

**Modified Enlarged 24pt**  
**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Monday 11 November 2019 – Afternoon**

**GCSE (9–1) Mathematics**

**J560/06 Paper 6 (Higher Tier)**

**Time allowed: 1 hour 30 minutes  
plus your additional time allowance**

**YOU MUST HAVE:**

**Insert for Question 7**

**YOU MAY USE:**

**a scientific or graphical calculator**

**geometrical instruments**

**tracing paper**

**A model for Question 8**

**Please write clearly in black ink.**

**Centre number**

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**Candidate number**

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**First name(s)** \_\_\_\_\_

**Last name** \_\_\_\_\_

**READ INSTRUCTIONS OVERLEAF**



## **INSTRUCTIONS**

**Use black ink. You may use an HB pencil for graphs and diagrams.**

**Answer ALL the questions.**

**Read each question carefully before you start to write your answer.**

**Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.**

**Write your answer to each question in the space provided.**

**If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.**

## **INFORMATION**

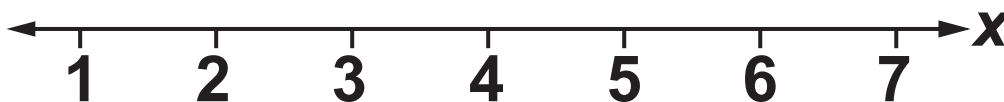
**The total mark for this paper is 100.**

**The marks for each question are shown in brackets [ ].**

**Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.**

**Answer ALL the questions.**

- 1 Solve  $3x - 5 \geq 10$ .  
Show your solution on the number  
line. [4]**



- 2 Amrit's income is 32% more than Bethan's income.  
Amrit and Bethan's combined income is £54 868.**

**Calculate Amrit's income.**

**£ \_\_\_\_\_ [5]**

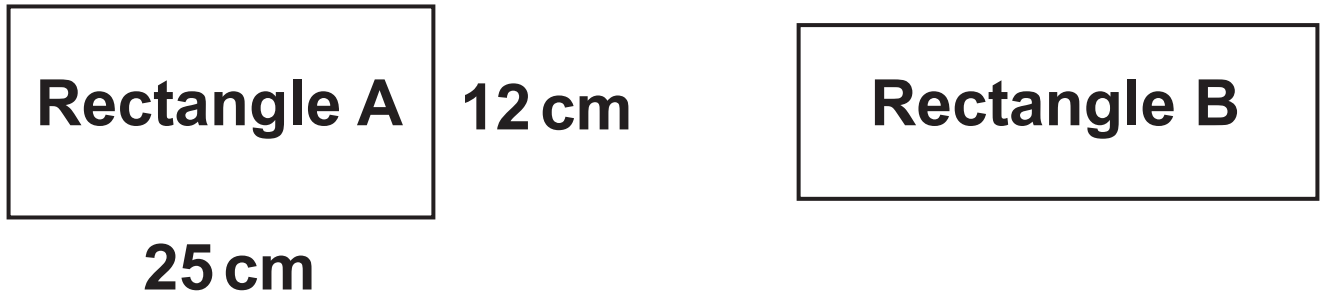
- 3 Jacob, Amelie and Reuben each roll a fair six-sided dice.  
What is the probability that all three roll a number less than 3?**

**Give your answer as a fraction in its simplest form.**

\_\_\_\_\_ **[3]**

- 4 The diagram shows two rectangles, A and B.**

**NOT TO SCALE**



**Rectangle A has a width of 25 cm and a height of 12 cm.**

**The width of rectangle B is three times the height of rectangle B.**

**The area of rectangle A is equal to the area of rectangle B.**

**Find the perimeter of rectangle B.**

\_\_\_\_\_ cm [5]

- 5 Kay invests £1500 in an account paying 3% COMPOUND interest per year.  
Neil invests £1500 in an account paying  $r\%$  SIMPLE interest per year.**

**At the end of the 5th year, Kay and Neil's accounts both contain the same amount of money.**

**Calculate  $r$ .**

**Give your answer correct to 1 decimal place.**



$$r = \frac{\quad}{9} \quad [6]$$

- 6 The table shows the children nominated to win the subject prize in Mathematics and the subject prize in English.**

<b>Mathematics</b>	<b>English</b>
<b>Alice</b>	<b>Alice</b>
<b>Ben</b>	<b>Claire</b>
<b>Emma</b>	<b>Gabi</b>
<b>Paddy</b>	<b>Simon</b>

**The winner of each subject prize is picked at random.  
It is possible for Alice to win both prizes.**

**In what percentage of the combinations of prize winners does Alice win AT LEAST one prize?**

\_\_\_\_\_ % [4]

- 7 (a) Complete the table for  $y = x^2 - 4x + 1$ . [2]

$x$	-1	0	1	2	3	4	5
$y$		1			-2		6

- (b) In the insert draw the graph of  $y = x^2 - 4x + 1$  for  $-1 \leq x \leq 5$ . [3]

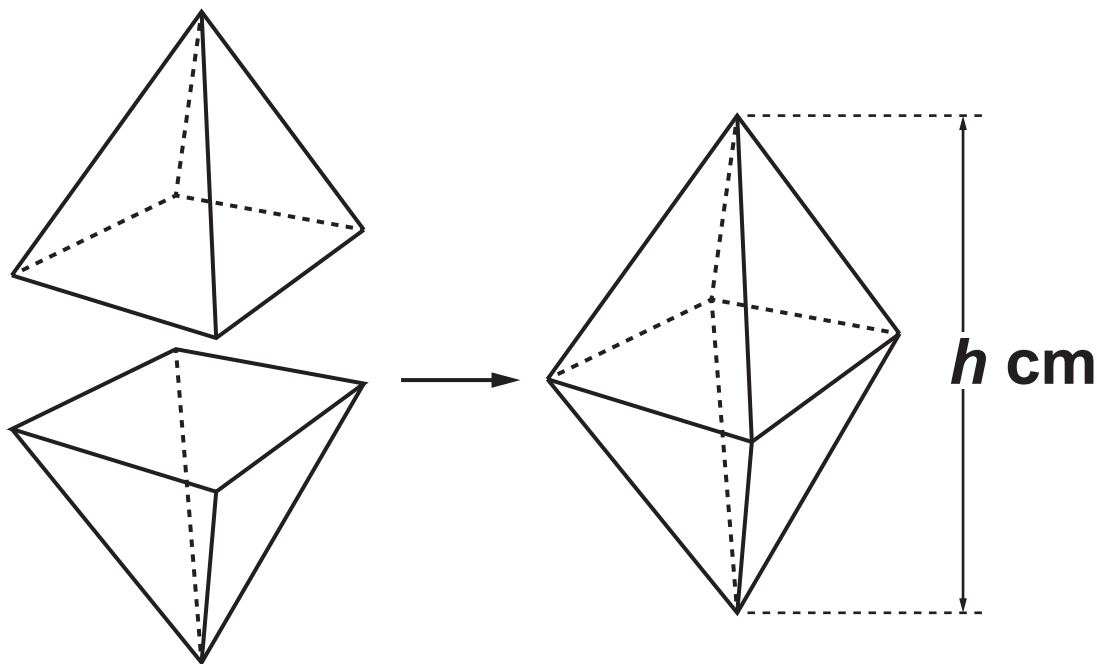
- (c) On the same grid in the insert, draw the graph of  $y = 2x - 6$  for  $-1 \leq x \leq 5$ . [3]

**(d) Use your graphs to solve the equation  $x^2 - 4x + 1 = 2x - 6$ .**

**Give your answers to 1 decimal place.**

**(d)  $x =$  \_\_\_\_\_ or  $x =$  \_\_\_\_\_ [2]**

- 8 An octahedron is formed from two identical square based pyramids. The square bases are stuck together as shown. You may use models to help you.**



**The volume of the octahedron is  $60 \text{ cm}^3$ .  
The length of the side of each pyramid's square base is 5 cm.**

**Work out the height  $h$  cm of the OCTAHEDRON.**

**[The volume of a pyramid is**

**$\frac{1}{3} \times \text{area of base} \times \text{perpendicular height}$ ]**

***h* = \_\_\_\_\_ cm [4]**

9 Vector  $\mathbf{a} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$  and vector  $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ .

(a) Find the values of  $k$  and  $n$  so that

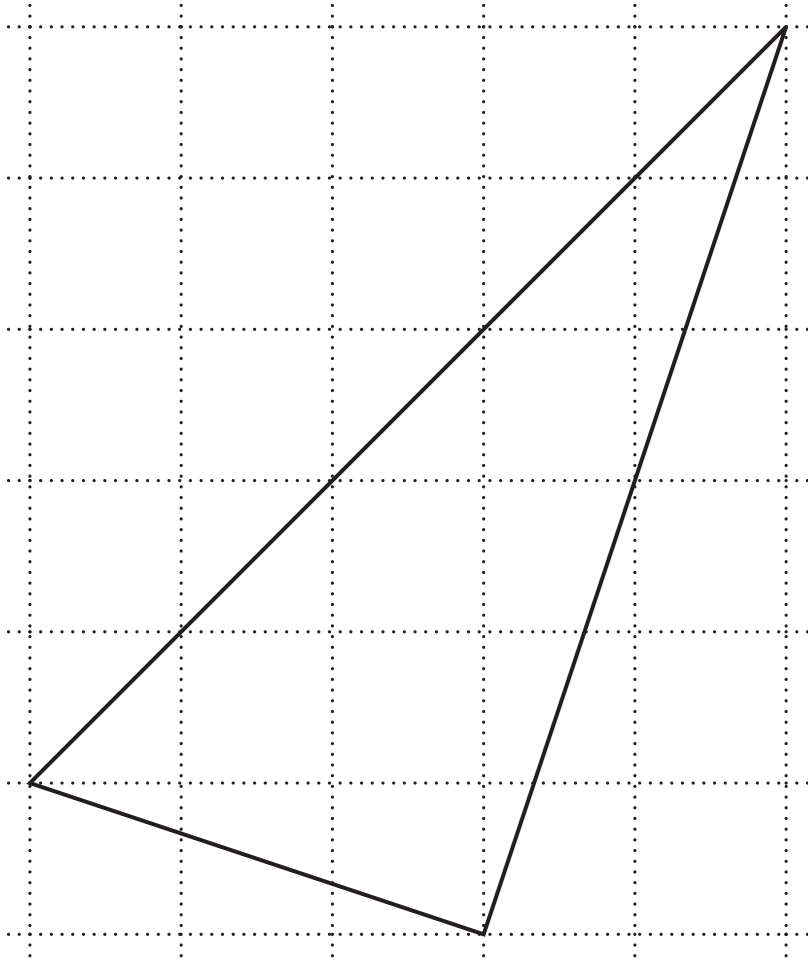
$$k(\mathbf{a} + \mathbf{b}) = \begin{pmatrix} 10 \\ n \end{pmatrix}.$$

(a)  $k =$  \_\_\_\_\_

$n =$  \_\_\_\_\_ [3]

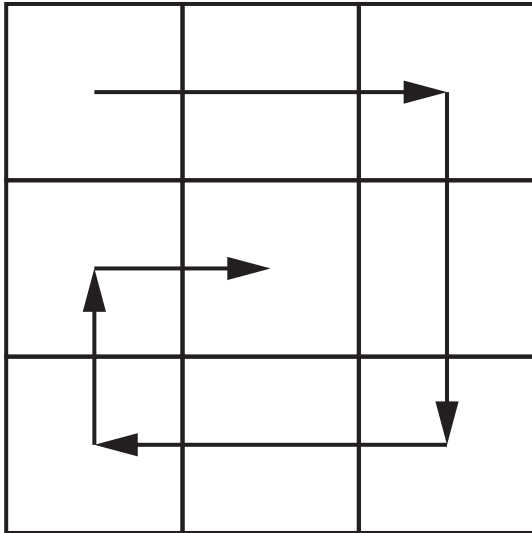


**(b) Gavin starts to draw a diagram to show that  $a + 2b = \begin{pmatrix} 5 \\ 5 \end{pmatrix}$ .**



**Complete Gavin's diagram. [3]**

- 10** Nine consecutive numbers are written on a 3-by-3 grid. They are arranged, in ascending order, in a spiral as shown.



- (a)** Karen writes the numbers 3 to 11 on her grid.

3	4	5
10	11	6
9	8	7

The total of the first column is  
 $3 + 10 + 9 = 22$ .

**Karen says**

**The total of the first column is one less than the total of the second column.**

**Show that this is correct for Karen's grid. [1]**

**(b) Victor says**

**If ANY nine consecutive numbers are arranged in ascending order in this spiral on a 3-by-3 grid, the total of the first column will ALWAYS be one less than the total of the second column.**

**Prove that Victor is correct. [5]**

**11 A sequence is defined by the rule**  
 **$u_{n+1} = 5u_n - 15$ .**

**(a) If  $u_3 = 6$ , calculate**

**(i)  $u_5$**

**(a)(i)  $u_5 =$  \_\_\_\_\_ [3]**

(ii)  $u_2$

(ii)  $u_2 =$  \_\_\_\_\_ [3]

**(b) Trevor says**

**If  $u_1 = 3.75$  then  $u_{100} = 3.75$**

**Show that Trevor is correct. [2]**

**12 (a) Arron ran a distance of 5 km at an average speed of 2.2 m/s.**

**How long did Arron run for?  
Give your answer in minutes and seconds, to the nearest second.**

**(a) \_\_\_\_\_ minutes \_\_\_\_\_ seconds [4]**



**(b) Claudine cycled a distance of 53 km in 2.7 hours.**

**The distance is measured correct to the nearest km.**

**The time is given correct to 1 decimal place.**

**Calculate the lower and upper bounds of her average speed.**

**Give your answers correct to 2 decimal places.**

**(b) lower bound = \_\_\_\_\_ km/h**

**upper bound = \_\_\_\_\_ km/h [6]**

**13 Dani has a pack of 45 cards.  
Each card is either red or black.**

**One-third of the cards in the pack are  
RED.**

**She picks two cards from the pack,  
without replacement.**

**Calculate the probability that Dani picks  
two BLACK cards.**

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**[5]**

**14 Write  $(\sqrt[4]{8})^5$  as a power of 2.**

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**[3]**

**15 The histogram opposite shows information about the weights of some of the parcels handled by a delivery company in one month.**

**(a) Zoe says**

**There are fewer parcels weighing between 450g and 700g than parcels weighing between 300g and 450g.**

**Is Zoe correct?  
Show how you decide.**

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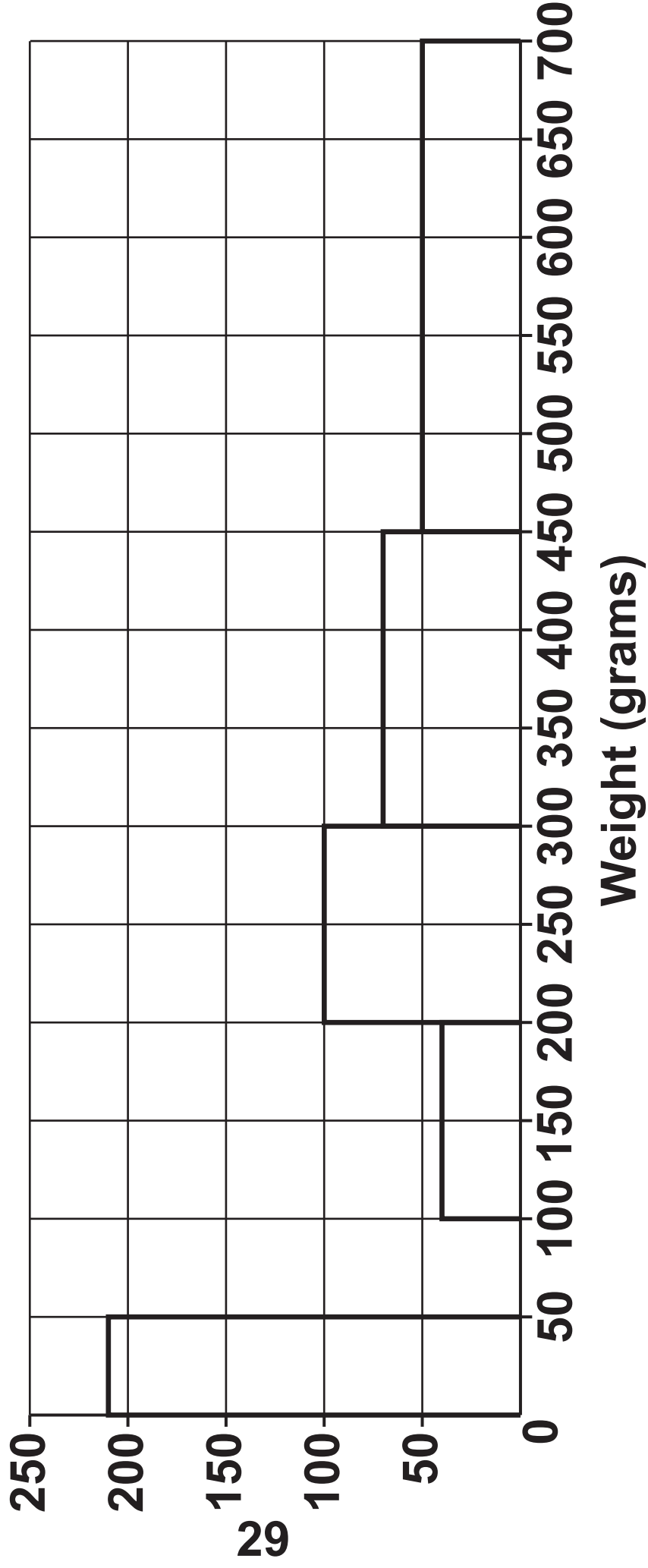
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**[4]**

Frequency  
density



- (b) The delivery company delivered 6500 parcels weighing between 50 g and 100 g.**

**Complete the histogram to show this information. [2]**

- (c) Zoe uses the histogram to calculate the number of parcels weighing between 200 g and 250 g.**

**Explain why Zoe's answer is unlikely to be reliable.**

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**[1]**

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16 (a) In the diagram,

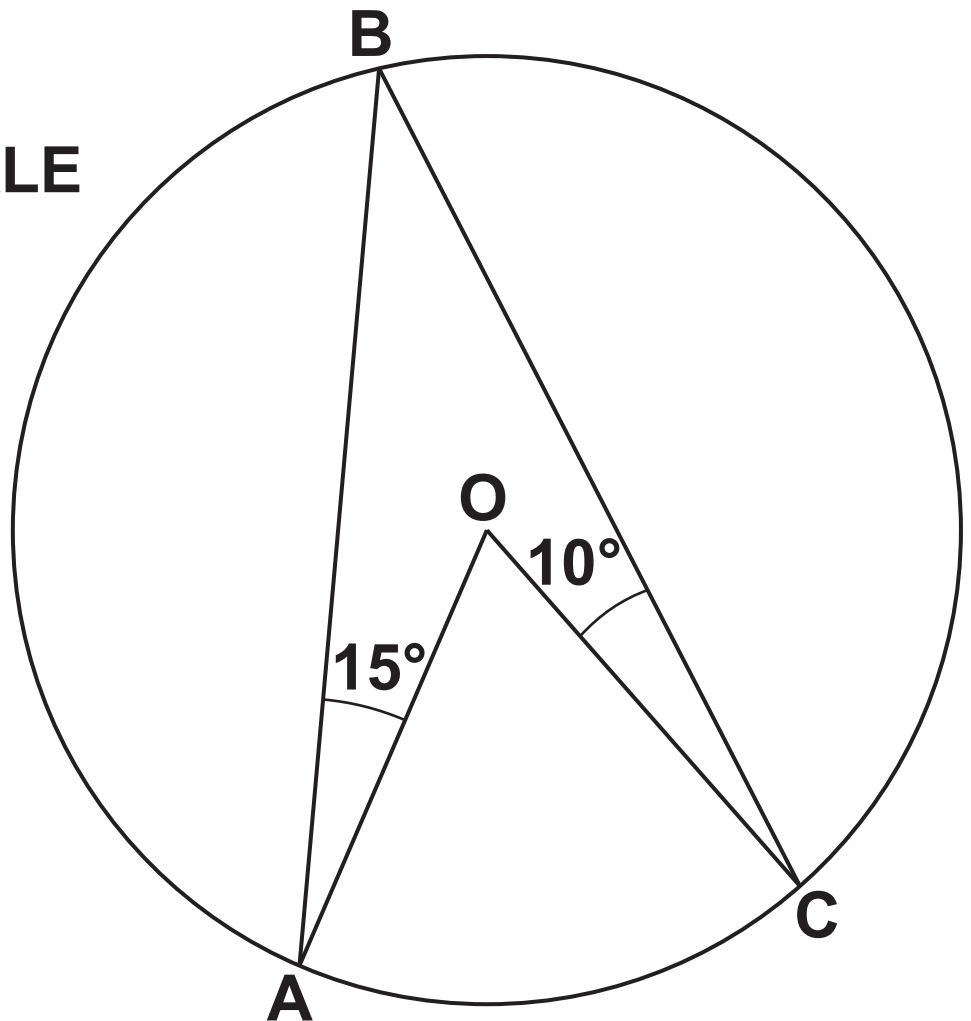
A, B and C are points on the  
circumference of a circle

O is the centre of the circle

angle  $OAB = 15^\circ$

angle  $BCO = 10^\circ$ .

NOT TO SCALE





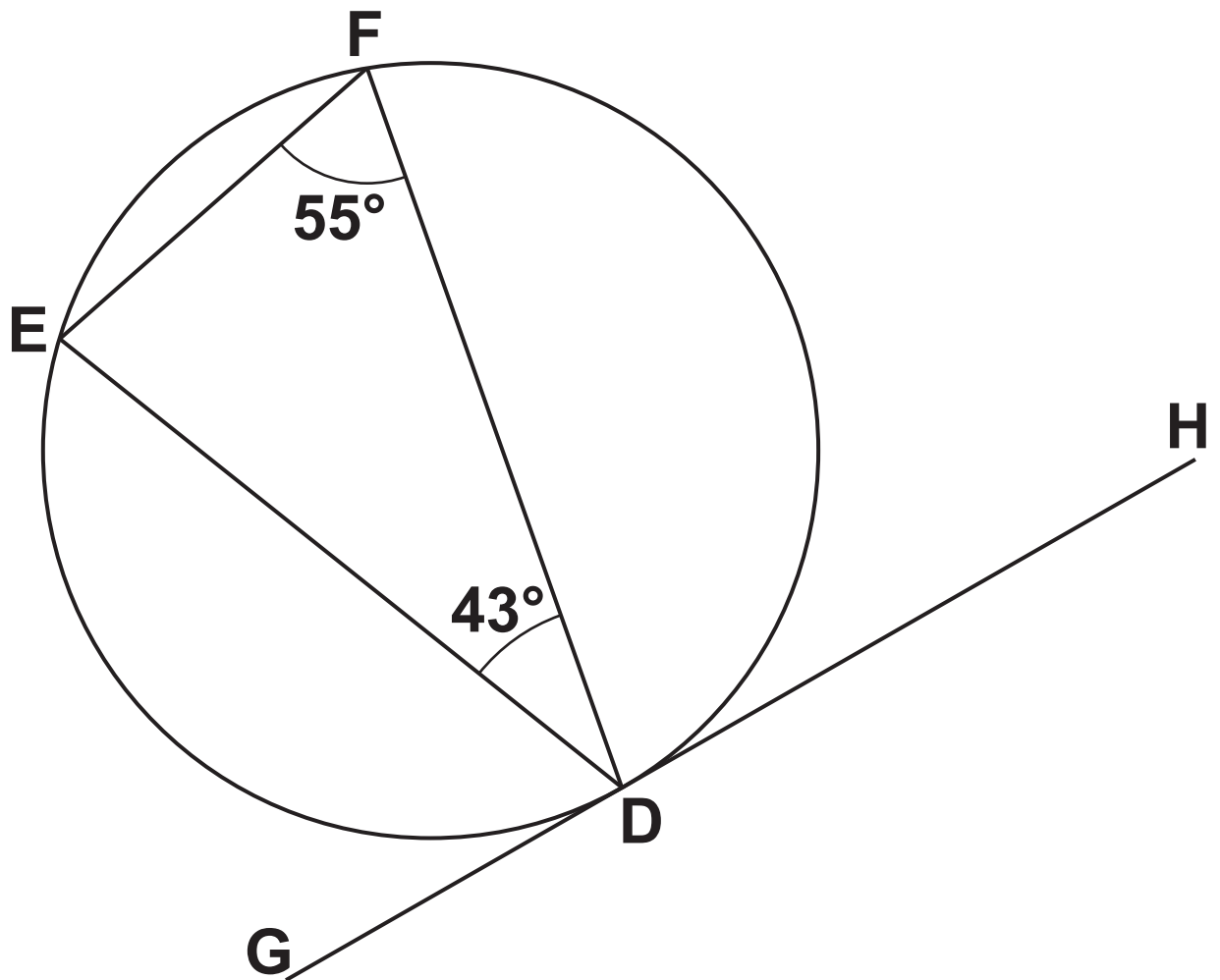
**Calculate the acute angle AOC.**

**(a) \_\_\_\_\_ ° [4]**

**(b) In the diagram,**

**E, F and D are points on the  
circumference of the circle  
G, D and H lie on a tangent to the  
circle  
angle  $EFD = 55^\circ$   
angle  $FDE = 43^\circ$ .**

**NOT TO SCALE**



**Explain why angle HDF is  $82^\circ$ .**

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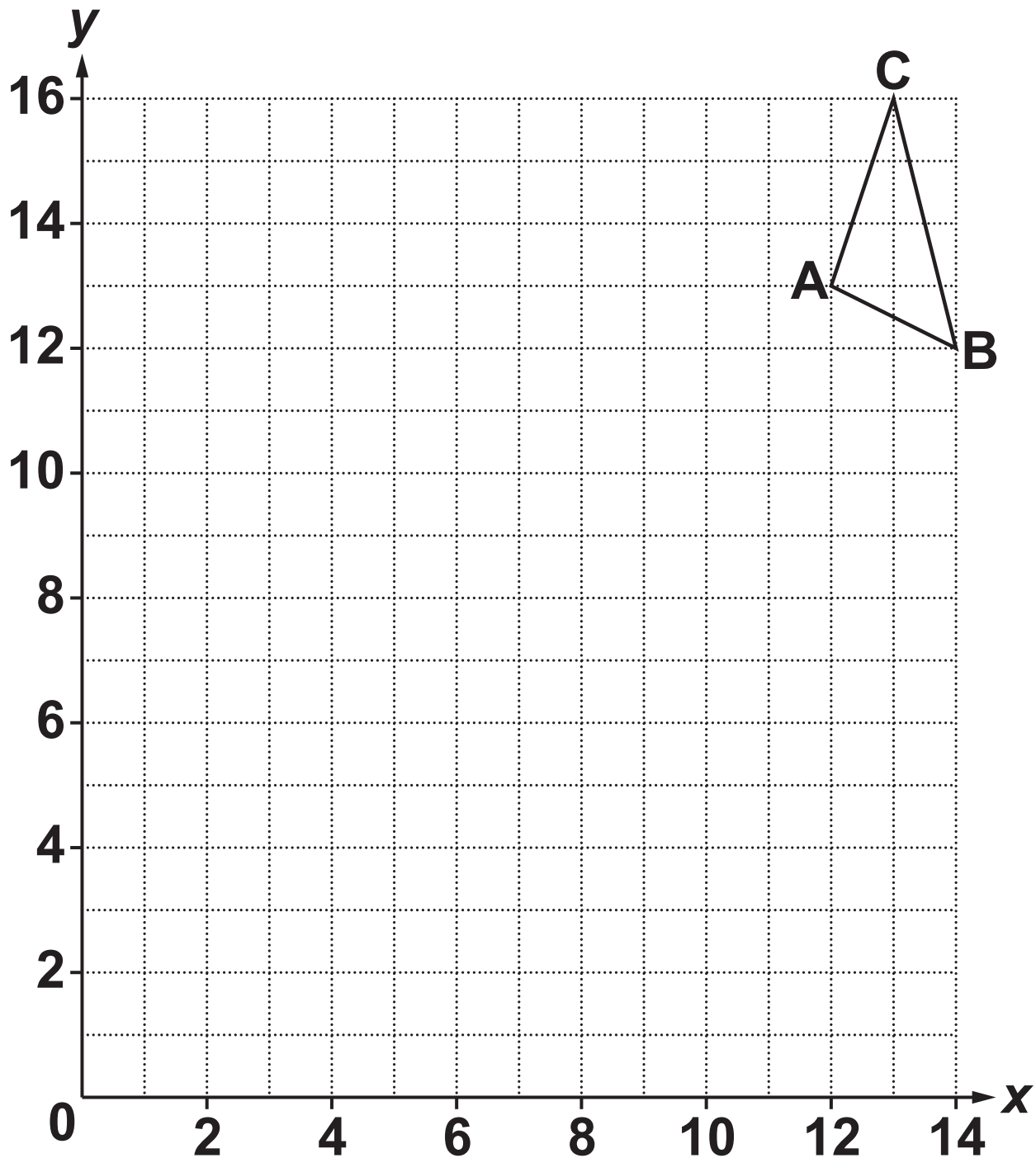
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**[4]**

**17 A triangle has vertices A, B and C.**



**The triangle is enlarged with scale factor  $f$  and centre of enlargement E.**

**Vertex A maps to (6, 7).**

**Vertex B maps to (2, 9).**

**(a) Find the coordinates of the centre of enlargement,  $E$ .**

**(a) ( \_\_\_\_\_ , \_\_\_\_\_ ) [2]**

**(b) Find the scale factor,  $f$ .**

**(b) \_\_\_\_\_ [2]**

**(c) Vertex C maps to the point R.  
Find the coordinates of R.**

**(c) ( \_\_\_\_\_ , \_\_\_\_\_ ) [2]**

**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

**If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).**





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