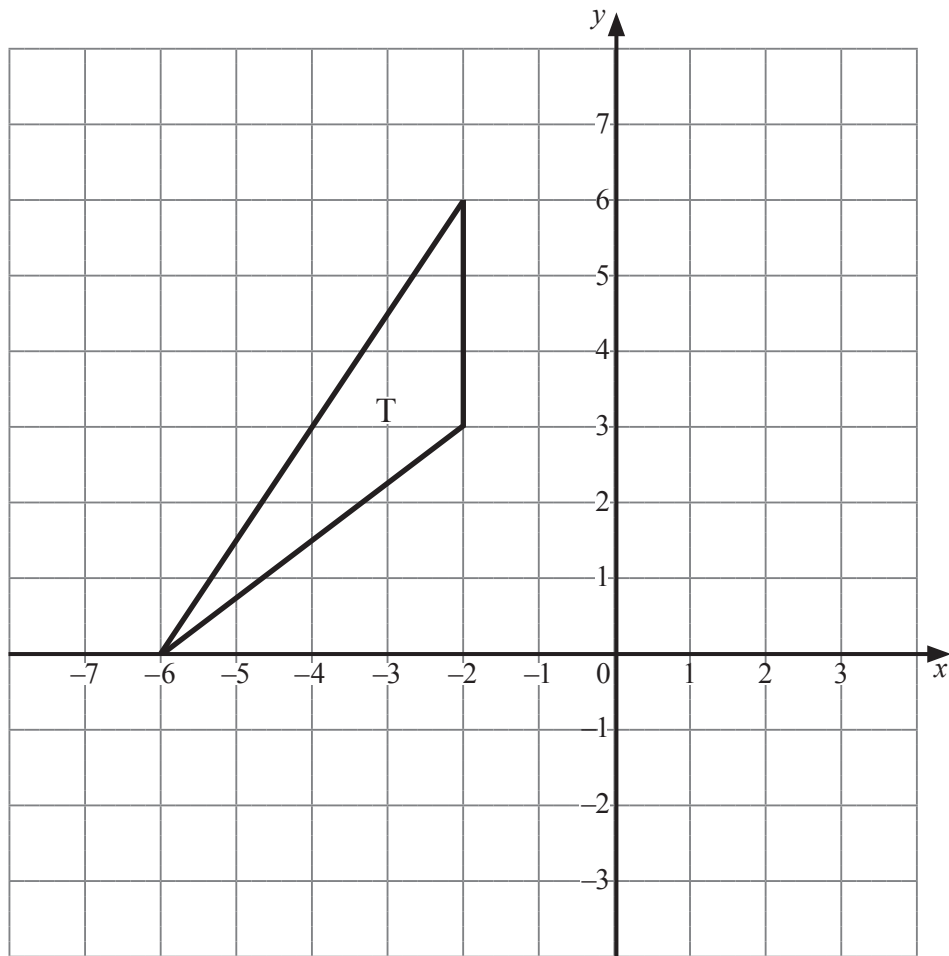
Label your answer B.

[2]

[Turn over



9 Rotate the triangle T through 90° clockwise about $(-3, -1)$.

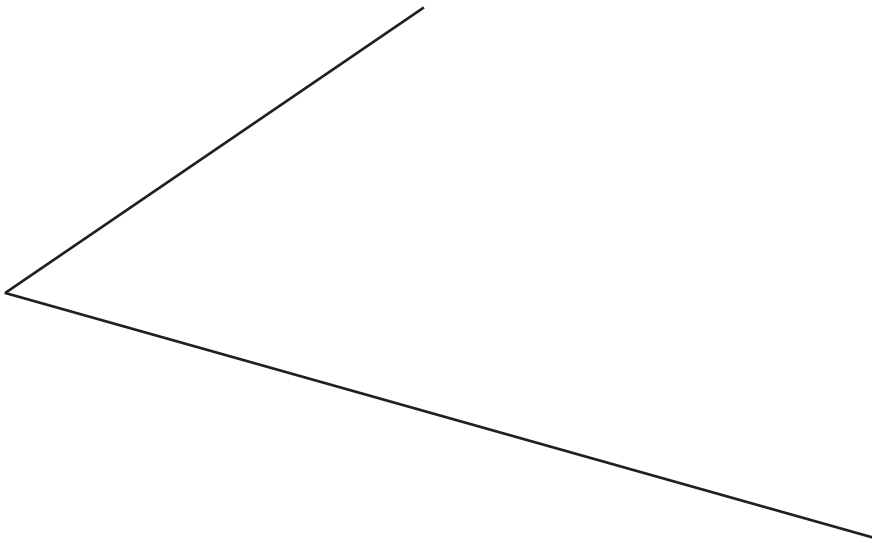


[2]



10 Using a ruler and compasses only, construct the bisector of the angle below.

You must show all construction lines.



[2]

[Turn over



- 11 (a) “If a and b are square numbers, then the difference between a and b is always an odd number”.

Is this statement true or false?

Explain your answer.

Answer _____ because _____
_____ [1]

- (b) Simplify

$$\frac{p^3}{p^7}$$

Answer _____ [1]

- (c) Solve the inequality $-7 < 5n \leq 15$ for **integer** values of n .

Answer $n =$ _____ [3]



12 A cylinder has a base radius of 8 cm and a height of 36 cm.

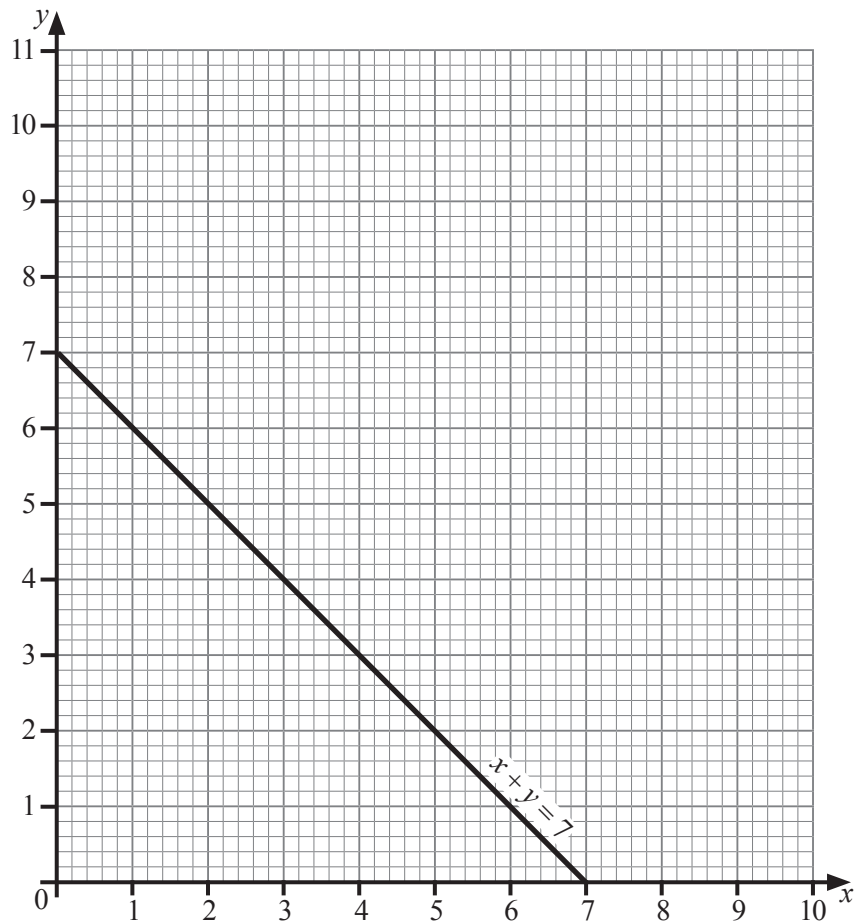
The curved surface area of this cylinder is the same as the surface area of a sphere.

What is the radius of the sphere?

Answer _____ cm [4]



13 The line $x + y = 7$ is shown below.



(a) On the diagram illustrate the region represented by the inequalities

$$x + y \leq 7, \quad y \geq 1, \quad y \leq 5x + 1$$

Mark the region with the letter R.

[2]

(b) In the region R, what is the greatest value of $2x + y$?

Answer _____ [2]



14 (a) Work out $6.543 \times 10^3 + 2.1 \times 10^{-1}$

Give your answer in standard form.

Answer _____ [2]

(b) Given that $(3.6 \times 10^3) + (1.7 \times 10^x) = (y \times 10^5)$ where all three numbers in brackets are in standard form, find the values of x and y .

Answer $x =$ _____, $y =$ _____ [2]

15 Write the recurring decimal $0.2\dot{1}7$ as a fraction.

Answer _____ [2]

[Turn over



16 Paula buys a packet of ten daffodil bulbs.

The bulbs all look the same.

Seven of the bulbs will produce yellow flowers and three will produce white flowers.

A bulb is taken at random and planted.

A second bulb is taken at random and planted.

Calculate the probability that the two bulbs planted will produce **at least** one white flower.

Answer _____ [3]



17 Simplify $4\sqrt{3} + 2\sqrt{75} + \sqrt{27}$

Answer _____ [2]

Quality of written communication will be assessed in this question.

18 By expanding each bracket and simplifying, explain why

$$(3 + \sqrt{5})^2 - (2 + \sqrt{2})^2 > 0$$

[3]

THIS IS THE END OF THE QUESTION PAPER



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For Examiner's use only	
Question Number	Marks
1	
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Total Marks	
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Examiner Number

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