



Rewarding Learning

General Certificate of Secondary Education  
January 2017

Centre Number

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Candidate Number

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## Mathematics

Unit T6 Paper 1  
(Non-calculator)

Higher Tier

[GMT61]



**WEDNESDAY 11 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 outside the boxed area on each page, 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 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.

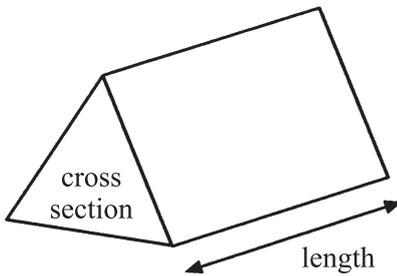
Quality of written communication will be assessed in Question 7.

You should have a ruler, compasses and a protractor.

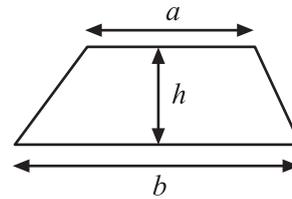
The Formula Sheet is on page 2.

## Formula Sheet

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

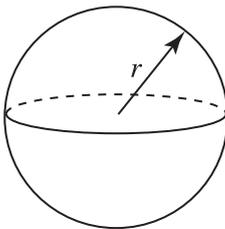


**Area of trapezium** =  $\frac{1}{2}(a+b)h$



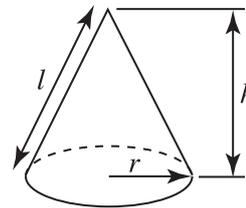
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

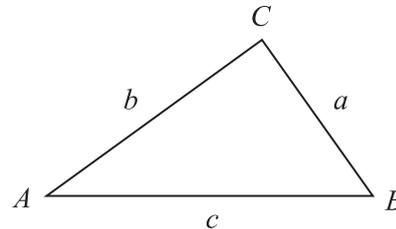


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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



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**(Questions start overleaf)**

- 1 The probability that a letter posted first class arrives the next day is 0.85

Eva posts 200 wedding invitations first class.

How many invitations would she expect to arrive the next day?

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

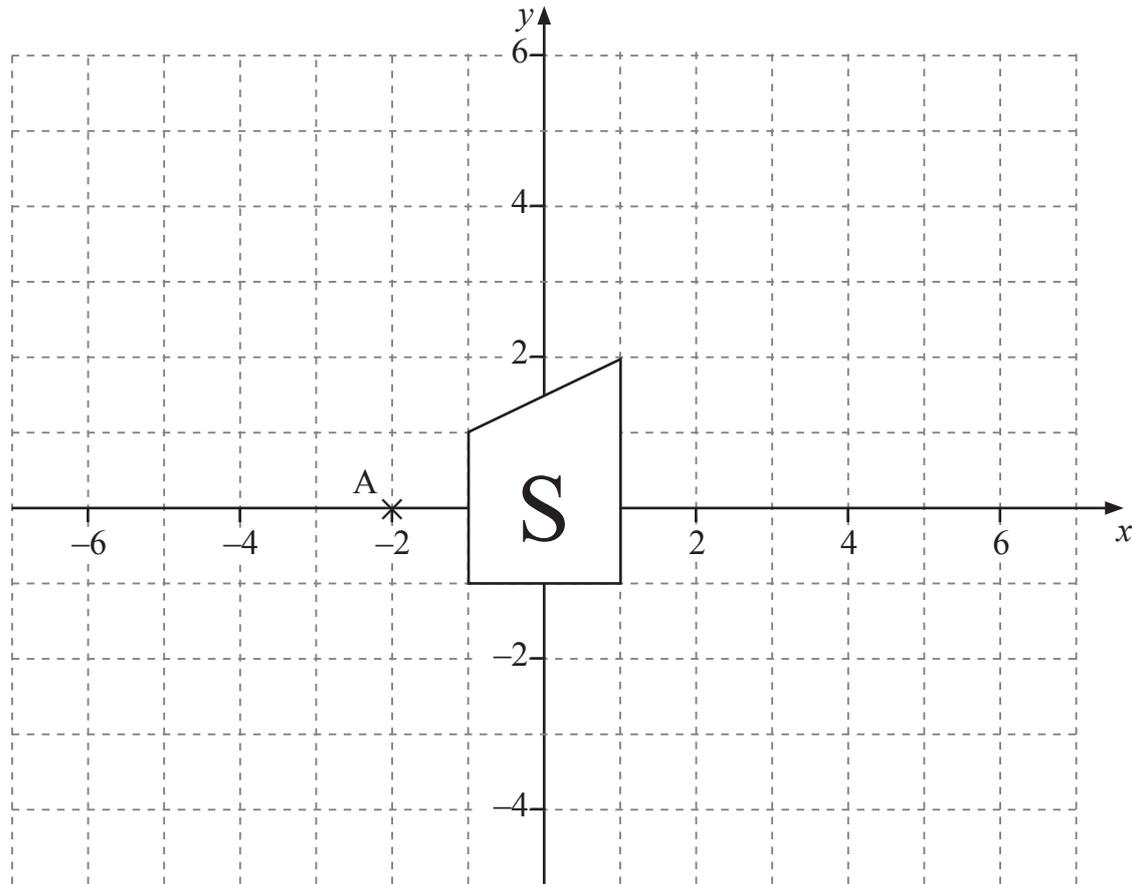
2

$$Q = \frac{P}{R(4-t)}$$

Calculate the value of  $Q$  when  $P = 36$ ,  $R = 3$  and  $t = -2$

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

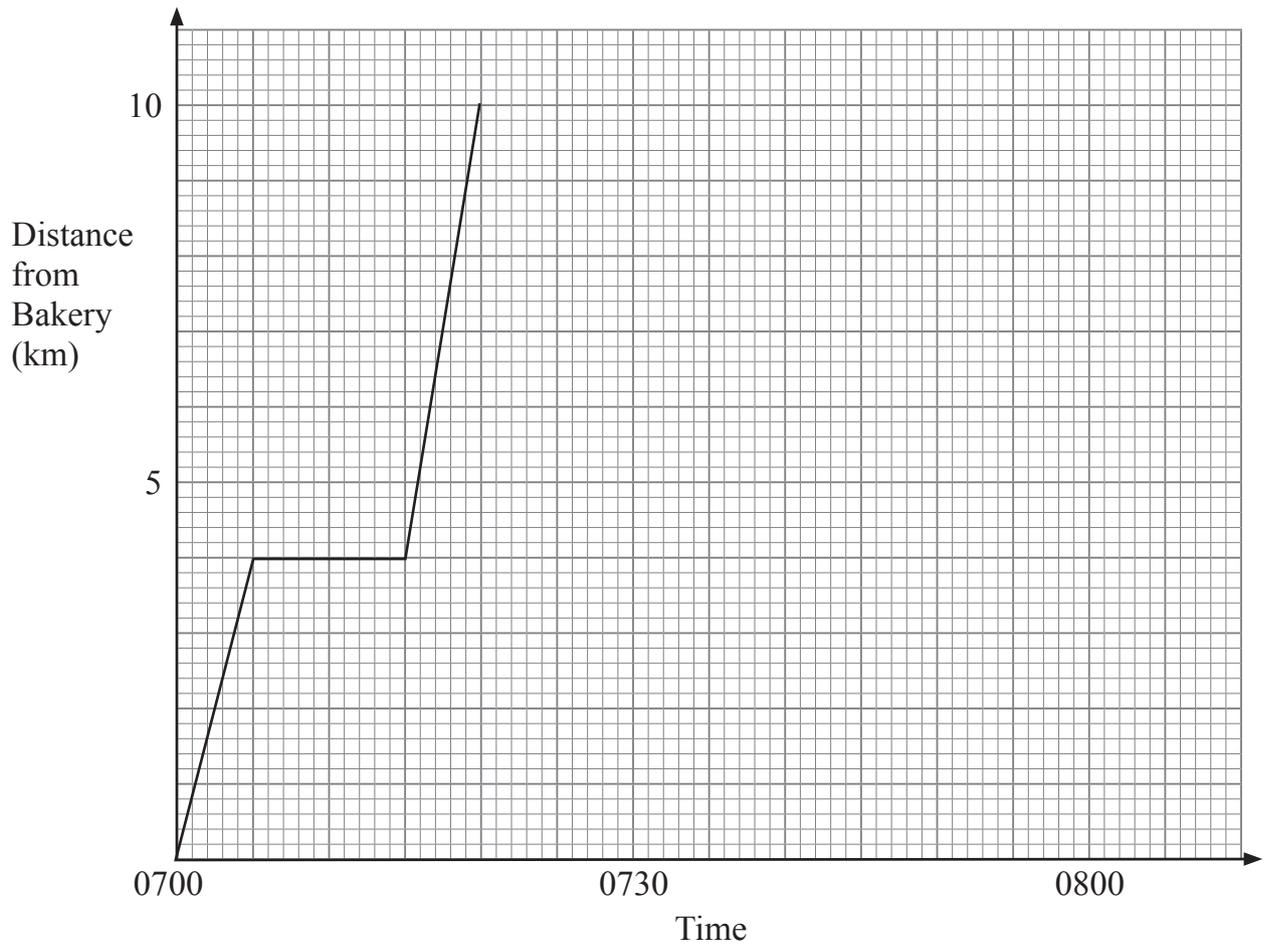
3



On the grid above,

- (a) Draw the image of shape S after a translation of 3 left and 2 up. [1]
- (b) Draw the image of shape S after an enlargement by scale factor 3 using the point A as the centre of enlargement. [3]

4 Look at the graph below. It shows the morning deliveries made by a baker.



He leaves the bakery at 0700 and his first delivery is to a hotel.

His second delivery is to a cake shop which is 10 km from the bakery.

He spends 5 minutes at the cake shop and then returns to the bakery. He travels an average speed of 40 km/h.

(a) Use this information to complete the graph for his complete journey. [2]

(b) Work out the baker's average speed from the bakery to the cake shop.

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

- 5 A golf shop sells gloves in three different sizes: small, medium and large.

The gloves come in 2 colours, black and white.

	SMALL	MEDIUM	LARGE
BLACK	10	22	15
WHITE	9	20	12

The table shows how many of each size and colour they have in the shop.

The gloves are for either a right hand or for a left hand.

The ratio of right-handed gloves to left-handed gloves is 7:4

- (a) How many right-handed gloves are there?

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

- (b) The gloves are all kept together in a box and a glove is taken at random.

What is the probability that it is a large glove?

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

(c) The glove is replaced in the box. One glove is taken at random. It is black.

What is the probability that it is medium?

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

(d) Jack picks another glove at random from the box and it is white.

He says there is a 50% chance that it is small or large.

Is he correct? Explain why.

[2]

[Turn over

6 Two boats are 40 km apart.

Boat Y is due east of boat X as shown in the scaled diagram below.

The scale used is 1 cm = 5 km

Lobster pots are placed in a region which is less than 25 km from boat X and less than 30 km from boat Y.

Using a ruler and compasses, show this region on the diagram by shading.

Boat X •

• Boat Y

[3]

Quality of written communication will be assessed in this question.

7 Amy, Katie and Maria use their calculators to work out the value of

$$\frac{27.98}{4.27 \times 0.48}$$

Amy gets 3.145, Katie gets 136.51 and Maria gets 13.651

Use approximations to show which one of them is correct.

You must show all your working.

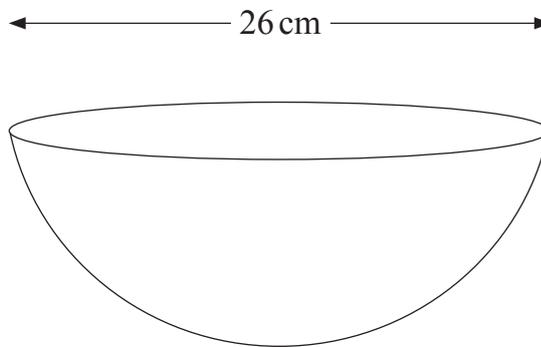
[3]

[Turn over

8 Find the reciprocal of  $1\frac{2}{3}$

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

9



The diagram above shows a **solid** hemisphere which has a diameter of 26 cm.

Find the total surface area of the solid hemisphere.

Give your answer in terms of  $\pi$ .

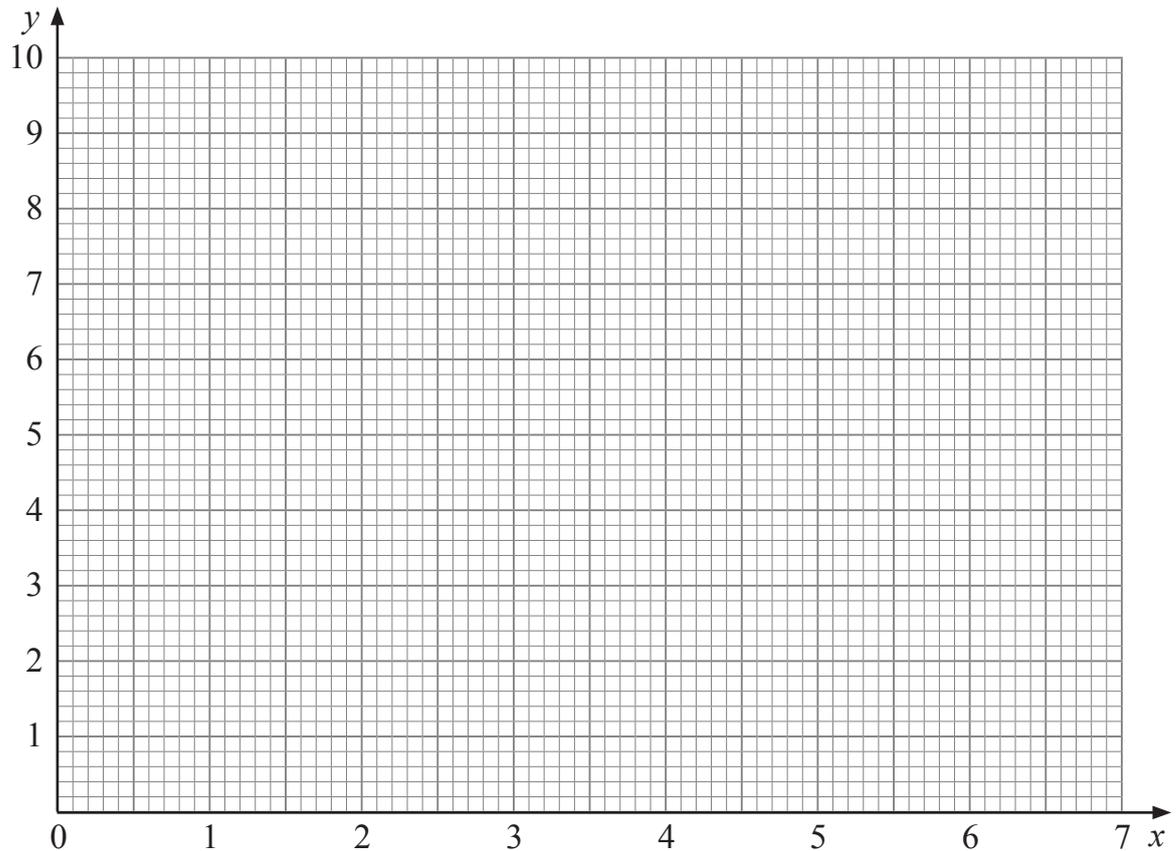
Answer \_\_\_\_\_  $\text{cm}^2$  [3]

10 (a) Complete the table of values for  $y = \frac{3}{x}$

$x$	0.5	1	2	3	4	5	6
$y$		3		1			

[2]

(b) On the grid below, draw the graph of  $y = \frac{3}{x}$  for  $0.5 \leq x \leq 6$



[2]

[Turn over]

11 Express the recurring decimal  $0.3\dot{7}\dot{2}$  as a fraction in its simplest form.

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

12 Rationalise the denominator of  $\frac{54}{\sqrt{3}}$  and simplify your answer.

You must show your working.

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

13 Mark is in a newsagents. The probability that Mark buys a newspaper is 0.8

In the same newsagents the probability that Mark independently buys a magazine is 0.3

Work out the probability that Mark buys at least a newspaper or a magazine in this same newsagents.

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

14

$$x^2 - 10x + 33 \equiv (x - a)^2 + b$$

(a) Work out the value of  $a$  and the value of  $b$

Answer  $a =$  \_\_\_\_\_ ,  $b =$  \_\_\_\_\_ [3]

(b) What is the minimum value of  $x^2 - 10x + 33$ ?

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

[Turn over

15 Expand  $(2 + \sqrt{7})(3 - \sqrt{7})$

Give your answer in the form  $a + b\sqrt{7}$  where  $a$  and  $b$  are both integers.

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

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

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

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