Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2013

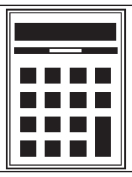
Mathematics 43603H

Unit 3

Friday 14 June 2013 9.00 am to 10.30 am

H

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



Time allowed
- 1 hour 30 minutes

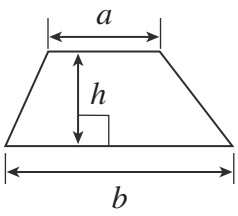
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.
- 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.
- The quality of your written communication is specifically assessed in Questions 6 and 16. 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.

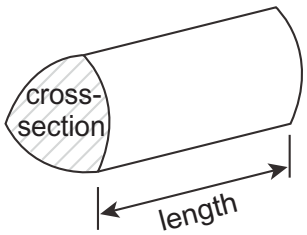
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

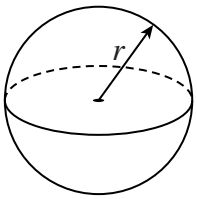


Volume of prism = area of cross-section × length



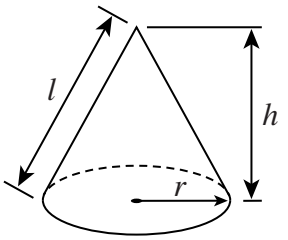
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

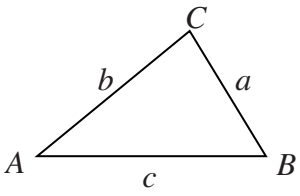
Curved surface area of cone = $\pi r l$



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 a circle, radius 3.5 cm.
Give your answer to 1 decimal place.

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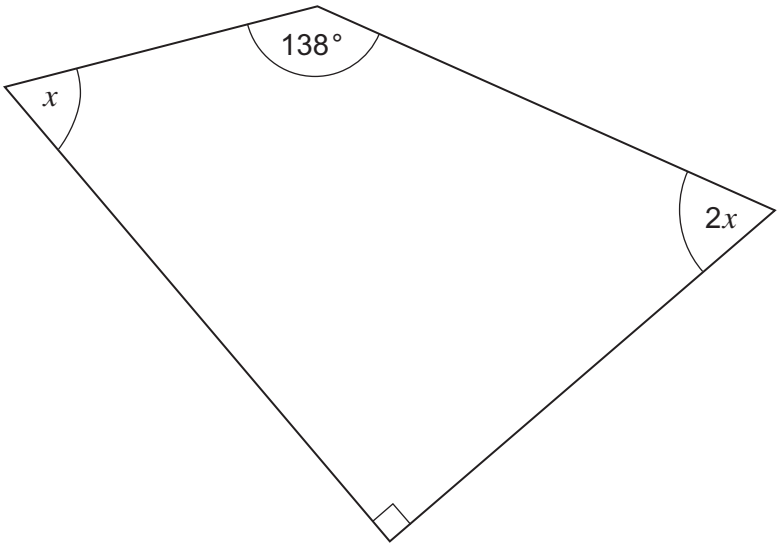
Answer ..... cm^2 *(3 marks)*

2 Work out the value of x.



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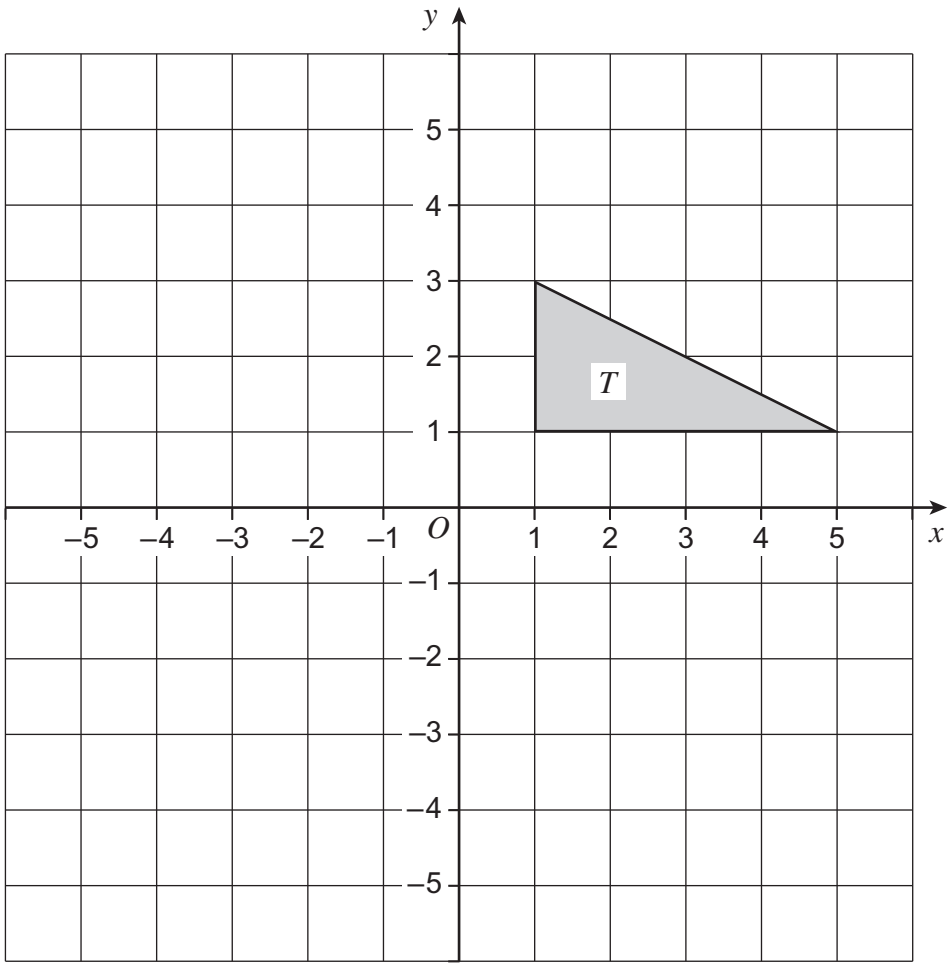
Answer ..... degrees *(4 marks)*

7

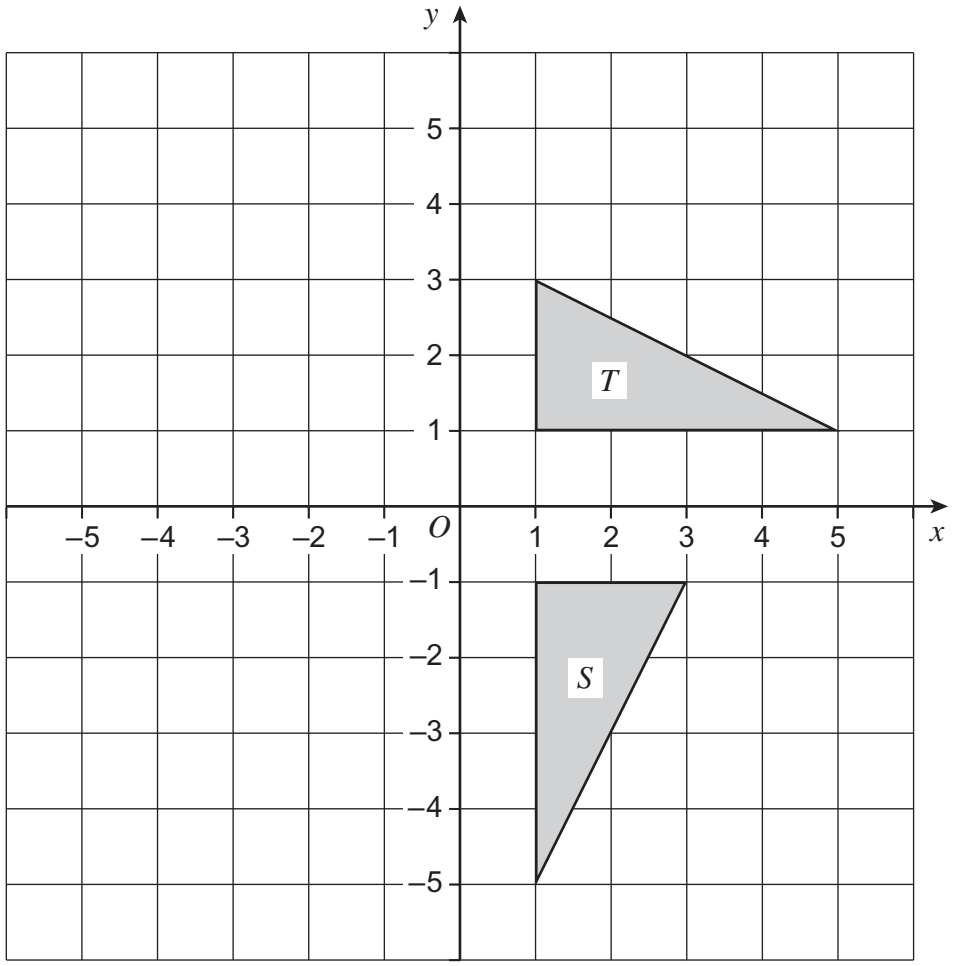
Turn over ▶

3 (a) Reflect triangle T in the line $y = -1$



(2 marks)

3 (b) Describe fully the **single** transformation that maps triangle T to triangle S.



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(3 marks)

5

4 A plasterer uses this formula to work out how much she charges (£ C).

$$C = 30 + 10A$$

A is the area to be plastered to the nearest square metre.

How much does she charge for a rectangular ceiling measuring 7.6 m by 2.4 m?

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Answer £ ..... *(5 marks)*

5 (a) How many pounds are in a kilogram?
Circle your answer.

1.6 2.2 2.5 4.5

(1 mark)

5 (b) Matthew's grandmother asked him to buy $\frac{1}{2}$ pound of cherries.

Cherries are sold in 100 g, 250 g and 500 g packs.

Which pack should he buy to get the nearest amount?
You **must** show your working.

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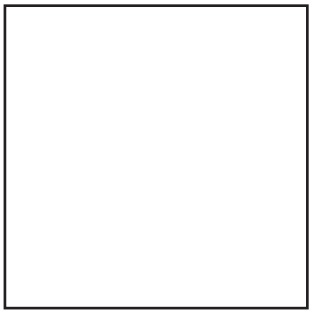
Answer ..... g *(4 marks)*

10

***6** The diagram shows a square.



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Work out the perimeter of the square.

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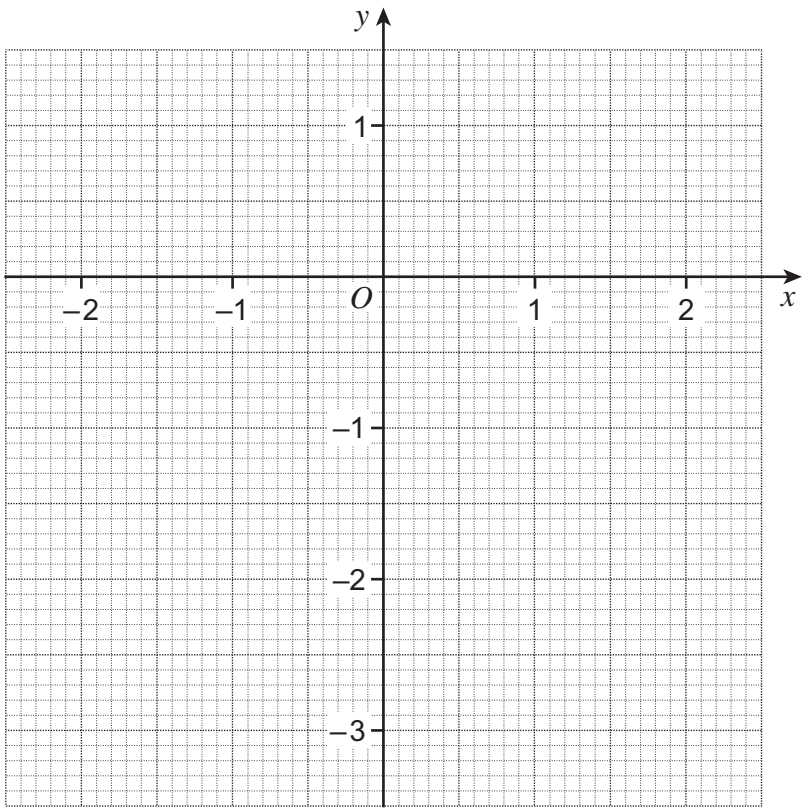
Answer ..... cm *(5 marks)*

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

x	-2	-1	0	1	2
y	1				1

(2 marks)

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



(2 marks)

7 (c) Use your graph to work out the values of x when $y = 0.5$

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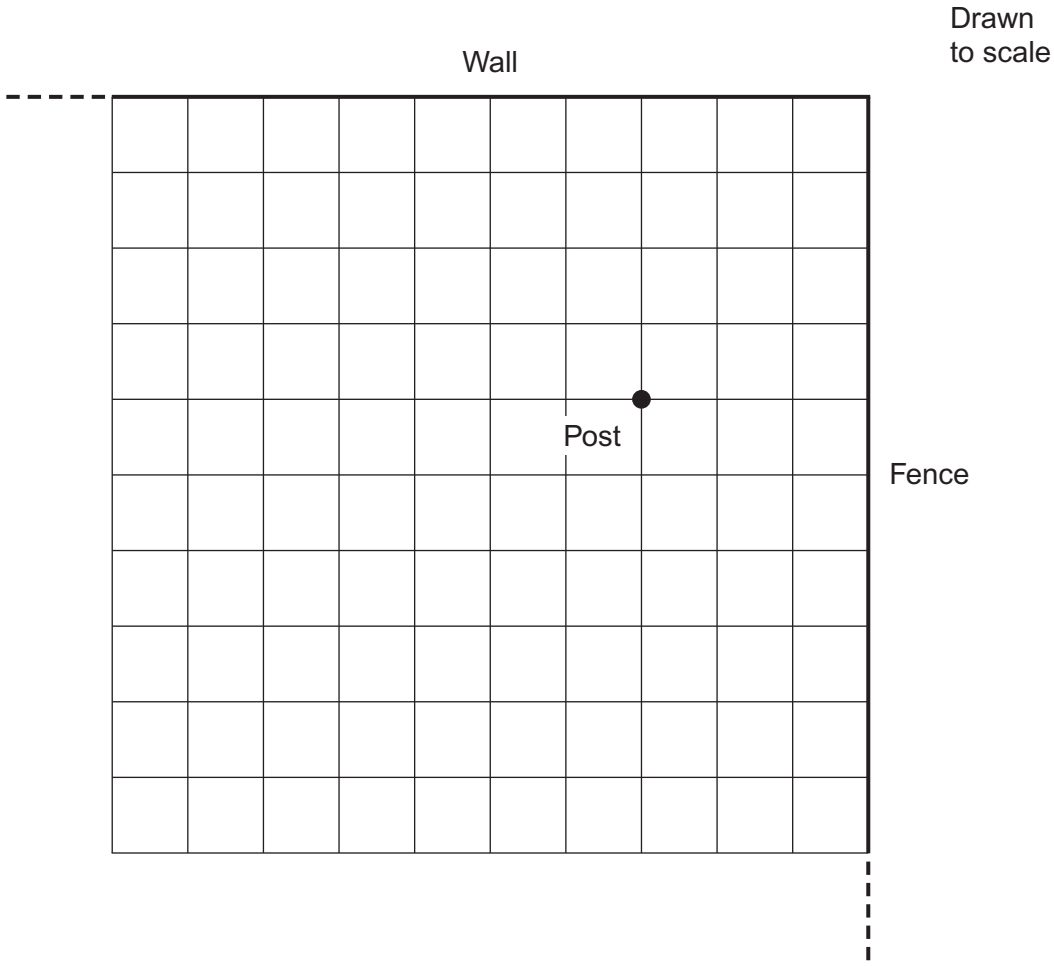
Answer ..... and ..... *(2 marks)*

11

8 The scale drawing shows a post which is 1.5 metres from the fence.



8 (a) How far is the post from the wall?

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Answer ..... metres *(1 mark)*

8 (b) A pony is tied to the post by a rope.
The pony can reach 2.5 metres from the post.

On the scale drawing, show accurately the area that the pony can reach.

(2 marks)

8 (c) Work out the scale of the drawing as a ratio.
Give your answer in its simplest form.

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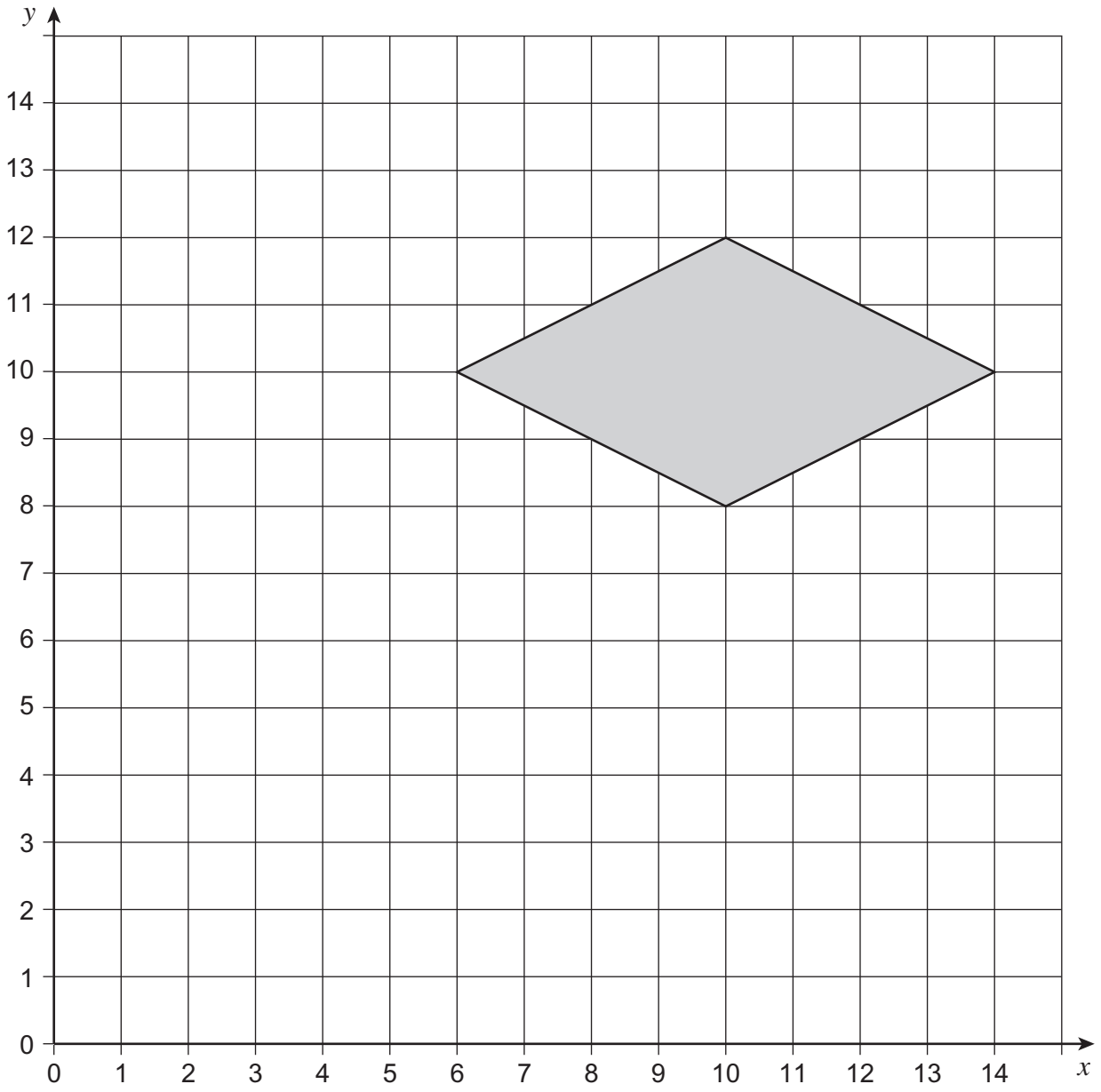
Scale ..... : ..... *(3 marks)*

Turn over for the next question

6

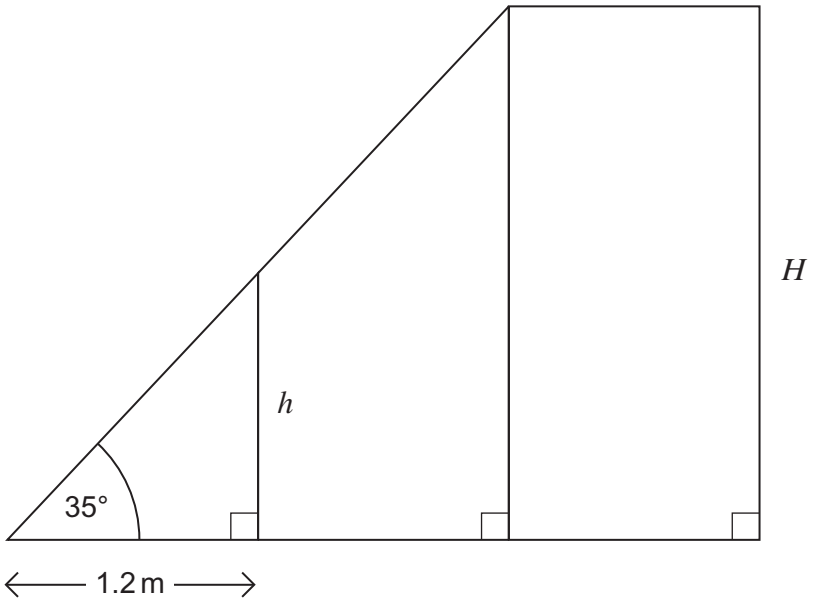
9 Enlarge the shape by scale factor $\frac{1}{2}$ with centre of enlargement (0, 2).



(2 marks)

10 The diagram shows three pieces of glass in a conservatory roof.

Not drawn accurately



10 (a) Work out the height, h, of the smallest piece.

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Answer ..... m *(3 marks)*

10 (b) Each piece of glass is the same width, 1.2 metres.

Work out the height, H, of the rectangular piece.

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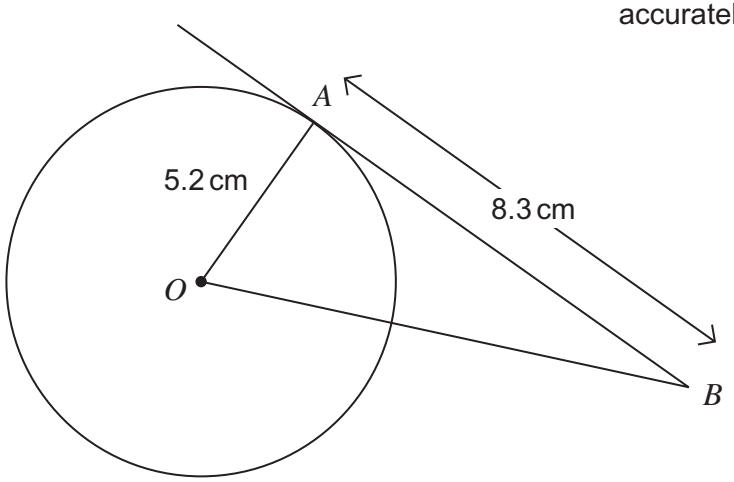
Answer ..... m *(2 marks)*

7

11 The diagram shows a circle, centre O.
AB is a tangent.

Not drawn accurately



Work out the length OB.

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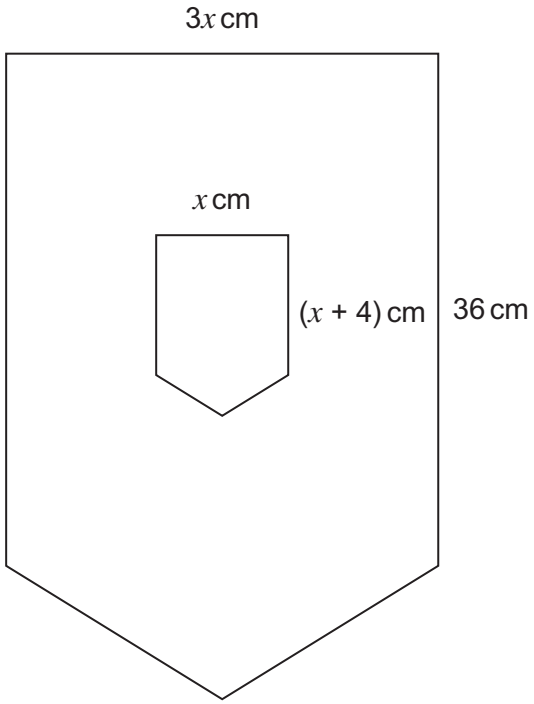
Answer ..... cm *(4 marks)*

12 The diagram shows a badge made from two similar pentagons.

Not drawn accurately



Work out the width of the badge.

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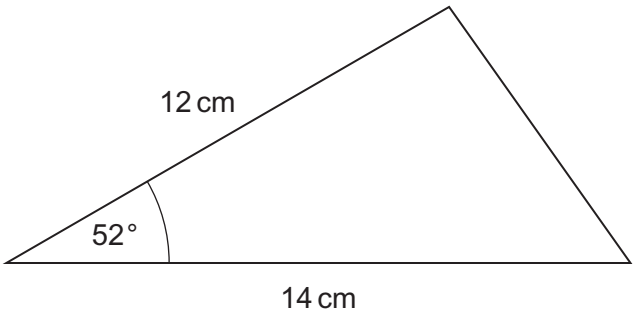
Answer ..... cm *(5 marks)*

9

13 Work out the area of the triangle.

Not drawn accurately



State the units of your answer.

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Answer ..... *(3 marks)*

14 Solve the quadratic equation $3x^2 + x - 5 = 0$
Give your answers to 3 significant figures.

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Answer ..... *(3 marks)*

Turn over for the next question

6

15 y is directly proportional to x.
When $y = 28$, $x = 7$

15 (a) Work out an equation connecting y and x.

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Answer ..... *(3 marks)*

15 (b) Work out the value of y when $x = 12$

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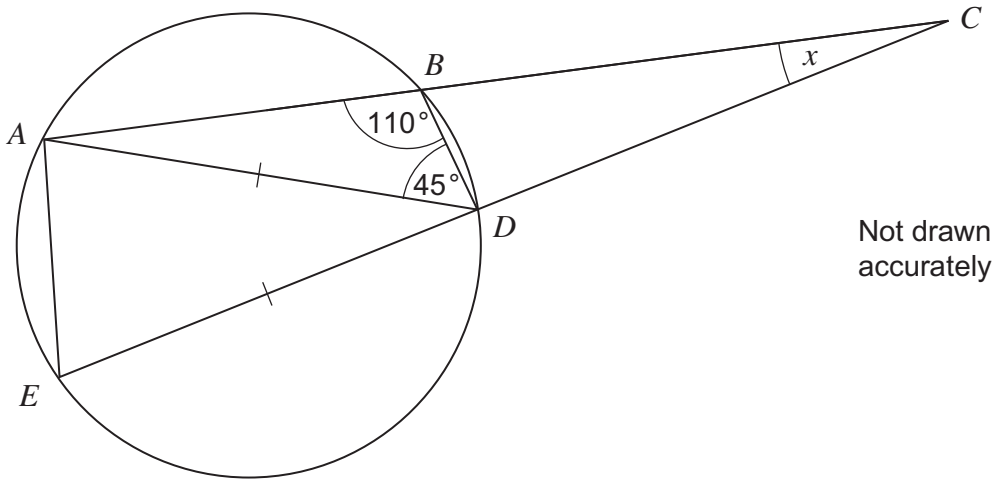
Answer ..... *(2 marks)*

16 ABC and EDC are straight lines.
$AD = ED$



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***16 (a)** Work out the size of angle AED.
Give a reason for your answer.

Answer ..... degrees

Reason .....

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(2 marks)

16 (b) Work out x.

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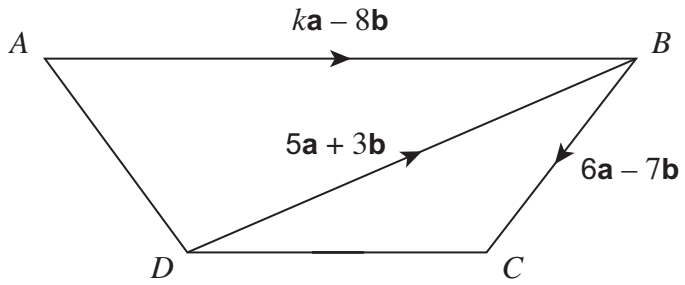
Answer ..... degrees *(4 marks)*

11

Turn over ▶

17



17 (a) Work out $\overrightarrow{DC}$ in terms of **a** and **b**.
Simplify your answer.

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Answer ..... *(2 marks)*

17 (b) $ABCD$ is a trapezium.

Work out the value of k.

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Answer ..... *(1 mark)*

18 You are given that 1 knot = 1 nautical mile per hour.

Two ships leave a port at the same time.

Ship A sails at 10 knots on a bearing of 035º
Ship B sails at 15 knots on a bearing of 270º

Calculate the distance between the ships after **2 hours**.
Do **not** use a scale drawing.

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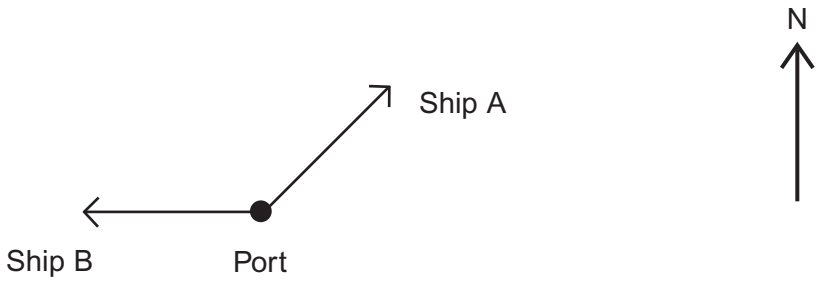

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Answer ..... nautical miles *(5 marks)*

END OF QUESTIONS

8

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