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	
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12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
24 – 25	
TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
November 2014

Mathematics 43603H

Unit 3 Higher Tier

H

Wednesday 12 November 2014 9.00 am to 10.30 am

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

Time allowed
- 1 hour 30 minutes

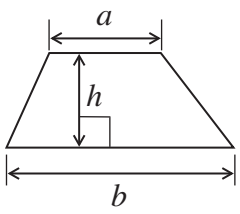
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. 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 1, 7, 8 and 19. 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 booklet.

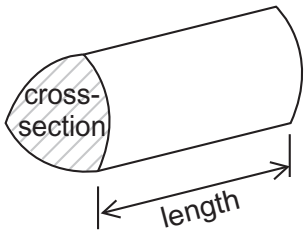
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

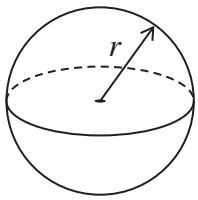


Volume of prism = area of cross-section × length



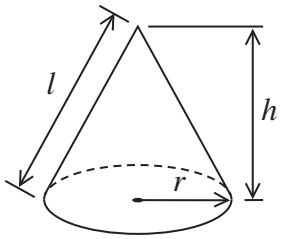
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

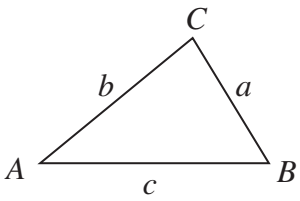
Curved surface area of cone = $\pi r l$



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** The length of a rectangle is x cm

The width of the rectangle is 3 cm **less** than the length.

The perimeter of the rectangle is 40 cm

Set up and solve an equation to work out the length of the rectangle.

[4 marks]

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Answer ..... cm

Turn over for the next question

4

2

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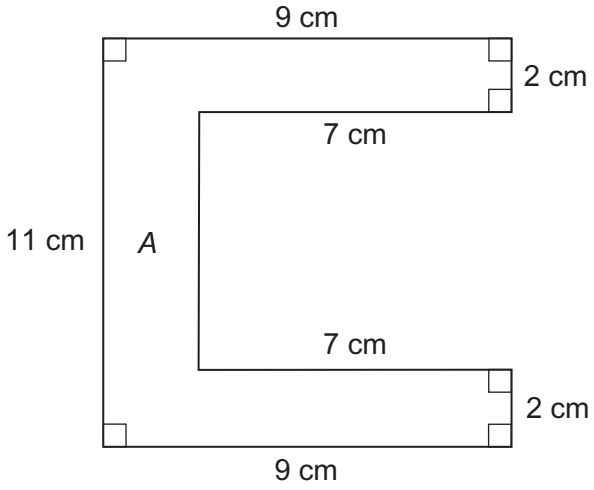

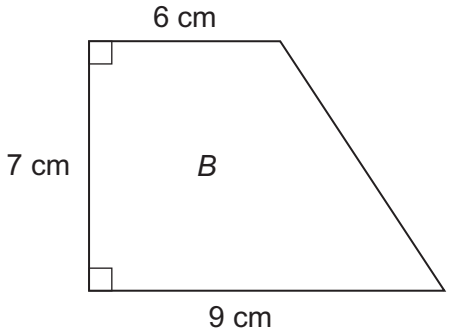

Which shape has the greater **area** and by how much?
You **must** show your working.

[5 marks]

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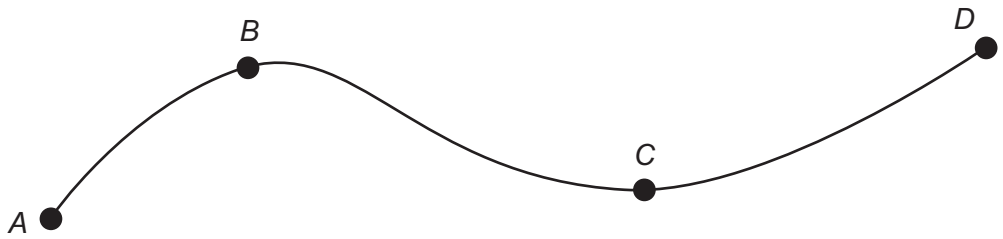
Shape ..... is greater by ..... cm^2

3 The diagram shows a road from *A* to *D*.

The distance from *A* to *D* is 35 miles



Each week

Amy drives from *A* to *D* and back to *A* **three** times
Bilal drives from *B* to *D* and back to *B* **five** times.

Bilal drives 60 miles **more** than Amy.

Work out the distance from *B* to *D*.

[3 marks]

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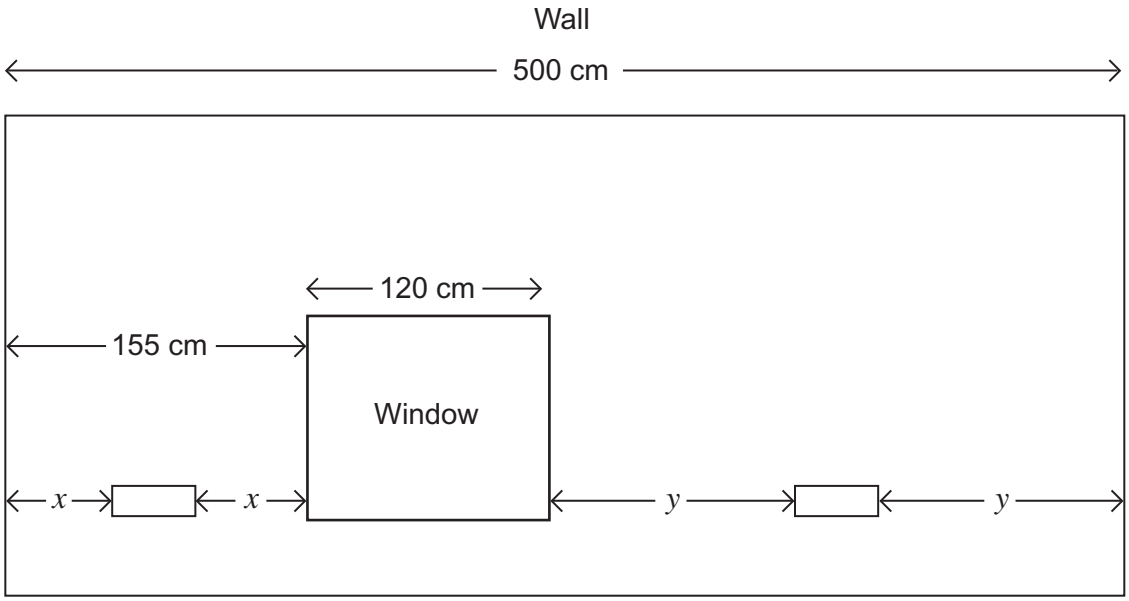
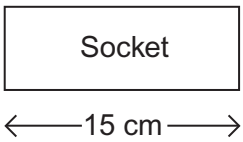
Answer ..... miles

8

4 The first diagram shows a kitchen wall with a window and two electric sockets.

The second diagram shows the length of each socket.





Not drawn accurately

Work out the lengths of x and y.

[5 marks]

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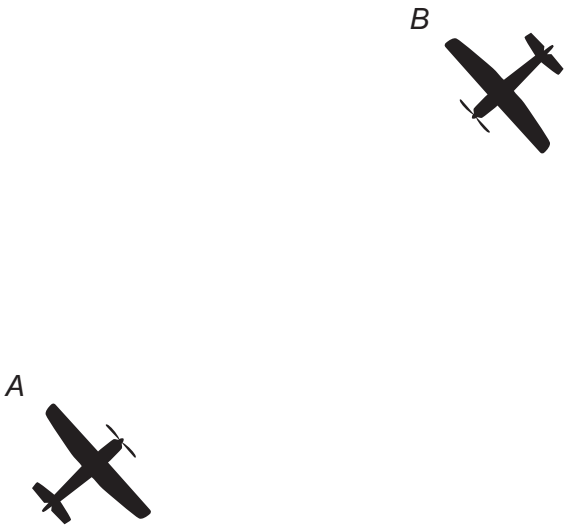
x = ... cm

y = ... cm

5 The diagram shows two aircraft, *A* and *B*, travelling in opposite directions.



Aircraft *B* is on a bearing of 225º

5 (a) Work out the three-figure bearing of aircraft *A*.

[2 marks]

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Answer ..... º

5 (b) Aircraft *B* turns 60º clockwise.

Work out the new three-figure bearing of aircraft *B*.
Circle your answer.

[1 mark]

105º 165º 285º 345º

8

6 (a) The circumference of a circle is 25 cm

Work out the radius of the circle.

[2 marks]

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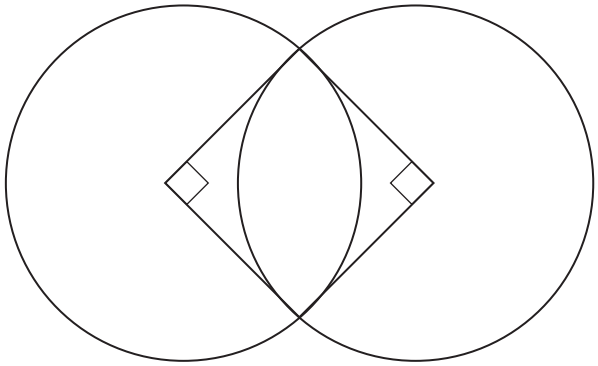
Answer ..... cm

6 (b) The diagram shows two identical circles and a square overlapping.

Each circle has a circumference of 32 cm

The sides of the square are radii to the circles.



Not drawn accurately

Work out the perimeter of the outer shape. 

[3 marks]

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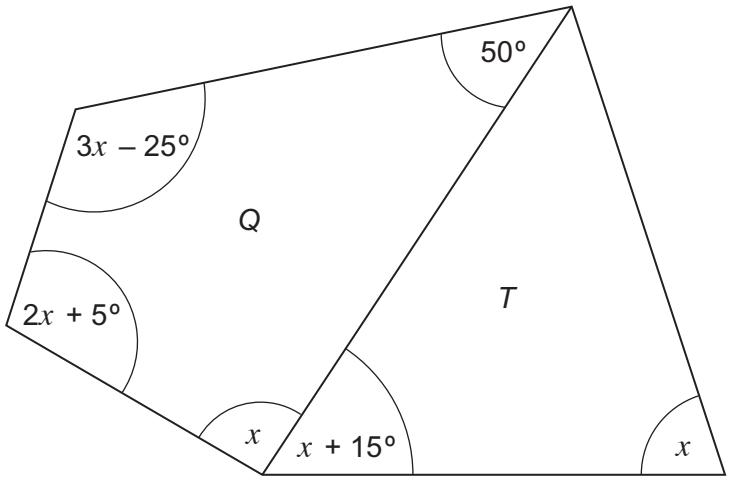
Answer ..... cm

***7** The diagram shows quadrilateral Q and triangle T joined together.



Not drawn accurately

What type of triangle is T?
You **must** show your working, which may be on the diagram.

[5 marks]

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Answer .....

10

Turn over ▶

***8** Use trial and improvement to find the solution to $x^3 = 6000$

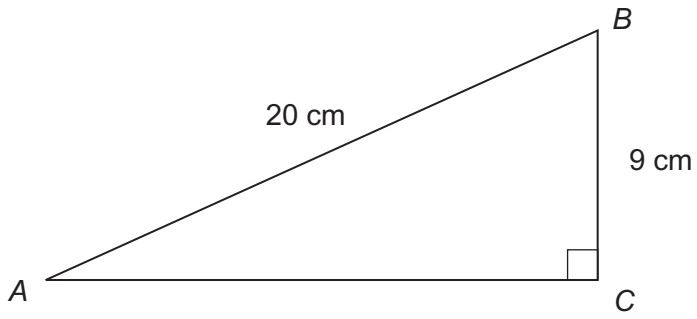
Give your answer to 1 decimal place.

[4 marks]

x	x^3	**Comment**

$x =$ .....

9



Not drawn accurately

Work out the length *AC*.

[3 marks]

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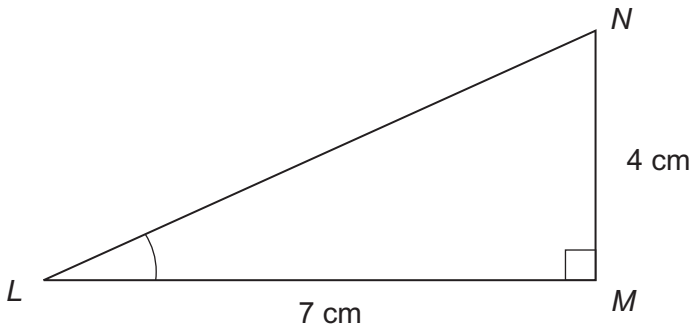
Answer ..... cm

Turn over for the next question

7

10 (a)



Not drawn accurately

Work out the size of angle *L*.

[3 marks]

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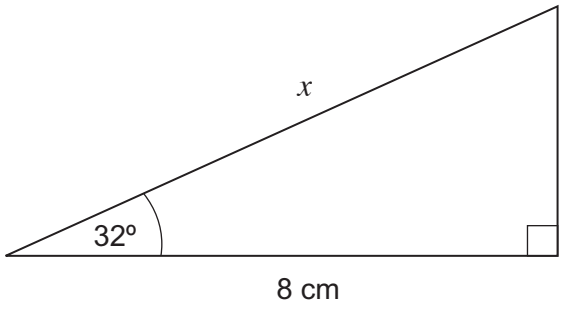
Answer ..... degrees

10 (b)

Not drawn accurately



Work out x.

[3 marks]

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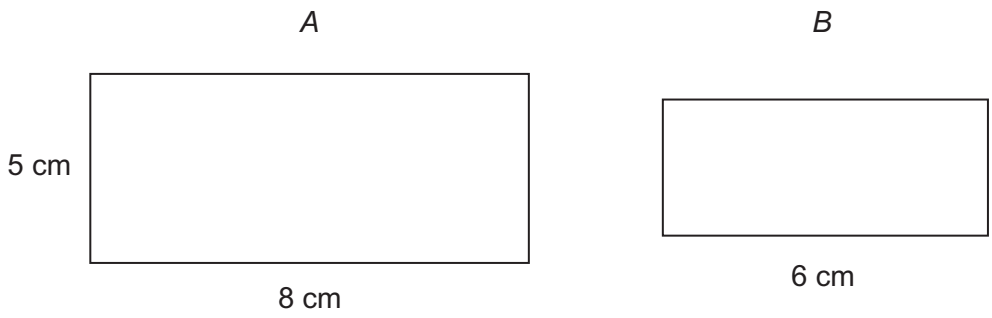
Answer ..... cm

Turn over for the next question

6

11 Rectangle *B* is an enlargement of rectangle *A*.

Not drawn accurately



11 (a) Write down the scale factor of the enlargement from rectangle *A* to rectangle *B*.

[1 mark]

Answer .....

11 (b) Work out the ratio area of rectangle *A* : area of rectangle *B*

Give your answer in simplest form.

[3 marks]

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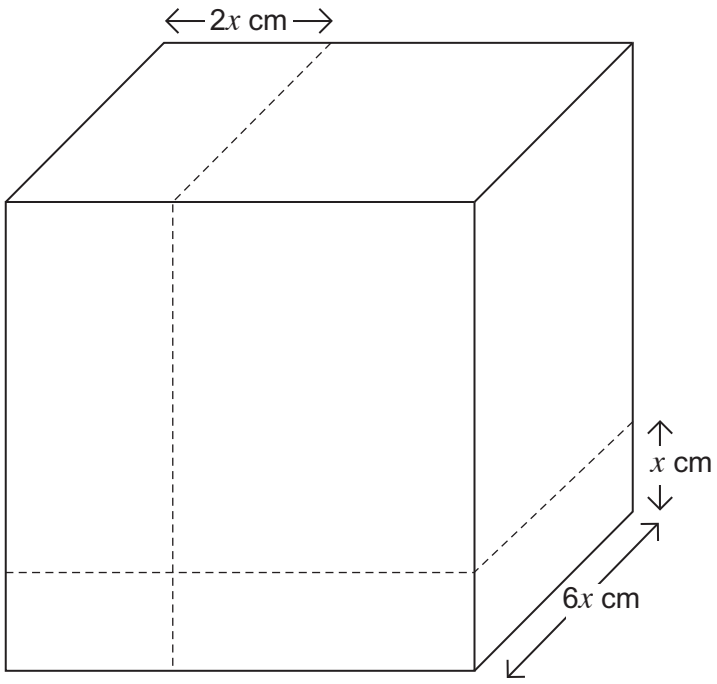
Answer ..... : .....

12 A cube is cut into four cuboids.



Write the volume of the **smallest** cuboid as a fraction of the volume of the cube.
Give your answer in its simplest form.

[3 marks]

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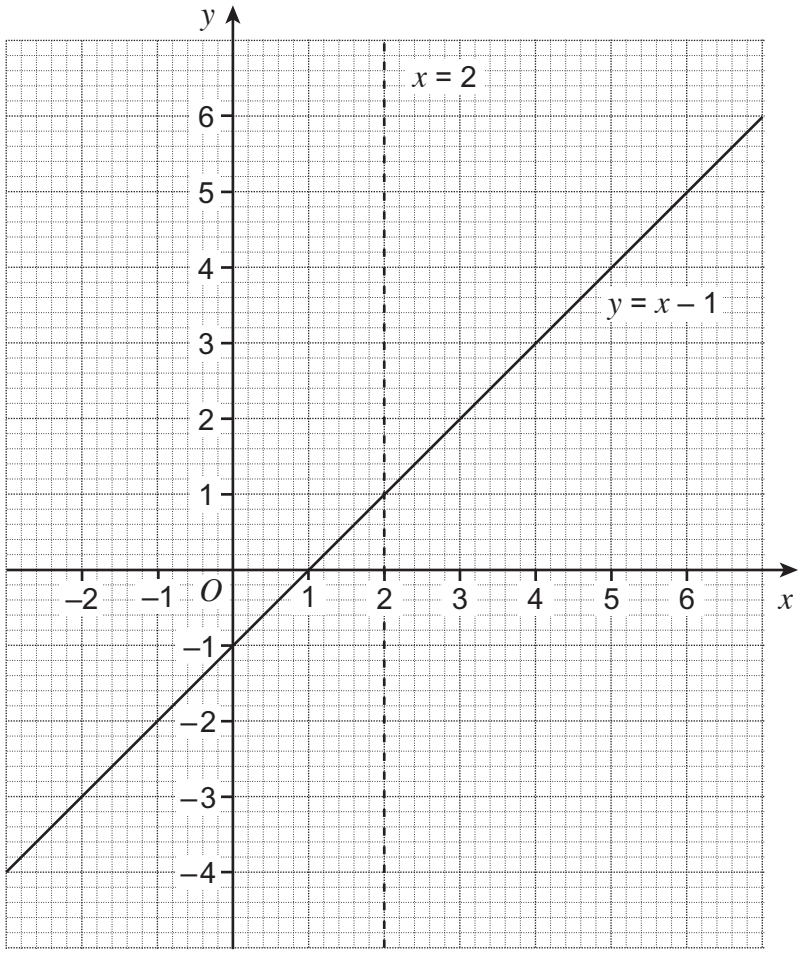
Answer .....

7

13 (a) Lines $y = x - 1$ and $x = 2$ are shown on the grid.



Draw the reflection of line $y = x - 1$ in the line $x = 2$

[1 mark]

13 (b) Work out the equation of the reflected line.

[2 marks]

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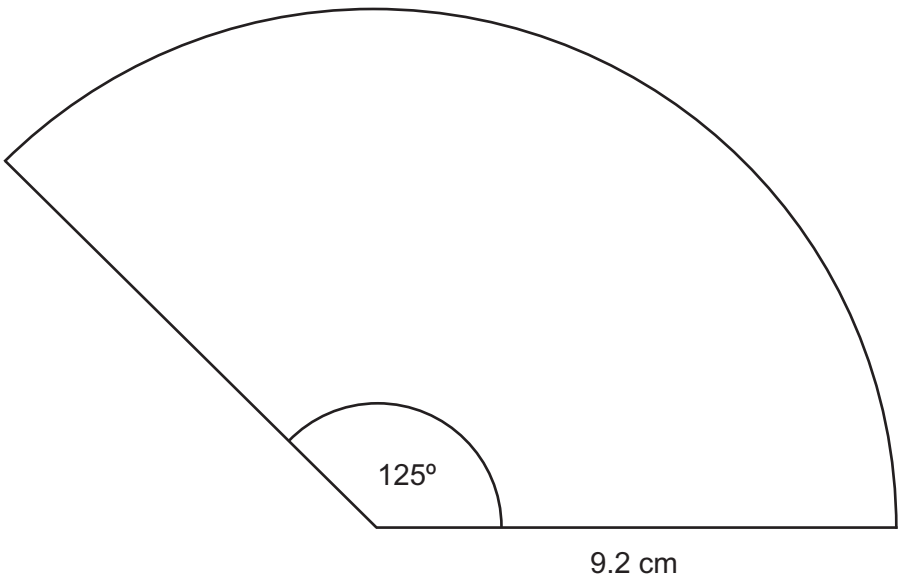
Answer .....

Turn over for the next question

3

14 The diagram shows a sector of a circle with radius 9.2 cm



14 (a) Work out the area of the sector.

[3 marks]

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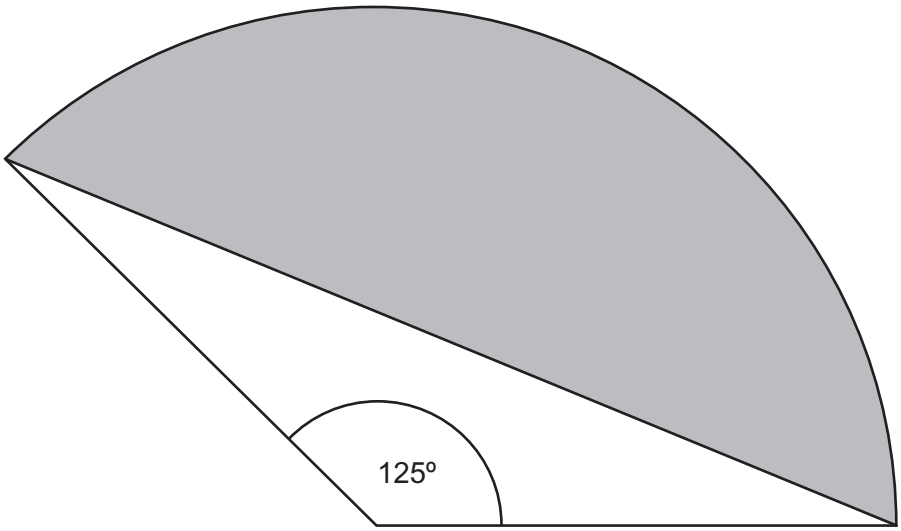
Answer ..... cm^2

14 (b) Work out the area of the shaded segment.

Not drawn accurately



[3 marks]

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Answer ..... cm^2

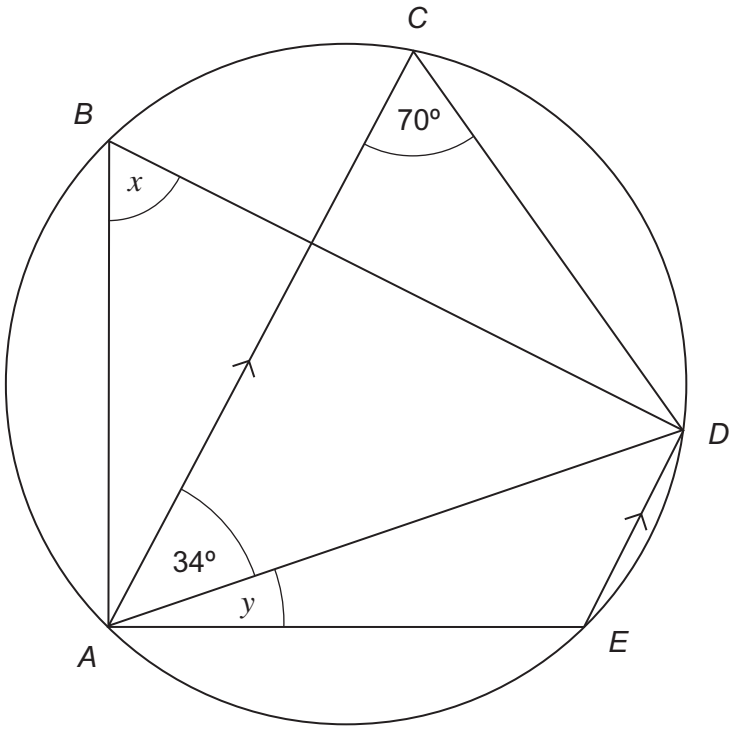
6

Turn over ▶

15 *A*, *B*, *C*, *D* and *E* are points on a circle.

AC is parallel to *ED*.

Not drawn accurately



15 (a) Write down the size of angle x.

[1 mark]

Answer ..... degrees

15 (b) Work out the size of angle y.

[3 marks]

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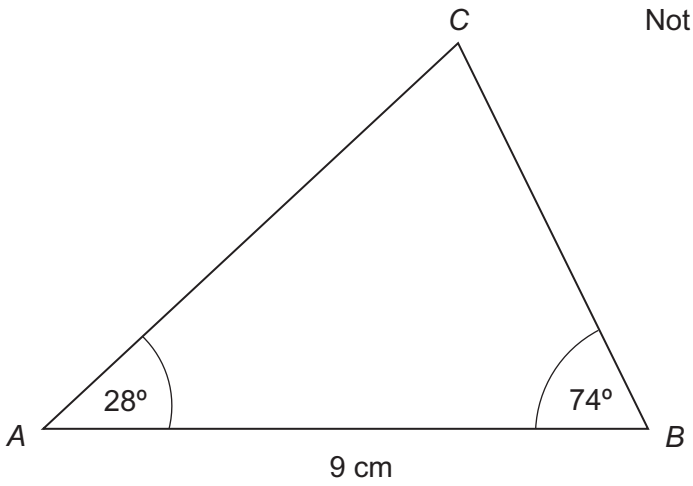
Answer ..... degrees

16



Work out the length of *BC*.

[4 marks]

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Answer ..... cm

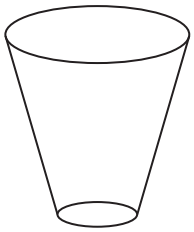
8

Turn over ▶

17 On the opposite page are five sketch graphs that show depth of water against time. Water is poured into each container at a steady rate.

For each part match the container to its graph opposite.

17 (a)

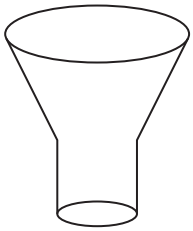


Circle your answer.

[1 mark]

A *B* *C* *D* *E*

17 (b)

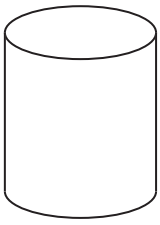


Circle your answer.

[1 mark]

A *B* *C* *D* *E*

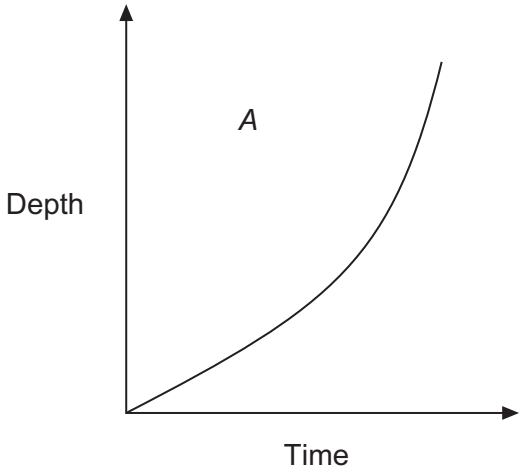
17 (c)

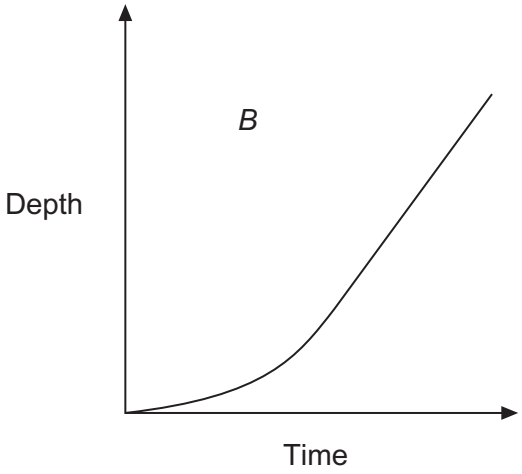


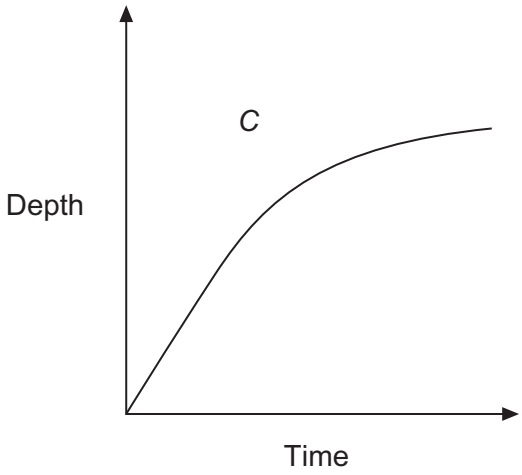
Circle your answer.

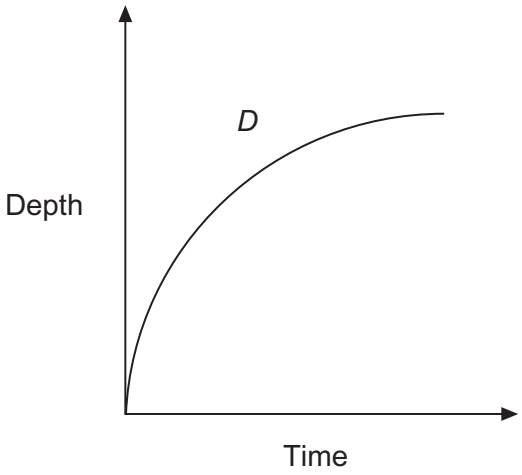
[1 mark]

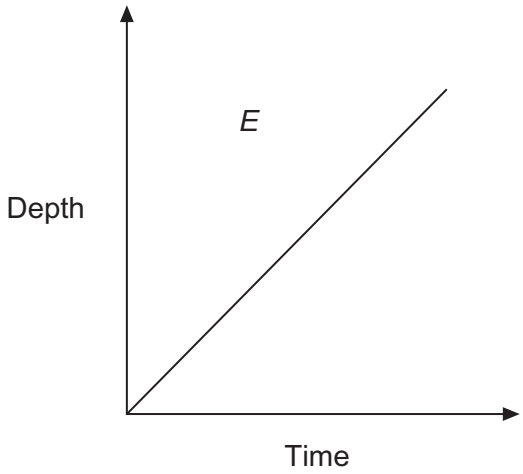
A *B* *C* *D* *E*











3

18 Work out the points of intersection of the graphs of

$$y = (x + 3)(x - 5)$$

and $$y = 4x + 1$$

[6 marks]

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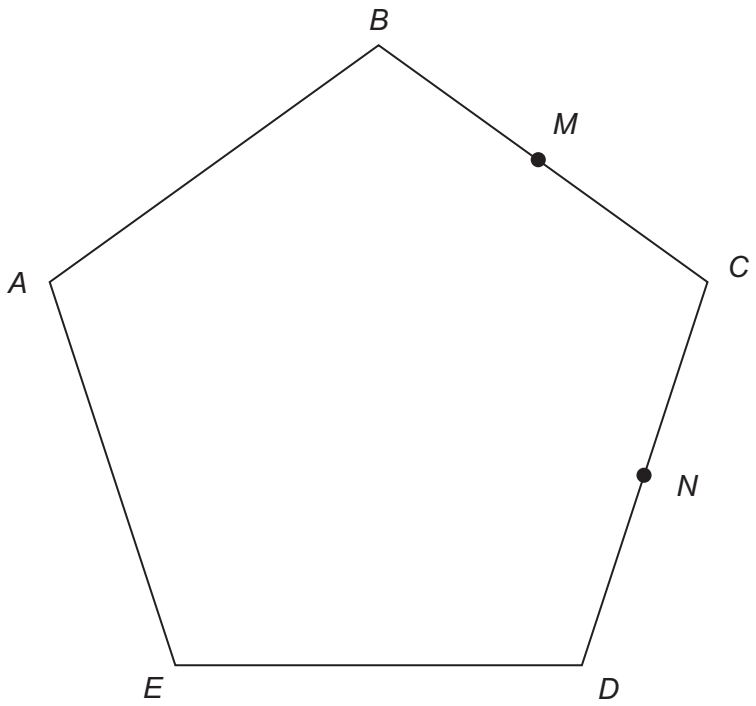
Answer .....

19 *ABCDE* is a pentagon.
M is the midpoint of *BC*.
N is the midpoint of *CD*.



$\overrightarrow{BC} = \boldsymbol{x}$

$\overrightarrow{CD} = \boldsymbol{y}$

***19 (a)** Show that *MN* is parallel to *BD*.

[3 marks]

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19 (b) Write down the ratio *BD* : *MN* in its simplest form.

[1 mark]

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

END OF QUESTIONS

10

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