Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4370/06

MATHEMATICS – LINEAR

PAPER 2

HIGHER TIER

A.M. WEDNESDAY, 13 June 2012

2 hours

Suitable for Modified Language Candidates

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 **2***(a)*.

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

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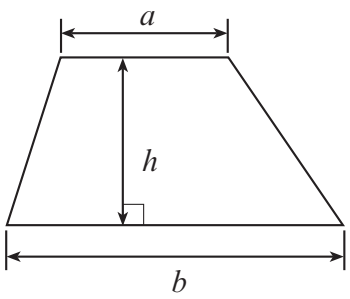
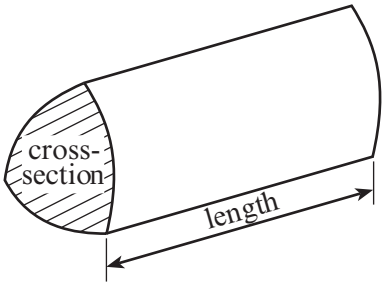
Formula List

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

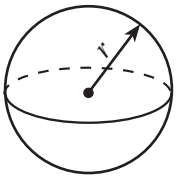


Volume of prism = area of cross-section × length



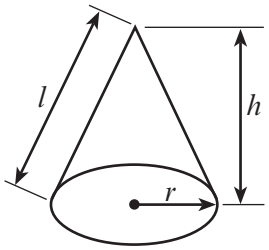
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

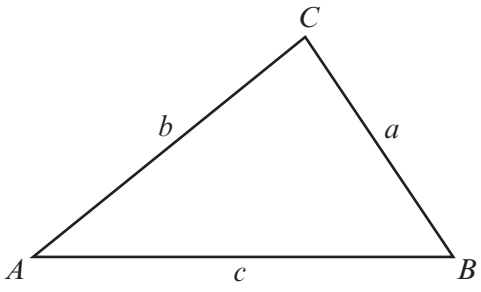


In any triangle ABC

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)* A bag contains 10 beads. 2 are red, 3 are blue and 5 are yellow.
One bead is selected at random from the bag.
Find the probability that the bead is

(i) white,

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[1]

(ii) either red or yellow.

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[1]

(b) A fair dice is thrown.
What is the probability that the top face shows a square number?

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[2]

(c) There are marbles of 6 different colours in a bag.
The table shows the probabilities of selecting the different coloured marbles from the bag.

Colour	Red	Orange	Yellow	Green	Blue	Purple
Probability	0·23	0·12	0·13		0·22	0·21

(i) Complete the entry for Green in the table.

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[2]

(ii) Which colour of marble is the mode?

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[1]

Examiner only

2. *(a)* *You will be assessed on the quality of your written communication in this part of the question.*

Valley Water Company measures the water used by a household in cubic metres.
There is a quarterly standing charge of £7.45.
The first 25 cubic metres of water used are charged at a rate of 93 pence per cubic metre.
All further water used is charged at the rate of 132 pence per cubic metre.

A household uses 46 cubic metres of water.
Calculate the quarterly water bill.

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[6]

(b) A different water company, Trevi Water, has a different scale of charges.

Trevi Water:

- Quarterly standing charge £4
- First 10 cubic metres per quarter at £1.50 per cubic metre
- All further water charged at £2 per cubic metre

A Trevi Water customer uses x cubic metres of water, where $x > 10$.
Write down, in its simplest form, an expression for the quarterly bill in pounds.

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[4]

(c) Mr and Mrs Alston recycle the water from their bath and washing machine to use in their garden.
Their meter reading on 1st April was 1678 cubic metres. On 30th June it was 1702 cubic metres. They recycled 8 cubic metres of the water used between 1st April and 30th June.
Find the percentage of the water that they recycled in the quarter.

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[3]

3. *(a)* Solve $5(2x - 7) = 75$.

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[3]

(b) Simplify $7x - 3(4x - 1)$.

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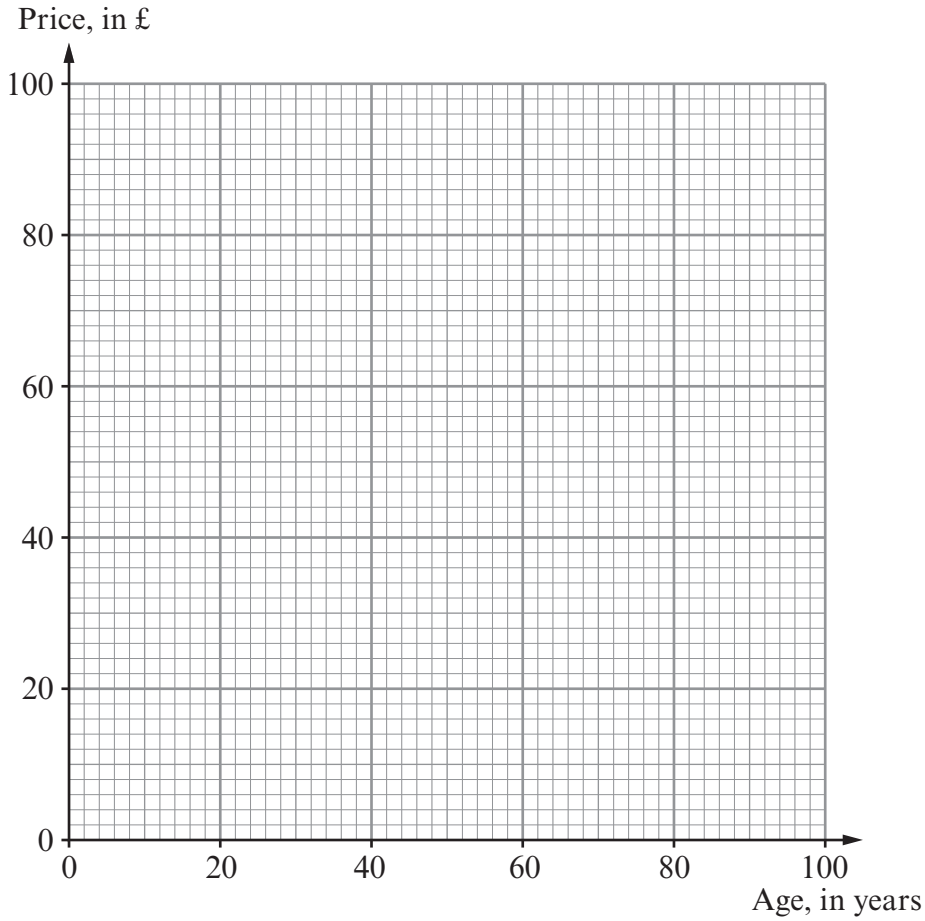
[2]

4. *(a)* The age and price of each of 10 chairs in a shop are recorded in the table.

Age, in years	26	40	70	50	46	80	66	64	70	32
Price, in £	100	60	80	70	50	40	20	50	50	30

(i) Draw a scatter diagram to display these ages and prices.

[2]



(ii) Write down the age and price of the oldest chair.

Age ..... years

Price £ .....

[2]

(iii) Does the scatter diagram indicate that there is a correlation between the age and price of the chairs? You must give a reason for your answer.

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[1]

(b) The same shop has a number of tables for sale.

Price, £x	Number of tables
$50 \leqslant x < 100$	6
$100 \leqslant x < 150$	10
$150 \leqslant x < 200$	4

Calculate an estimate for the mean price of a table.

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[4]

(c) A leather sofa costs £2400.
Each year, the value of furniture depreciates (goes down) by 18% of its value at the start of the year. At the end of two years, by how much has the value of the leather sofa depreciated?

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[4]

Examiner only

5. *(a)* Kerbstones are made in the shape of a cuboid.

The dimensions of the kerbstones are 50 cm by 20 cm by 10 cm.
All measurements are given correct to the nearest centimetre.
Calculate the greatest possible length of 200 of these kerbstones laid along a straight road.
Give your answer in metres.
Explain any assumption you have made in working out your answer. (Thoughts you have had, and **used**, in working out your answer.)

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[5]

Examiner only

(b) Concrete blocks in the shape of cuboids are made using cement, sharp sand, gravel and water. A builder's yard offers customers use of their Concrete Quantity Calculator.

Customers enter the length, width and depth of the block of concrete they want to make. The calculator then works out the quantities of cement, sharp sand, gravel and water needed.

One customer enters her measurements, length 0·5 m, width 0·2 m and depth 0·3 m for the concrete she wants to make. This is what the Concrete Quantity Calculator shows:

Concrete Quantity Calculator			
Block dimensions	Length 0·5 metres	Width 0·2 metres	Depth 0·3 metres
	Cement	**10** kg	
	Sharp sand	**18** kg	
	Gravel	**36** kg	
	Water	**5** litres	

Complete the Concrete Quantity Calculator for another customer who wants to make a block of the same type of concrete, measuring 0·6 m by 0·4 m by 0·2 m.

Concrete Quantity Calculator			
Block dimensions	Length 0·6 metres	Width 0·4 metres	Depth 0·2 metres
	Cement	**16** kg	
	Sharp sand	..... kg	
	Gravel	..... kg	
	Water	..... litres	

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[4]

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Examiner only

6.

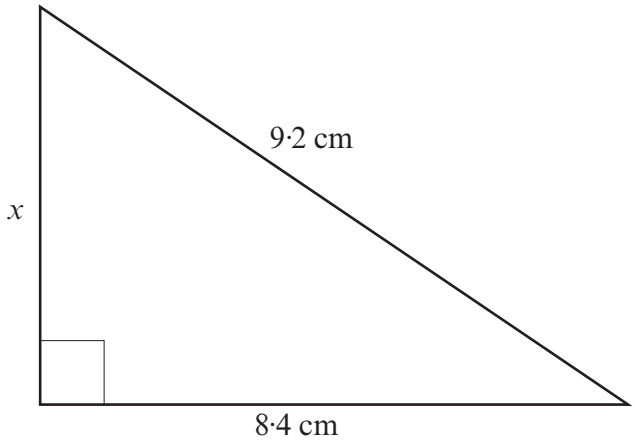

Diagram not drawn to scale

Calculate the length of the side marked x.

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[3]

7. *(a)* Write the number twenty million in standard form.

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[1]

(b) Calculate, giving your answers in standard form correct to 2 significant figures.

(i) $(4{\cdot}6 \times 10^{-7}) \times (7{\cdot}2 \times 10^{14})$

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[2]

(ii) $\dfrac{4{\cdot}56 \times 10^{3}}{9{\cdot}24 \times 10^{14}}$

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[2]

8.

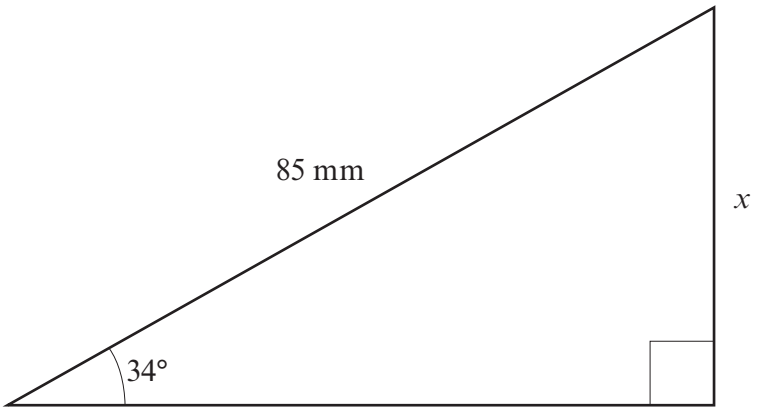

Diagram not drawn to scale

Calculate the length x to an appropriate degree of accuracy.

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[4]

9. Draw the region which satisfies **all** of the following inequalities. Use the graph paper provided.

$$x + y \leqslant 6$$
$$y \leqslant 3x + 1$$
$$y \geqslant 2$$

Make sure that you clearly indicate the region that represents your answer.

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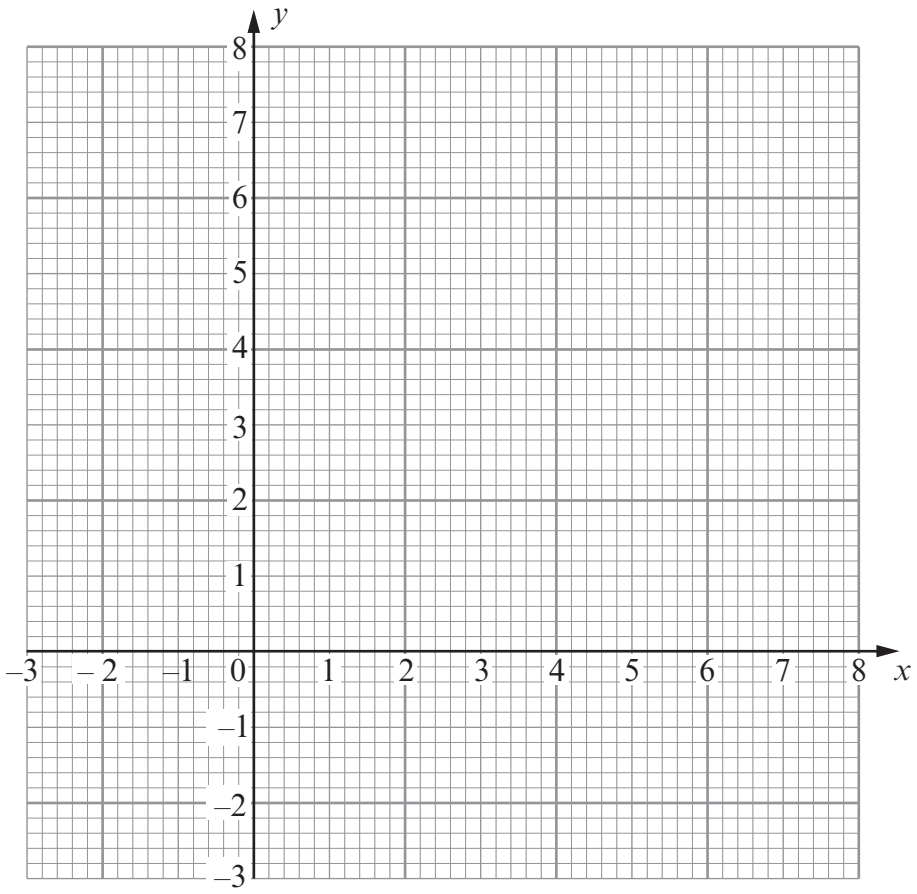
[3]



Examiner only

10. *(a)* Make g the subject of the formula.

$$3(g - 2f) = ag + 5h$$

[4]

(b) Factorise $4x^2 - 169$.

[2]

(c) Solve $3 - 2n > 4n - 9$.

[2]

(d) Solve $3x^2 + 4x - 18 = 0$. Give your answers correct to two decimal places.

[3]

Examiner only

11.

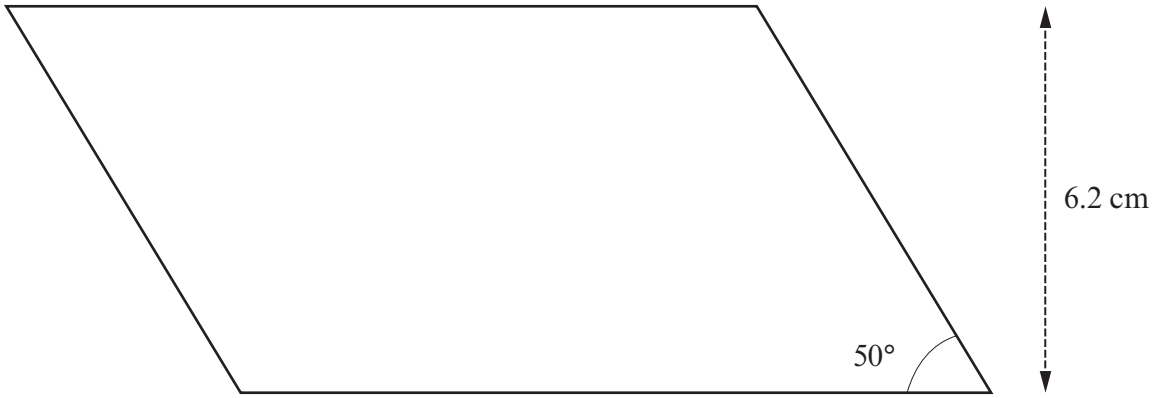


Diagram not drawn to scale

The diagram shows a parallelogram with a base of length 13·8 cm, a perpendicular height of 6·2 cm and one interior angle of 50°. Calculate the perimeter of the parallelogram.

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[5]

Examiner only

12. Given that y is inversely proportional to x^2, and that $y = 8$ when $x = 0{\cdot}5$,

(a) find an expression for y in terms of x,

[3]

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

x		0·2	0·5
y	800		8

[2]

Examiner only

13. A company manufactures two different sized boxes.
Both boxes are cuboids and are similar in shape.
The total surface area of the smaller box is 132 cm^2. The length of its longest edge is 12 cm.
The total surface area of the larger box is 297 cm^2.
Calculate the length of the longest edge of the larger box.

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[4]

Examiner only

14. The diagram below shows a sketch of a company logo.
The company needs to paint the triangle *ACD* blue.

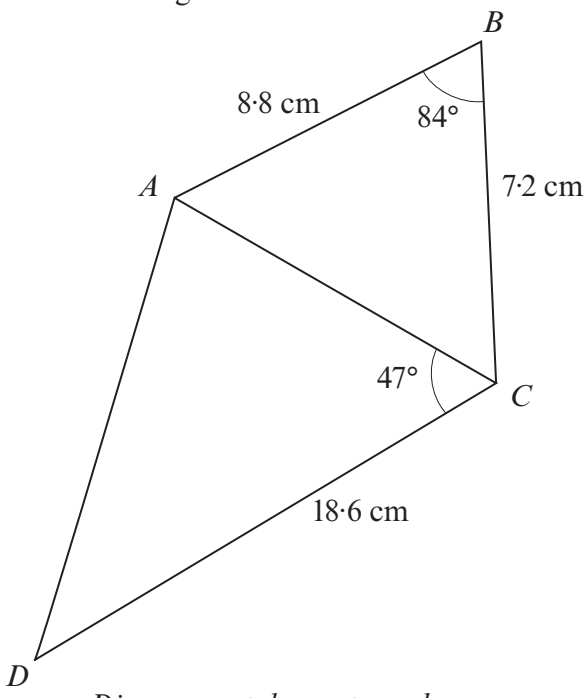


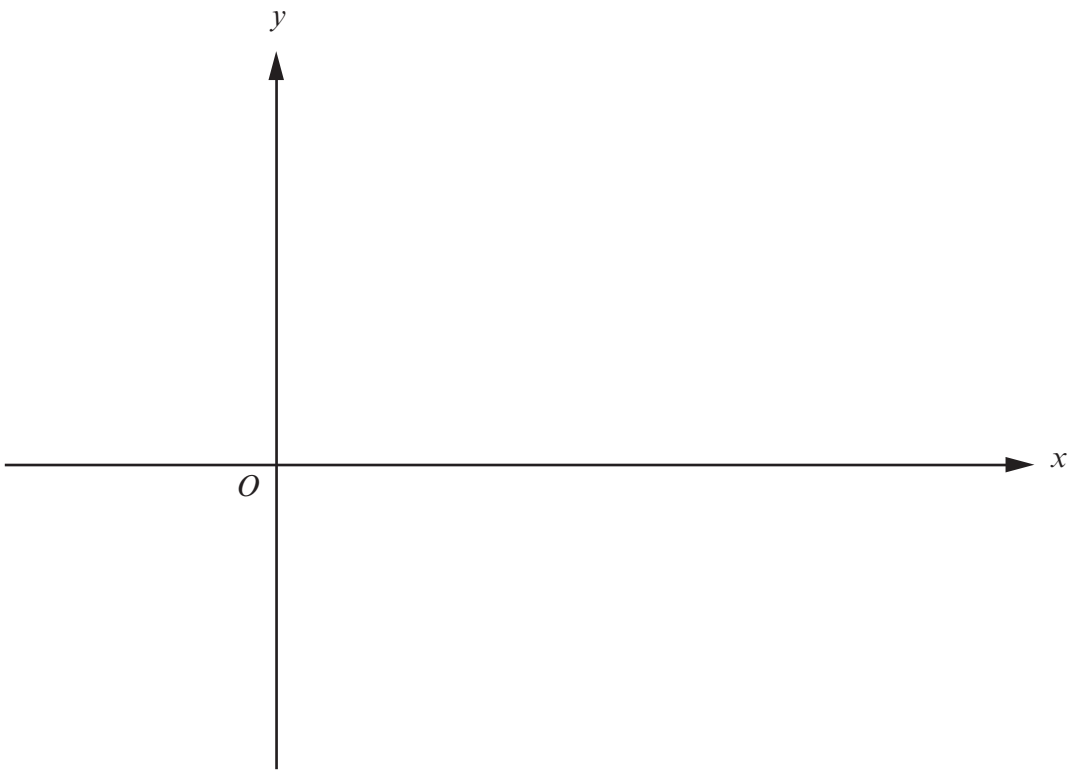
Diagram not drawn to scale

Calculate the area of the triangle *ACD*.

[6]

Examiner only

15. *(a)* **Sketch** the graph of $y = \sin x + 3$ for values of x from 0° to 360°.
Use the axes below for your graph. [2]



(b) Solve the simultaneous equations $y = 3{\cdot}5$ and $y = \sin x + 3$ for values of x from 0° to 360°.

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[3]

Examiner only

(c) Denia says that "the graph of $\sin x$ is the same as the graph of $\cos(x - 90°)$".
Explain the transformation from $y = \cos x$ to $y = \cos(x - 90°)$ and decide if Denia is correct.

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[2]

Question number	Additional page, if required. Write the question numbers in the left-hand margin

Examiner only