

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4353/02

**MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
HIGHER TIER**

A.M. TUESDAY, 17 June 2014

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

A ruler, a protractor and a pair of compasses may be required.

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 3.

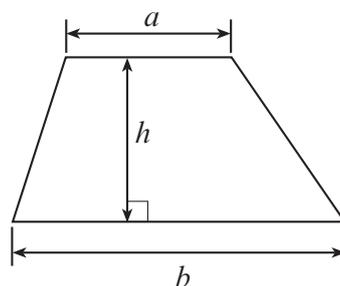
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	3	
3.	7	
4.	8	
5.	4	
6.	2	
7.	4	
8.	3	
9.	2	
10.	4	
11.	6	
12.	4	
13.	4	
14.	7	
15.	2	
16.	3	
17.	7	
18.	7	
19.	4	
Total	90	



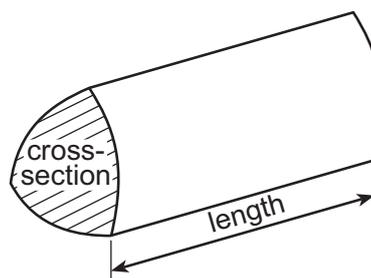
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Formula List

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

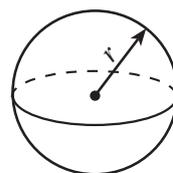


Volume of prism = area of cross-section \times length



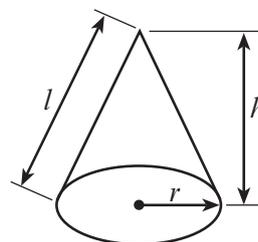
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

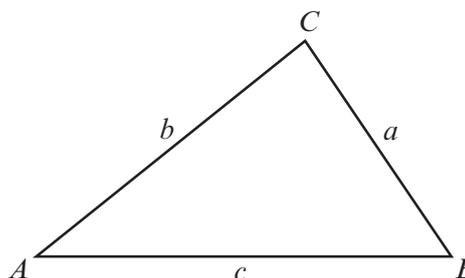


In any triangle ABC

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. (a) Evaluate $\frac{\sqrt[3]{90}}{10.5 - 7.74}$. Give your answer correct to 2 decimal places. [2]

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- (b) Factorise the expression $18 - 9y$. [1]

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- (c) Given the formula $H = 3R + 2S$, find H when $R = 1\frac{1}{3}$ and $S = -1.8$. [2]

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- (d) Solve the equation $\frac{3}{a} = 10$. [1]

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- (e) Solve the equation $3(x - 2) = x + 2$. [3]

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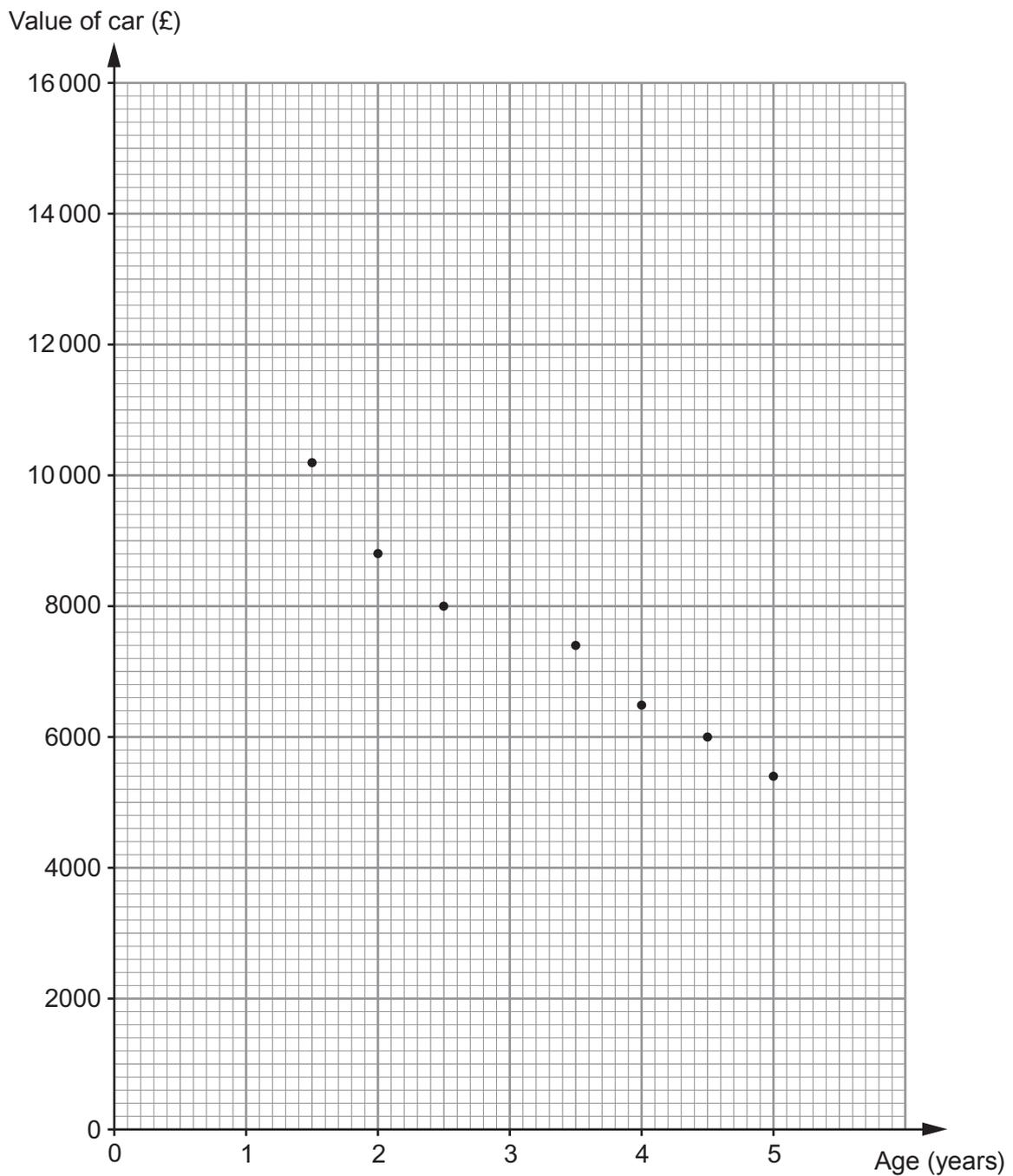
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2. The scatter diagram shows the values and ages of cars of a particular model.



- (a) Write down the value of the oldest car. [1]
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- (b) Draw, by eye, a line of best fit on the scatter diagram. [1]
- (c) Use your line of best fit to estimate the value of a 3-year-old car of this model. [1]
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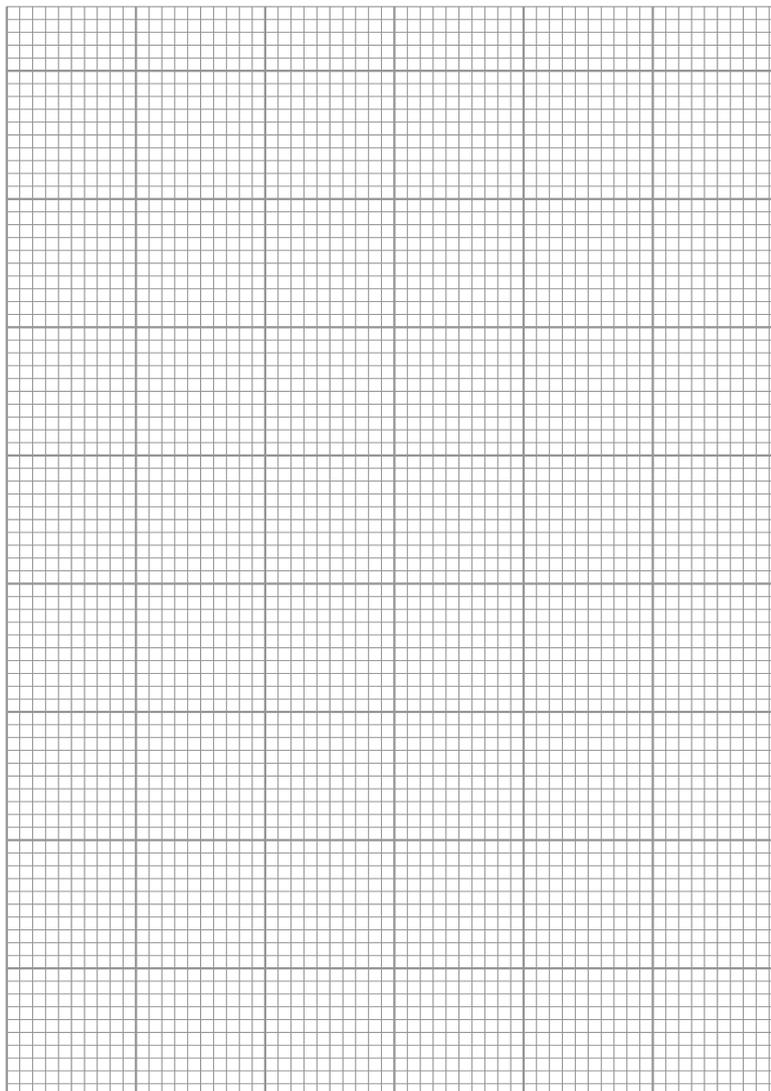


4. A survey of 240 primary school pupils was carried out to find the amount of time they spent each week doing their homework.
Here are the results of the survey.

Time taken, t , in hours	Number of pupils
$0 < t \leq 1$	80
$1 < t \leq 2$	60
$2 < t \leq 3$	52
$3 < t \leq 4$	32
$4 < t \leq 5$	16

- (a) Draw a grouped frequency diagram of the data.

[3]



(b) Calculate an estimate of the mean time that pupils spent each week doing their homework. [4]

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(c) Write down the class interval that contains the median. [1]

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5. Two brothers, Gethin and David, share a sum of money in the ratio 2:7. David gets £30 more than Gethin. Calculate how much money the brothers share. [4]

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6. The diagram below shows part of a regular polygon. Calculate the number of sides of this regular polygon. [2]



Diagram not drawn to scale

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7. In a speedboat race, competitors travel 8.5 km south from the start to buoy A. Then they travel 7 km east to buoy B and then travel directly back to the start. Calculate the total distance that the competitors travel in the race. [4]

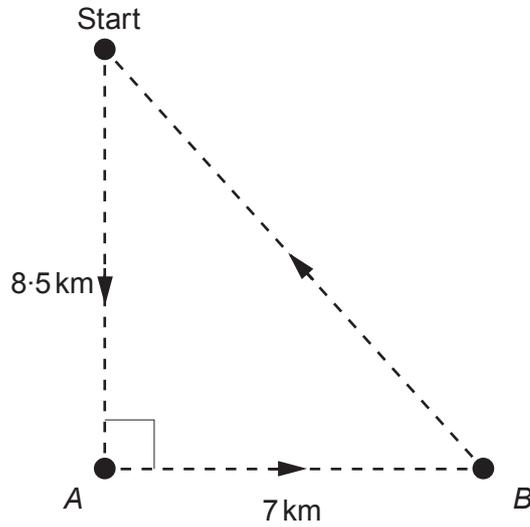


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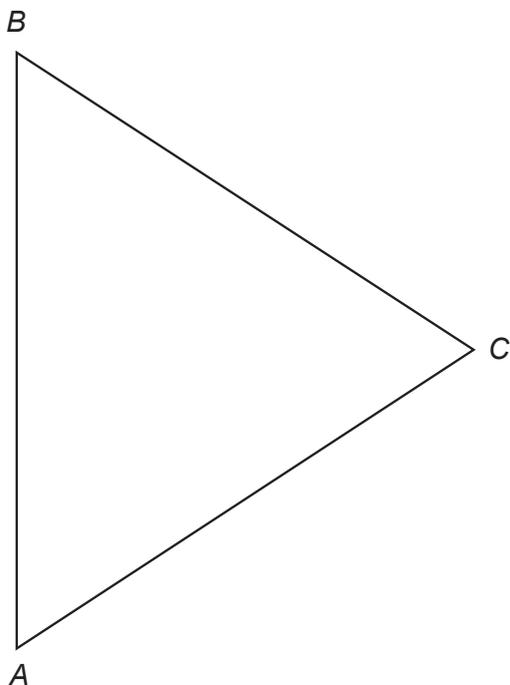
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8. Shade the region, inside the triangle below, that satisfies both of the following conditions:

- it is less than 5 cm from AC , and
- it is less than 4 cm from B .

[3]



9. Find the value of $(9.2 \times 10^5) - (3 \times 10^4)$. Give your answer in standard form.

[2]

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10.

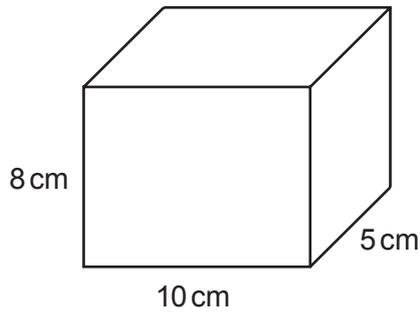


Diagram not drawn to scale

A cuboid made of metal has dimensions 10 cm, 8 cm and 5 cm. The mass of the cuboid is 1.1 kg. Calculate the density of the metal. State the units of your answer. [4]

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11. In a survey at a factory, 200 workers were asked to state their weekly earnings. The results of the survey are summarised in the table below.

Weekly earnings, s , in £	Frequency
$0 < s \leq 100$	18
$100 < s \leq 200$	22
$200 < s \leq 300$	60
$300 < s \leq 400$	84
$400 < s \leq 500$	16

(a) Complete the table below.

[1]

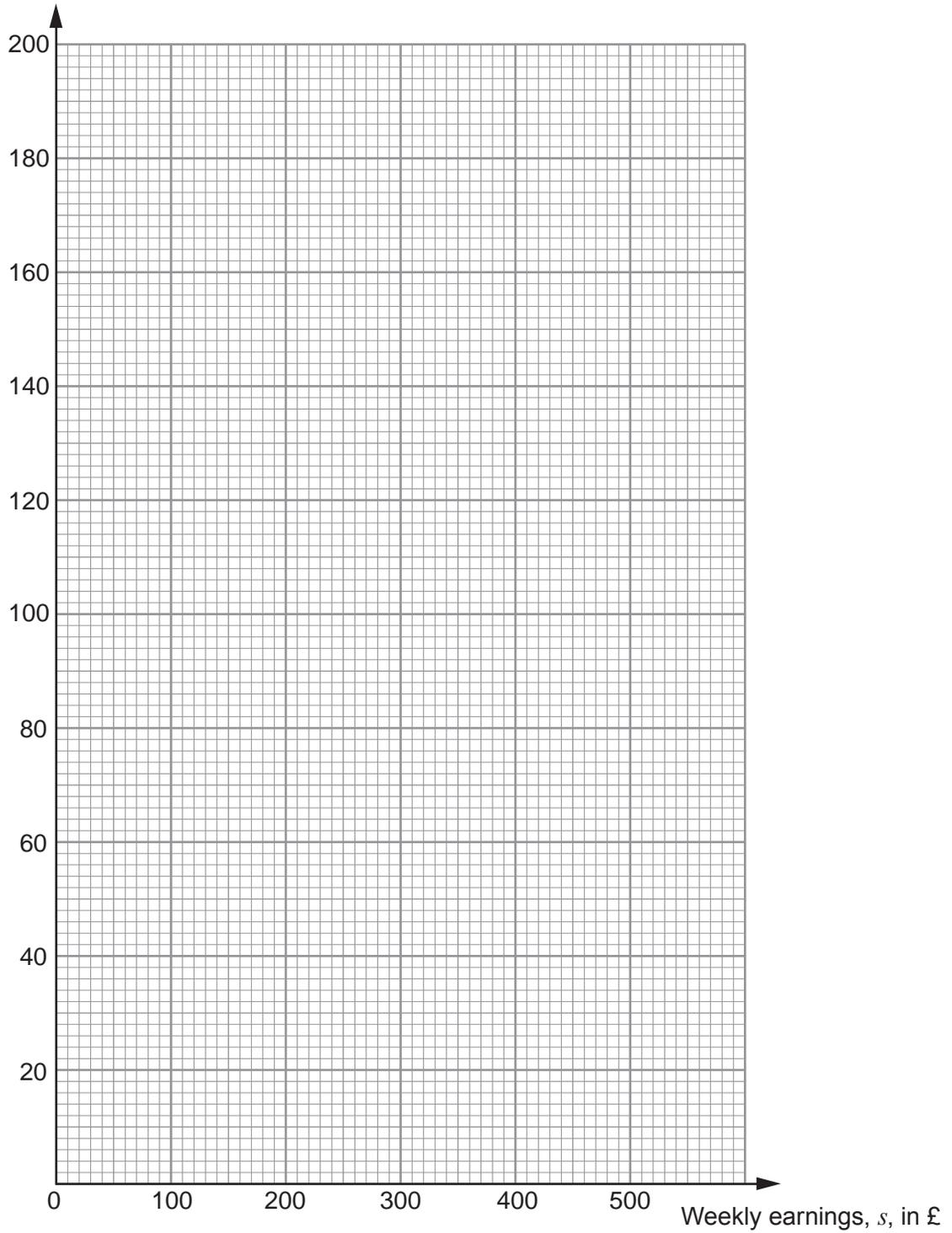
Weekly earnings, s , in £	≤ 0	≤ 100	≤ 200	≤ 300	≤ 400	≤ 500
Cumulative frequency	0					



(b) Draw a cumulative frequency graph showing the earnings of the 200 workers. [3]

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only

Cumulative frequency



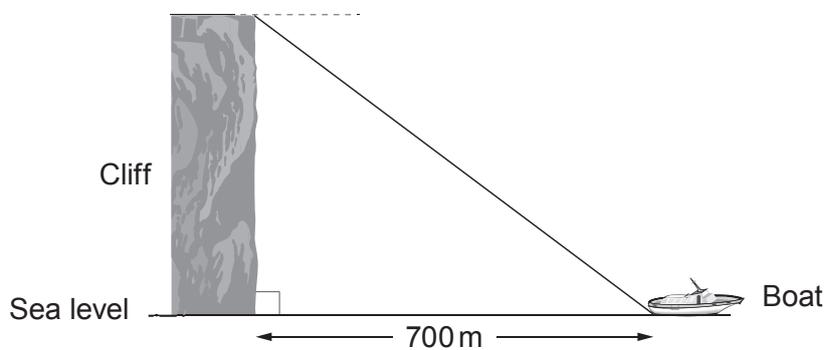
(c) Estimate the number of workers whose weekly earnings were more than £250. [2]

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13. From the top of a vertical cliff, the angle of depression of a sailing boat is 15° . If the sailing boat is 700 m from the base of the cliff, calculate the height of the cliff above sea level. [4]



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14. (a) Use the graph paper on the opposite page to draw the graph of $y = x^2 - 2x$ for values of x from -2 to 4 . [3]

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- (b) Solve the equation $x^2 - 2x = 0$. [1]

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

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15. In a shot put event, competitors throw the shot from the throwing circle into a landing area. The landing area is part of a sector of a circle of radius 25 m, with its centre at the centre point of the throwing circle. The sector angle is 35° . A diagram of the throwing circle and landing area is shown below.

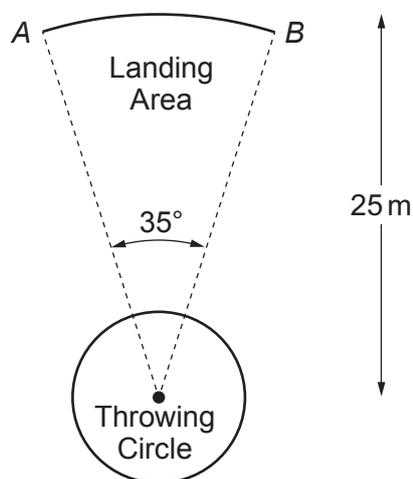


Diagram not drawn to scale

Calculate the length of the arc AB .

[2]

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16. Given that p is inversely proportional to r^2 , and that $p = 6$ when $r = 3$, find an expression for p in terms of r . [3]

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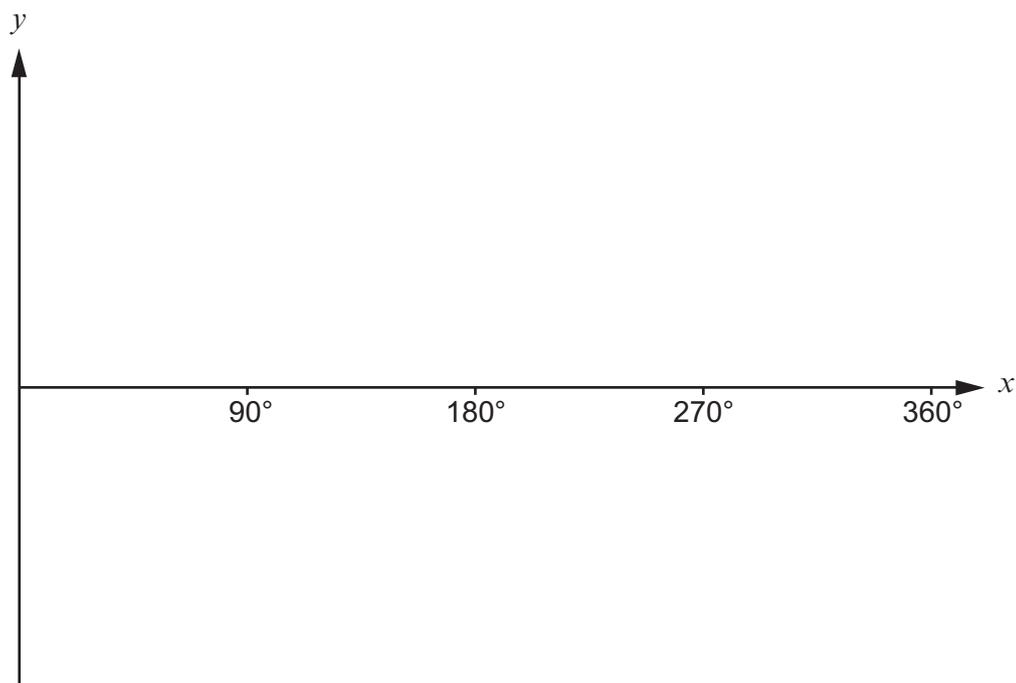
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19. (a) On the axes below, sketch the graph of $y = \tan x$, for values of x from 0° to 360° . [2]



- (b) Find all the solutions of the following equation in the range 0° to 360° . [2]

$$\tan x = -2$$

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