

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4353/02

**MATHEMATICS (UNITISED SCHEME)
UNIT 3: CALCULATOR-ALLOWED MATHEMATICS
HIGHER TIER**

P.M. TUESDAY, 19 June 2012

1 $\frac{3}{4}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

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.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

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.

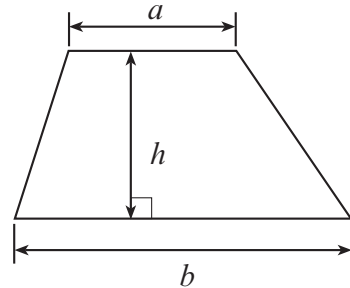
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 7.

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

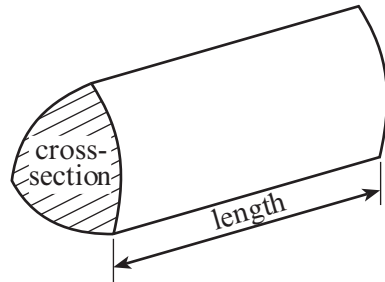


Formula List

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

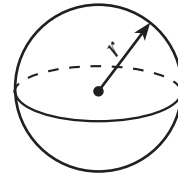


Volume of prism = area of cross-section \times length



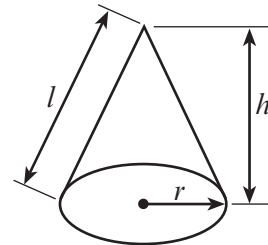
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

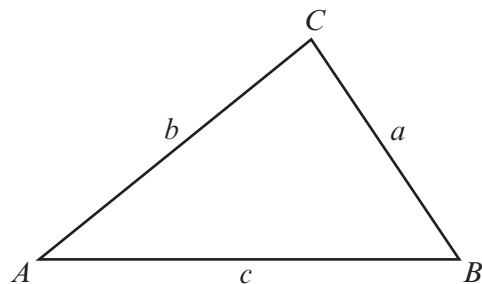


In any triangle ABC

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

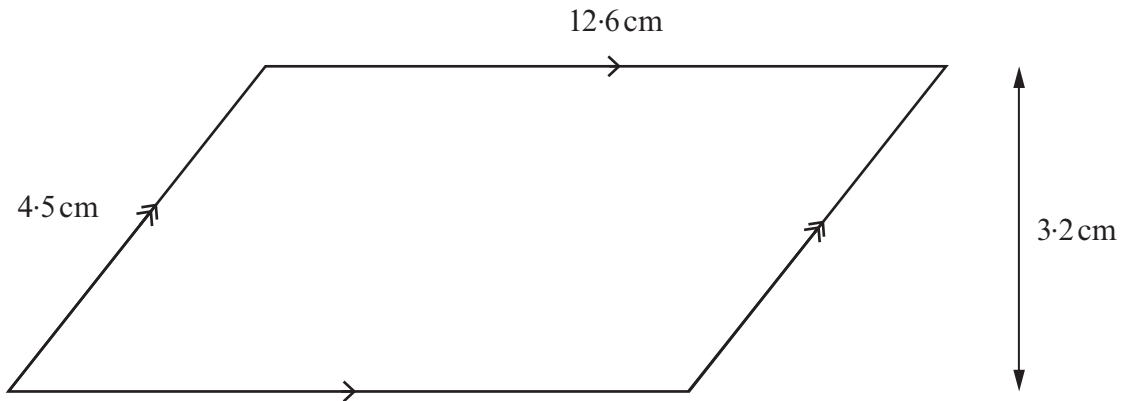
The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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



1. (a)

*Diagram not drawn to scale*

Calculate the area of the parallelogram.

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(b) A regular polygon has an exterior angle of 22.5° .
 How many sides does this regular polygon have?
 You must show all your working.

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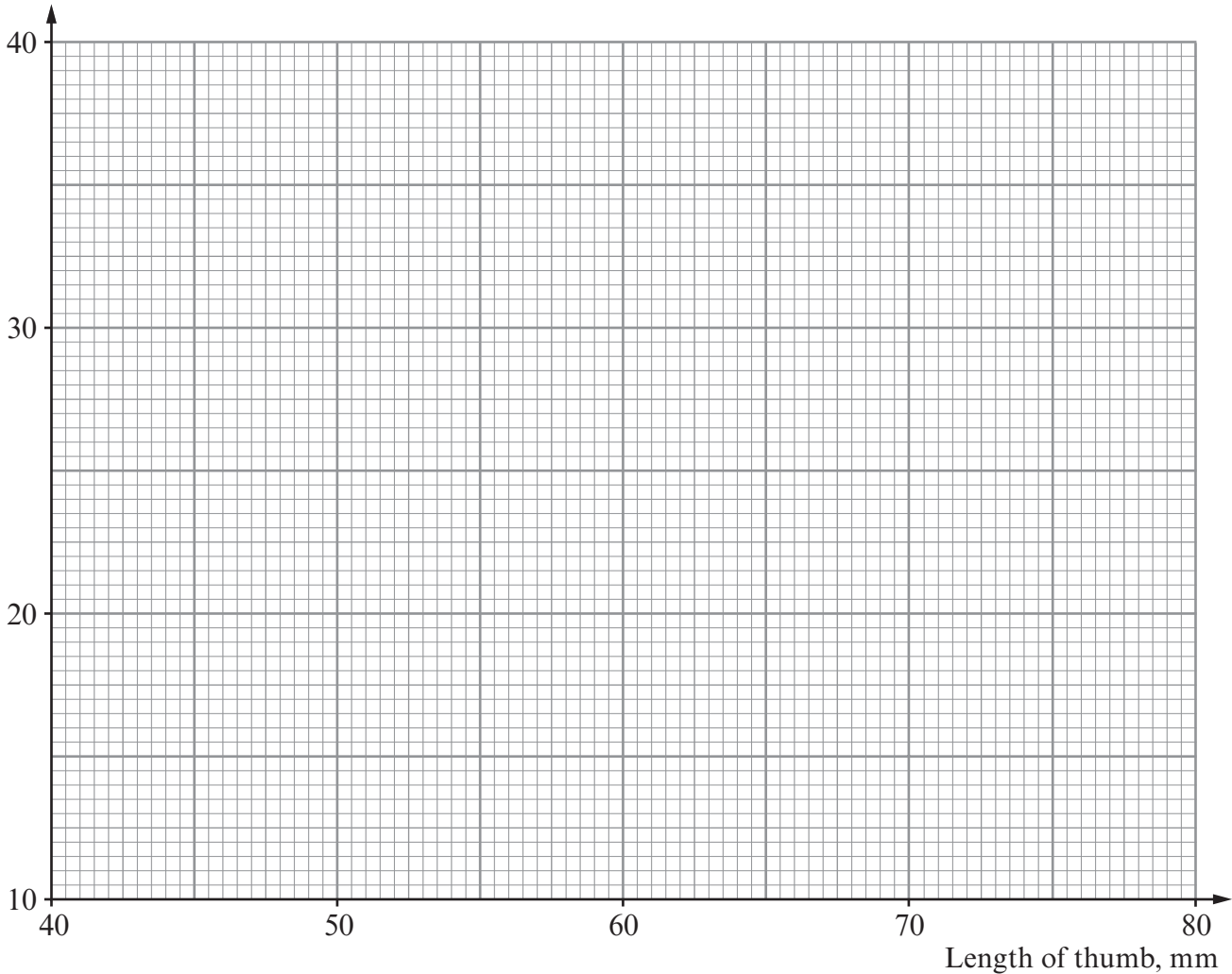
2. A number of students measured the length of their thumb in millimetres and the length of their foot in centimetres.

Thumb, mm	56	70	48	54	62	64
Foot, cm	24	36	20	22	28	32

- (a) Draw a scatter diagram to display these measurements.

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Length of foot, cm



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(b) (i) For the given data, find one point that the line of best fit needs to pass through.

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(ii) Draw a line of best fit on your scatter diagram.

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(c) State the type of correlation shown in your scatter diagram.

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(d) Give a possible reason why the graph was drawn with neither scale starting at zero.

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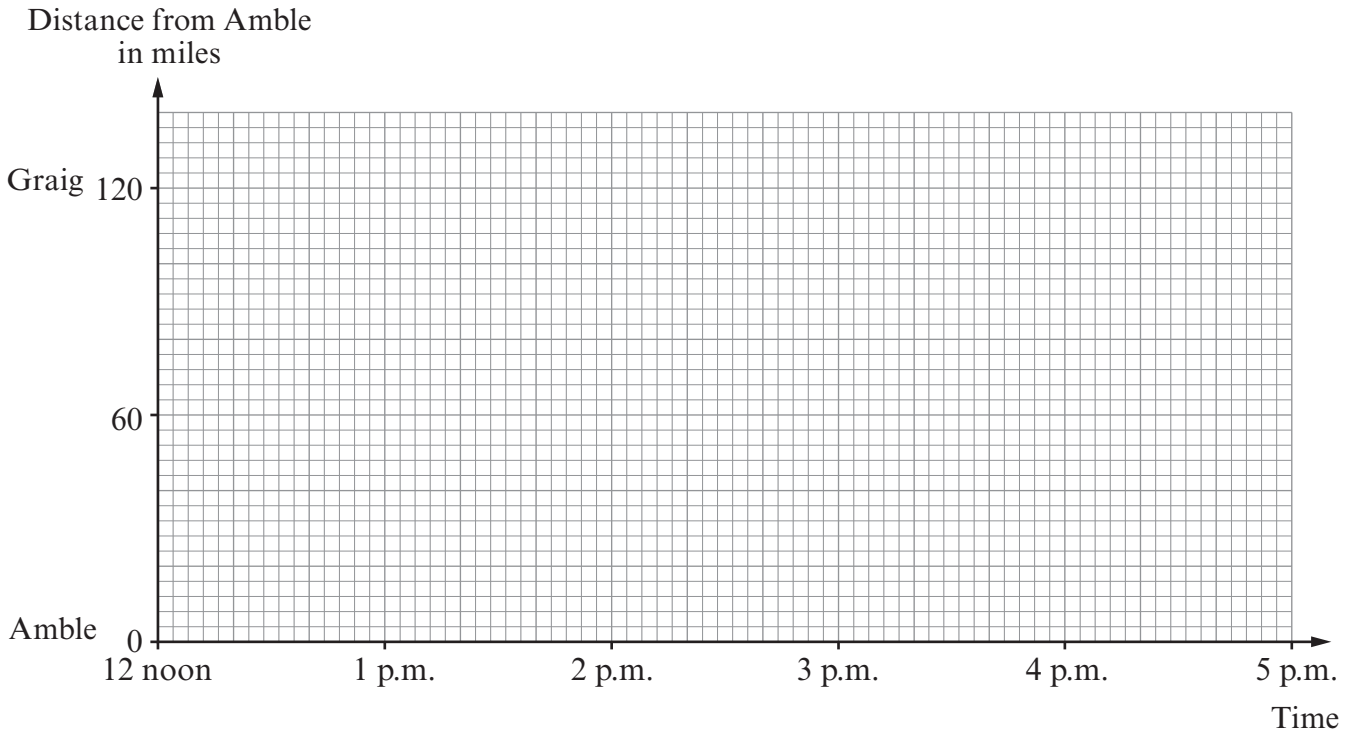
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3. (a) Use the graph paper to illustrate the journey described below.

Fiona travels from Amble to Graig, a distance of 120 miles.
She sets out at 12 noon from Amble.
Her average speed for the first 60 miles of her journey is 40 mph.
After travelling the first 60 miles, she stops for lunch for 30 minutes.
She then continues her journey to Graig, arriving at 5 p.m.



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(b) Calculate Fiona's average speed, in m.p.h., for the complete journey from Amble to Graig.

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4. (a) Factorise $15x^2 - 45x$.

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- (b) Solve $\frac{2}{3}x + 6 = 10 - \frac{1}{3}x$.

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- (c) Find the value of y^3 when $y = -4$.

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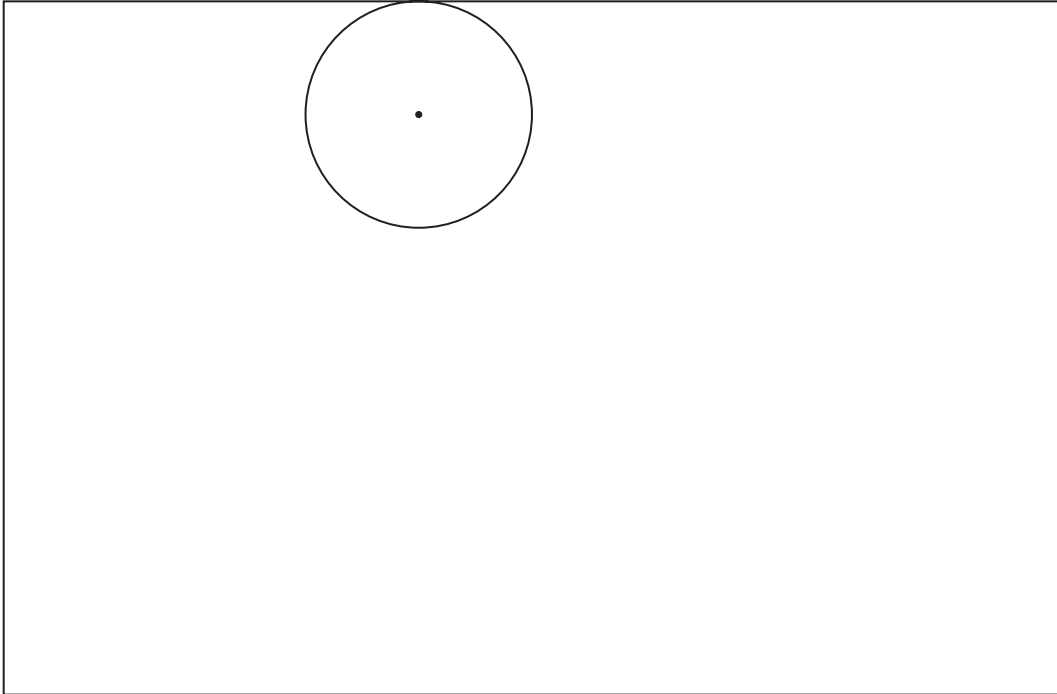
- (d) Given that $a = 3$, $b = -7$ and $c = 10$, evaluate $\frac{2a^2 - b}{5c}$.

Express your answer as a decimal.

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5. The diagram shows the aerial view of a ball in a box.
 The centre of the ball is marked on the diagram.
 The ball must remain in contact with at least one side of the box.
 Draw the locus of the set of points where the centre of the ball could be inside this box.



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6. A solution to the equation $x^3 - x - 5 = 0$ lies between 1 and 2.
 Find this solution correct to 1 decimal place.

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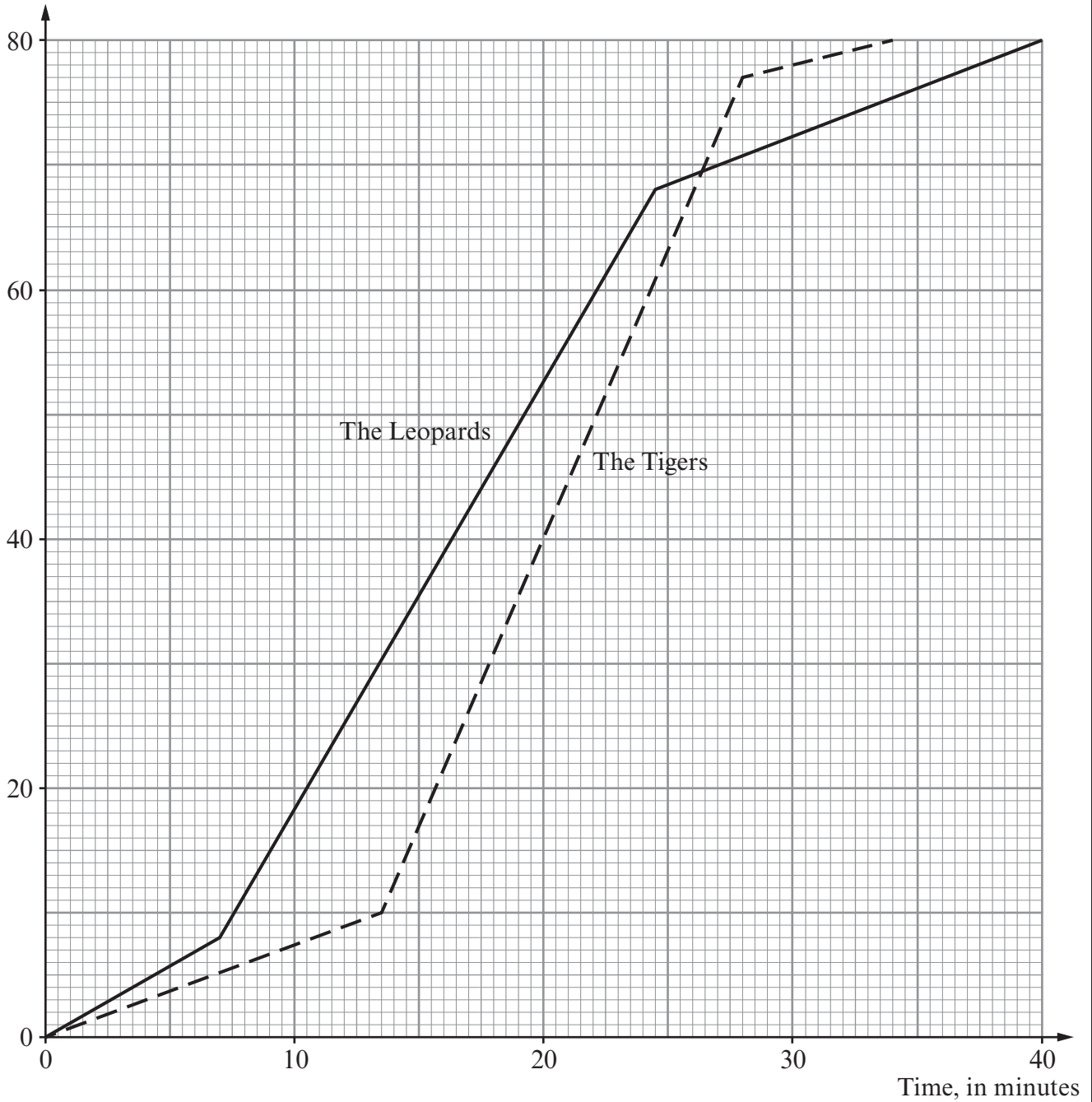
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8. The cumulative frequency diagram shows the times taken by the members of two different clubs, The Leopards and The Tigers, to complete a fitness course. Each club has 80 members.

Cumulative frequency



(a) Find the median and inter-quartile range for **The Tigers**.

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Median

Inter-quartile range

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(b) State which club, The Leopards or The Tigers, was slower on average at completing the fitness course. Give a reason for your answer.

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(c) The times taken by another group of students to complete the fitness course are shown in the grouped frequency distribution table below.

Time, t minutes	Number of students
$0 \leq t < 10$	2
$10 \leq t < 20$	30
$20 \leq t < 30$	45
$30 \leq t < 40$	3

Calculate an estimate for the mean time taken by these students.

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9. Solve $\frac{8x-5}{3} + \frac{4x+5}{4} = \frac{149}{12}$.

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10. The diagram shows a cross-section of the roof of a building, with the base BCD being horizontal and AC representing a vertical support.

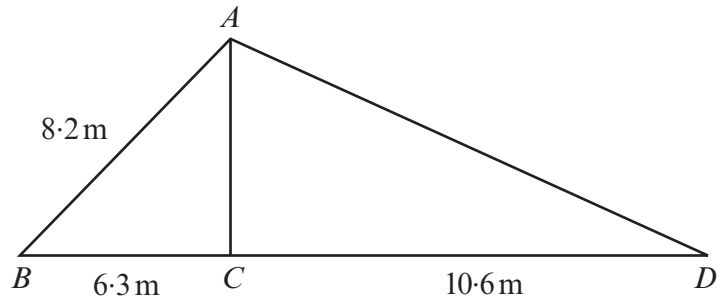


Diagram not drawn to scale

Calculate the size of the angle that the roof AD makes with the horizontal.

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12. The radius of the circle below is 3.6 cm.

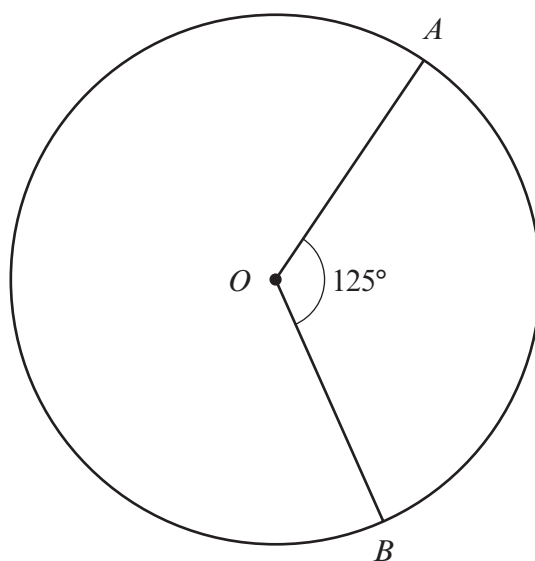


Diagram not drawn to scale

Calculate the length of the minor arc AB .

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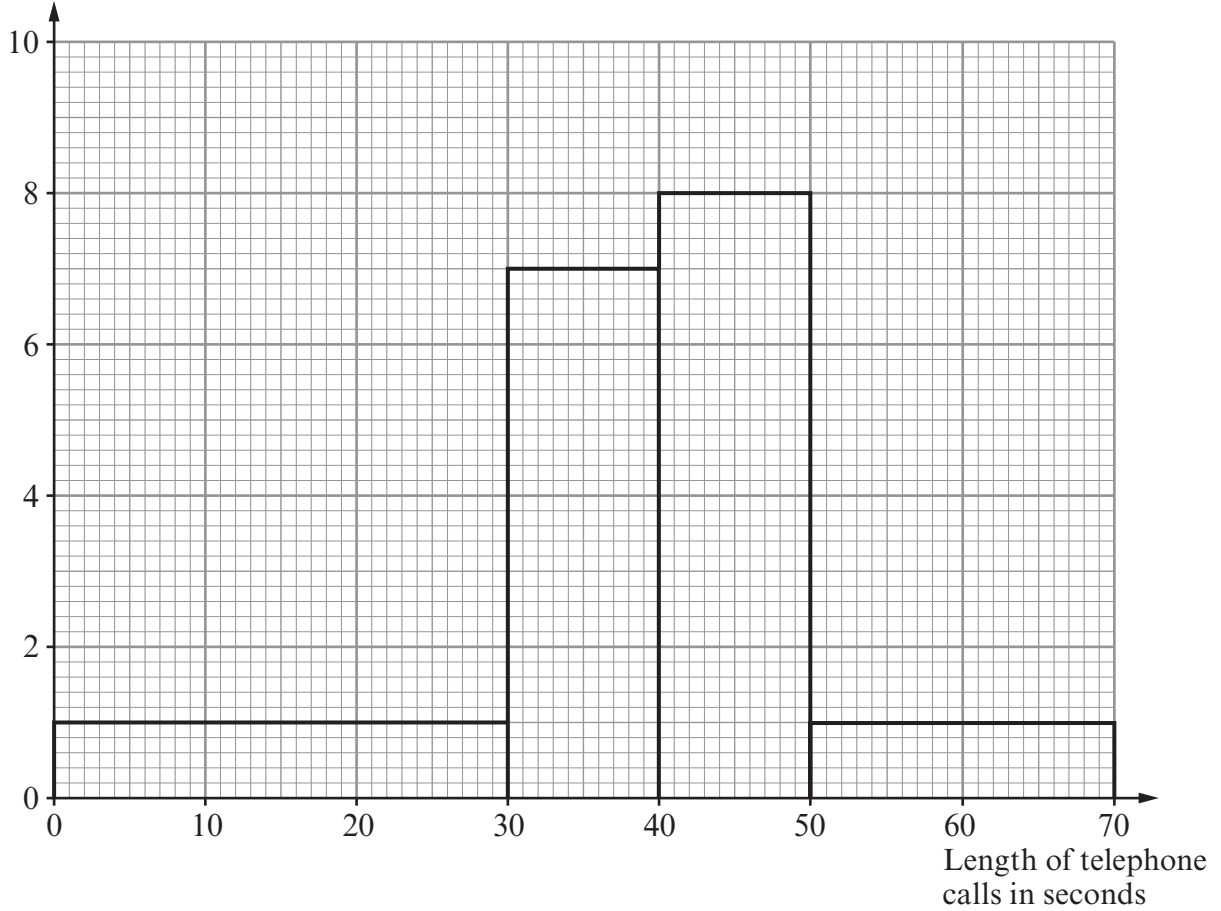
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13. The histogram illustrates the lengths of telephone calls made to a computer helpline during one Tuesday evening.

Frequency density



- (a) Calculate how many telephone calls were made to the computer helpline during the Tuesday evening.

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(b) Estimate the median length of a telephone call made to the computer helpline during the Tuesday evening.

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15. A sketch of $y = 9 - x^2$ is shown below for values of x from 0 to 3.

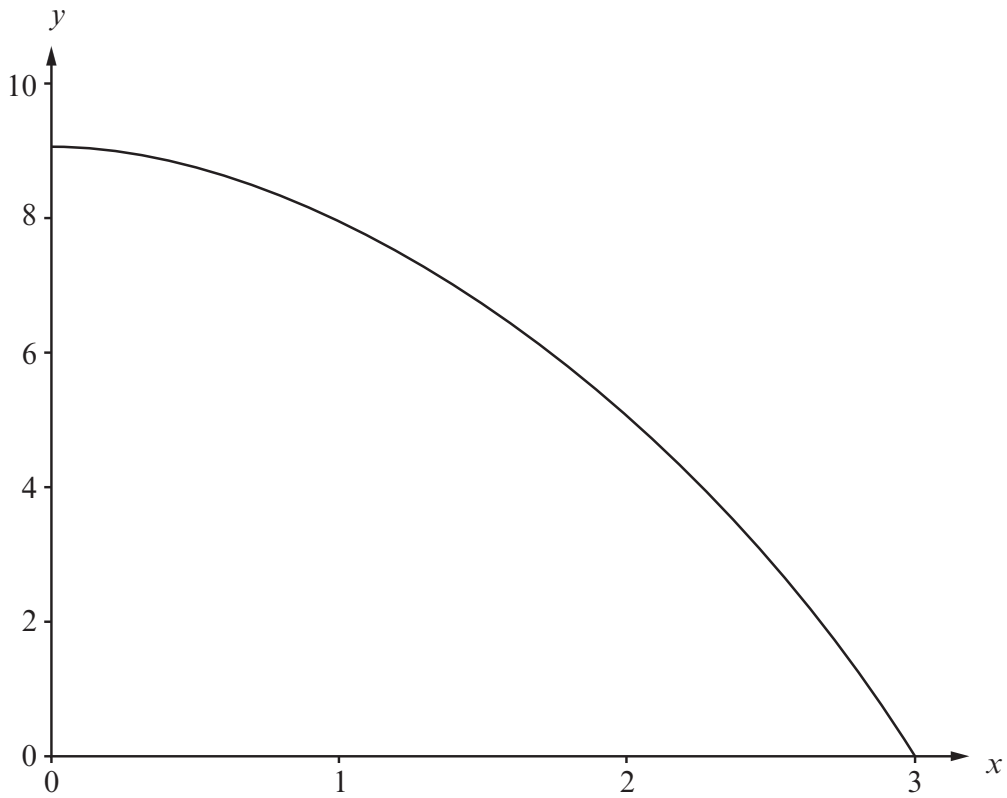


Diagram not drawn to scale

Use the trapezium rule, with the ordinates $x = 0$, $x = 1$, $x = 2$ and $x = 3$, to estimate the area of the region enclosed by the curve, the x -axis and the y -axis.

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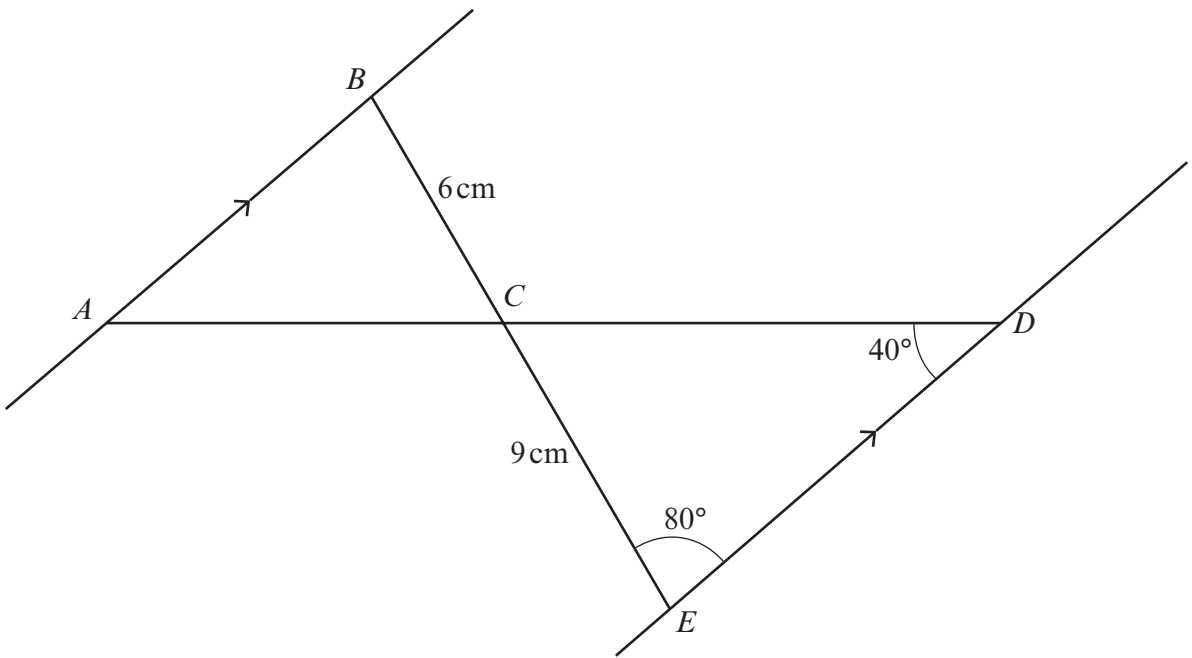


Diagram not drawn to scale

Given that AB is parallel to ED , calculate the length of AB .

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