Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2017

Mathematics

Unit T6 Paper 1
(Non- calculator)
Higher Tier

MV18

[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.
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 at the end of each question 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 pages 4 and 5.

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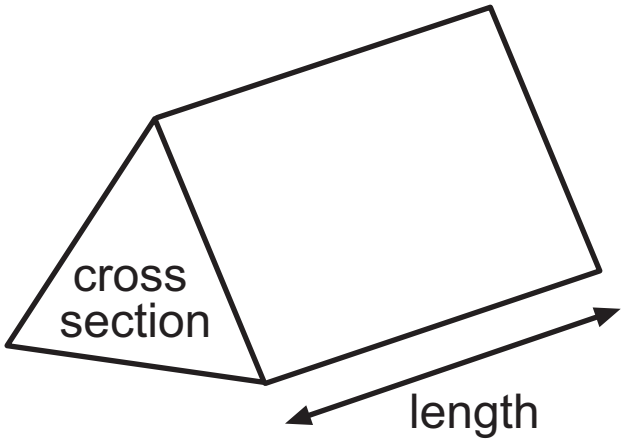
(Questions start on page 6)

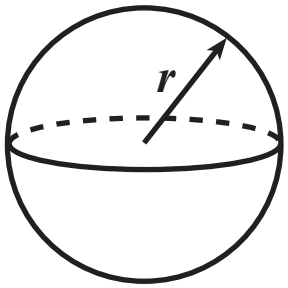
Formula Sheet

Volume of prism = area of cross section × length



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

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



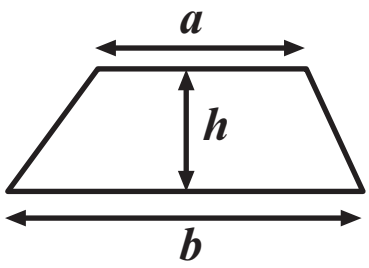
Quadratic Equation

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

where $a \neq 0$, are given by

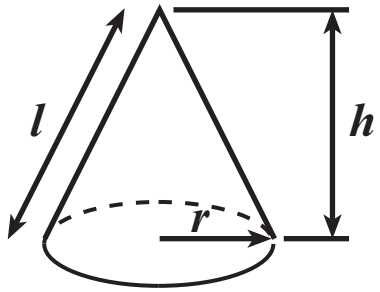
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

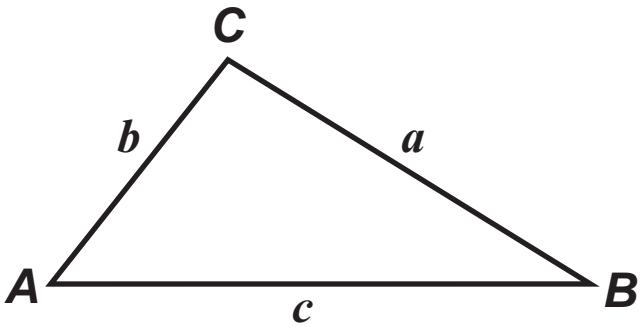


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



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

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? [2 marks]

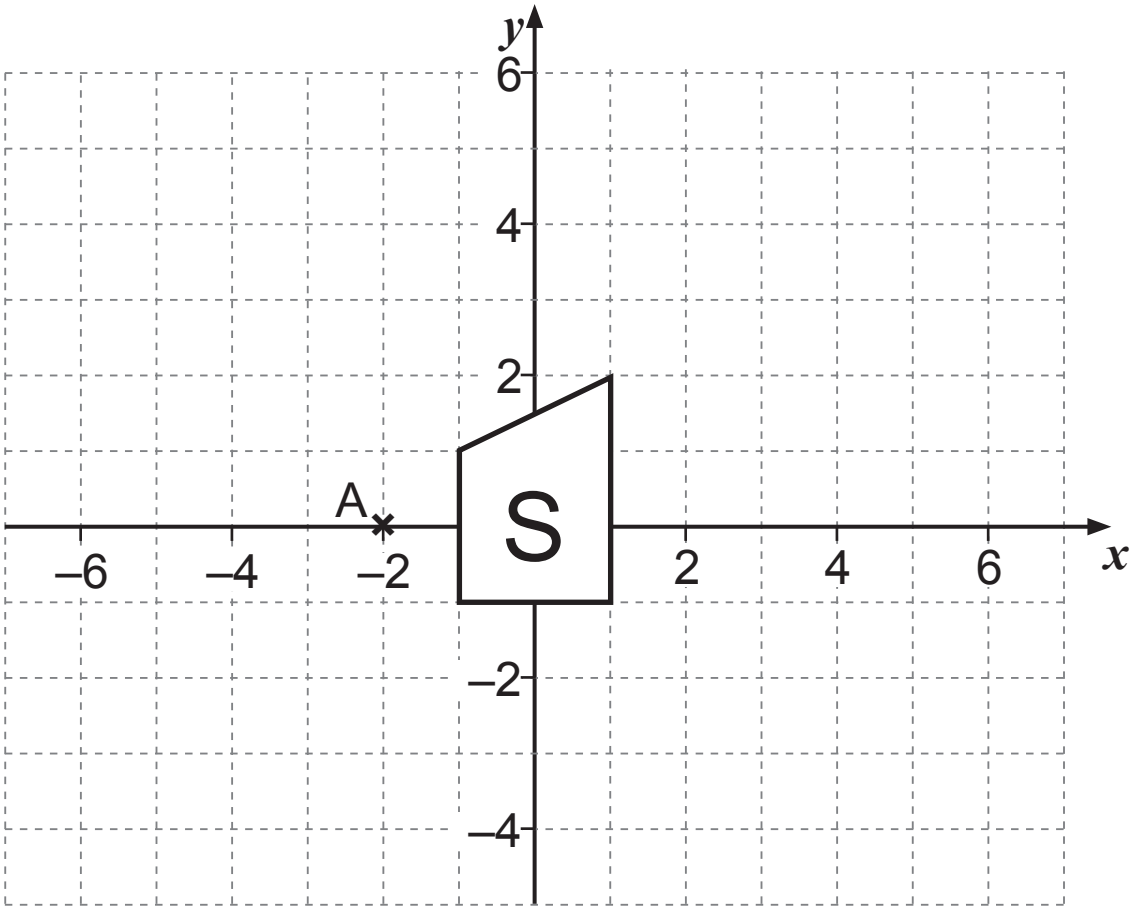
Answer _____

2 $Q = \frac{P}{R(4 - t)}$

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

Answer Q = _____

3

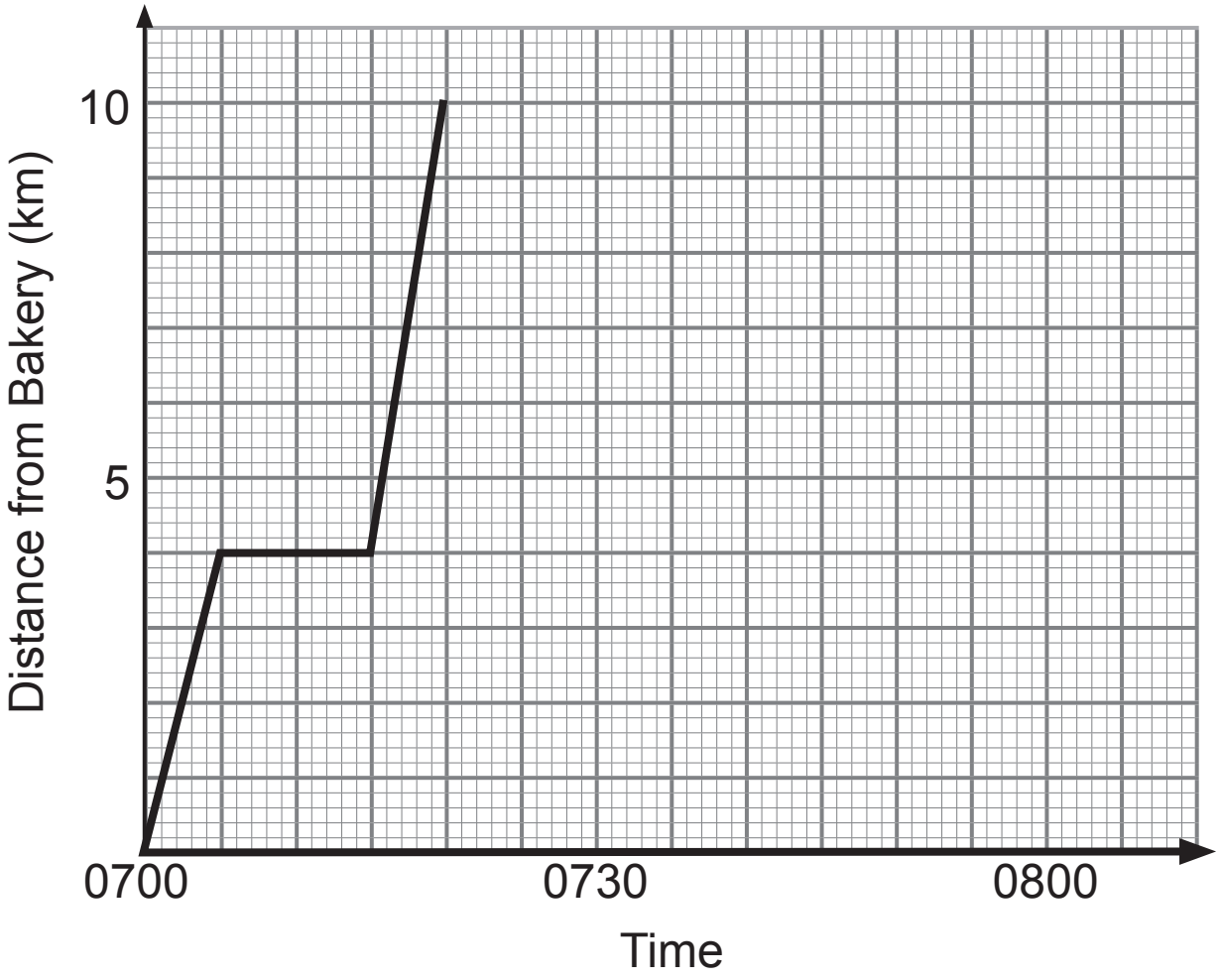


On the grid above,

(a) Draw the image of shape S after a translation of 3 left and 2 up. [1 mark]

(b) Draw the image of shape S after an enlargement by scale factor 3 using the point A as the centre of enlargement. [3 marks]

4



The graph 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 at an average speed of 40 km/h.

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

(b) Work out the baker's average speed from the bakery to the cake shop. [2 marks]

Answer _____ km/h

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 stock.

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? [2 marks]

Answer _____

(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?
[2 marks]

Answer _____

(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? [2 marks]

Answer _____

(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 marks]

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. [3 marks]

Boat X • • Boat Y

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

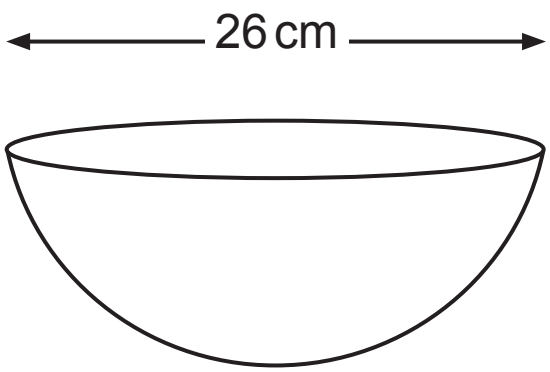
Use approximations to show which one of them is correct. [3 marks]

You must show all your working.

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

Answer _____

9



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

Find the total surface area of the solid hemisphere.

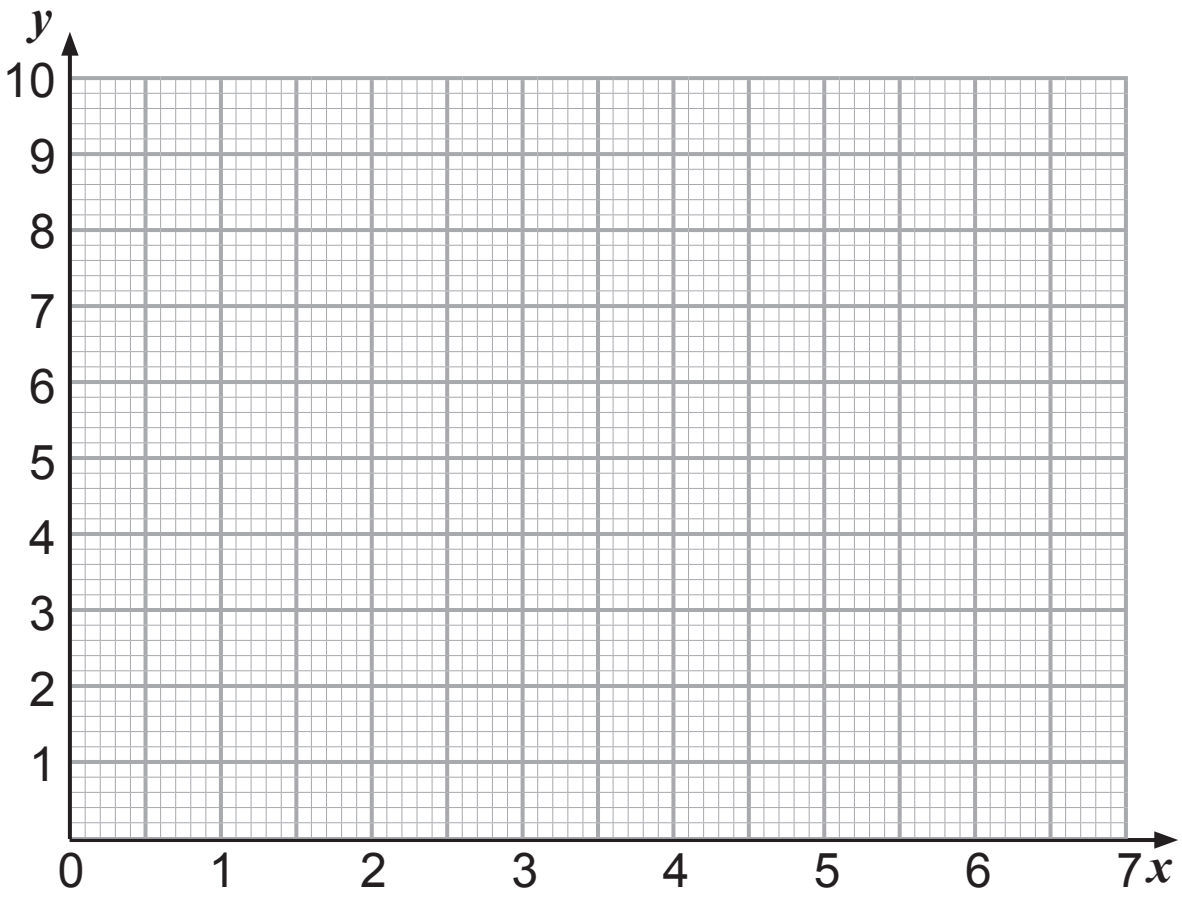
Give your answer in terms of π. [3 marks]

Answer _____ cm^2

10 (a) Complete the table of values for $y = \frac{3}{x}$ [2 marks]

x	0.5	1	2	3	4	5	6
y		3		1			

(b) On the grid below, draw the graph of $y = \frac{3}{x}$ for $0.5 \leqslant x \leqslant 6$ [2 marks]



11 Express the recurring decimal $0.3\dot{7}\dot{2}$ as a fraction in its simplest form. [3 marks]

Answer _____

12 Rationalise the denominator of $\frac{54}{\sqrt{3}}$ and simplify your answer. [2 marks]

You must show your working.

Answer _____

13 While in a newsagents the probability that Ed buys a newspaper is 0.8

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

Work out the probability that Ed buys at least a newspaper or a magazine in this same newsagents. [3 marks]

Answer _____

14 $x^2 - 10x + 33 \equiv (x - a)^2 + b$

(a) Work out the value of a and the value of b [3 marks]

Answer a = _____ , b = _____

(b) What is the minimum value of $x^2 - 10x + 33$? [1 mark]

Answer _____

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. [2 marks]

Answer _____

THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
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Total Marks	

Examiner Number