

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4353/02

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

A.M. THURSDAY, 17 January 2013

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  $\pi$  as 3.14 or use the  $\pi$  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.

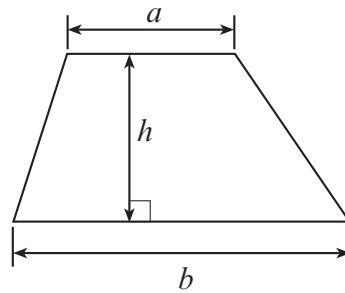
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 6.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	5	
3	5	
4	2	
5	4	
6	9	
7	6	
8	5	
9	6	
10	4	
11	4	
12	3	
13	8	
14	10	
15	5	
16	7	
17	2	
<b>TOTAL MARK</b>		

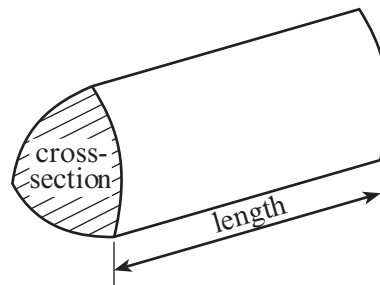


### Formula List

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

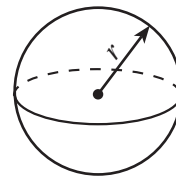


**Volume of prism** = area of cross-section  $\times$  length



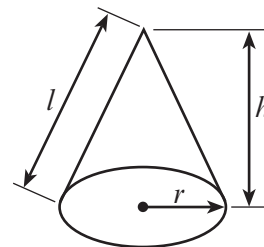
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

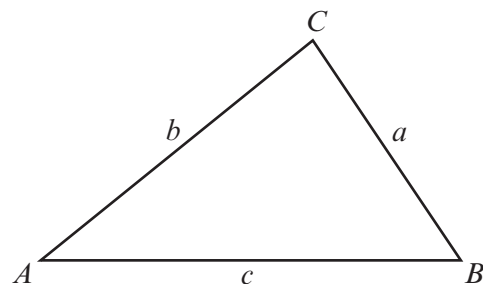


**In any triangle ABC**

**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

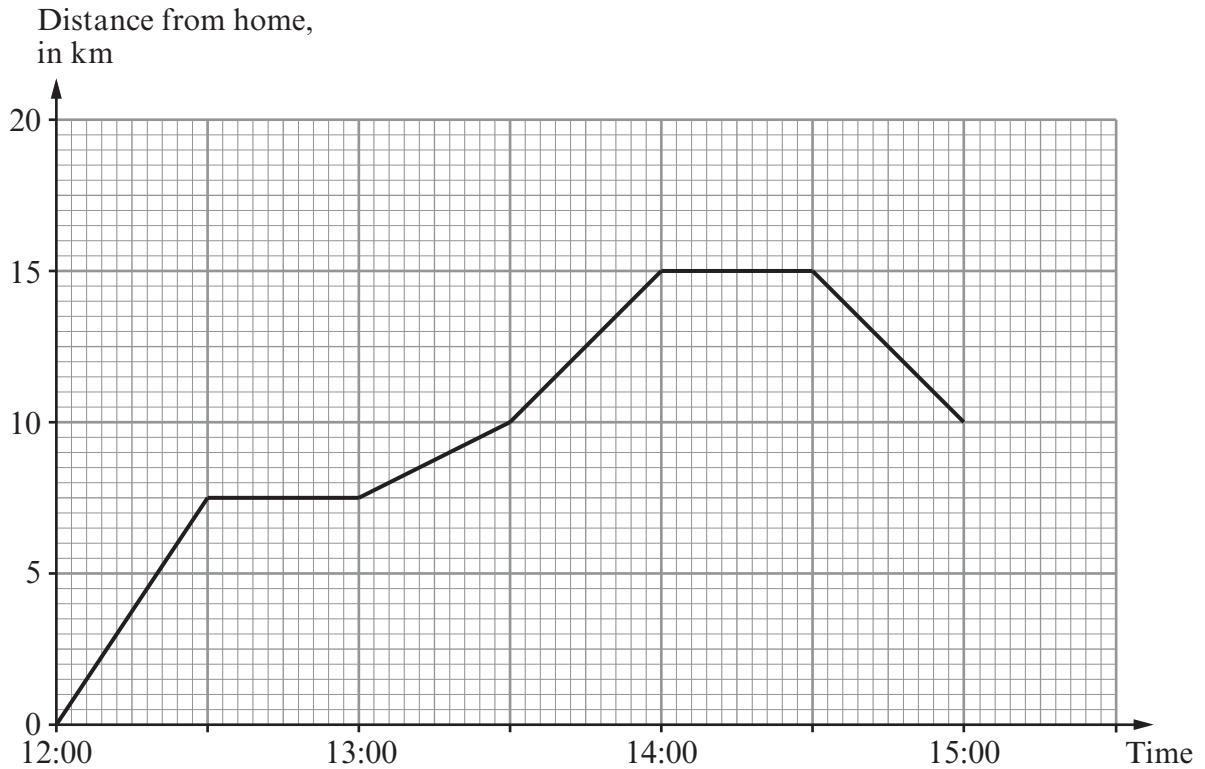
The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$  are given by

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



1. The travel graph below represents Scot's bike ride, starting from home.



(a) Between which two times was Scot furthest away from home?

Between ..... and .....

[1]

(b) Scot started his bike ride at 12:00.  
 He has a cycle computer that shows the distance he rides.  
 He had two half-hour rests, but otherwise kept on cycling.  
 He set his cycle computer to zero when he left home.  
 What distance did his cycle computer show at 15:00?

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[1]

(c) What was Scot's average speed between 13:00 and 13:30?  
 You must give the units of your answer.

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[3]



2. A tile maker needs to make an accurate drawing of a regular hexagon.  
The length of each side of the hexagon is 4 cm.  
Draw the hexagon accurately below.  
You must mark on your drawing the size of each angle.

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[5]





4. Toby and his sister share £42.21 in the ratio of 1 : 6.  
Calculate how much each of them will receive.

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[2]

5. A solution to the equation  $x^3 + 2x - 25 = 0$  lies between 2 and 3.  
Find this solution correct to 1 decimal place.

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[4]





7. Factorise each of the following expressions.

(a)  $6x^3 - 12x^2$

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..... [2]

(b)  $x^2 - x - 42$

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..... [2]

(c)  $15x^2 + 31x + 14$

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..... [2]





8. (a) Solve  $2x + 5 = 5(x + 1)$ .

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[2]

(b) Solve  $\frac{1}{3}(2x + 3) + 4x = 8$ .

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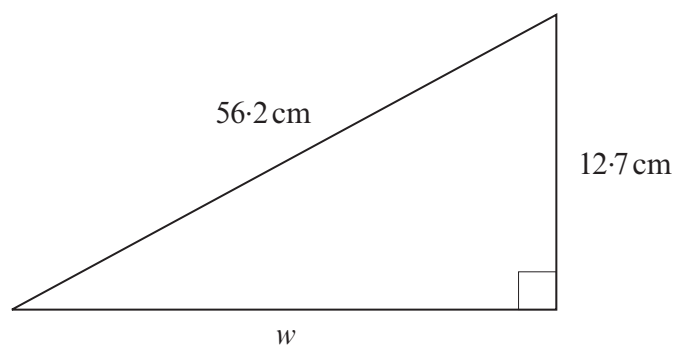
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9. (a)



*Diagram not drawn to scale*

Calculate the length  $w$ .

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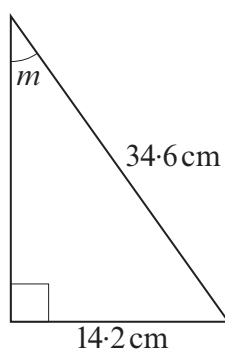
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(b)



*Diagram not drawn to scale*

Calculate the size of angle  $m$ .

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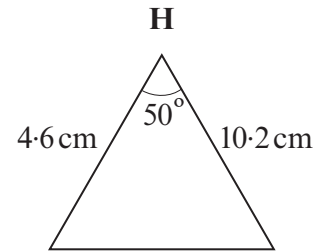
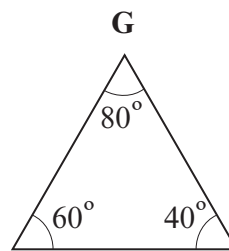
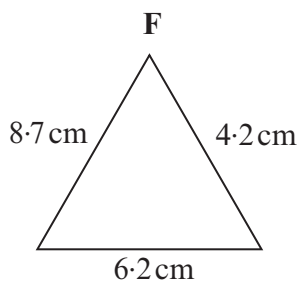
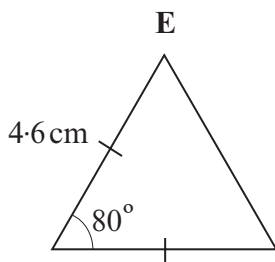
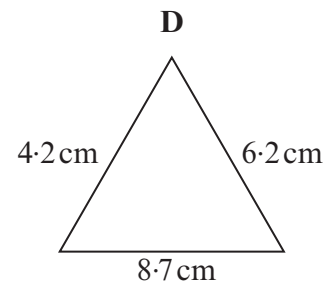
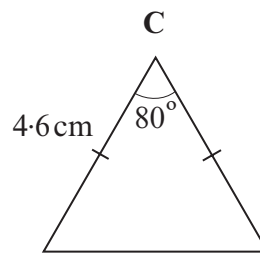
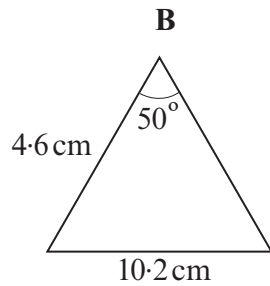
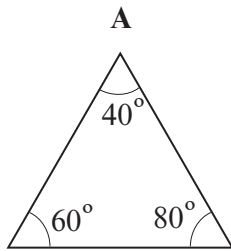
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11. Select two different pairs of congruent triangles from the diagrams below.  
Give a reason why each of the pairs of triangles are congruent.



*Diagrams not drawn to scale*

Triangle ..... is congruent to triangle .....

Reason

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[2]

Triangle ..... is congruent to triangle .....

Reason

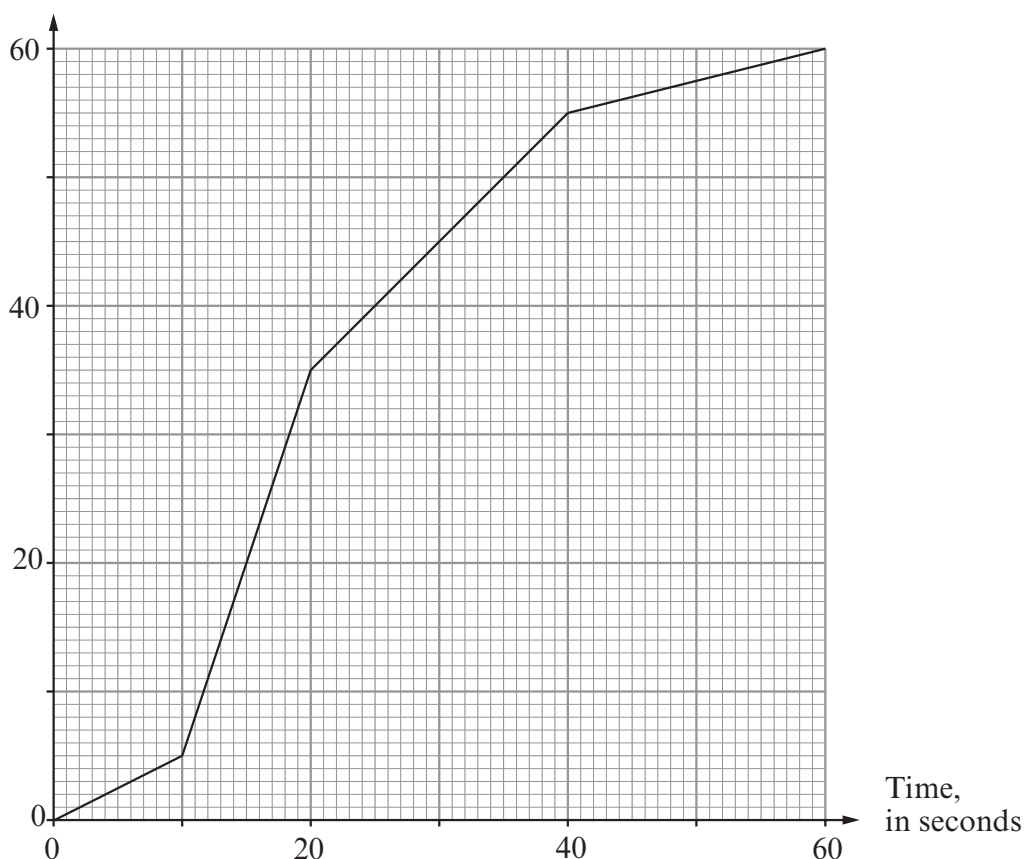
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12. A timekeeper has recorded the times taken by a number of children to complete a task. All of the children completed the task. The results are shown in the following cumulative frequency diagram.

Cumulative frequency



In order to compare with another task, the timekeeper needs to know the interquartile range.

- (a) Calculate an estimate for the interquartile range.

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[2]

- (b) The same children completed a different task of similar difficulty. The interquartile range for this task was 30 seconds. More children finished with a time closer to the median in one of the tasks. Which task was this, the first task or the second task? Give a reason for your answer.

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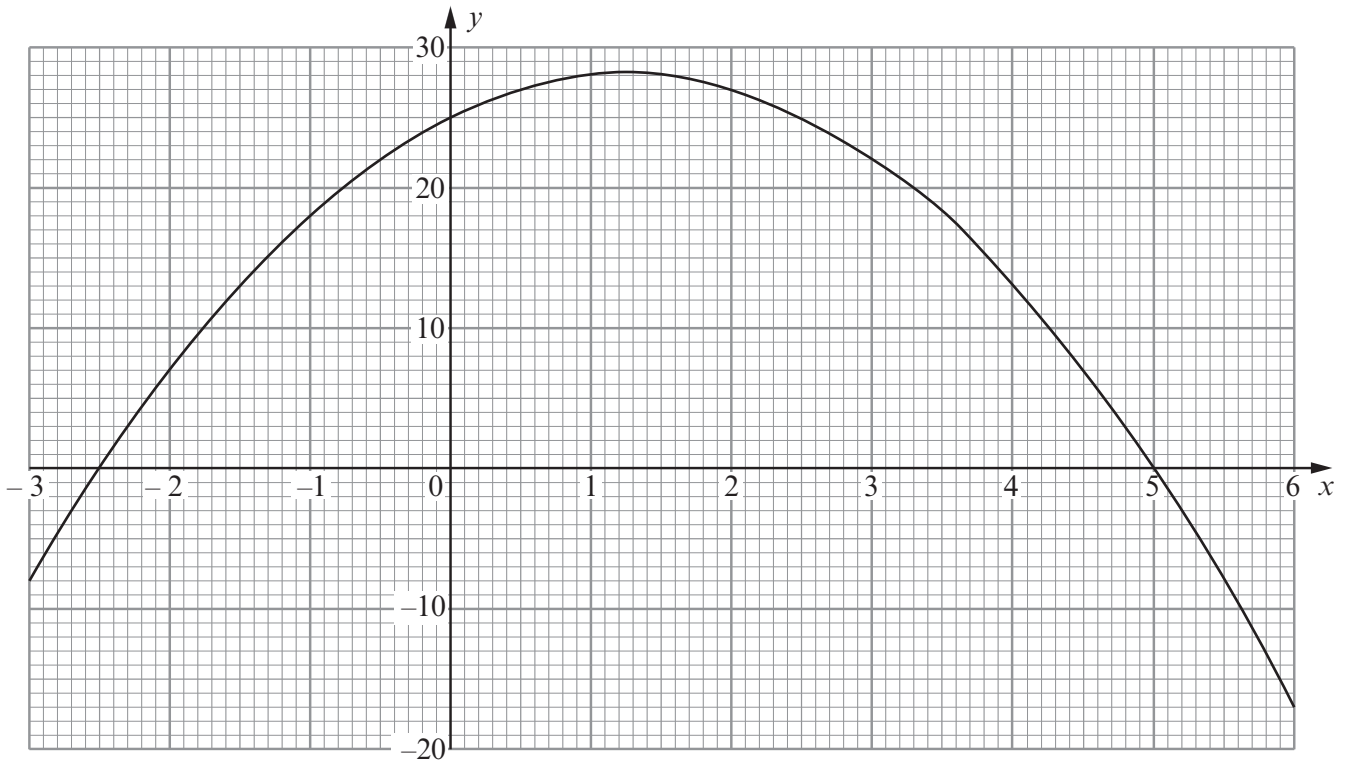
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[1]



13. The graph of  $y = -2x^2 + 5x + 25$  for values of  $x$  from  $-3$  to  $6$  is shown below.



(a) Use the graph to solve each of the following equations.

(i)  $-2x^2 + 5x + 25 = 0$

..... [1]

(ii)  $-2x^2 + 5x + 20 = 0$

.....  
 .....  
 ..... [2]





14. Fifty people took part in a charity walk.

The table shows a grouped frequency distribution of the amounts of money raised, to the nearest £.

Amount $a$ , in £	Number of people
$10 \leq a \leq 19$	2
$20 \leq a \leq 29$	18
$30 \leq a \leq 39$	29
$40 \leq a \leq 49$	1

(a) Calculate an estimate for the mean amount of money raised per person.

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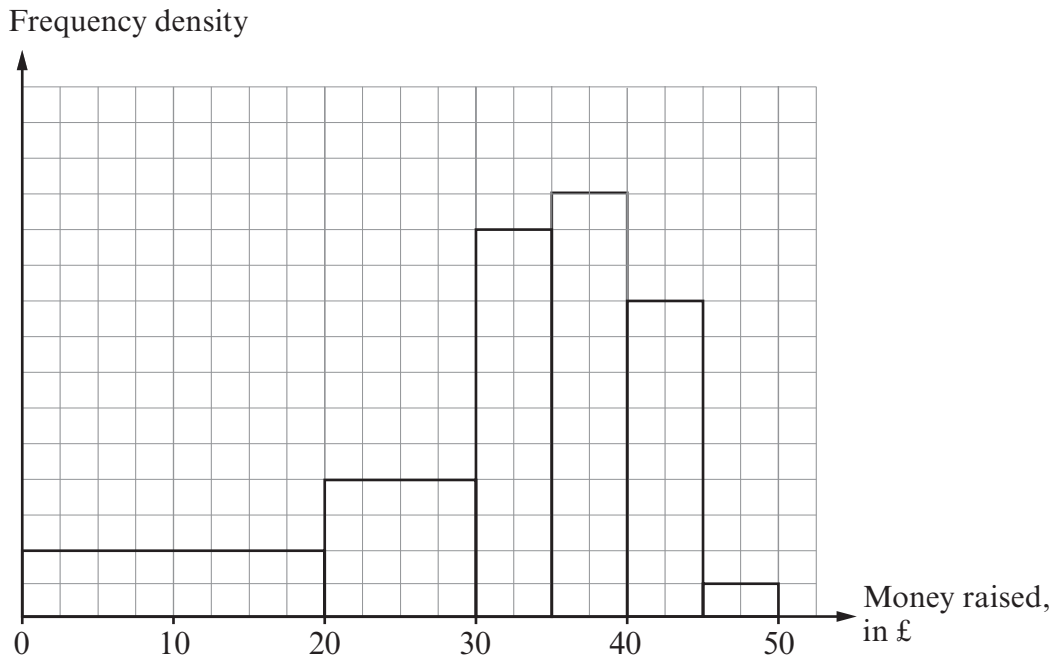
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[4]





(b) Morgan arranged a charity run to raise money. She had drawn a histogram to show the distribution of money raised from the charity run.



Morgan has forgotten to write the scale on the vertical axis. She remembers that 16 people raised £30 or less. Calculate an estimate for the total money raised.

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[6]



15. Given that  $g$  is directly proportional to  $t^2$ , and that  $g = 450$  when  $t = 7.5$ ,

(a) find an expression for  $g$  in terms of  $t$ ,

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[3]

(b) use the expression you found in (a) to complete the following table.

$g$		450	800
$t$	2.5	7.5	

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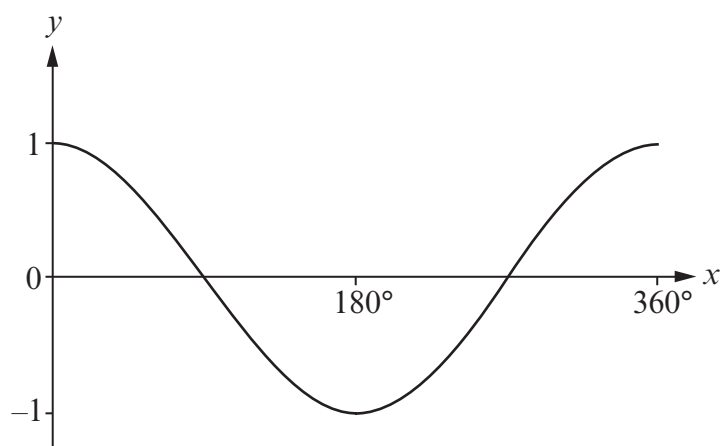
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17. The diagram shows a sketch of  $y = \cos x$  for the values of  $x$  from  $0^\circ$  to  $360^\circ$ .



Solve the equation  $\cos x = 0.342$  for all values of  $x$  from  $0^\circ$  to  $360^\circ$ .

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[2]

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