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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

GMT62

[GMT62]

FRIDAY 2 JUNE, 10.45am–12 noon

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 black ink only. **Do not write with a gel pen.**
Answer **all seventeen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** 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 **5** and **9**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

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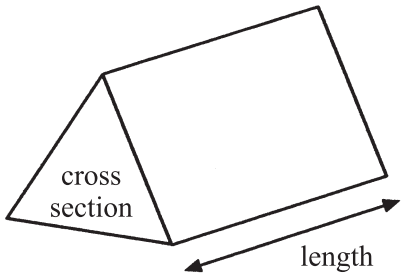
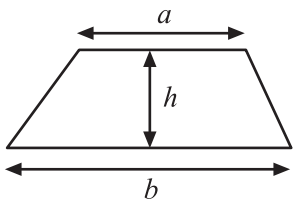
Formula Sheet

Volume of prism = area of cross section × length

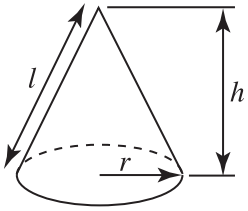


Area of trapezium $= \frac{1}{2}(a+b)h$



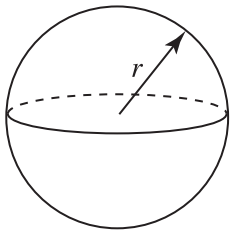
Volume of cone $= \frac{1}{3}\pi r^2 h$

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

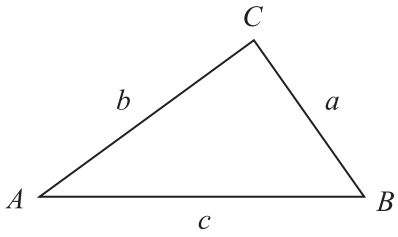


Volume of sphere $= \frac{4}{3}\pi r^3$

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 What is the sum of all the fractions of the form $\frac{N}{5}$ where N is a whole number less than 5?

Answer _____ [2]

2 Rewrite $p + 8 = 6 - q$ to make q the subject.

Answer: q = _____ [2]

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3 A coach travels 140 miles in 2 hours 30 minutes.

Calculate the average speed.

Answer _____ mph [3]

4 A six-sided dice is biased.

The table shows the probability of each score from 1 to 6

1	2	3	4	5	6
0.09	0.13	0.14	0.15	0.21	0.28

Mary rolls the dice once.

Work out the probability that at least 3 will be scored.

Answer _____ [2]

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Quality of written communication will be assessed in this question.

5 n is a positive integer.

Which of the following statements below describes the number $n + n^2$?

Explain your answer.

"always even" "always odd" "could be even or odd"

Answer _____

because _____

_____ [2]

6 Solve

$4 < 3n \leqslant 18$ for integer n

Answer _____ [3]

[Turn over

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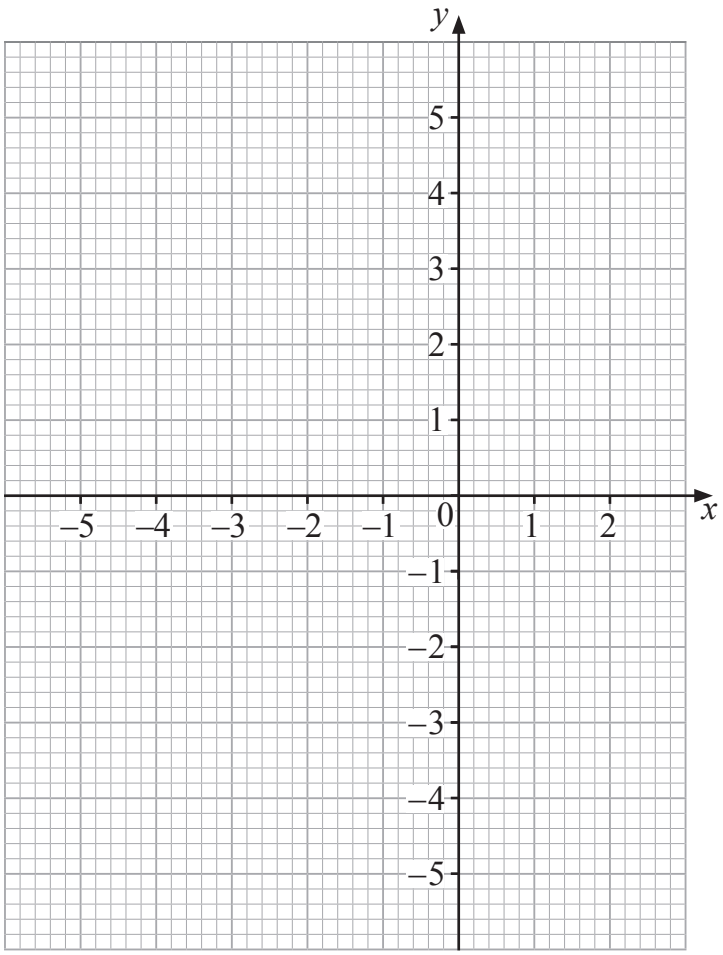
7 Here is a table of values for $y = 1 - 3x - x^2$

x	–4	–3	–2	–1	0	1
y	–3	1	3	3	1	–3

Use the table to draw the graph of $y = 1 - 3x - x^2$ on the grid below for values of x from –4 to 1



[2]

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8 Ben observes whether cars turn right or left at a T junction. He records the number of cars that come to the junction and the number that turn left.

Number of cars observed	10	20	50	100
Number of cars that turn left	4	13	33	72

(a) What is the relative frequency of cars turning left after 50 observations?

Answer _____ [1]

(b) What is the best estimate for the probability that a car will turn left at this junction?

Answer _____ [1]

(c) In one week 580 cars come to this junction.

Estimate how many turn **right**.

Answer _____ [2]

[Turn over

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Quality of written communication will be assessed in this question.

9 The six angles of two different triangles are placed in order of decreasing size.
Two of the angles are unknown.

The sizes of the angles are:

$$118° \quad 82° \quad 78° \quad 46° \quad x° \quad y°$$

What is the size of the smallest angle?

Answer _____ [2]

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10 Adam, Bob and Chris have 18 marbles in total.

Bob gives 5 to Chris. Chris gives 3 to Adam. Adam gives 2 to Bob.

They now have the same number of marbles each.

How many marbles did Bob have to begin with?

Answer _____ [2]

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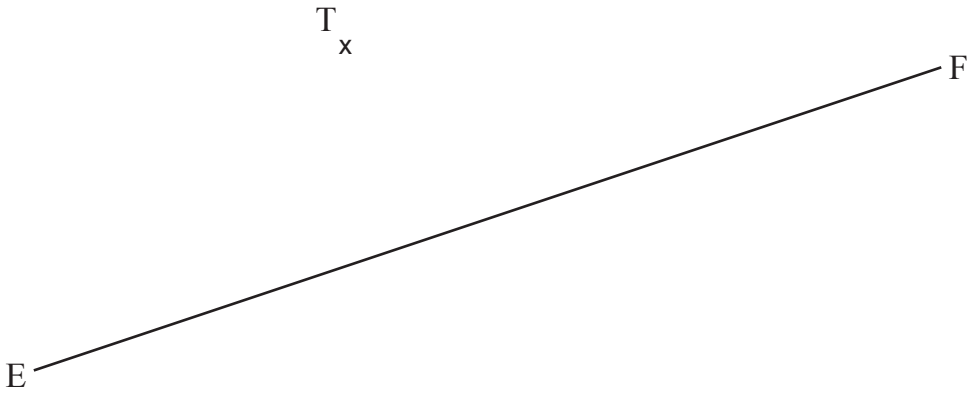
11 Use ruler and compasses only to construct the perpendicular from the point T to the line EF.

You must show all your construction work.



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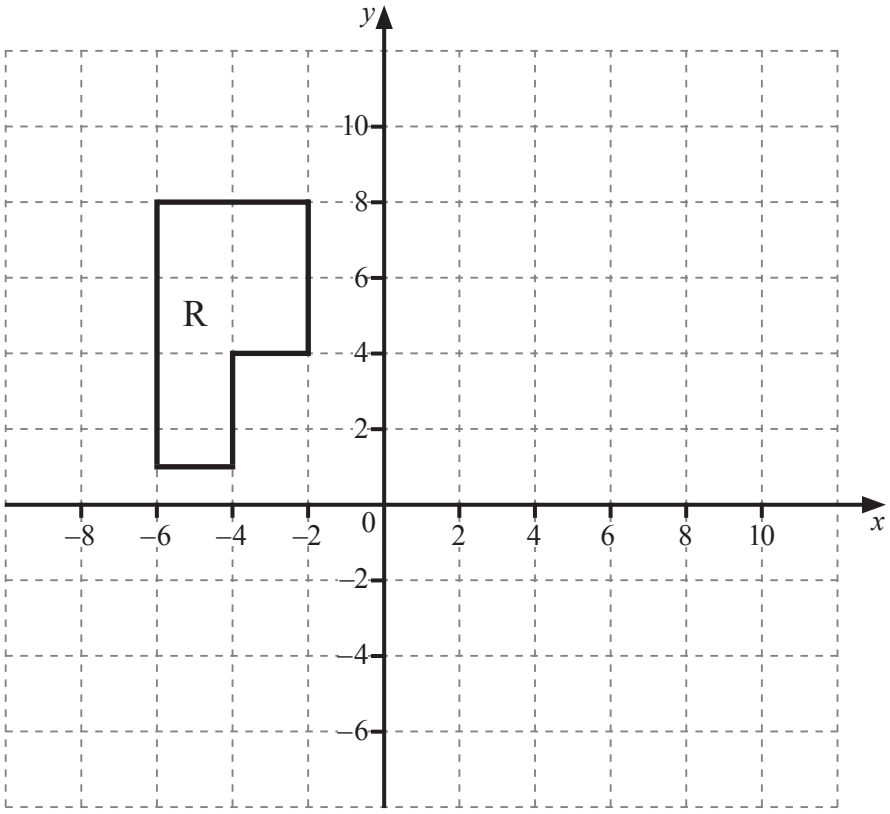
12 (a)



Draw the image of the shape R after the translation $\begin{pmatrix} 7 \\ -2 \end{pmatrix}$. [2]

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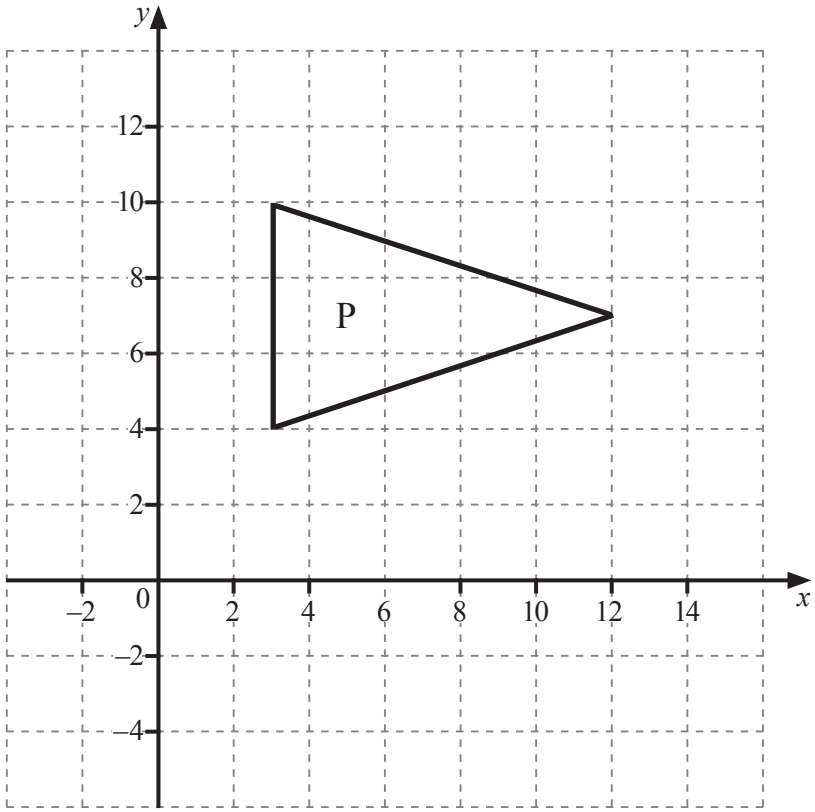
(b)



On the grid above, draw the image of the triangle P after an enlargement by a scale factor of $\frac{1}{3}$ using the centre (0, –2). [2]

13 Here are some expressions.

fg^3	$2h^2(f+g)$	h^3+3fg	$3\pi h^2$	$8fgh$

The letters f, g and h represent lengths.

Some of the expressions represent volumes.

Tick the boxes underneath the expressions which represent volumes. [2]

[Turn over

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14 **(a)** Simplify

(i) $(3t^3)^3$

Answer _____ [2]

(ii) $24x^3y \div 8x^2y^3$

Answer _____ [2]

(b) Make v the subject of the following formula.

$$\frac{1}{u} = \frac{1}{v} + \frac{1}{w}$$

Answer _____ [3]

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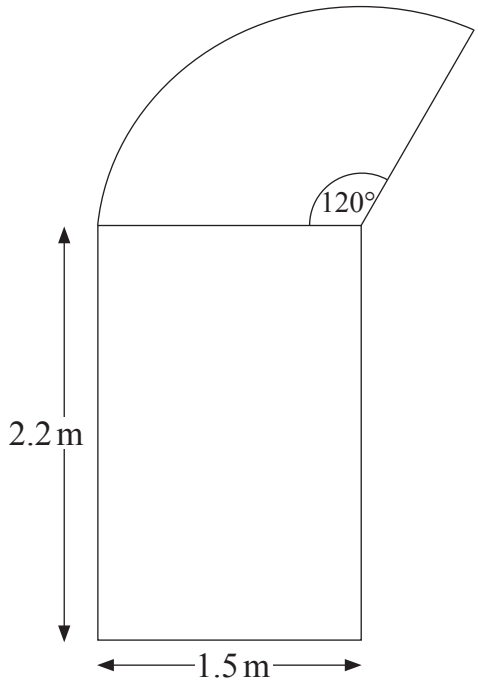
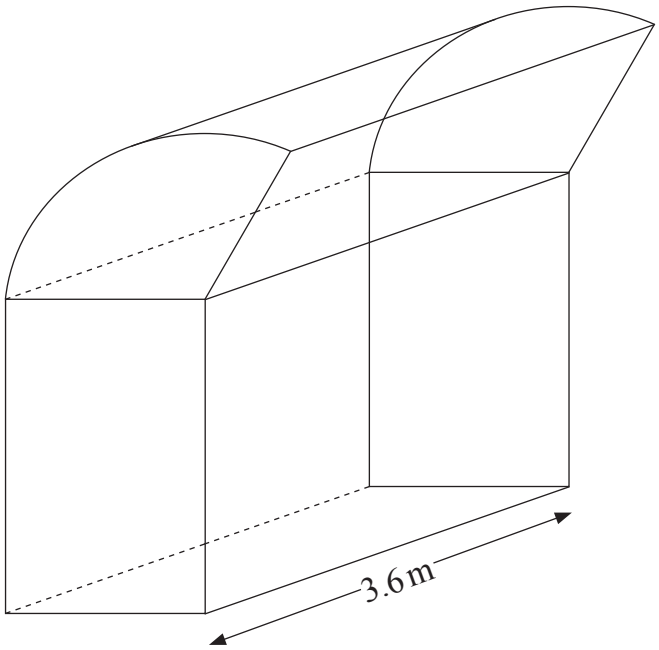
15



A



B

Diagram A above represents the cross section of a solid sculpture (B).

The lower section is a rectangle measuring 1.5 metres by 2.2 metres.

The upper section is a sector of a circle containing an angle of 120°

The sculpture is 3.6 metres long.

Work out the volume of the sculpture.

Answer _____ m^3 [4]

[Turn over

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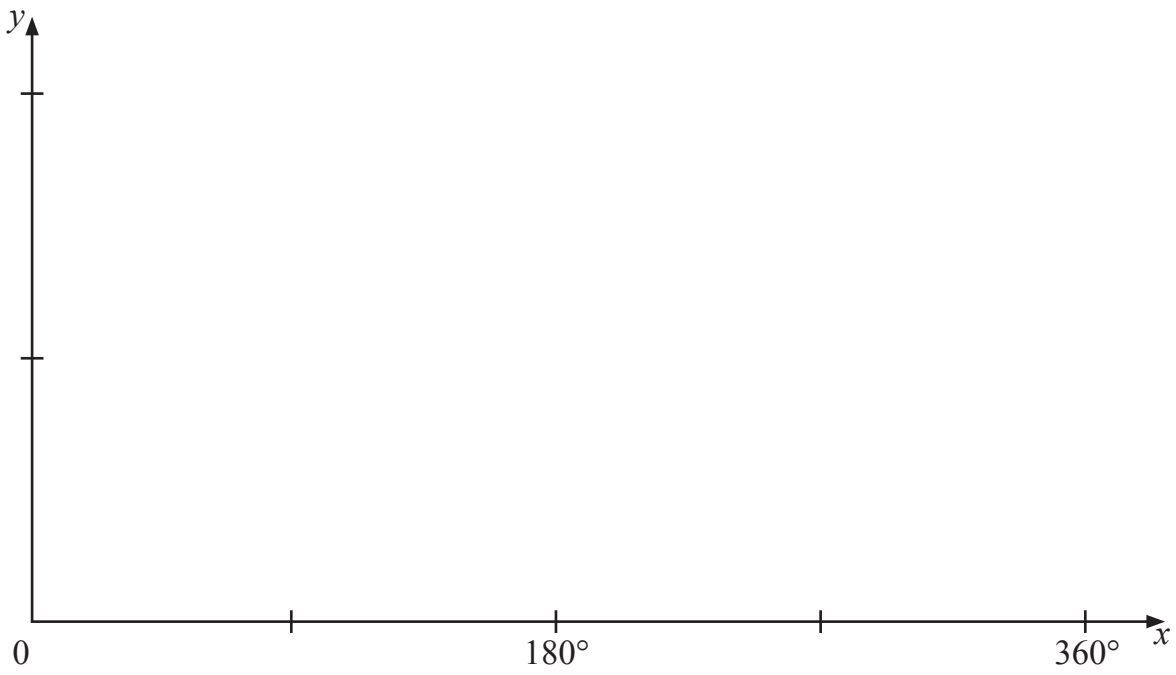
16 Using the axes below, draw a sketch of the graph of $y = 1 + \sin x$ for values of x from 0° to 360°

You are required to mark the values on the y-axis. [2]



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17 A jar contains n sweets in total.

One of the sweets in the jar is strawberry and two are lime.

The rest of the sweets in the jar are orange.

Suzi takes a sweet at random from the jar and eats it.

She then takes another sweet at random from the jar and eats it.

The probability that Suzi eats two orange sweets is $\frac{6}{11}$

Show that $5n^2 - 71n + 132 = 0$

[5]

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