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Rewarding Learning

Centre Number

71

Candidate Number

General Certificate of Secondary Education
2014

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

MV18

[GMT62]

FRIDAY 30 MAY, 3.00pm–4.15pm

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 blue or black ink only.
Answer **all fifteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

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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 15**.
You should have a calculator, ruler, compasses and protractor.
The Formula Sheet is on pages 4 and 5.

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(Questions start on page 6)

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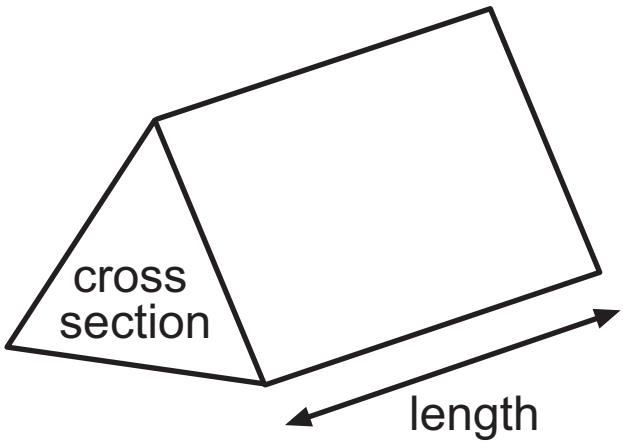
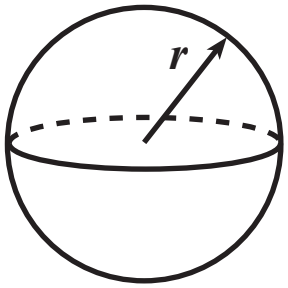
Formula Sheet

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

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

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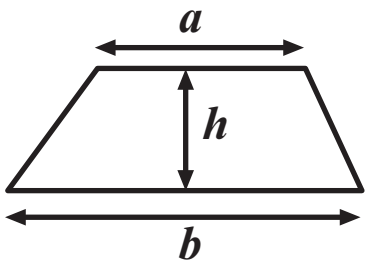
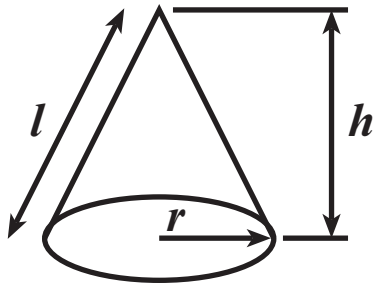
Area of trapezium $= \frac{1}{2}(a + b)h$

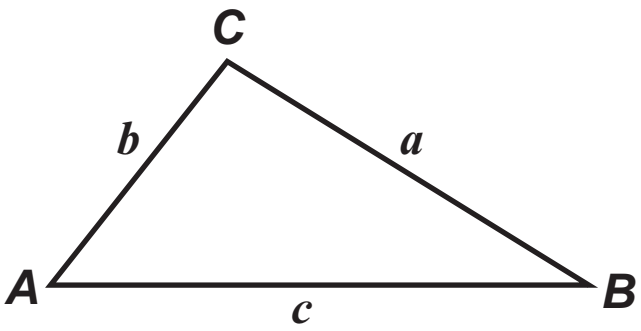


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



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

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1 In a survey of ages of 80 rail passengers buying tickets in a train station, 32 were under the age of thirty.
5000 passengers bought tickets at this station. Estimate how many were aged under thirty. [2 marks]

Answer _____

2 On the grid opposite draw and shade the image of the triangle after a reflection in the line $y = 1$ [2 marks]

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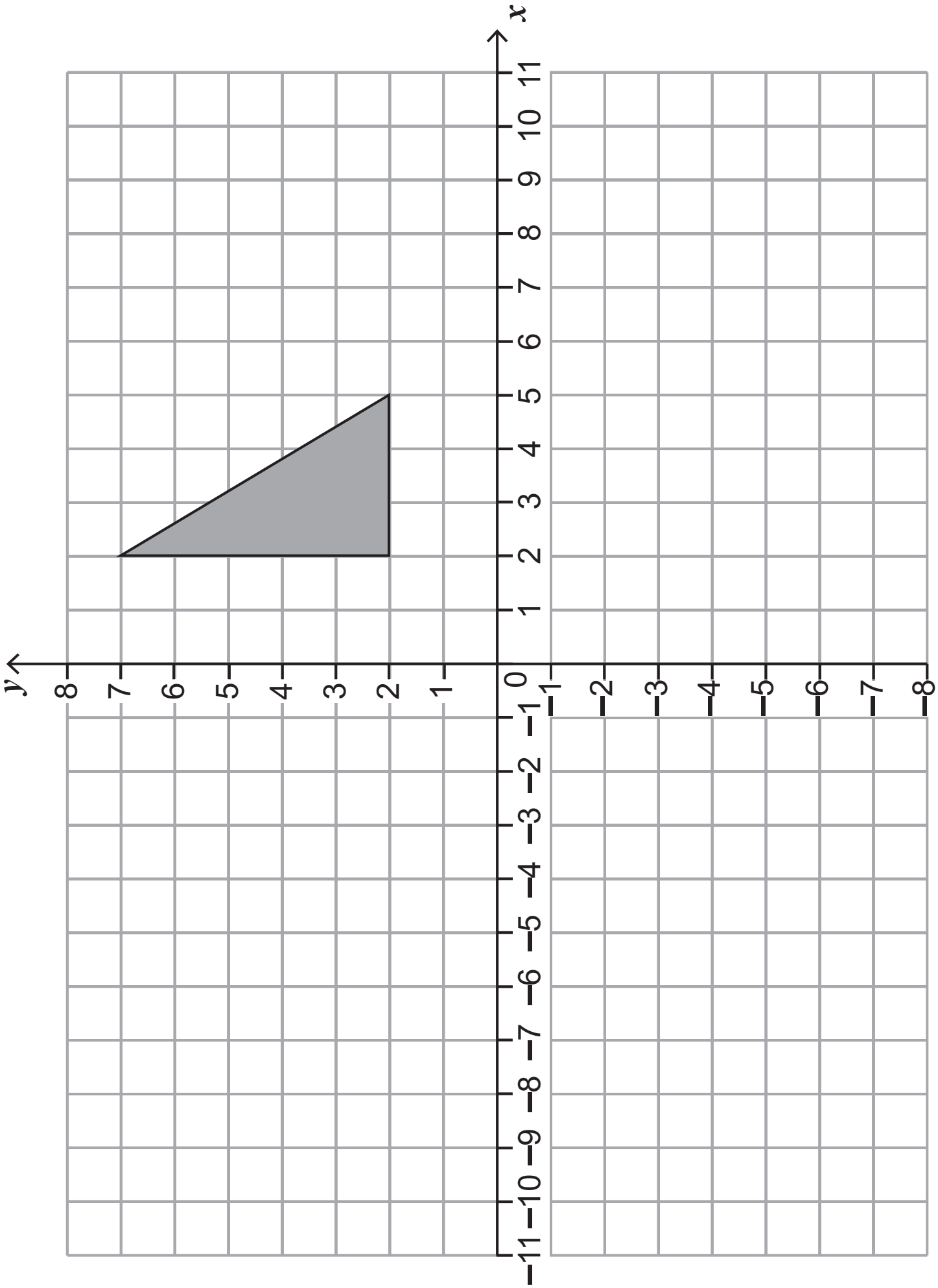

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3 A car travels 152 km in 2 hrs 25 mins.
It then travels a further 87 km in 1 hour 20 mins.

Find the average speed of the car for the whole journey **giving your answer in km/hr to a suitable degree of accuracy**. [3 marks]

Answer _____ km/hr

4 "When an odd number is multiplied by **A** and then **B** is subtracted, the answer is an even number."
Find a value for **A** and a value for **B** to make this a true statement. [2 marks]

Answer **A** = _____ **B** = _____

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(Questions continue overleaf)

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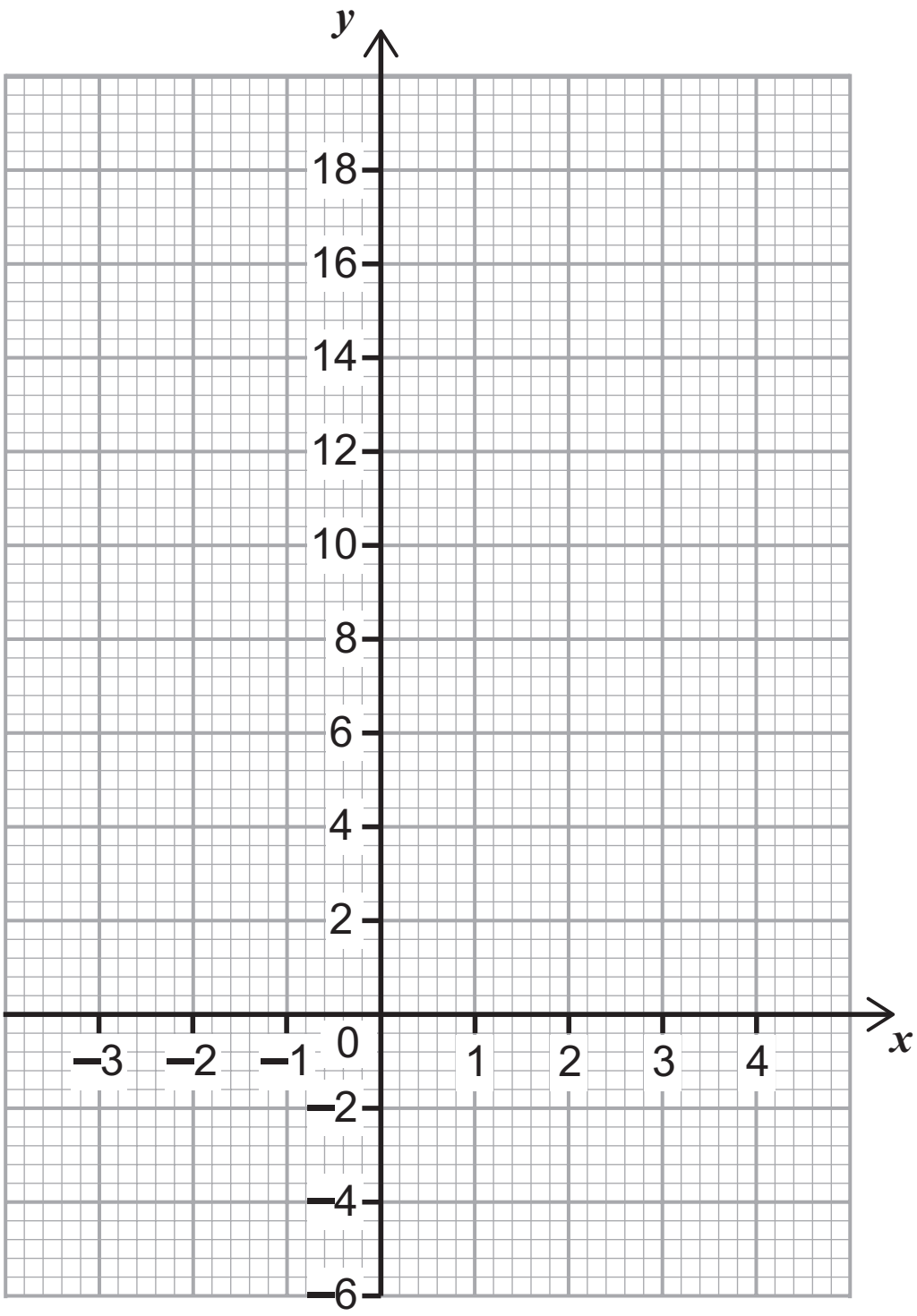
5 **(a)** Complete the table for $y = x^2 - 3x$ [1 mark]

x	−2	−1	0	1	2	3	4
y		4	0	−2		0	4

(b) On the grid draw the graph of $y = x^2 - 3x$ [2 marks]



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(c) From your graph estimate the minimum value of y
[1 mark]

Answer y = _____

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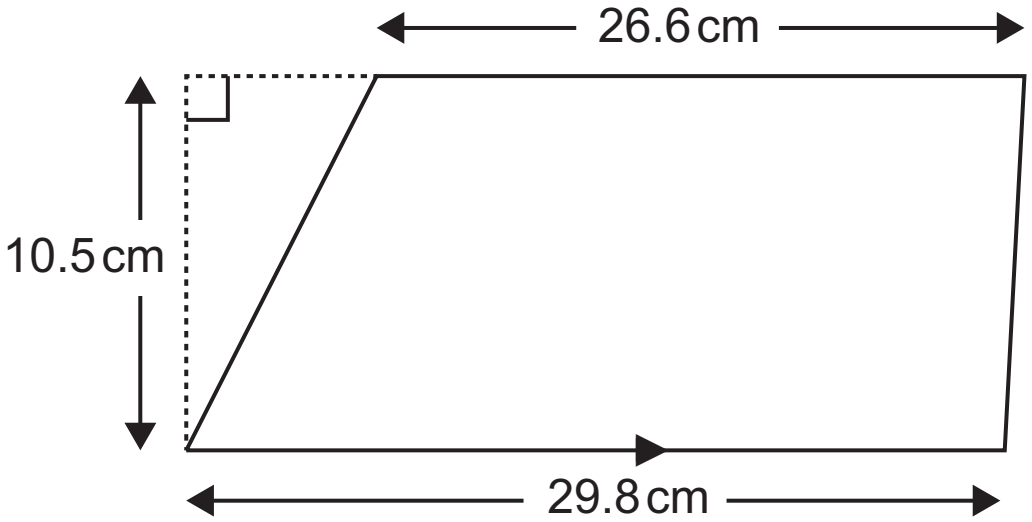
6 **(a)** Find the area of this trapezium. [2 marks]



Answer _____ cm^2

(b) The trapezium in part **(a)** is the cross section of a prism of rock which measures 78 cm from front to back. The density of this rock is 20 g/cm^3.

Calculate the mass of the prism of rock. [3 marks]

Answer _____ g

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7 Alex and Bethany share **£**840 in the ratio 2 : 5
How much more money does Bethany get than Alex?
[2 marks]

Answer **£** _____

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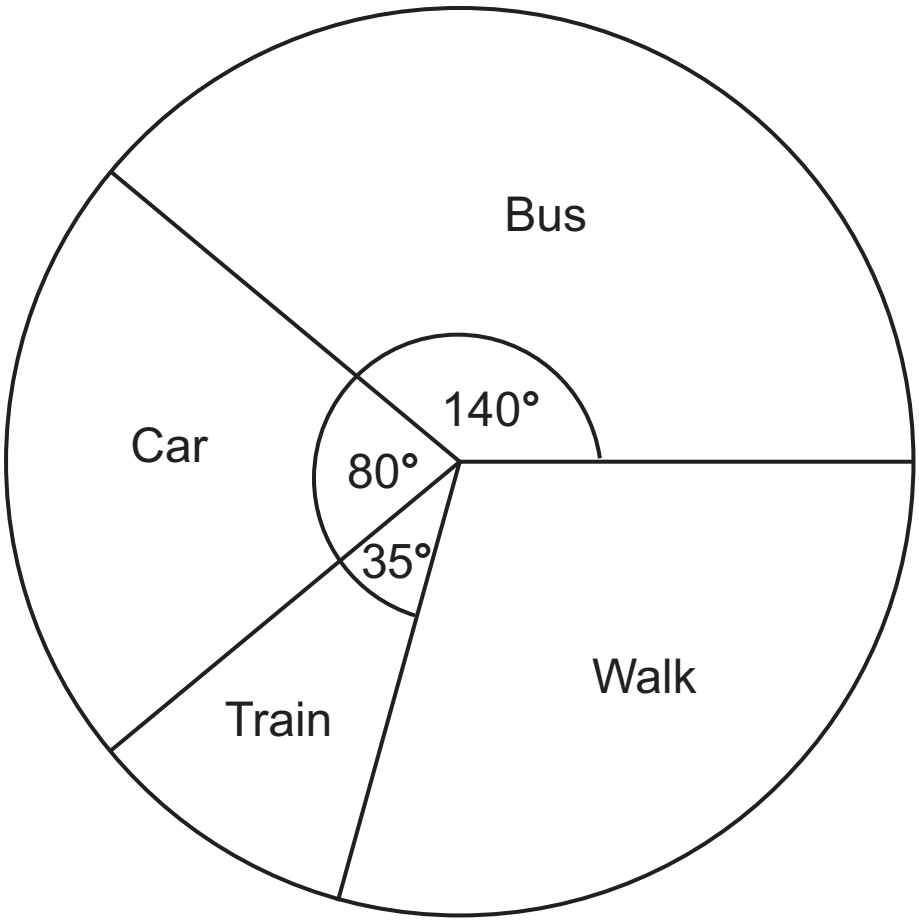
8 In a college survey, all 1800 students were asked how they travelled to college on their first day of term.
The pie chart represents their responses.



(a) What is the probability of a student having walked to college? [2 marks]

Answer _____

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(b) Calculate the number of students who travelled by bus to college. [2 marks]

Answer _____

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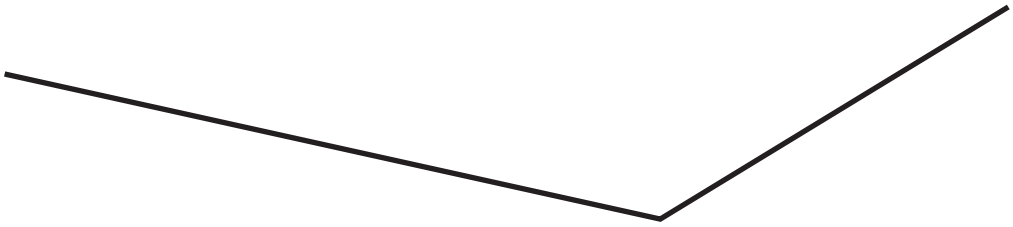
9 Construct the bisector of the obtuse angle shown.
You must show all your construction lines. [2 marks]



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10 a, b, c, x, y, p, q, r, s all represent lengths.
By considering dimensions find out which two of the following expressions could represent area. [2 marks]

A $4\sqrt{abc^2}$

B $2(xy + a)^2$

C $(3pq + 0.2rs)^3$

D $\dfrac{a^3 + b^3 + c^3}{2\pi r}$

Answer _____ and _____

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11 (a) Which of these numbers is smallest? [2 marks]
Show working to justify your answer.

1.3×10^{-2} 0.13 13×10^{-1} 31×10^{-3} $31 \div 100$

Answer _____

(b) Oil flows through a pipe at a rate of $40\,m^3$/sec.
How many seconds will it take to fill a tank of volume $1.08 \times 10^5 m^3$? [1 mark]

Answer _____ seconds

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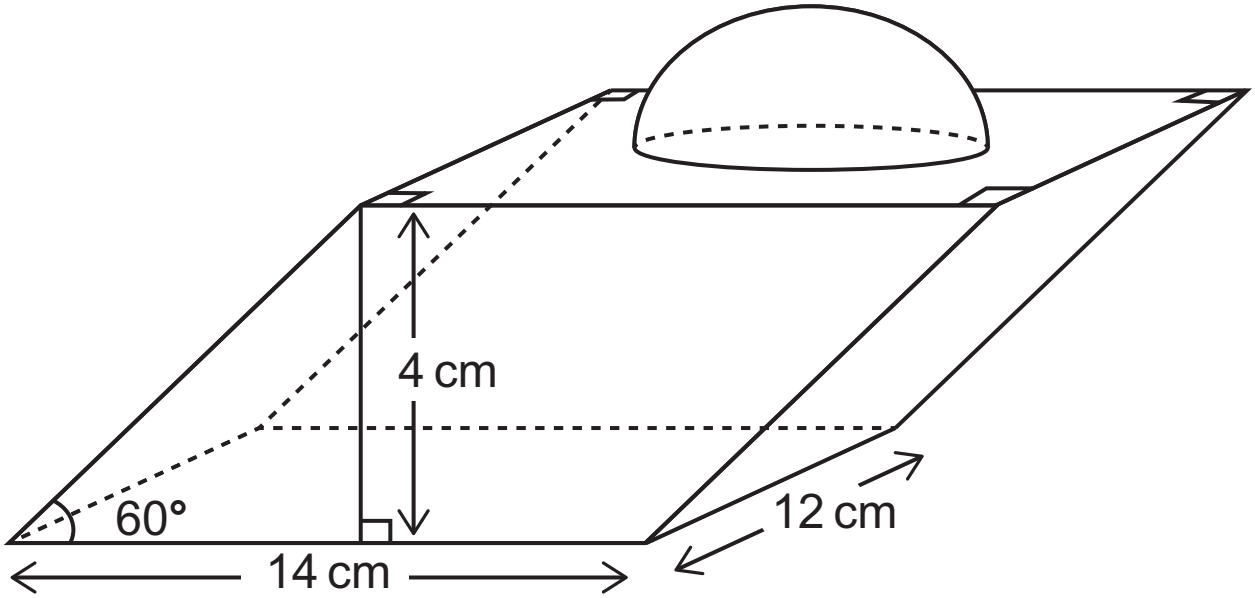
12 A trophy is made up of a wooden plinth surmounted by a solid hemisphere.



The plinth is a prism whose cross-section is a parallelogram. The length of the parallelogram is 14 cm and its perpendicular height is 4 cm.
The depth of the plinth is 12 cm.

(a) Find the volume of the plinth. [3 marks]

Answer _____ cm^3

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The hemisphere has a radius of 4.5 cm.

(b) Find the volume of the hemisphere. [2 marks]

Answer _____ cm^3

(c) The **top** surface of the plinth including the curved surface area of the hemisphere is sprayed with gold paint.
Find the total surface area sprayed. [3 marks]

Area _____ cm^2

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13 The probability of a telephone salesperson being female is 0.7

The probability of a female telephone salesperson using a mobile phone is 0.2

The probability of a male telephone salesperson using a mobile phone is 0.15

What is the probability that a telephone sales call is made on a mobile phone? [3 marks]

Answer _____

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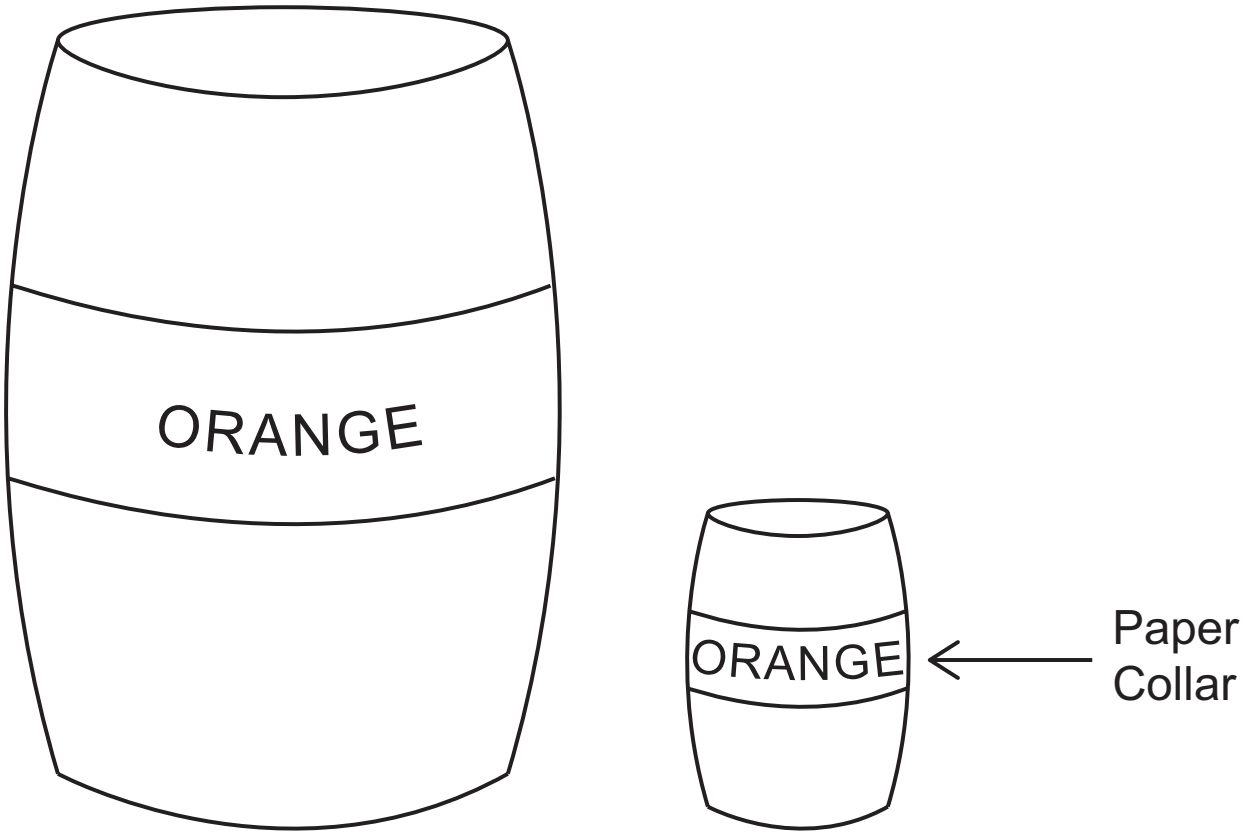
14 Barrels of orange juice come in two sizes which are similar to each other, with similar paper collars.



The diameter of the base of the standard size is $2\frac{1}{2}$ times larger than the diameter of the base of the small size. The small size has a paper collar of area 32 cm^2.

(a) Calculate the area of the paper collar on the standard size. [2 marks]

Answer _____ cm^2

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(b) The company decides to build a large barrel with a paper collar of area 2450 cm^2. This barrel is similar to the standard and small barrels.

Find how many times bigger the diameter of the large size is compared to the diameter of the small size. [3 marks]

Answer _____

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Quality of written communication will be assessed in this question.

15 Find an irrational number between 3.14 and π
Explain your reasoning clearly. [3 marks]

Answer _____ because _____

_____

_____

_____

_____

THIS IS THE END OF THE QUESTION PAPER

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

Examiner Number

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