AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Unit 3 Geometry and Algebra

Tuesday 10 November 2015 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.

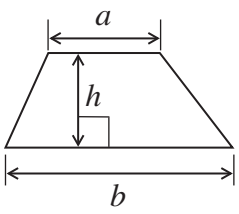
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- Quality of written communication is specifically assessed in Questions 3 and 6. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

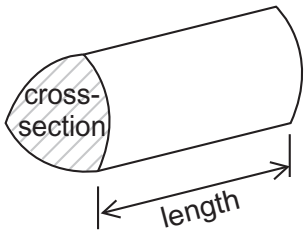
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

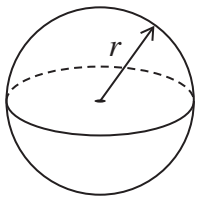


Volume of prism = area of cross-section $\times$ length



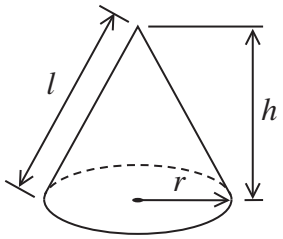
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

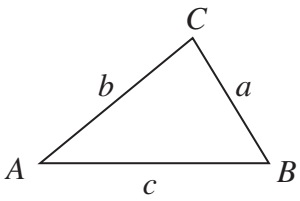
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

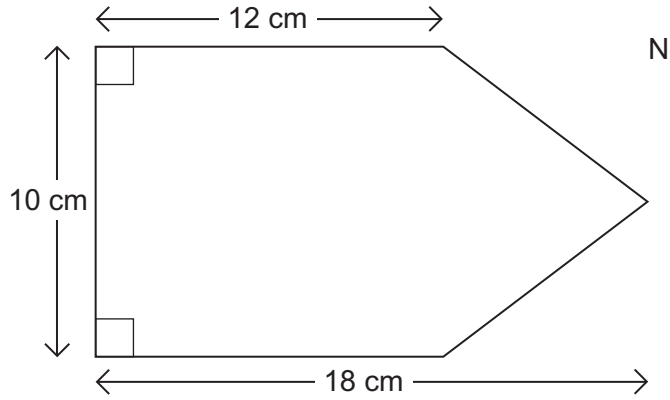
The Quadratic Equation

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

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

Answer **all** questions in the spaces provided.

1 Work out the area of this pentagon.



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[3 marks]

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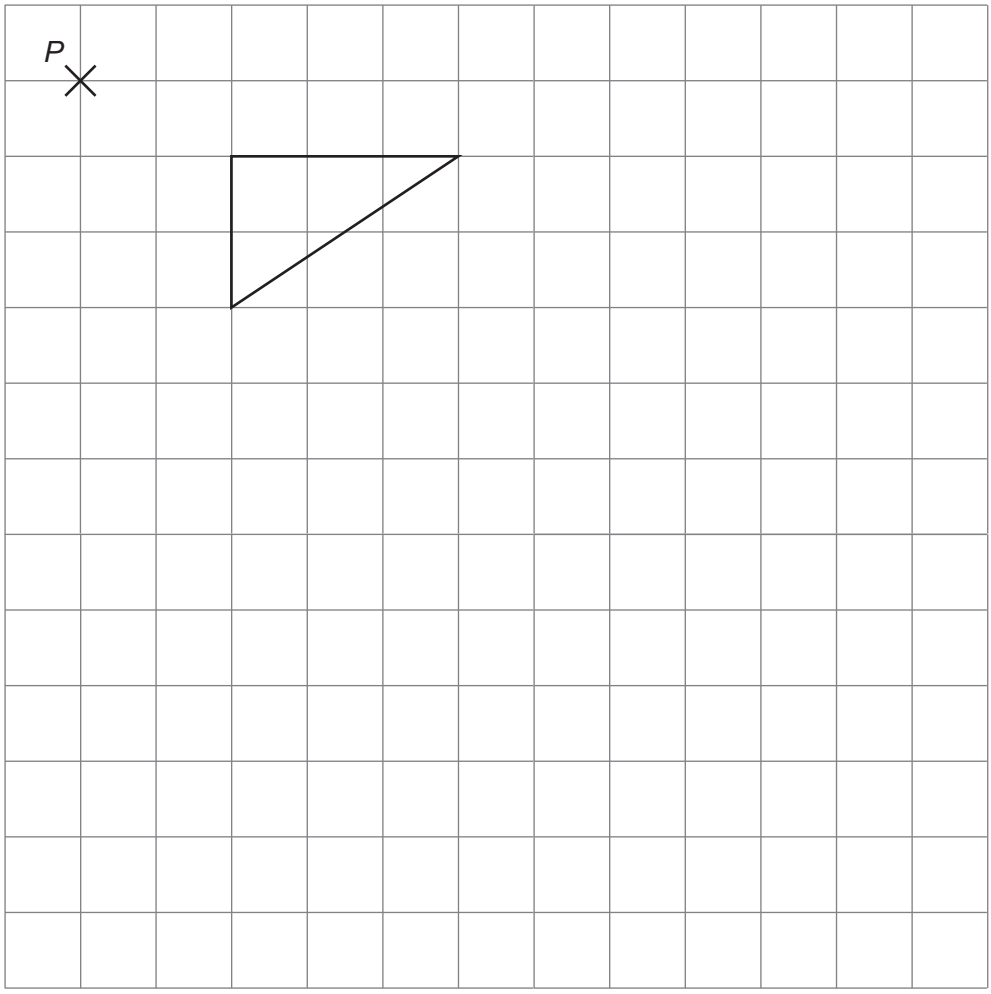
Answer ..... cm^2

3

Turn over ▶

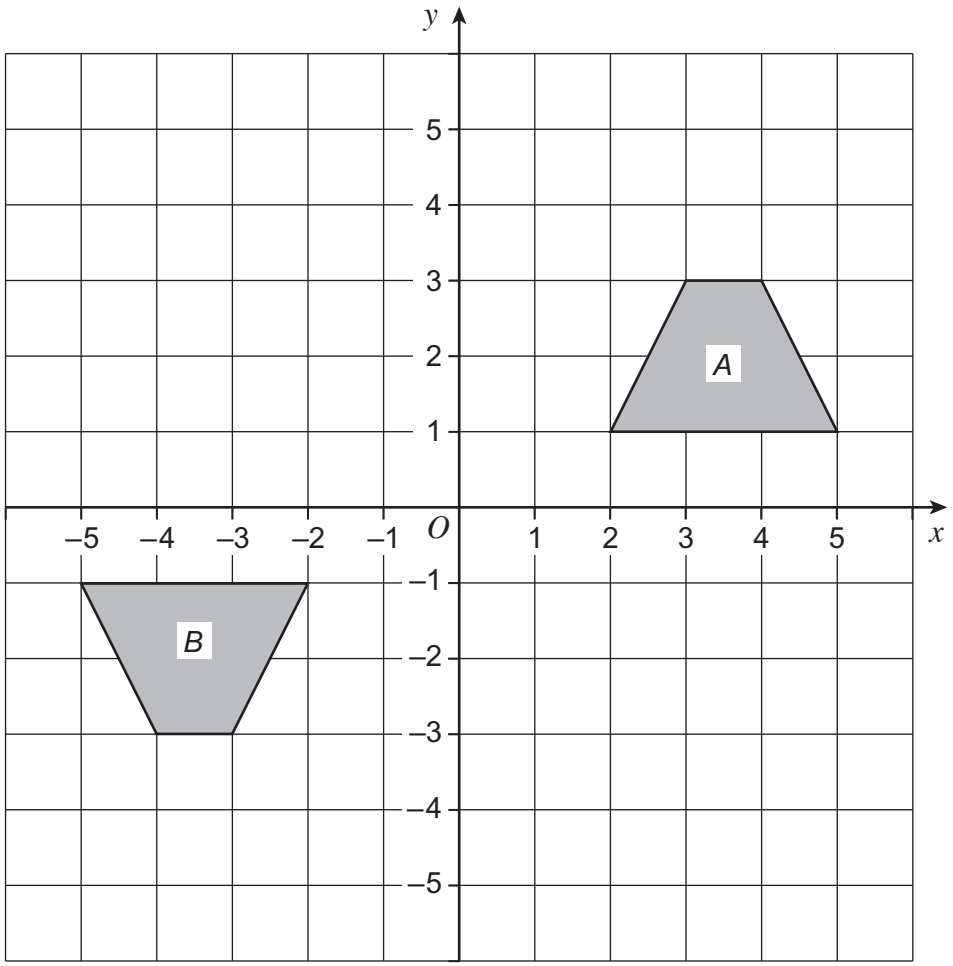
2 (a) Enlarge this shape by scale factor 2 with centre of enlargement point *P*.

[3 marks]



2 (b) Describe fully the **single** transformation that maps shape *A* to shape *B*.

[3 marks]



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6

***3** A gardener uses this formula to work out how much he charges to make a lawn.

$$C = \frac{7(14 + A)}{3}$$

C is the charge in £

A is the area in m^2

He makes a rectangular lawn measuring 12.5 m by 17.6 m

How much does he charge?

[3 marks]

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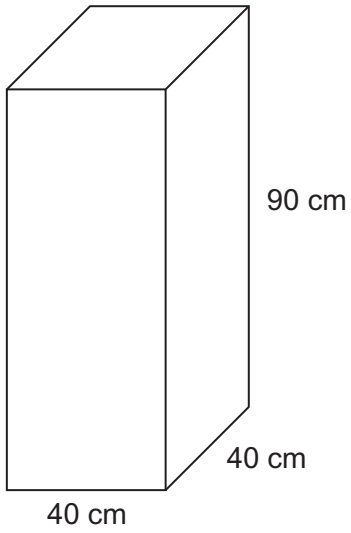
Answer £ .....

4 The diagram shows a water tank in the shape of a cuboid.



The tank is full of water.

1 litre = 1000 cm^3

How many gallons of water are in the tank?

[4 marks]

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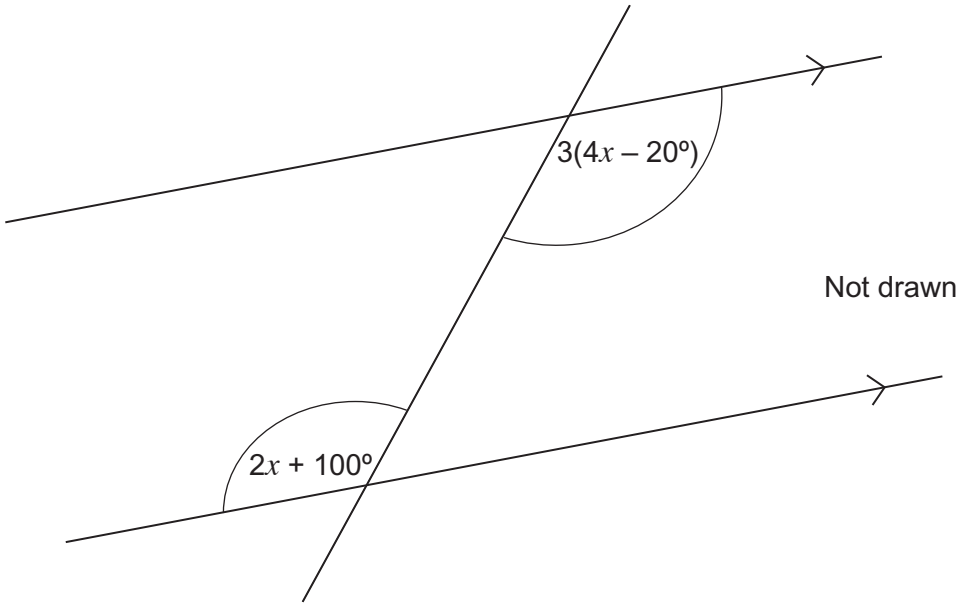
Answer ..... gallons

7

5 The diagram shows three straight lines.



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5 (a) Which of the following describes the pair of angles marked?
Circle your answer.

[1 mark]

Alternate Corresponding Interior Vertically opposite

5 (b) Work out the value of x.

[4 marks]

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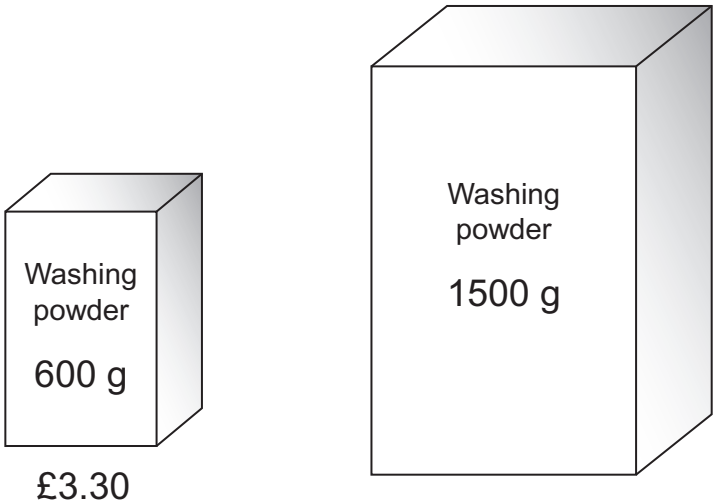
x = ... degrees

Turn over for the next question

5

***6** Washing powder is sold in two sizes, 600 grams and 1500 grams.



Which size is better value for money?
You **must** show your working.

[6 marks]

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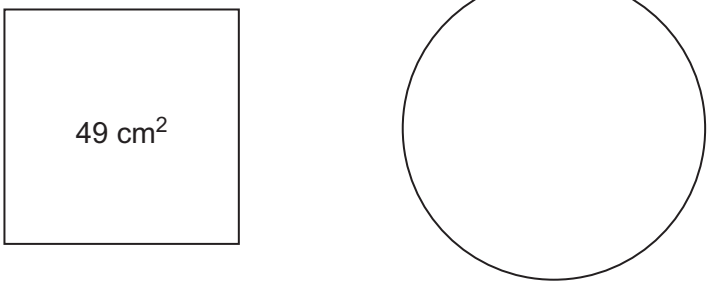
Answer .....

7 The diagram shows a square and a circle.

Not drawn accurately



The **area** of the square is 49 cm^2

The **perimeter** of the square is equal to the **circumference** of the circle.

Work out the radius of the circle.
Give your answer to 1 decimal place.

[5 marks]

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Answer ..... cm

11

Turn over ▶

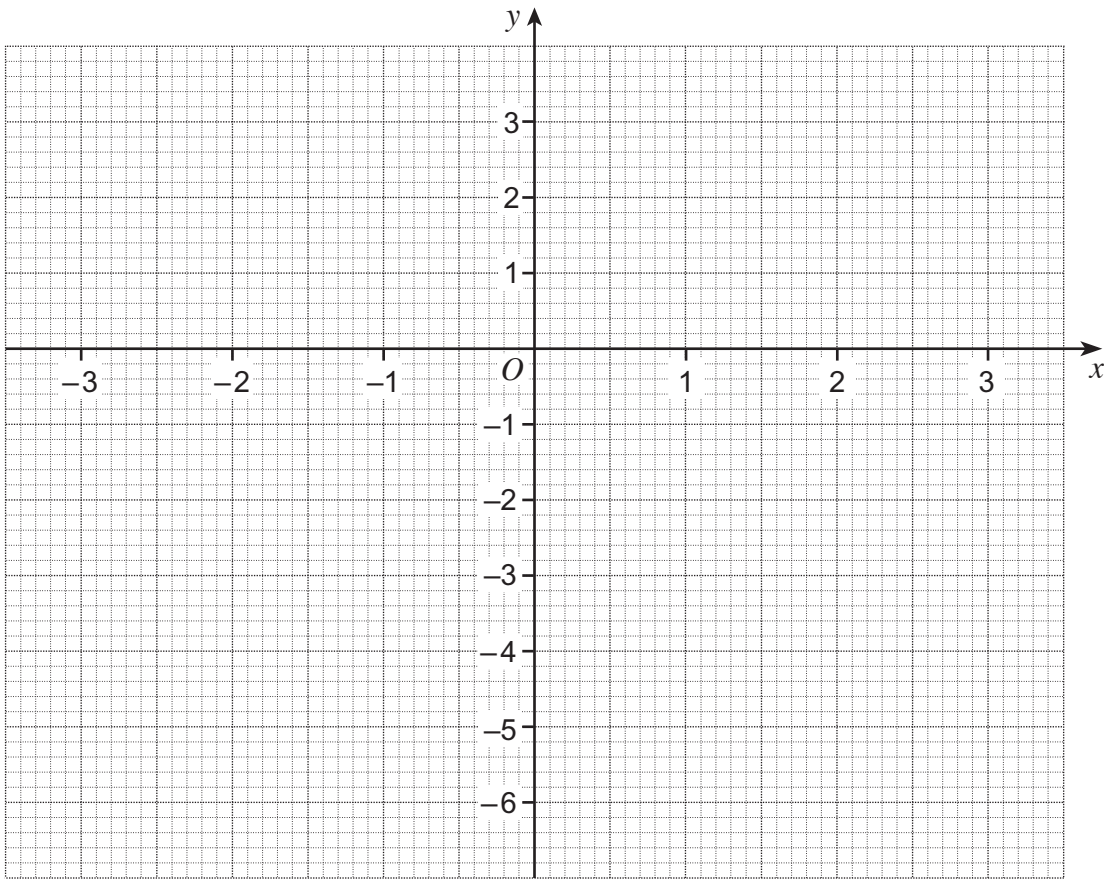
8 (a) Complete the table of values for $y = 3 - x^2$

[2 marks]

x	-3	-2	-1	0	1	2	3
y		-1	2		2		-6

8 (b) Draw the graph of $y = 3 - x^2$ for values of x from -3 to 3

[2 marks]



8 (c) Use the graph to work out the values of x when $y = -1.5$

[2 marks]

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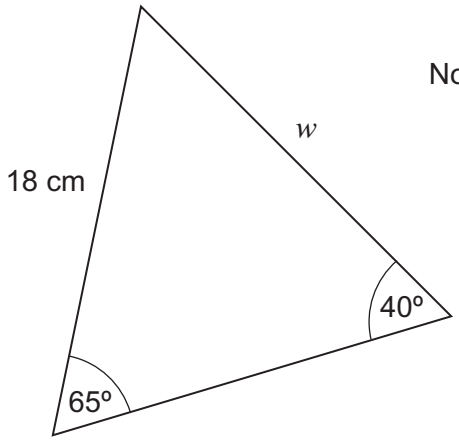
Answer ..... and .....

9



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Work out the length w.

[3 marks]

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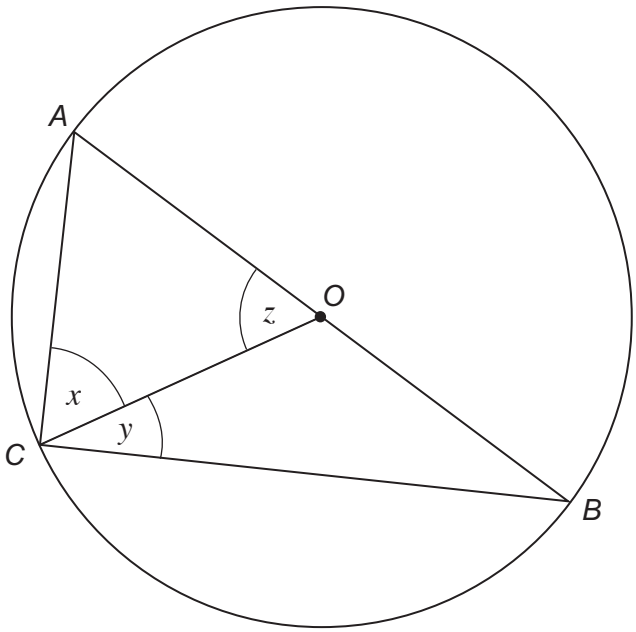
Answer ..... cm

9

Turn over ▶

10 (a) *A*, *B* and *C* are points on a circle, centre *O*.

Not drawn accurately



AB is a diameter.

The ratio of the size of angle x to the size of angle y is

$x : y = 5 : 1$

Work out the size of angle z.

[3 marks]

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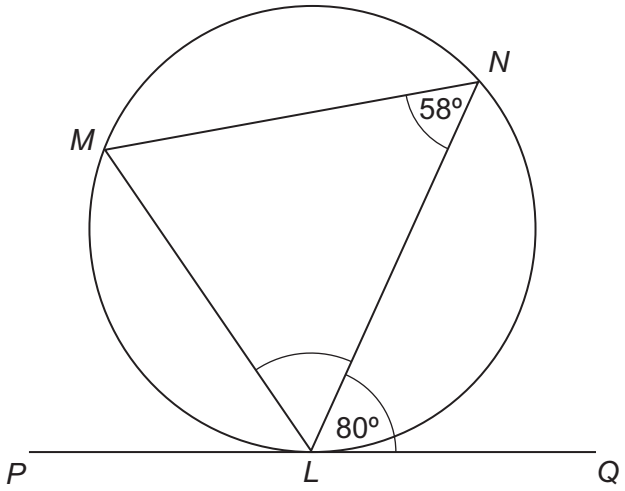
Answer ..... degrees

10 (b) *L*, *M* and *N* are points on a circle.
PLQ is a tangent.



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Work out angle *MLN*.

[3 marks]

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Answer ..... degrees

Turn over for the next question

6

11 *A* and *B* are similar triangles.
All measurements are in centimetres.

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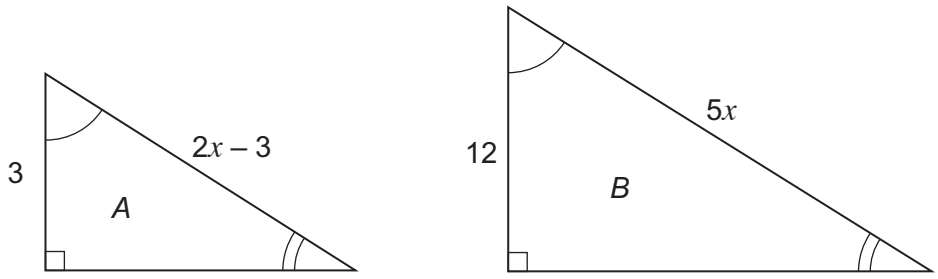

Work out the area of triangle *B*.

[7 marks]

Answer ..... cm^2

12 Solve $5x^2 + 3x - 4 = 0$

Give your answers to 2 decimal places.

[3 marks]

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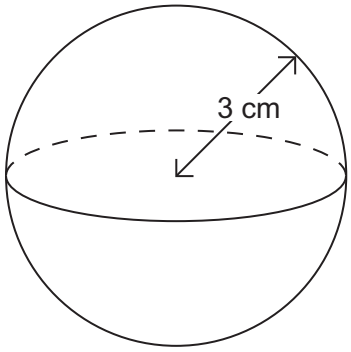
Answer ..... and .....

Turn over for the next question

10

13 The diagram shows a sphere made of wood.



The radius of the sphere is 3 cm
The mass of the sphere is 85 grams.

Work out the density of the wood.

[3 marks]

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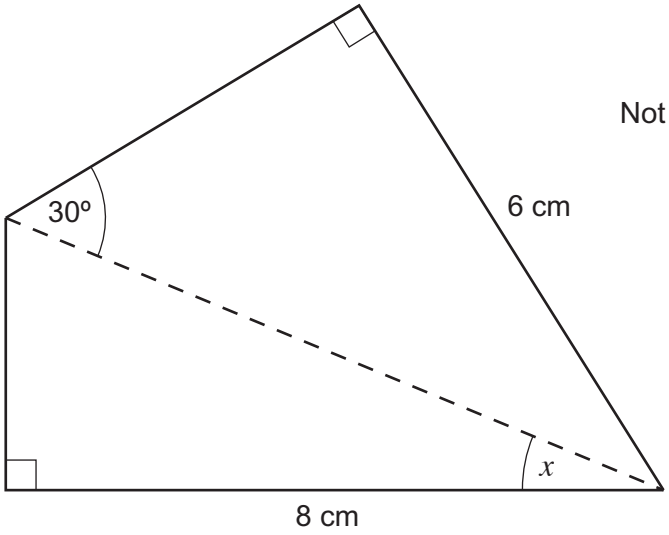
Answer ..... grams / cm^3

14 The diagram shows a quadrilateral.



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Work out the size of angle x.

[4 marks]

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Answer ..... degrees

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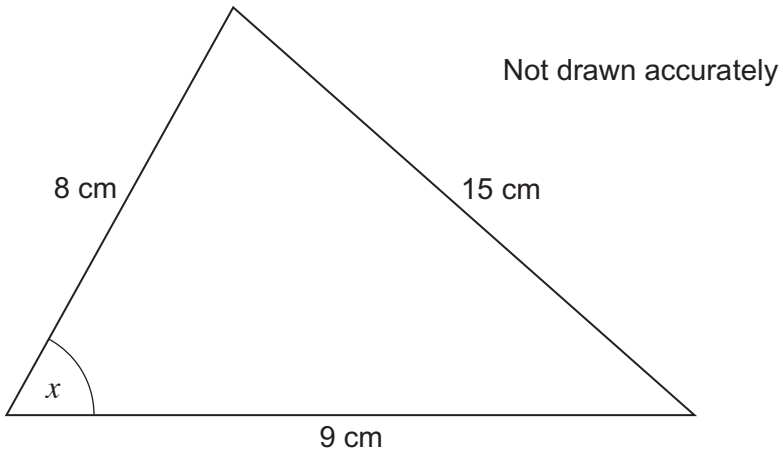

15 (a) Which equation is correct for the triangle?
Circle your answer.

[1 mark]

$\cos x = \dfrac{15^2 - 8^2 - 9^2}{2 \times 8 \times 9}$

$\cos x = \dfrac{8^2 + 9^2 - 15^2}{15 \times 8 \times 9}$

$\cos x = \dfrac{8^2 + 9^2 - 15^2}{2 \times 8 \times 9}$

$\cos x = \dfrac{15^2 - 8^2 + 9^2}{15 \times 8 \times 9}$

15 (b) Use your calculator to work out the value of x in your equation.

[1 mark]

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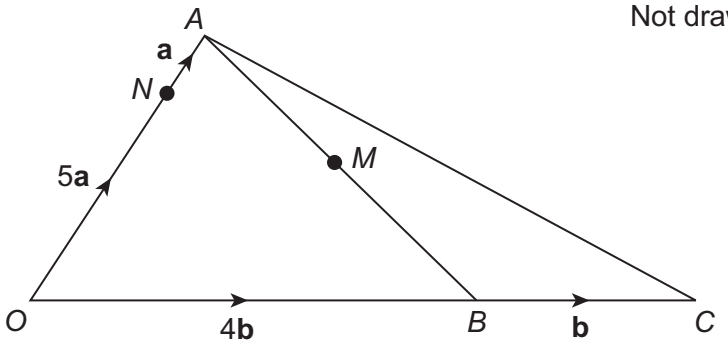
Answer ..... degrees

16



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$\overrightarrow{ON} = 5\mathbf{a}$ $\overrightarrow{NA} = \mathbf{a}$

$\overrightarrow{OB} = 4\mathbf{b}$ $\overrightarrow{BC} = \mathbf{b}$

M is the midpoint of AB.

16 (a) Show that $\overrightarrow{NM} = 2(\mathbf{b} - \mathbf{a})$

[2 marks]

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16 (b) Work out the ratio $NM : NC$

[2 marks]

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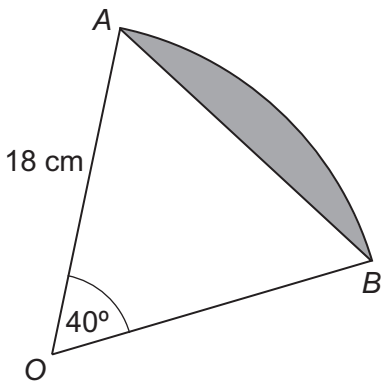
Answer ..... : .....

6

17 The diagram shows a sector of a circle, centre O, radius 18 cm



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Work out the area of the shaded segment.

[3 marks]

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Answer ..... cm^2

18 The table shows information about two journeys.

Journey	Distance (km)	Average speed (km/hr)
A	15	x
B	6	$x + 4$

The total time of the two journeys is 1 hour.

You are given that $\text{time} = \dfrac{\text{distance}}{\text{average speed}}$

Set up and solve an equation to work out x.

[7 marks]

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Answer ..... km/h

END OF QUESTIONS

10

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