

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4370/06

**MATHEMATICS – LINEAR
PAPER 2
HIGHER TIER**

A.M. MONDAY, 12 November 2012

2 hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

Take π as 3.14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

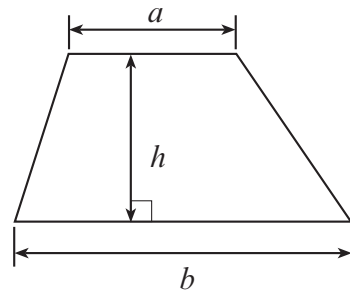
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 4.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	3	
2	10	
3	4	
4	8	
5	7	
6	9	
7	10	
8	6	
9	3	
10	11	
11	3	
12	6	
13	2	
14	9	
15	7	
16	2	
TOTAL MARK		

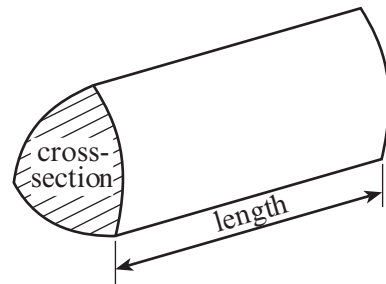
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Formula List

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

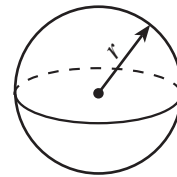


Volume of prism = area of cross-section \times length



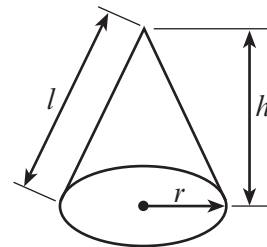
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

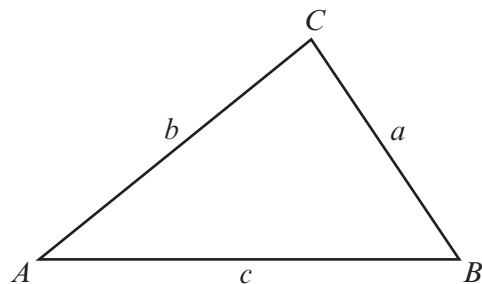


In any triangle ABC

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

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

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



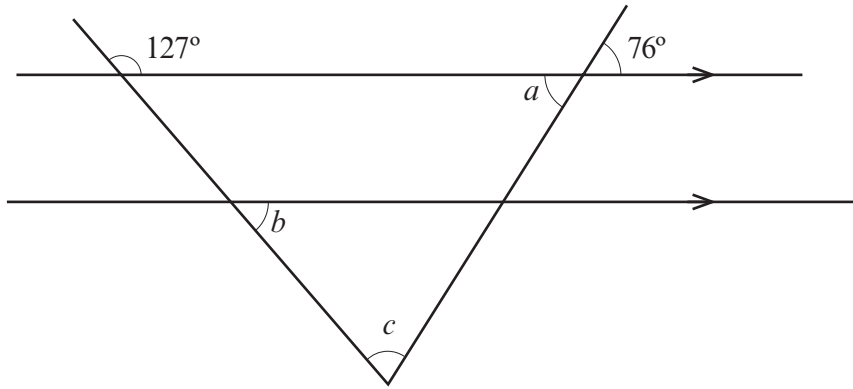
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

1.

*Diagram not drawn to scale*Find the sizes of the angles a , b and c .

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$a = \dots\dots\dots^\circ$

$b = \dots\dots\dots^\circ$

$c = \dots\dots\dots^\circ$

[3]

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2. The table below gives information from the Highway Code on stopping distances for cars.





Speed in mph	Stopping distance in metres = Thinking distance + Braking distance (Thinking distance is given first, followed by Braking distance)
20 mph	
30 mph	
40 mph	
50 mph	

Diagram not drawn to scale

- (a) A warning sign for a crossroads is to be placed on a road, which has a speed limit of 30 mph.
Use the data given above to find the minimum distance that the warning sign should be placed from the crossroads.

[1]

- (b) An average car is approximately 4 metres in length. How many car lengths is the stopping distance for a car travelling at 40 mph?

[2]

(c) Complete the table below.

Speed	
mph	km/h
30
50	80
.....	112

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[3]

(d) The stopping distances given in the Highway Code are given assuming good driving conditions and alert drivers.
 When a driver is tired, the thinking distance increases by 30% and the braking distance increases by 20%.
 Calculate the stopping distance, in metres, for a tired driver travelling at 50 mph in good driving conditions.

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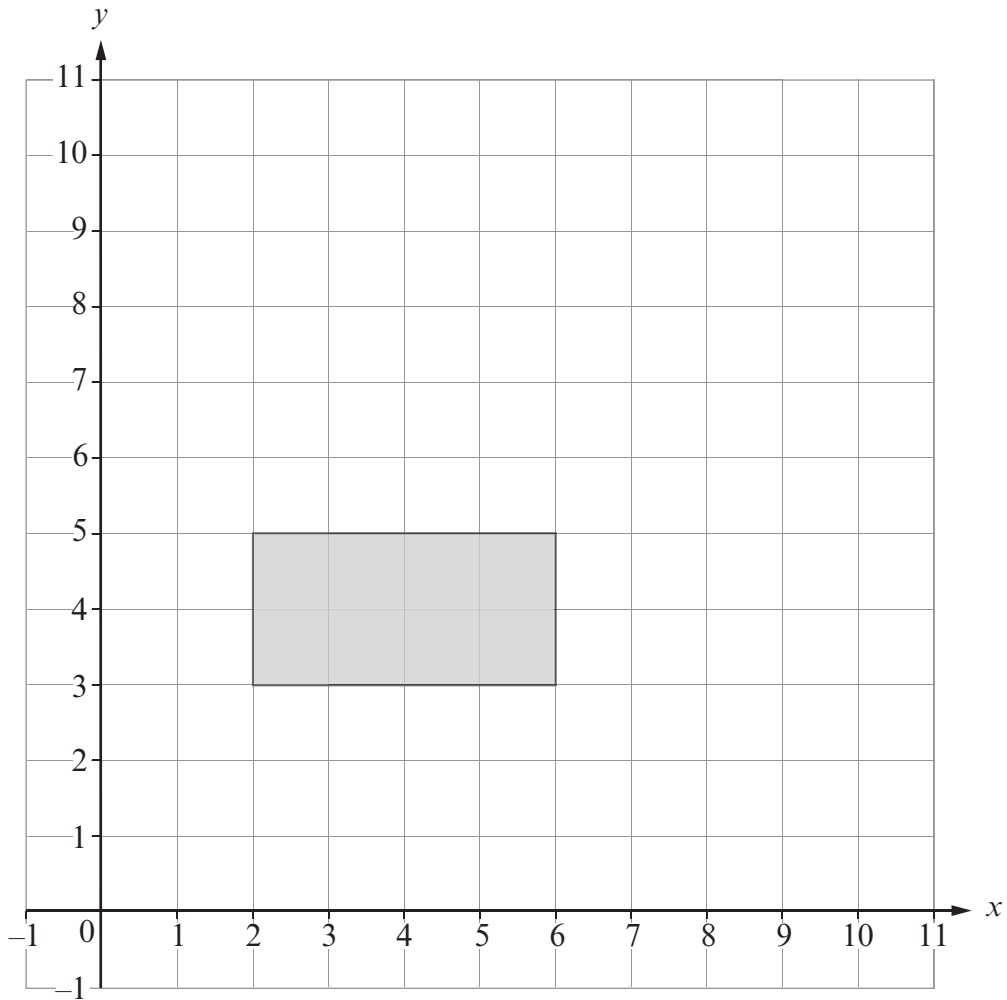
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[4]

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3. (a) Enlarge the rectangle shown by a scale factor of 2 using $(2, 2)$ as the centre of the enlargement.

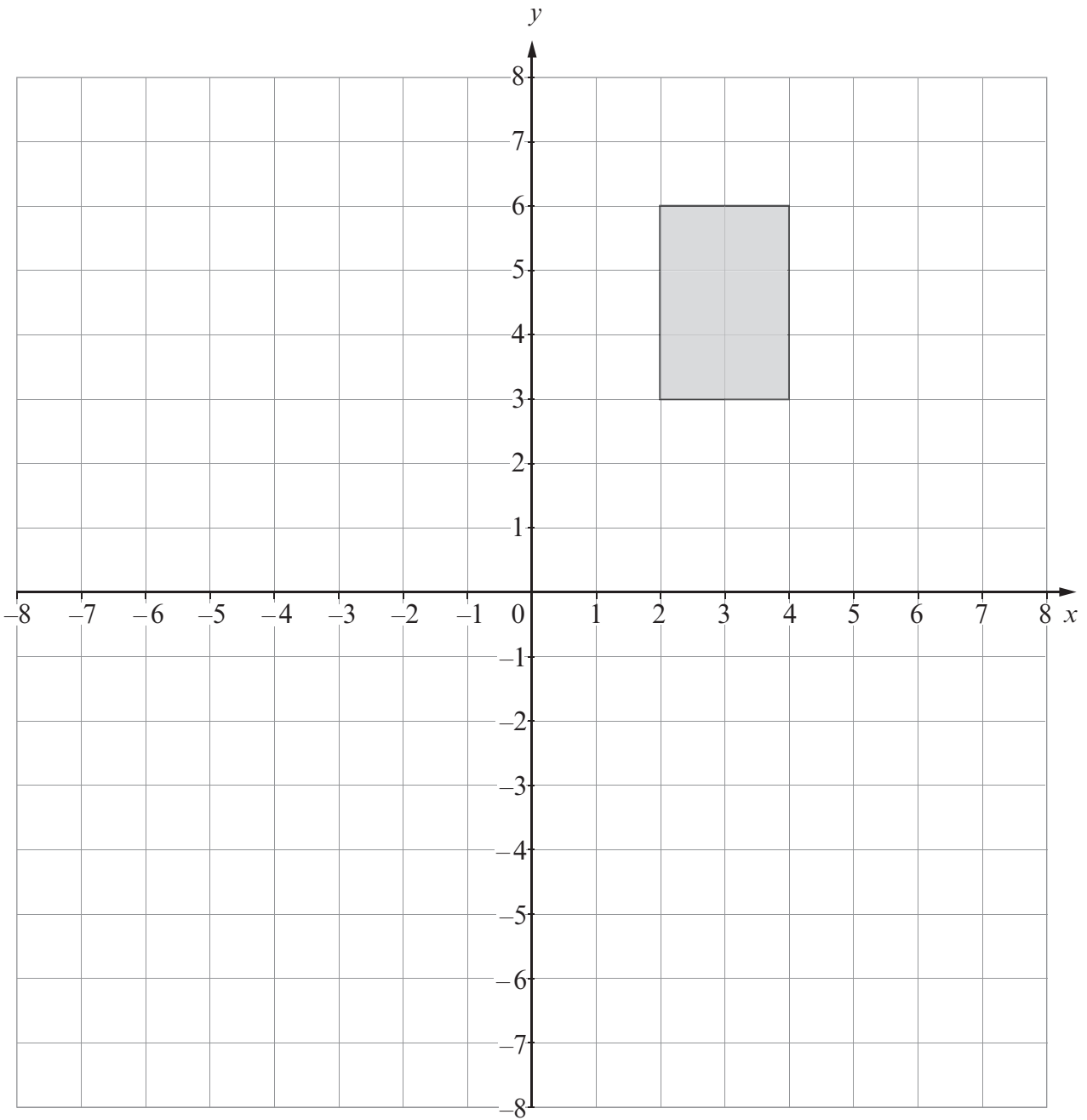
[2]



(b) Rotate the rectangle shown below through 180° about the point $(2, 1)$.

[2]

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5. (a) In Kingstone, the mean daily snowfall for a week was 5.6 cm. What would the mean daily snowfall have been if it had snowed 2 cm more on each day?

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[1]

- (b) In Greyfield, the snowfall for each of 10 days was measured. The results are summarised in the table below.

Daily snowfall, s , in cm	Number of days
$4.5 \leq s < 5.5$	4
$5.5 \leq s < 6.5$	2
$6.5 \leq s < 7.5$	1
$7.5 \leq s < 8.5$	1
$8.5 \leq s < 9.5$	2

- (i) Calculate an estimate for the mean daily snowfall for the 10 days.

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[4]

- (ii) State the modal class.

Modal class

[1]

- (iii) Write down the class in which the median lies.

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[1]

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6. (a) Calculate the volume of a cylinder with a diameter of 4.6 cm and a height of 8.4 cm.

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[3]

(b)

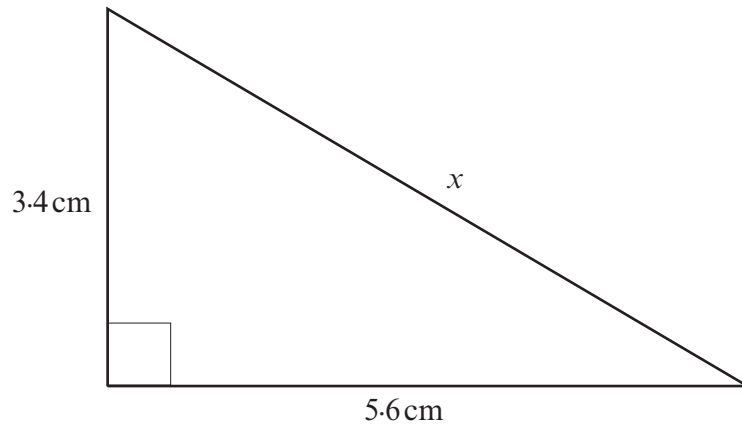


Diagram not drawn to scale

- (i) Calculate the length of the side marked x in the diagram above.
Give your answer correct to 2 significant figures.

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[4]

- (ii) Calculate the area of the triangle.

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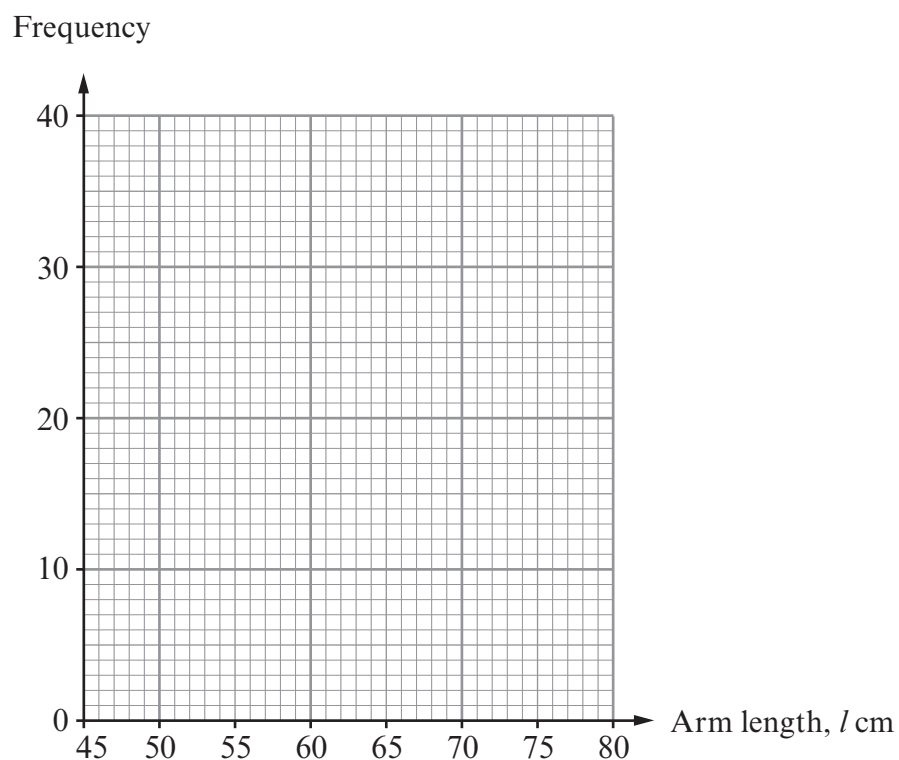
[2]

7. The arm lengths of 100 women were measured in centimetres.
The table below shows a grouped frequency distribution of the results.

Arm length, l cm	$50 < l \leq 55$	$55 < l \leq 60$	$60 < l \leq 65$	$65 < l \leq 70$	$70 < l \leq 75$
Frequency	4	18	38	30	10

- (a) On the graph paper below, draw a frequency polygon to show this data.

[2]



- (b) Complete the following cumulative frequency table.

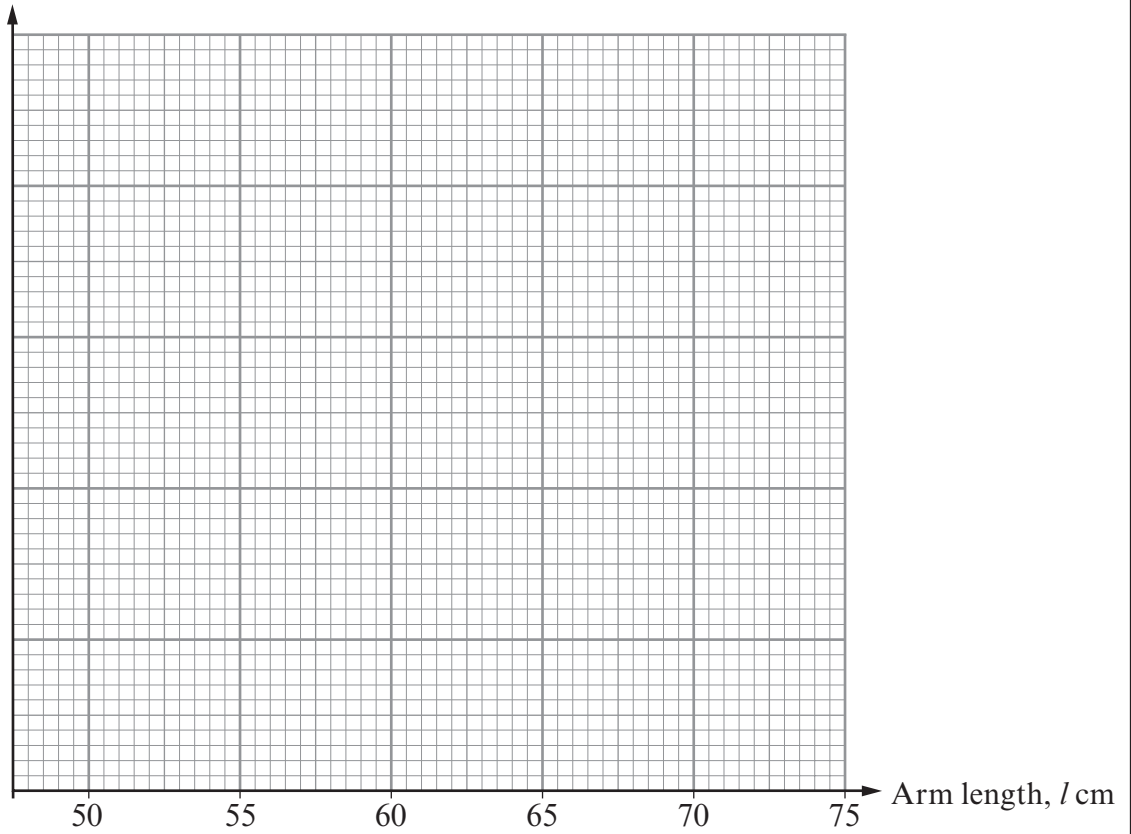
Arm length, l cm	$l \leq 50$	$l \leq 55$	$l \leq 60$	$l \leq 65$	$l \leq 70$	$l \leq 75$
Cumulative frequency	0	4				

[1]

(c) Use the graph paper below to draw a cumulative frequency diagram for the arm lengths of the 100 women.

[4]

Cumulative frequency



(d) Use your cumulative frequency diagram to find estimates for

(i) the median,

..... [1]

(ii) the interquartile range.

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..... [2]

8. A warehouse stores electrical goods in boxes.
The boxes are all cuboids.

(a) One of the boxes has a depth of 46 cm, a width of 55 cm and a length of 62 cm, where all the measurements are correct to the nearest centimetre.

(i) Write down the greatest and least possible values for each of these measurements in the table below.

Dimension	Least value	Greatest value
Depth 46 cm cm cm
Width 55 cm cm cm
Length 62 cm cm cm

[2]

(ii) Hence, calculate the **greatest** possible volume of the box.

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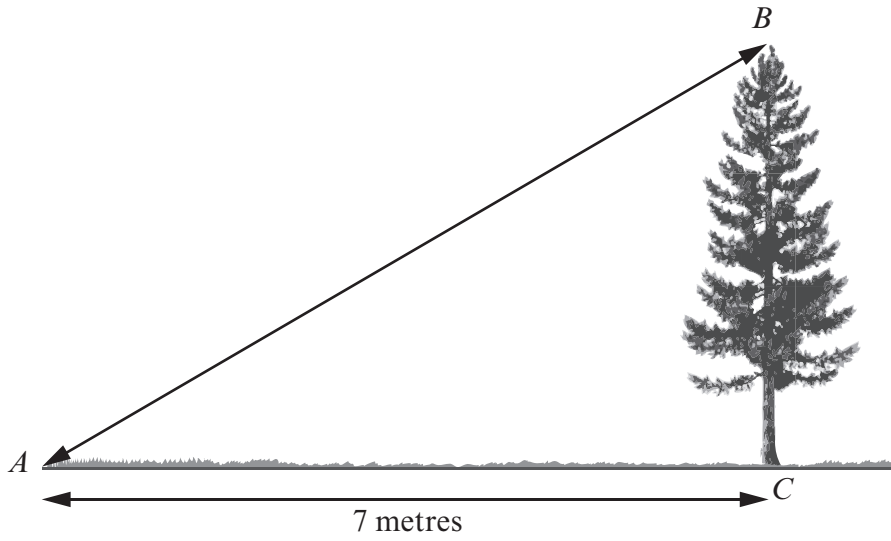
[2]

(b) Another box has dimensions x cm by y cm by z cm.
Each of these measurements is correct to the nearest cm.
Find an expression for the **least** possible volume of this box in terms of x , y and z .
You do not need to simplify your expression.

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[2]

9.



The height of a vertical tree is 3.2 metres.
The horizontal distance of a point A from the base of the tree is 7 metres.
Calculate the angle of elevation of the top of the tree from the point A .

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[3]

- (c) Rearrange the following formula to make r the subject.

$$7r - b = ar - c$$

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[3]

11. A unit of measure used with textiles is the denier.
Silk is said to measure 1 denier when 9000 m of a single strand of the silk weights 1 g.

1 denier is the same as 1 g per 9000 m

- (a) Complete the statement.

1 denier is the same as g per 450 m

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[1]

- (b) Complete the following statement, giving your answer in standard form correct to two significant figures.

1 denier is the same as g per metre

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[2]

12. (a) The diagram shows a circle with centre O .
The points A , B , C and D all lie on the circumference of the circle.

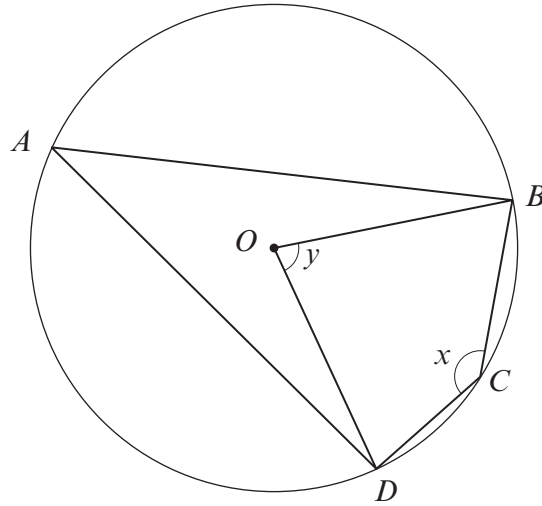


Diagram not drawn to scale

Find an expression for y in terms of x .

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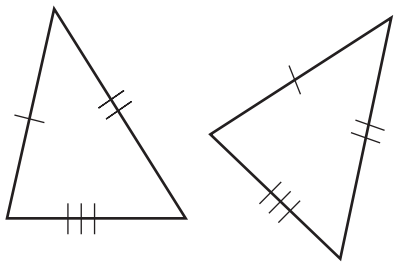
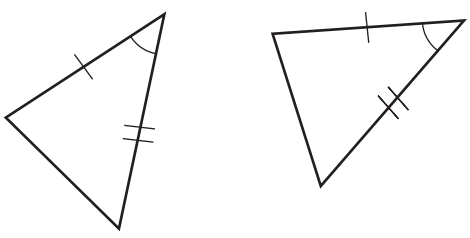
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[2]

13. State why each of the pairs of triangles below are congruent.

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	<p>.....</p> <p>.....</p>

[2]

16. Using the axes below, **sketch** the graph of $y = \cos x + 1$ for values of x from 0° to 360° .

[2]

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