



Please write clearly in block capitals.

Centre number

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Candidate number

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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.



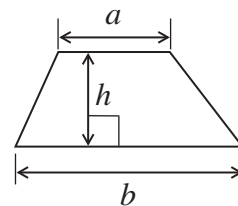
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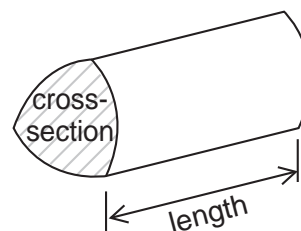
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Formulae Sheet: Higher Tier

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

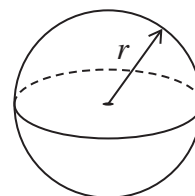


Volume of prism = area of cross-section \times length



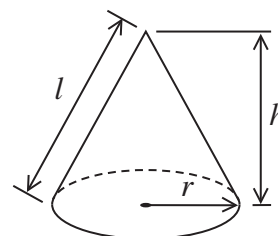
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

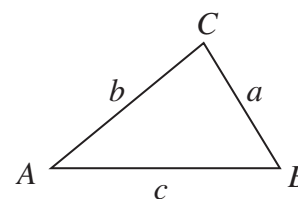


In any triangle ABC

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

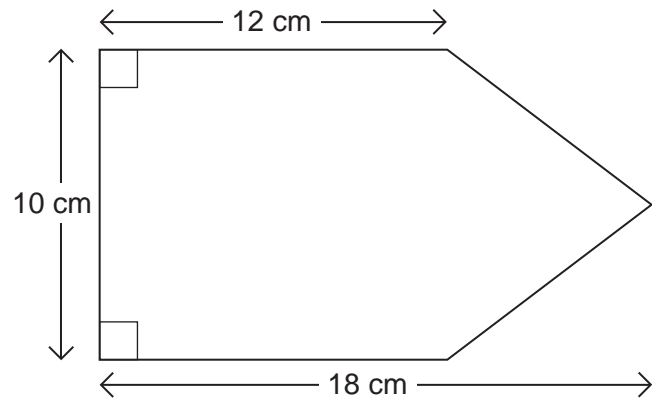
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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



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

1 Work out the area of this pentagon.



Not drawn accurately

[3 marks]

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Answer cm²

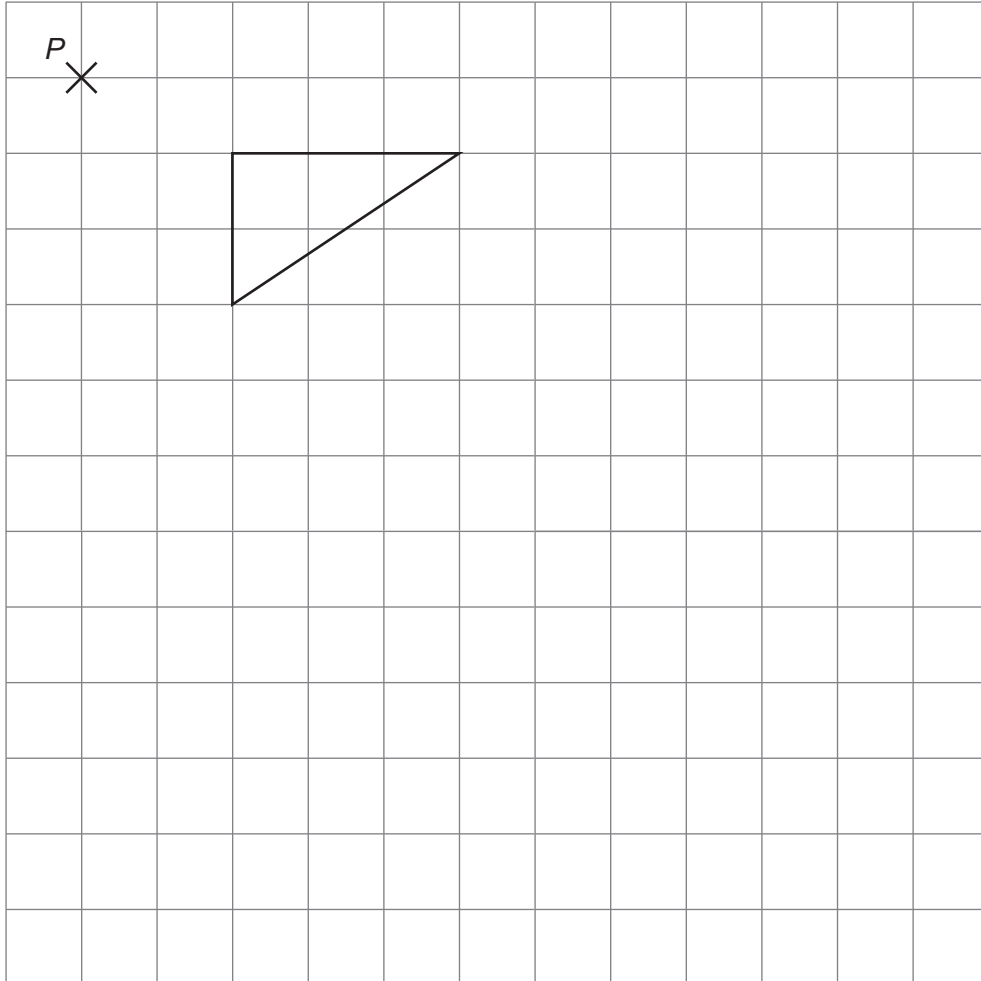
3

Turn over ►



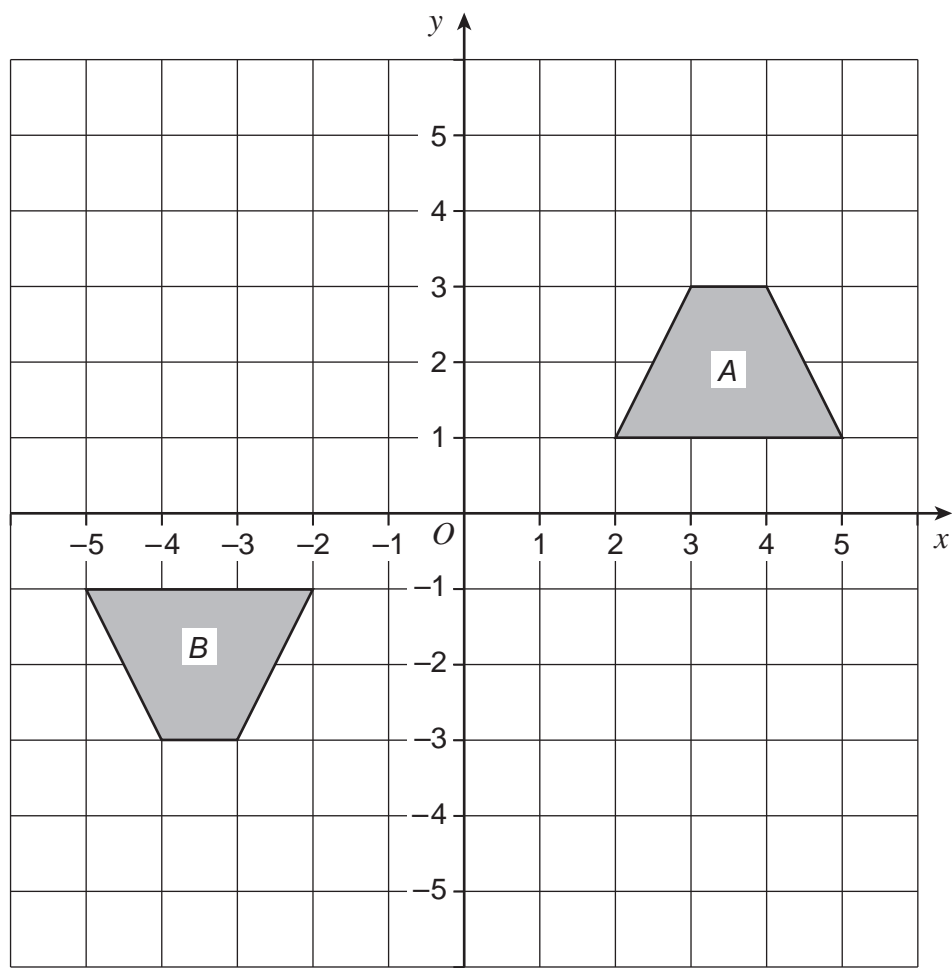
2 (a) Enlarge this shape by scale factor 2 with centre of enlargement point P .

[3 marks]



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

[3 marks]



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Turn over ►



*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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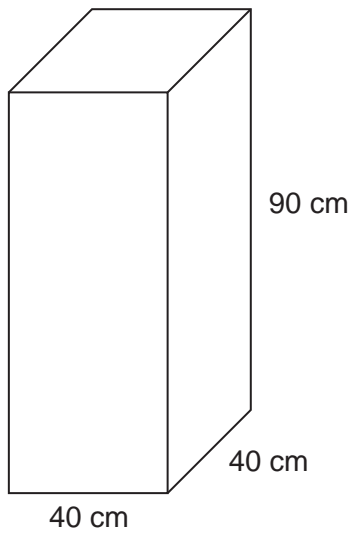
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Answer £



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



The tank is full of water.

1 litre = 1000 cm³

How many gallons of water are in the tank?

[4 marks]

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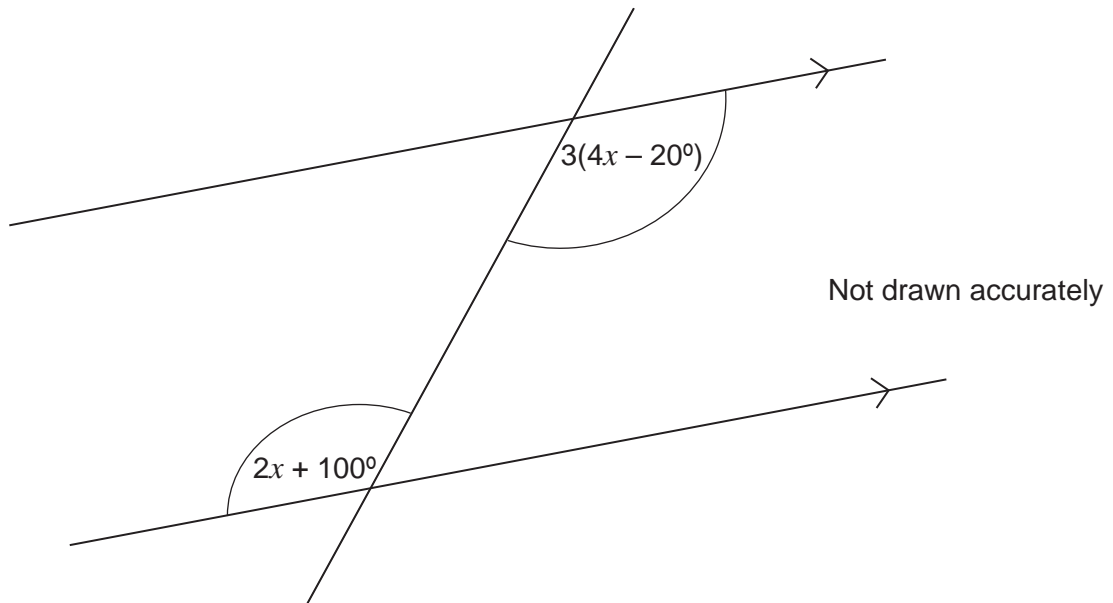
Answer gallons

7

Turn over ►



- 5 The diagram shows three straight lines.



- 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

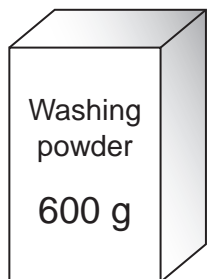
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5

Turn over ►



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



£3.30



Was £9.60
Now 15% off

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

[6 marks]

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Answer



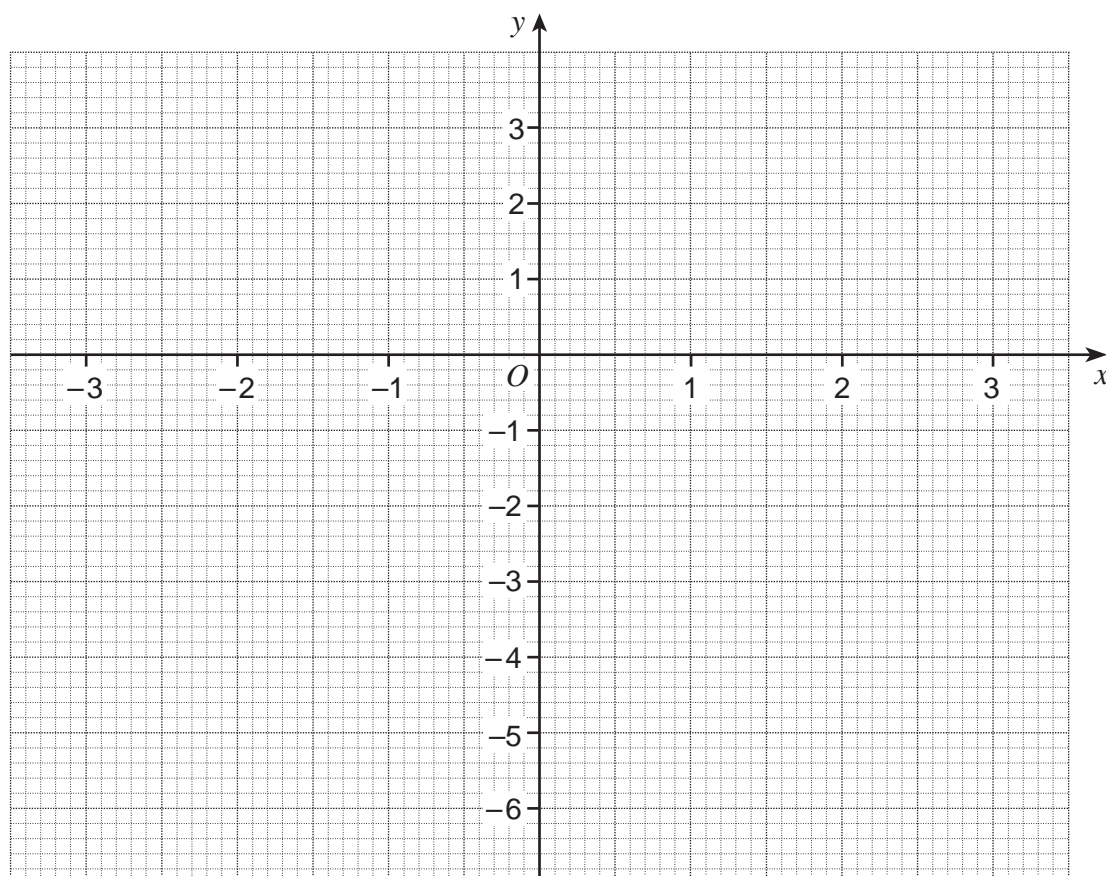
8 (a) Complete the table of values for $y = 3 - x^2$

[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 $y = -1.5$

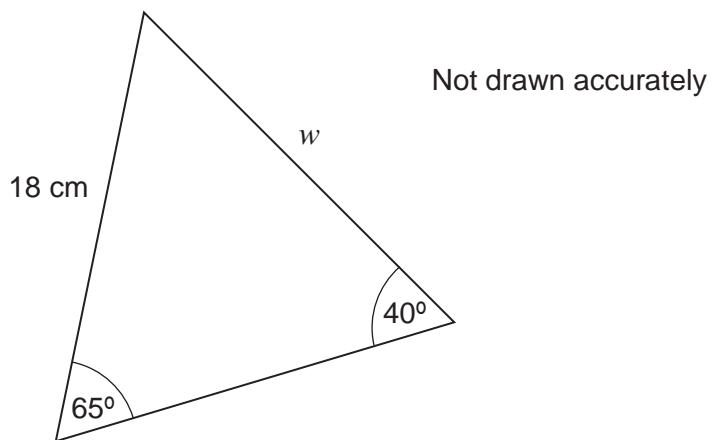
[2 marks]

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Answer and

9



Work out the length w .

[3 marks]

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Answer cm

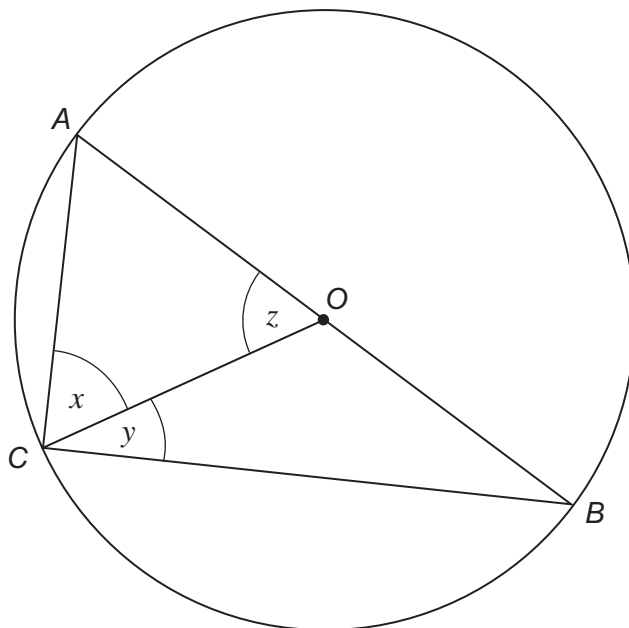
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Turn over ►



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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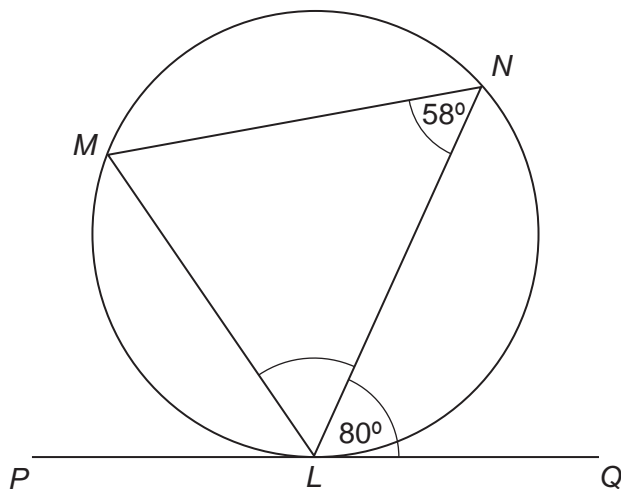
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Answer degrees



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



Not drawn accurately

Work out angle *MLN*.

[3 marks]

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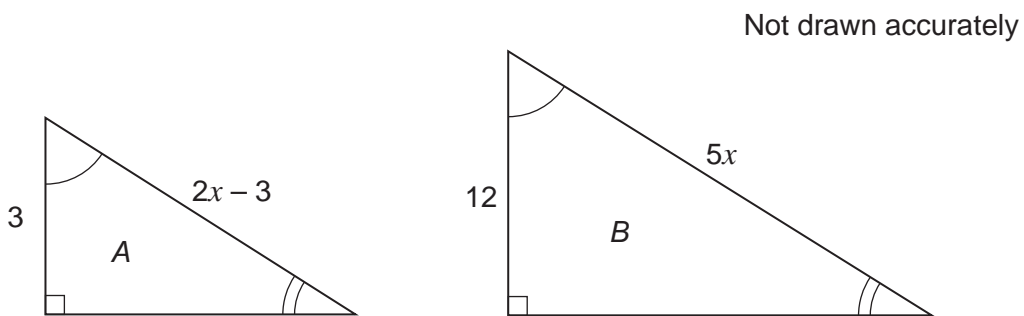
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Answer degrees

Turn over for the next question



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



Work out the area of triangle B.

[7 marks]

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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

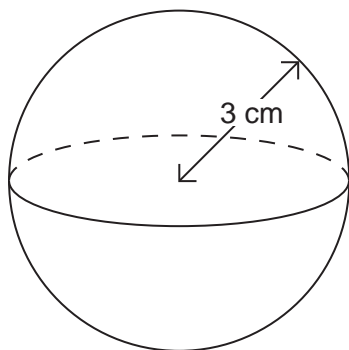
Turn over for the next question

10

Turn over ►



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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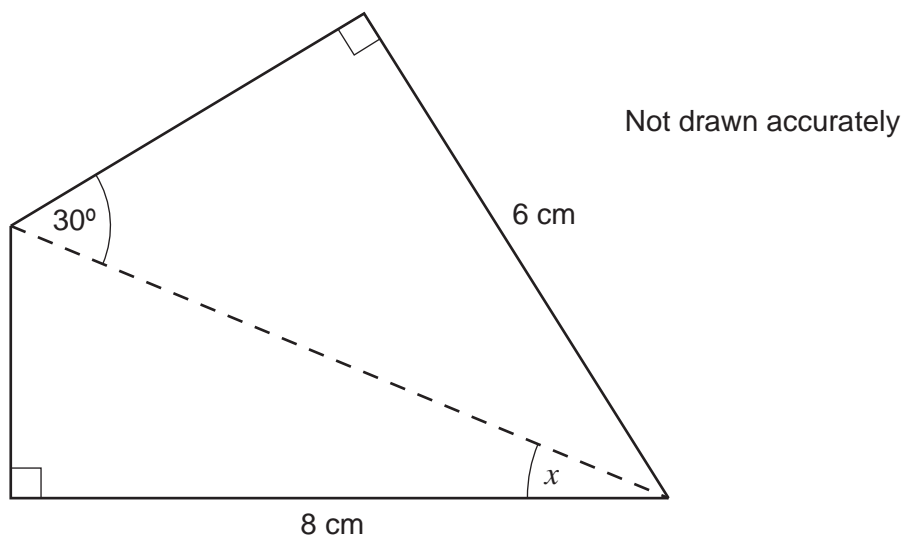
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Answer grams / cm³



14 The diagram shows a quadrilateral.



Work out the size of angle x .

[4 marks]

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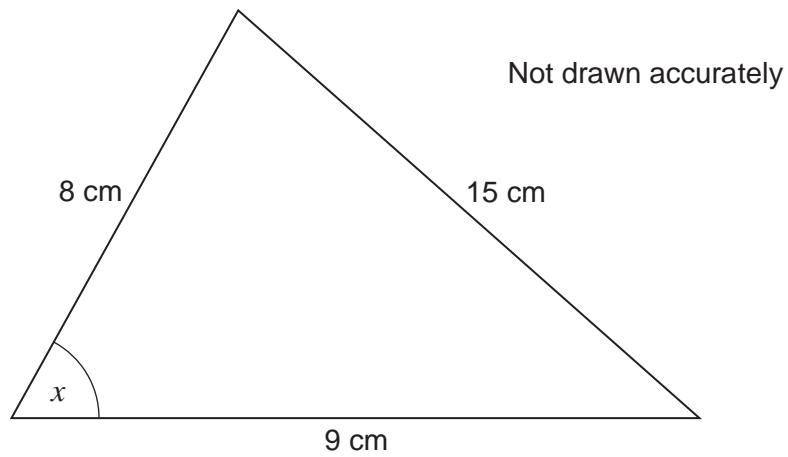
Answer degrees

7

Turn over ►



15



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

[1 mark]

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

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

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

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

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

[1 mark]

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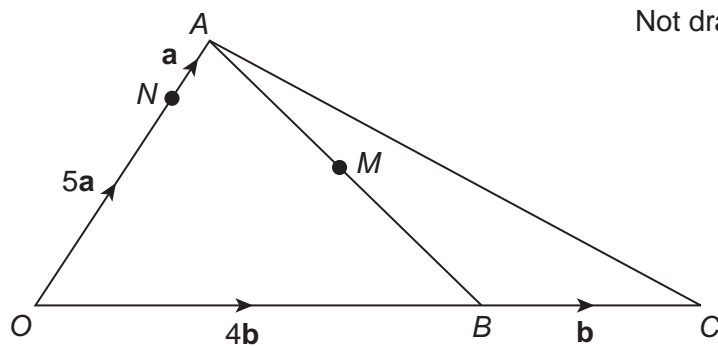
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Answer degrees



16



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

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

M is the midpoint of AB.

16 (a) Show that $\vec{NM} = 2(\mathbf{b} - \mathbf{a})$ [2 marks]

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16 (b) Work out the ratio $NM : NC$ [2 marks]

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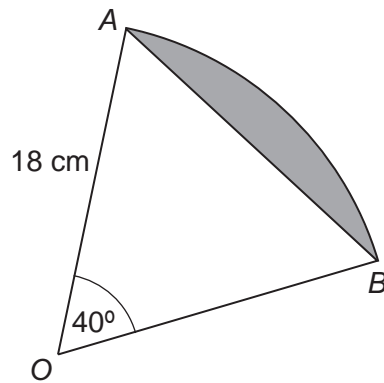
Answer :

6

Turn over ►



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



Not drawn accurately

Work out the area of the shaded segment.

[3 marks]

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Answer cm^2



There are no questions printed on this page

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