Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T6 Paper 1
(Non-calculator)
Higher Tier

[GMT61]

GMT61

MONDAY 11 JUNE 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.
Write your answers in the spaces provided in the question paper.
Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**
Answer **all fifteen** 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 **14**.
You should have a ruler, compasses and protractor.
The Formula Sheet is on page 2.

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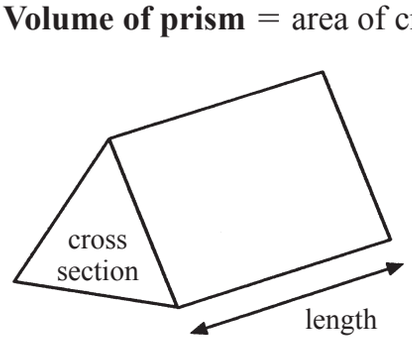
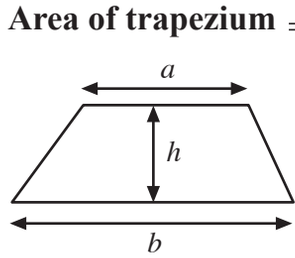
Formula Sheet

Volume of prism = area of cross section × length

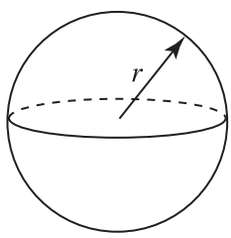


Area of trapezium $= \frac{1}{2}(a+b)h$



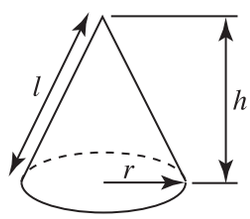
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

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

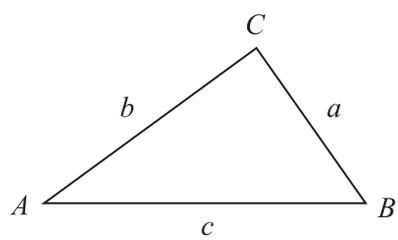


Quadratic equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

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

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

Answer **all** questions.

Examiner Only	
Marks	Remark

1 A letter is taken at random from the word

G E O G R A P H I C A L

Write down the probability that the letter is **not** in the word GRAPH.

Answer _____ [2]

Total Question 1

[Turn over

2 **(a)** Share 72 sweets in the ratio 8:1

Answer _____ , _____ [2]

(b) Given that $689 \times 537 = 369993$, write down the value of

(i) $\dfrac{369993}{53700}$

Answer _____ [1]

(ii) $\dfrac{36.9993}{0.0689}$

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 2	

3 Find the area of the trapezium.

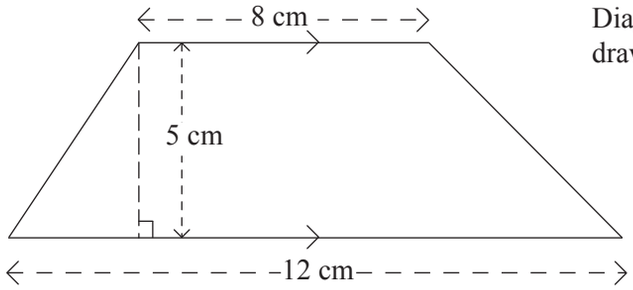
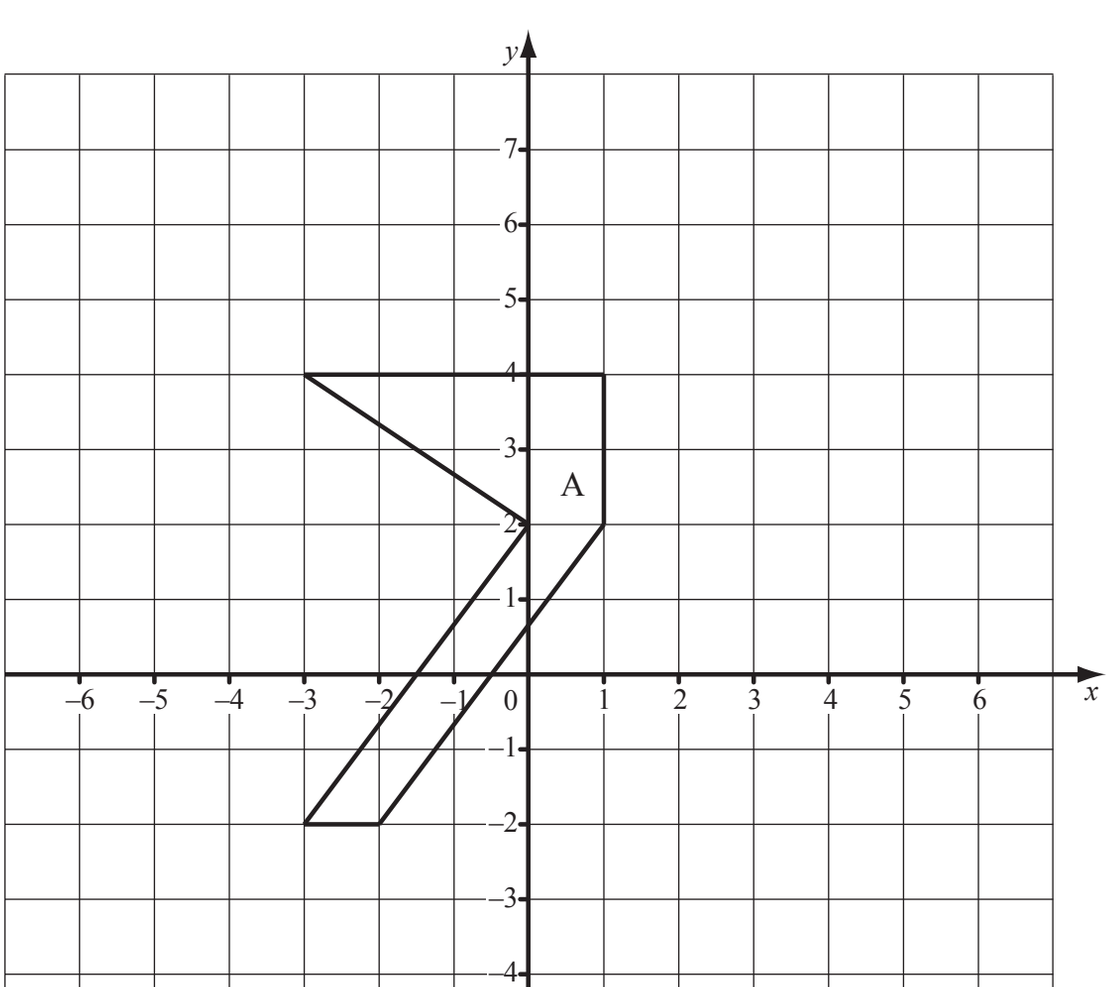


Diagram not drawn accurately

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark
Total Question 3	

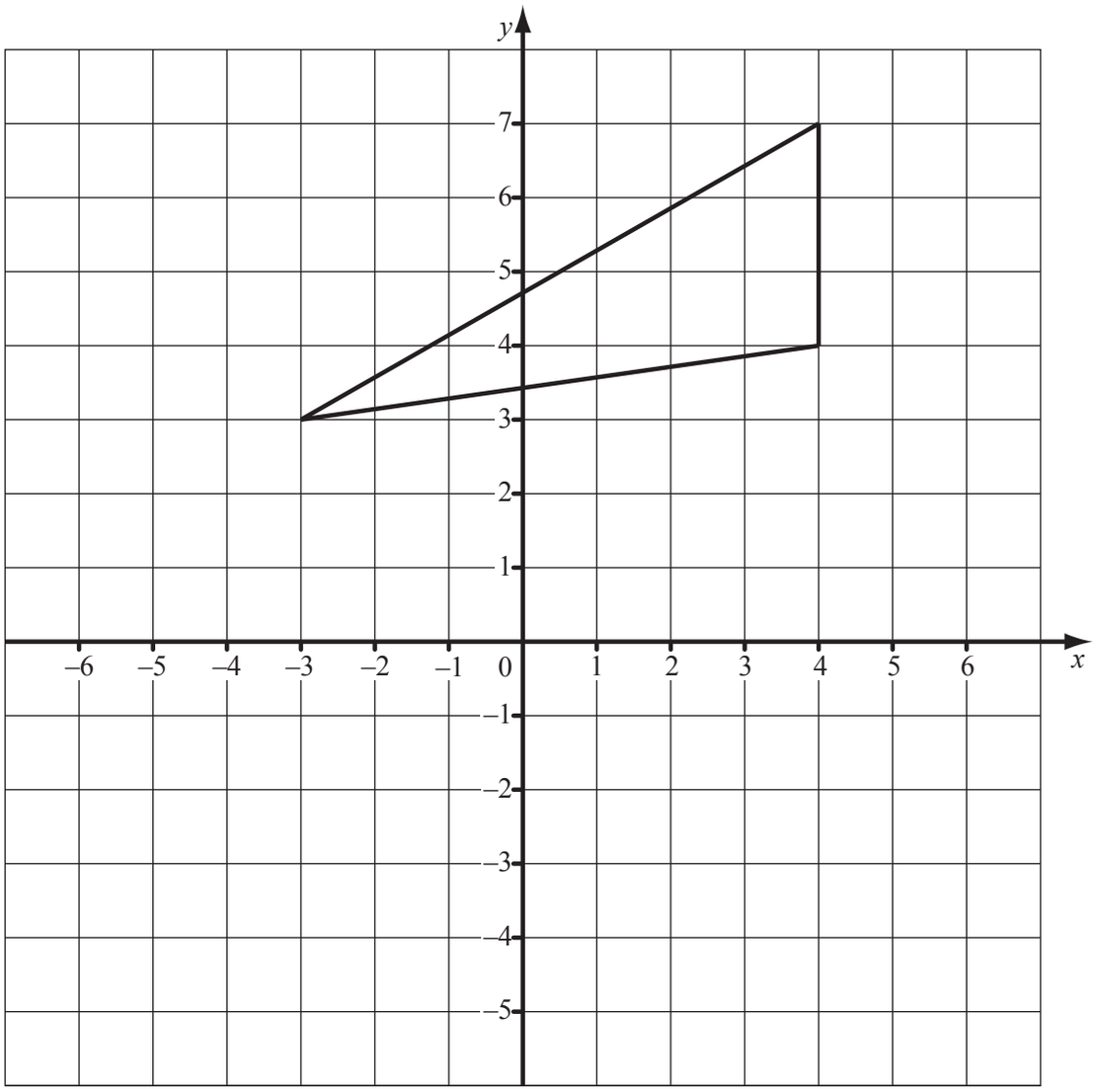
4 **(a)** Enlarge the shape A by scale factor 2 from the centre C(−4, 1).



[3]

Examiner Only	
Marks	Remark

(b) Reflect the triangle below in the line $y = 1$



[2]

Examiner Only	
Marks	Remark
Total Question 4	

5 A bag contains 4 toffee sweets, 6 nut sweets and some fruit sweets.

(a) The probability of me taking a fruit sweet from the bag is $\frac{1}{2}$

How many fruit sweets are in the bag?

Answer _____ [1]

(b) I eat 2 toffee sweets. What is the probability that the next sweet I take is toffee?

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 5	

6 **(a)** Write down all the values of n, where n is an integer, such that $-9 \leqslant 3n < 3$

Answer _____ [2]

(b) Work out the value of $\dfrac{a(5b+6)}{c}$ when $a = -3$, $b = 2$ and $c = 4$

Answer _____ [3]

Examiner Only	
Marks	Remark
Total Question 6	

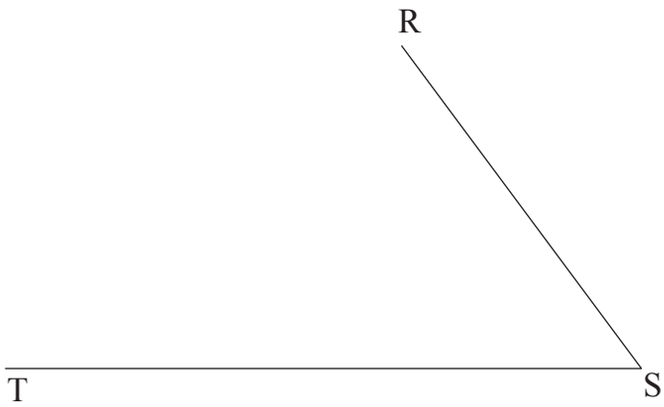
[Turn over

7 Work out the reciprocal of 1.5

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 7	

8 Using ruler and compasses only, construct the bisector of the angle RST.



[2]

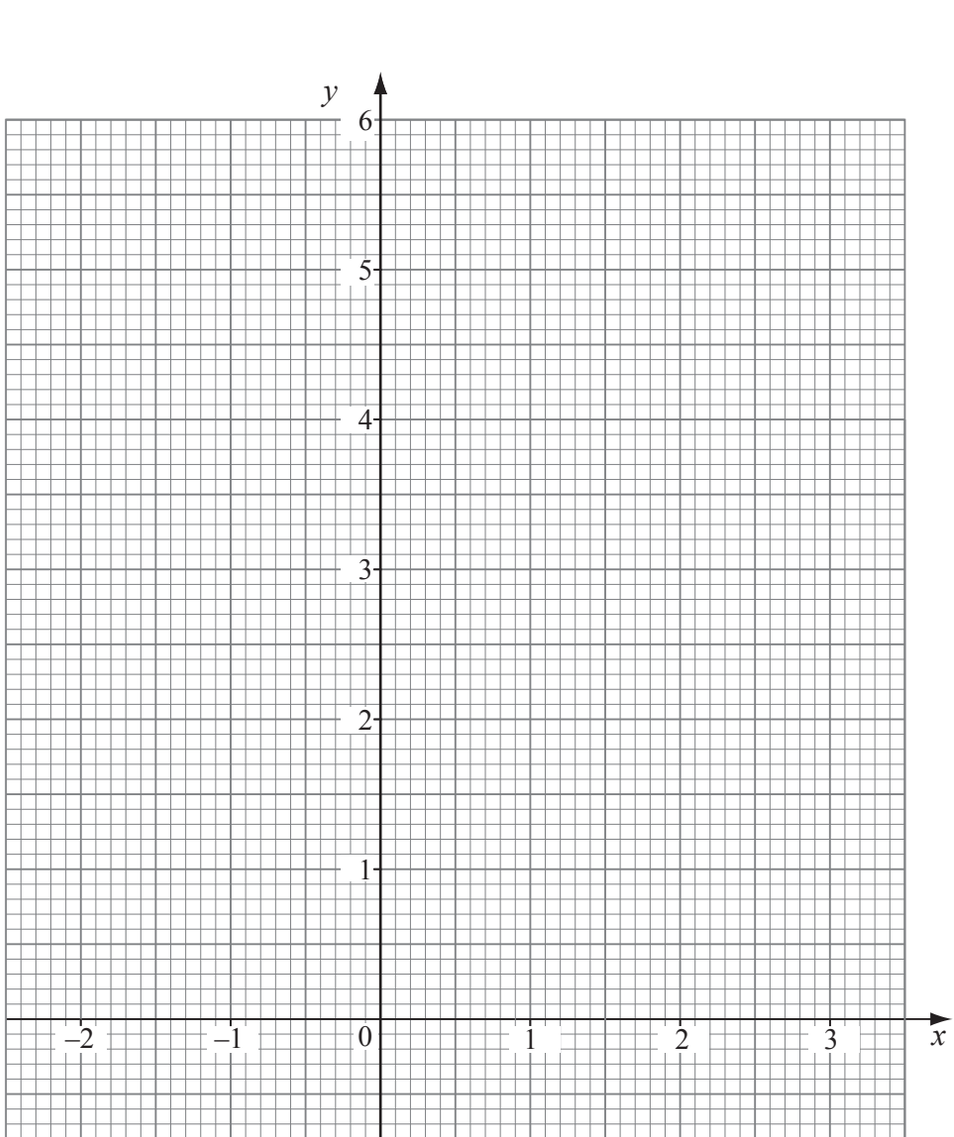
Examiner Only	
Marks	Remark
Total Question 8	

9 **(a)** Complete the table of values for $y = x^2 - x - 1$

x	-2	-1	0	1	2	3
y		1	-1		1	5

[1]

(b) On the axes below, draw the graph of $y = x^2 - x - 1$ for values of x from -2 to 3 [2]



Examiner Only	
Marks	Remark

(c) Use your graph to solve the equation

$$x^2 - x - 1 = 0$$

Answer $x =$ _____ [2]

(d) Use your graph to find the value of y when $x = -1.7$

Answer $y =$ _____ [1]

(e) From your graph estimate the minimum value of y.

Answer $y =$ _____ [1]

(f) By drawing an appropriate straight line on the grid opposite, find the positive solution of the equation $x^2 + x - 3 = 0$

Answer $x =$ _____ [3]

Examiner Only	
Marks	Remark
Total Question 9	

10 Rearrange the formula $V = \frac{4}{3}\pi r^3$ to make r the subject.

Answer $r =$ _____ [2]

Examiner Only	
Marks	Remark
Total Question 10	

11 **(a)** Work out the value of $\sqrt{5} \times \sqrt{5}$

Answer _____ [1]

(b) Write the number 0.000000567 in standard form.

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 11	

[Turn over

12 Rationalise the denominator of $\frac{30}{\sqrt{6}}$

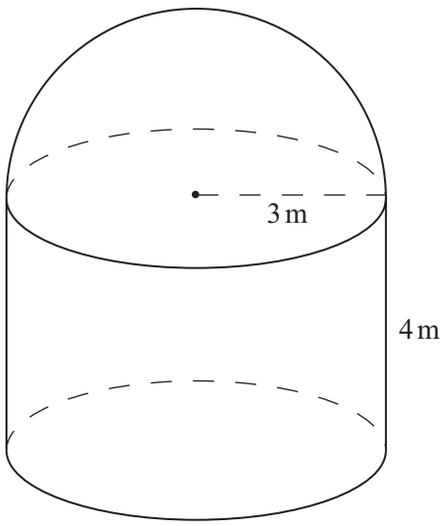
Give your answer in its simplest form.

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 12	

13 The diagram shows an oil-tank made from a cylinder of radius 3 metres and height 4 metres with a hemisphere on top.

Calculate the volume of the oil-tank, giving your answer in terms of π.



Answer _____ m^3 [5]

Examiner Only	
Marks	Remark
Total Question 13	

Quality of written communication will be assessed in this question.

14 Explain why $(n + 1)^2 + (n - 1)^2$ is always even for any integer value of n.

[2]

Examiner Only	
Marks	Remark
Total Question 14	

15 What is the area of a square of side $(5+\sqrt{3})$ cm?

Give your answer in the form $a+b\sqrt{3}$

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark
Total Question 15	

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
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10	
11	
12	
13	
14	
15	
QWC	
Total Marks	

Examiner Number