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Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
November 2003

MATHEMATICS (MODULAR) (SPECIFICATION B) 33005/I1
Module 5 Intermediate Tier
Paper 1 Non-Calculator

Tuesday 11 November 2003 9.00 am to 10.15 am

In addition to this paper you will require:
  mathematical instruments.
You must **not** use a calculator.

Time allowed: 1 hour 15 minutes

Instructions
- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.

Information
- The maximum mark for this paper is 70.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.

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

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

33005/I1

Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

Area of trapezium = $\frac{1}{2}(a+b)h$
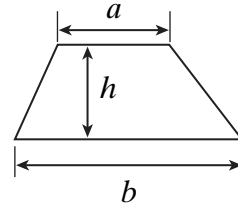
Volume of prism = area of cross-section × length

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

1 The graph shows a train journey.
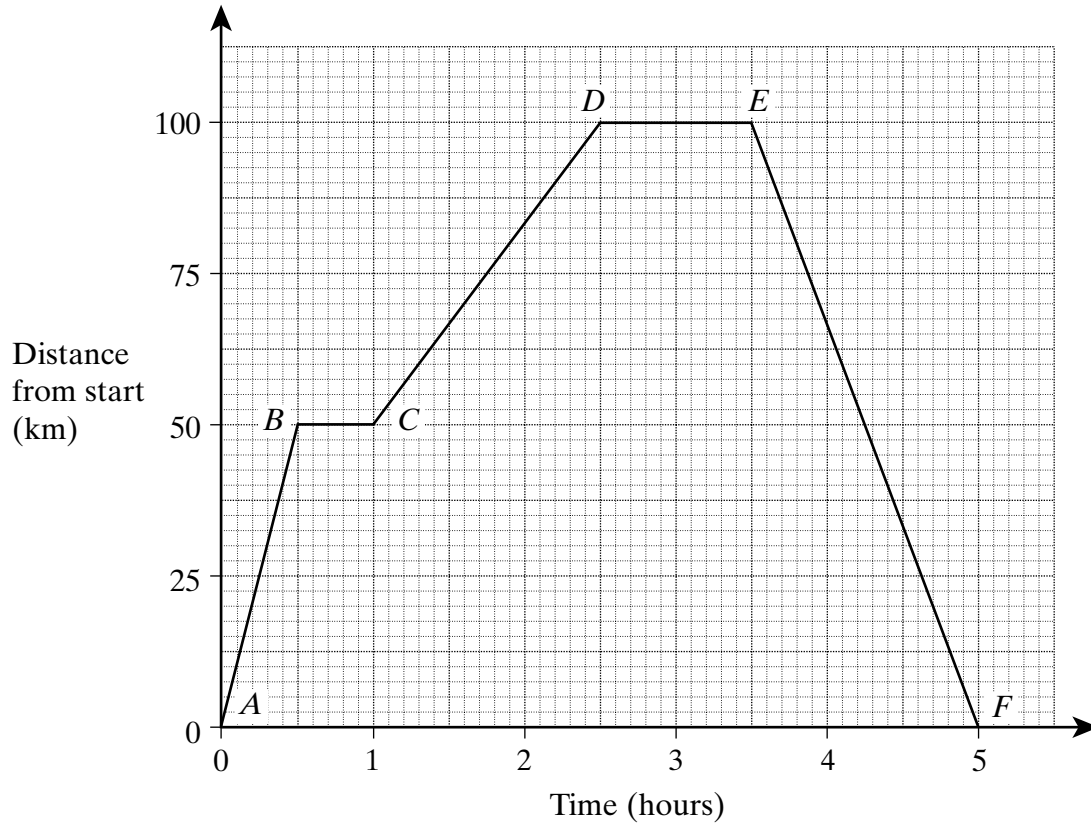
(a) What is happening from *B* to *C*?

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(1 mark)

(b) Which part of the journey is faster, from *A* to *B* or from *C* to *D*?
Explain your answer.

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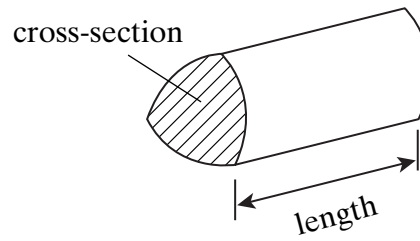...

(1 mark)

(c) How far did the train travel altogether?

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....

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

Turn over ▶

4

2   The diagram shows a kite.
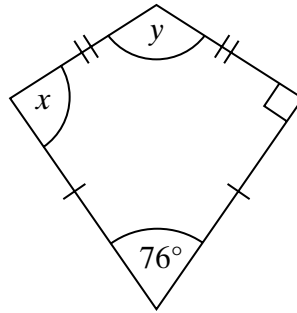
Not drawn accurately

(a)   (i)   Write down the value of *x*.

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

(ii)   Give a reason for your answer.

....

....
(1 mark)

(b)   Work out the value of *y*.

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

(c)   A line segment *AB* is now drawn as shown.
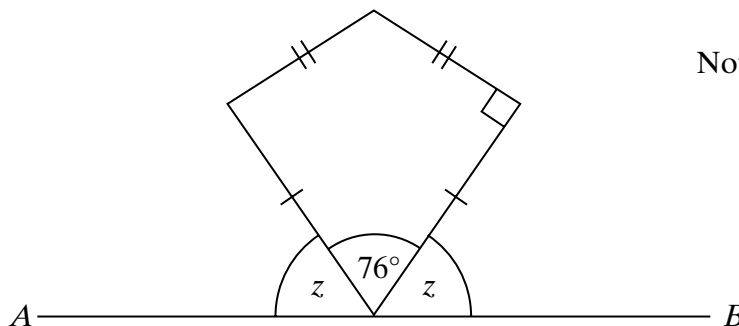
Not drawn accurately

Work out the value of *z*.

....

....

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

3 Here are four expressions.

$$n^2 \qquad \frac{n}{3} \qquad n+3 \qquad \frac{3}{n}$$

(a) If $n = 3$, which expression has the greatest value?
Show your working.

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Answer .... *(2 marks)*

(b) If $n = 0.3$, which expression has the greatest value?
Show your working.

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Answer .... *(2 marks)*

Turn over ▶

$\overline{10}$

4 Triangle *A* has vertices (1,2), (1,5) and (3,2).
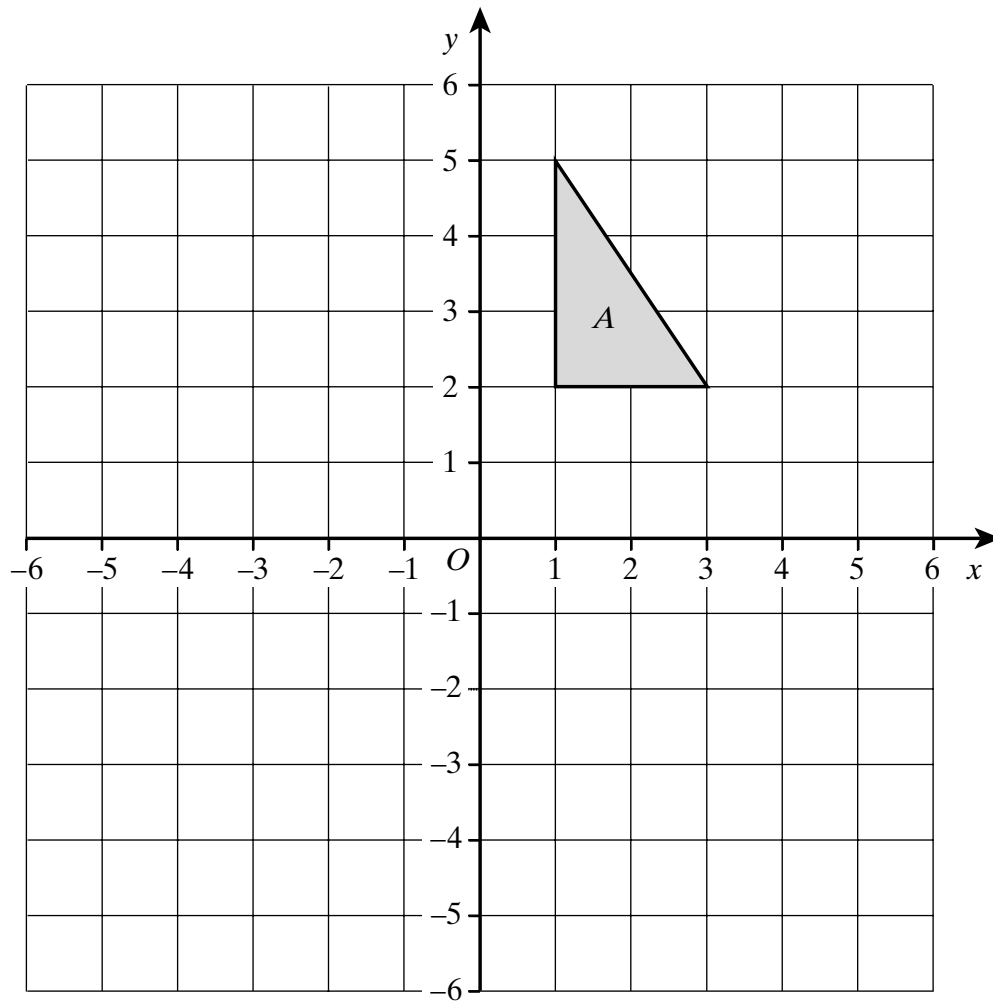
Draw the new position of triangle *A* after a rotation of 90° clockwise about the origin.

(3 marks)

5 A pattern using pentagons is made of sticks.
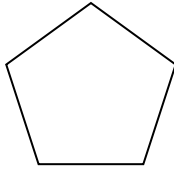
Diagram 1   Diagram 2   Diagram 3
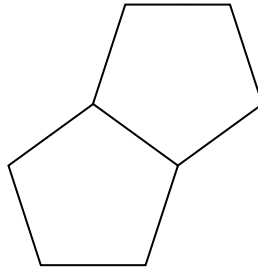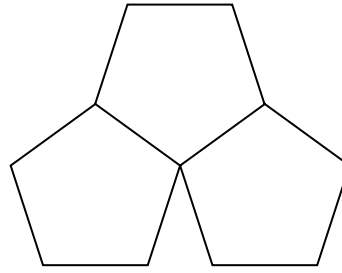
5 sticks   9 sticks   13 sticks

(a) How many sticks are needed for Diagram 5?

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Answer .... *(2 marks)*

(b) Write down an expression for the number of sticks in Diagram *n*.

....

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Answer .... *(2 marks)*

(c) Which Diagram uses 201 sticks?

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Answer .... *(3 marks)*

Turn over ▶

10

6 The diagram shows a circle of radius 6 cm.

Not drawn accurately

6 cm
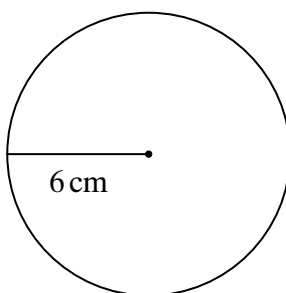
(a) Work out the area of the circle.
Give your answer in terms of π.

....

....

Answer .... *(3 marks)*

(b) A badge is made out of 2 semicircles and a square, as shown.
The radius of the semicircle is 6 cm.
The square has side 5 cm.

Not to scale

6 cm

5 cm   *h*
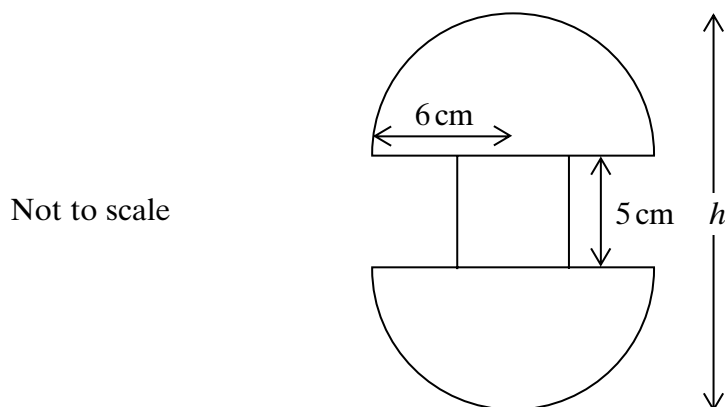
(i) Write down the area of the badge.
Give your answer in terms of π.

....

....

Answer .... *(1 mark)*

(ii) Write down the height of the badge, marked *h* on the diagram.

....

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

(iii) The badges are made from a strip of metal 2 metres long and 12 cm wide as shown.

Not to scale

12 cm
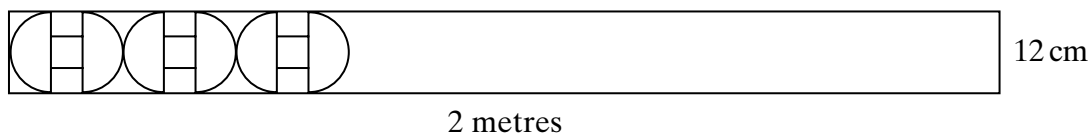
2 metres

How many badges can be made from the strip of metal?
Show your working.

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Answer .... *(3 marks)*

TURN OVER FOR THE NEXT QUESTION

7 *A* is shown on the diagram.

N

×
A
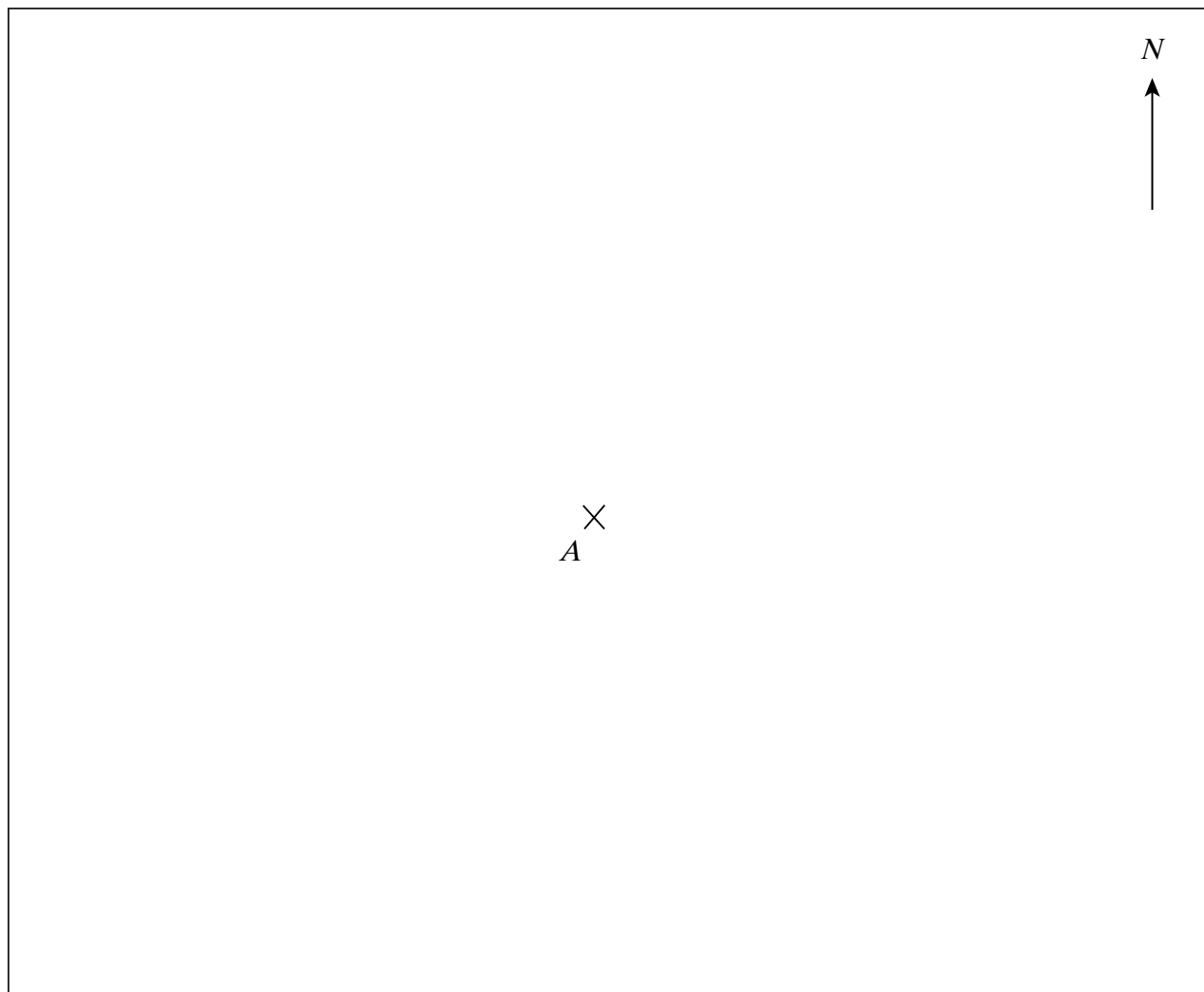
B is 5 kilometres due North of *A*.
C is 12 kilometres due East of *B*.

(a)   Sketch the positions of *B* and *C* on the diagram.
      You do **not** need to use accurate measurements.

(1 mark)

(b)   Calculate the distance from *A* to *C*.
      You **must** show your working.

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

8   The angles of a quadrilateral are $73°$, $2x°$, $3x°$ and $102°$.
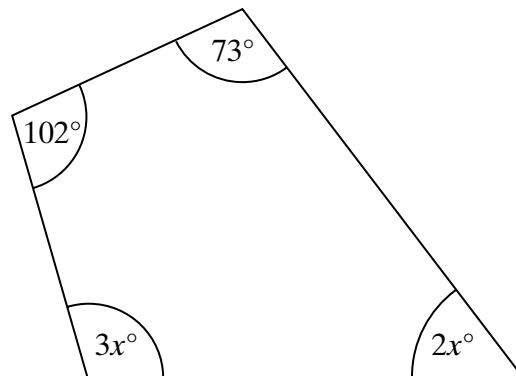
Not drawn accurately

(a)   Write down an equation in x.

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(2 marks)

(b)   Use your equation to find the largest angle in the quadrilateral.

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

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

9 (a) Work out the value of $2^4 \times 3^2$

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              Answer .... *(2 marks)*

(b) Simplify $(2x^3y) \times (3xy)$

....

....

              Answer .... *(2 marks)*

10 (a) Complete the table for the graph of $y = x^2 - 3x + 1$.

x	–1	0	1	2	3	4
y		1	–1	–1		5

....

....

(2 marks)

(b) On the grid below, draw the graph of $y = x^2 - 3x + 1$ for values of x from -1 to $+4$.
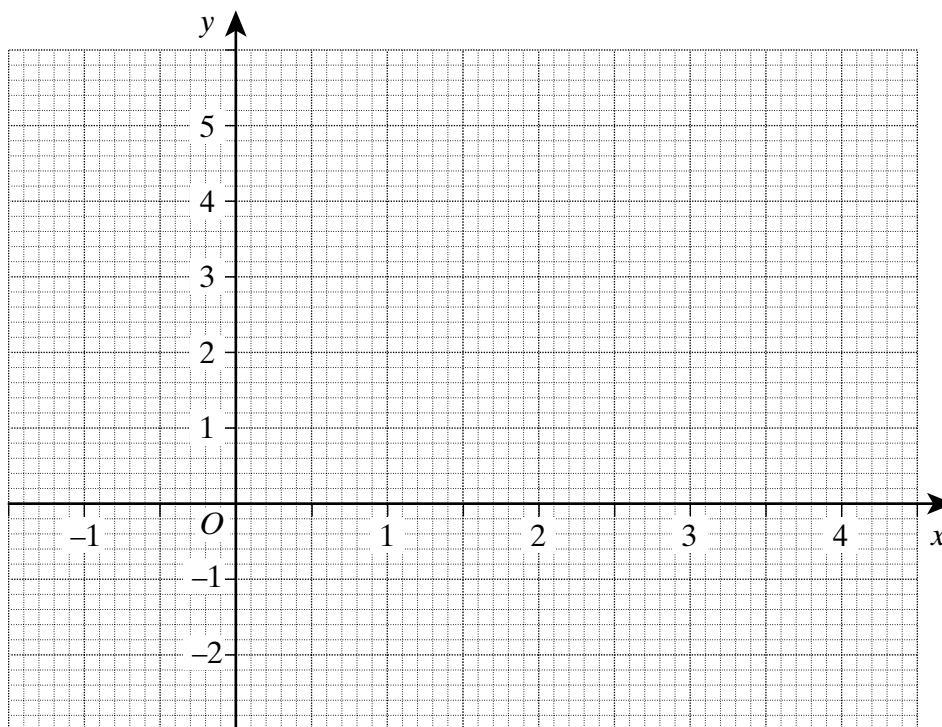
(2 marks)

(c) Use your graph to solve the equation $x^2 - 3x + 1 = 0$.

....

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

Turn over ▶

10

11 (a) Show that $(x + 2)(x + 3)$ expands and simplifies to $x^2 + 5x + 6$

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....

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(2 marks)

(b) Simplify $\dfrac{x^2 + 5x + 6}{(x + 3)^2}$

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Answer .... *(2 marks)*

12 In this question, the letters x, y and z represent lengths.

State whether each expression could represent a length, an area or a volume.

(a) $\pi x^2 y$

Answer .... *(1 mark)*
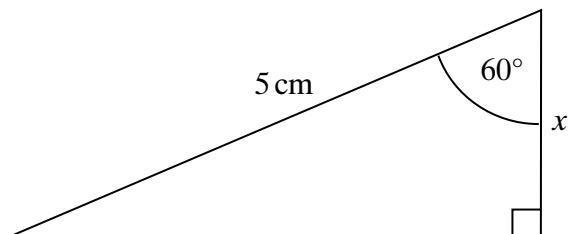
(b) $x + y + z$

Answer .... *(1 mark)*

(c) $x^2 + y^2$

Answer .... *(1 mark)*

13 Use the information in the table to calculate the value of *x*.

Not drawn accurately

$\sin 60° = 0.866$

$\cos 60° = 0.5$

$\tan 60° = 1.732$

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

TURN OVER FOR THE NEXT QUESTION

$\dfrac{}{10}$

Turn over ▶

14 (a) The diagram shows a circle with centre *O*.
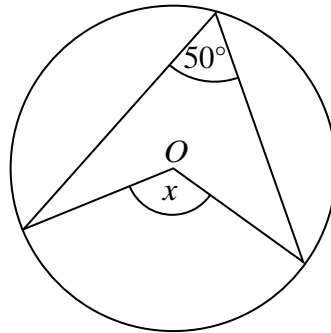
Not drawn accurately

Work out the size of the angle marked *x*.

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

(b) The diagram shows a different circle with centre *O*.
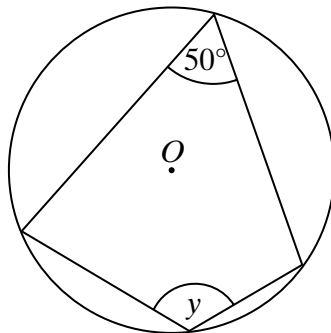
Not drawn accurately

Work out the size of the angle marked *y*.

....

....

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

(c)   *A*, *B* and *C* are points on the circumference of a circle with centre *O*.
      BOC is a diameter of the circle.
      Angle *ABC* = 30°
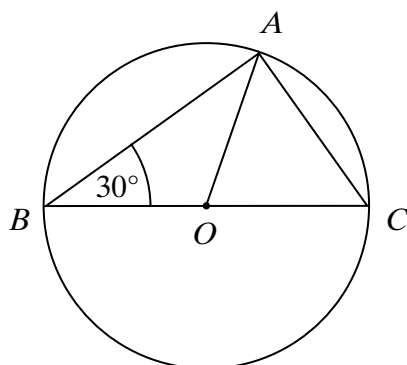

Not drawn accurately

Explain why triangle *OAC* is equilateral.

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(3 marks)

TURN OVER FOR THE NEXT QUESTION

5

Turn over ▶

15   Solve the simultaneous equations

$$5x + 3y = 13$$
$$3x + 5y = 3$$

You **must** show your working.
Do **not** use trial and improvement.

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Answer $x =$ .... , $y =$ ....   *(4 marks)*

END OF QUESTIONS