

A

AQA 

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

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I declare this is my own work.

GCSE

H

MATHEMATICS

Higher Tier Paper 3 Calculator

8300/3H

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

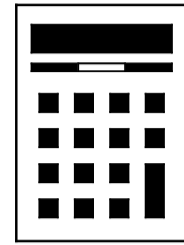
[Turn over]



J U N 2 1 8 3 0 0 3 H 0 1

For this paper you must have:

- **a calculator**
- **mathematical instruments.**



INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**



INFORMATION

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.**

ADVICE

In all calculations, show clearly how you work out your answer.

**DO NOT TURN OVER UNTIL TOLD
TO DO SO**



Answer ALL questions in the spaces provided.

1 b is 3 more than the square root of a .

Circle the correct equation. [1 mark]

$$b = \sqrt{a} + 3$$

$$b = \sqrt{a} - 3$$

$$b = \sqrt{a + 3}$$

$$b = \sqrt{a - 3}$$

2 Circle the largest number. [1 mark]

0.5̇

0.55

0.545

0.54̇5̇



3 A line has equation $3y = 3x - 2$

Circle the coordinates of the intercept of the line with the y -axis. [1 mark]

$$(0, 1)$$

$$(0, -1)$$

$$\left(0, \frac{2}{3}\right)$$

$$\left(0, -\frac{2}{3}\right)$$

4 Factorise $x^2 - 64$

Circle your answer. [1 mark]

$$(x + 8)^2$$

$$(x - 8)^2$$

$$(x + 8)(x - 8)$$

$$x(x - 64)$$

[Turn over]



**5 Six positive numbers have
a mean of 10
a range of 19**

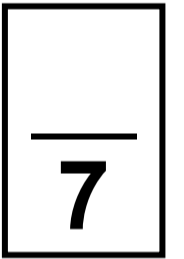
Four of the numbers are

12 7 15 3

**Work out the other two numbers.
[3 marks]**

Answer _____ **and** _____

[Turn over]



6 At a country park there is a house, a museum and a garden.

The table shows the prices per person to visit the park.

	Price per person
Garden only	Free
House and museum	£12.50
House only	£8
Museum only	£7

One day, 480 people visit the park.

67 visit the garden ONLY.

40% visit the house AND the museum.

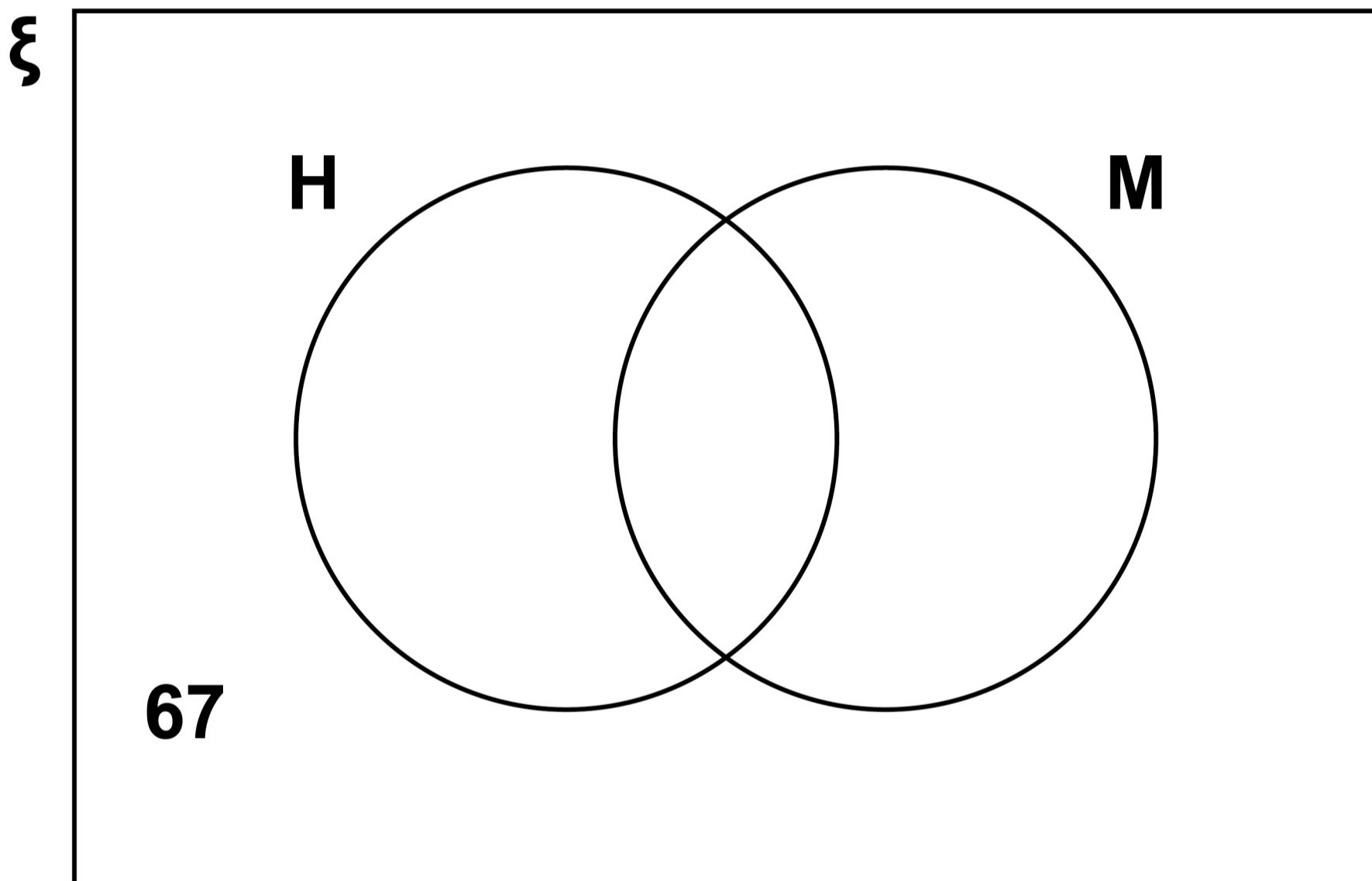
$\frac{3}{8}$ visit the house ONLY.

The rest visit the museum ONLY.



In total, how much do the 480 people pay to visit the park?

You may use the Venn diagram to help you. [5 marks]

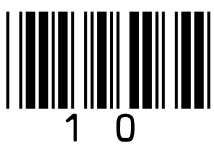


[Turn over]



10

Answer £ _____



**7 Jeff and Kaz share £270 in the ratio
Jeff : Kaz = 2.6 : 1**

**How much MORE than Kaz does Jeff
get? [3 marks]**

Answer £ _____

[Turn over]



8 The heel of a shoe exerts a pressure of 198 pounds per square inch.

Convert this pressure into kilograms per square centimetre.

Use

1 pound = 0.45 kilograms

1 square inch = 6.25 square centimetres

[3 marks]



13

Answer _____ **kg/cm²**

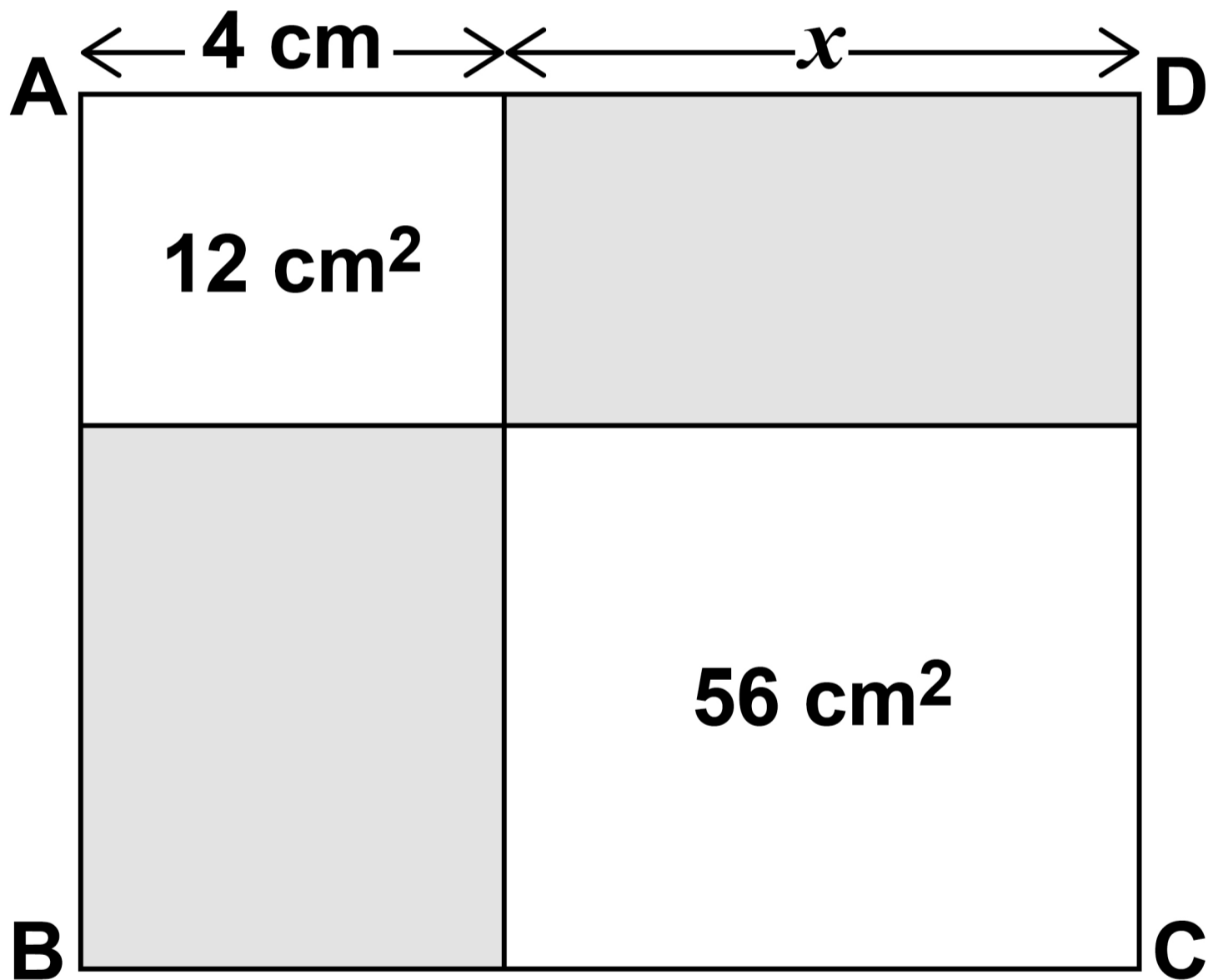
[Turn over]



9 Rectangle $ABCD$ is split into four smaller rectangles.

Two of the smaller rectangles are shaded.

The diagram is not drawn accurately.



$$4 : x = 1 : 2$$

For rectangle $ABCD$, work out the ratio shaded area : unshaded area



**Give your answer in its simplest form.
[4 marks]**

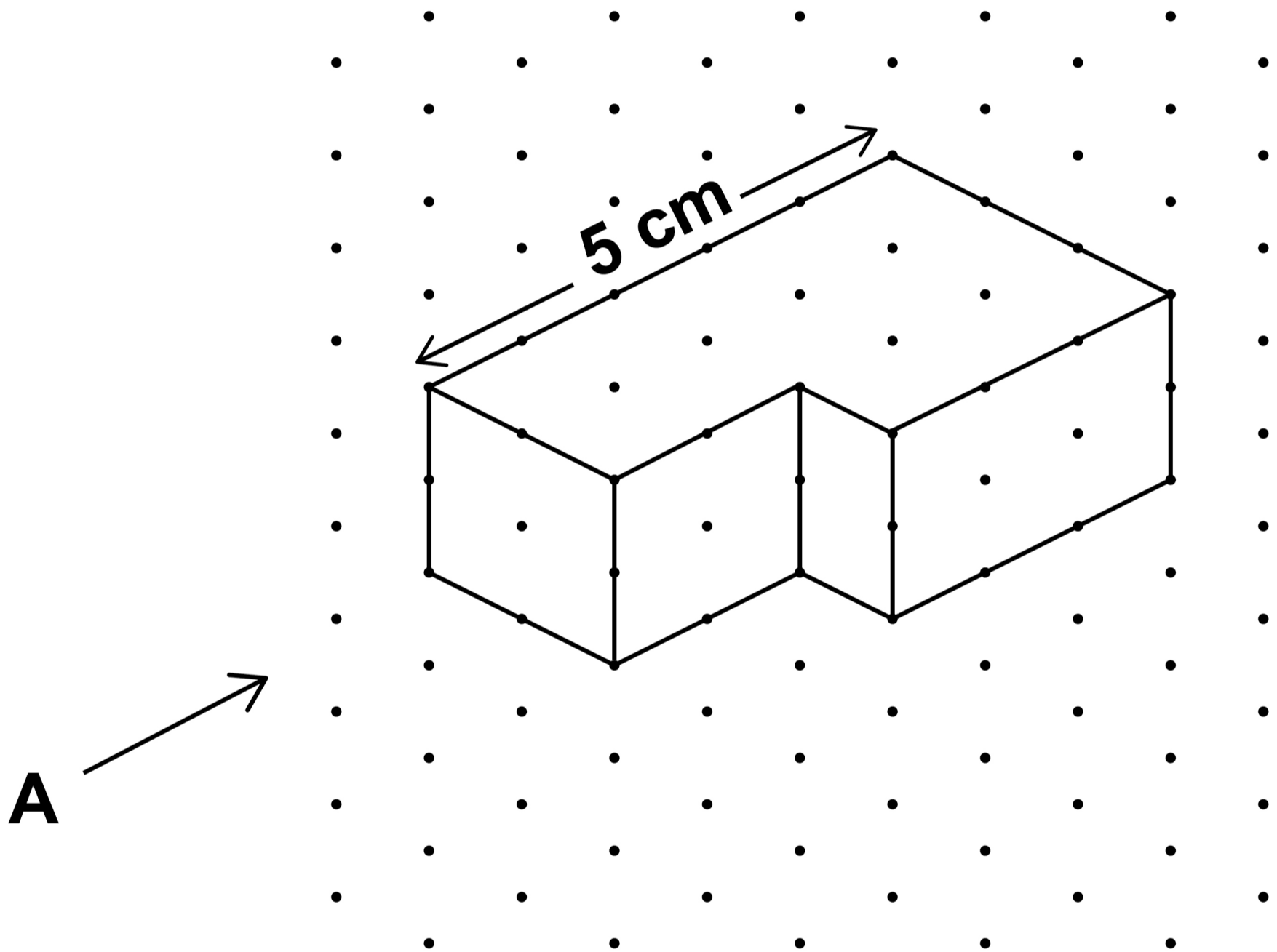
Answer _____ :

[Turn over]



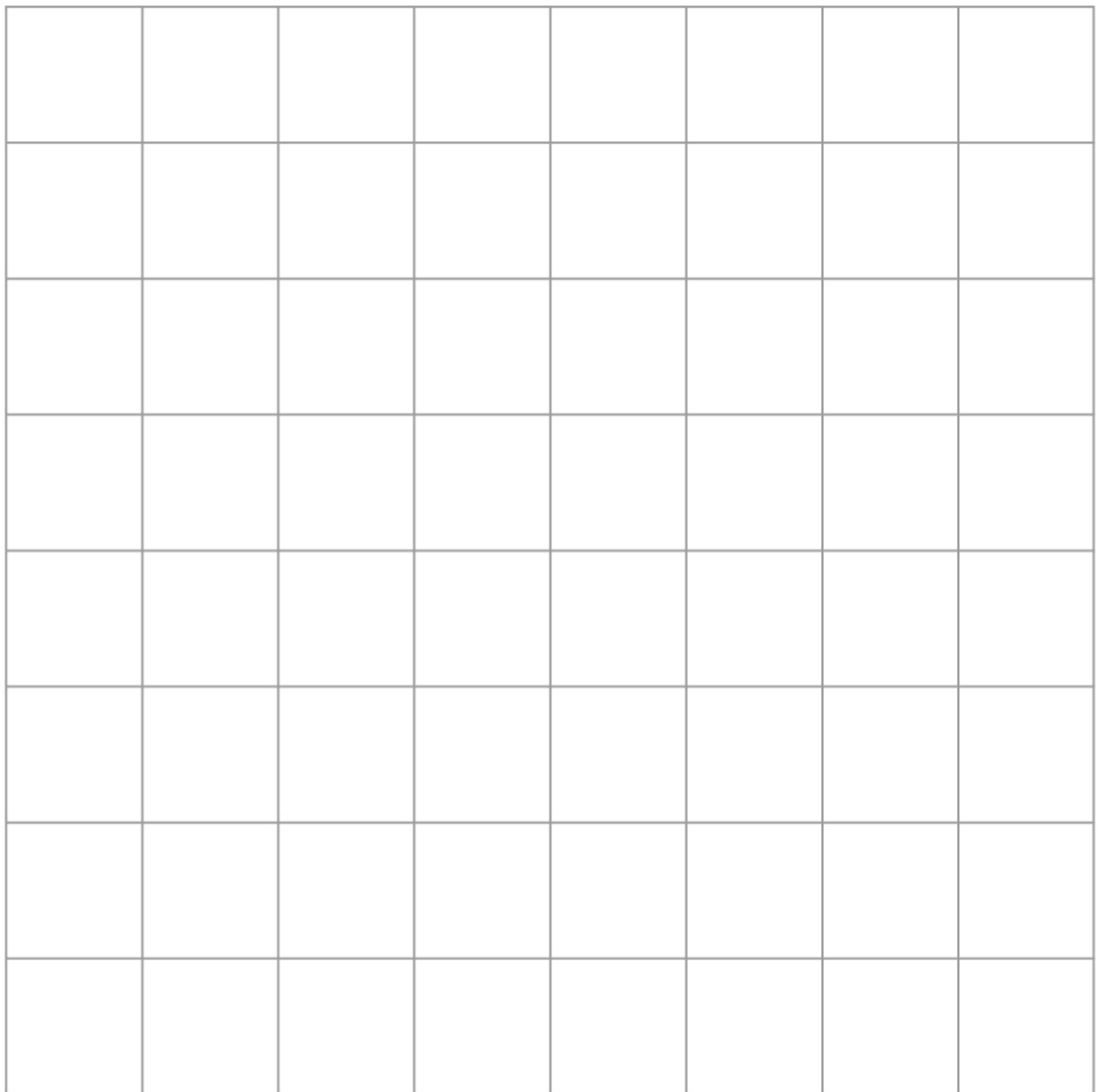
10 A solid shape is drawn on isometric paper.

The gaps between the dots represent 1 centimetre.



10(a) On the grid below, draw the elevation of the shape from A.

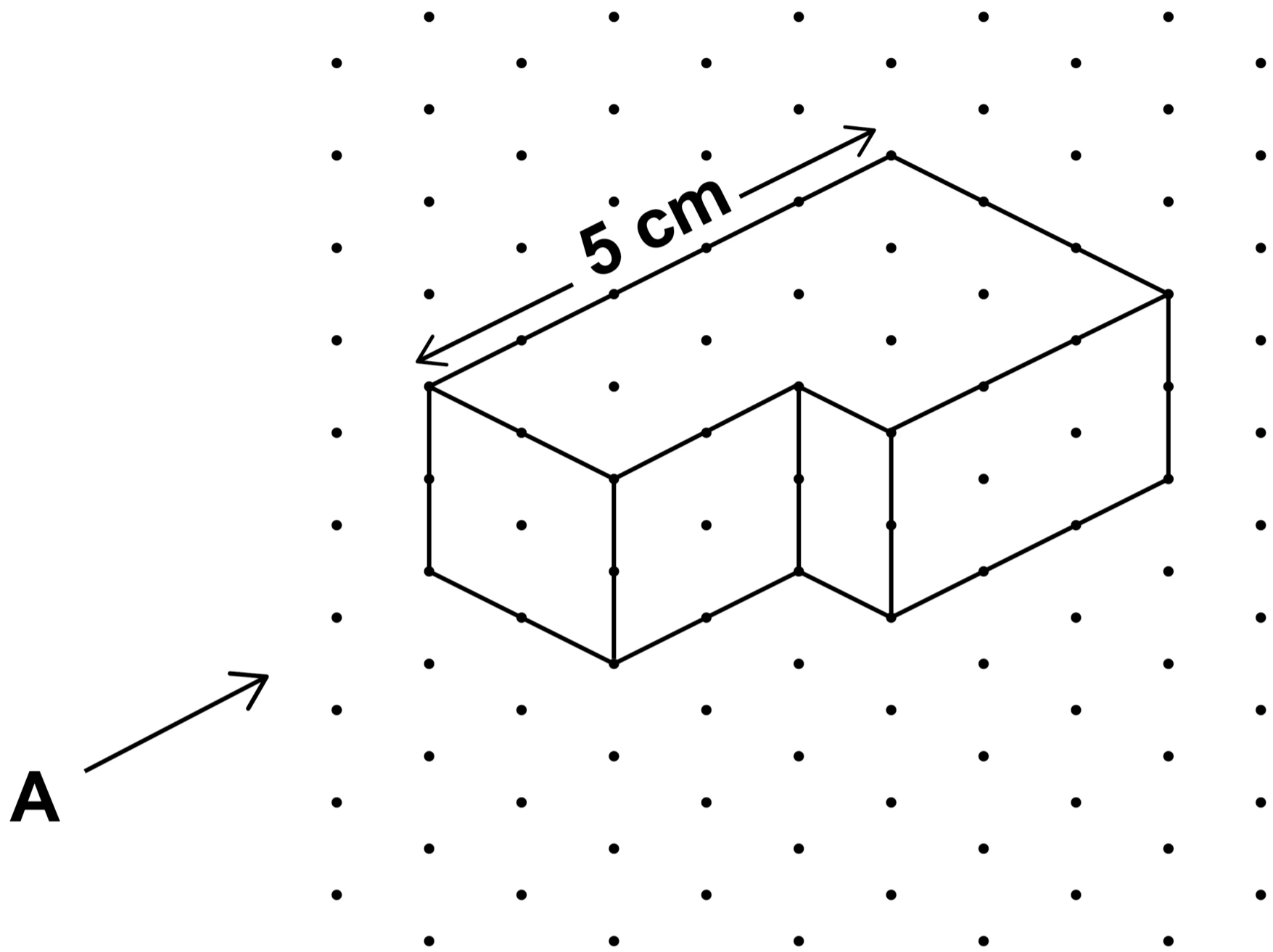
The side of each square on the grid represents 1 centimetre. [1 mark]



[Turn over]

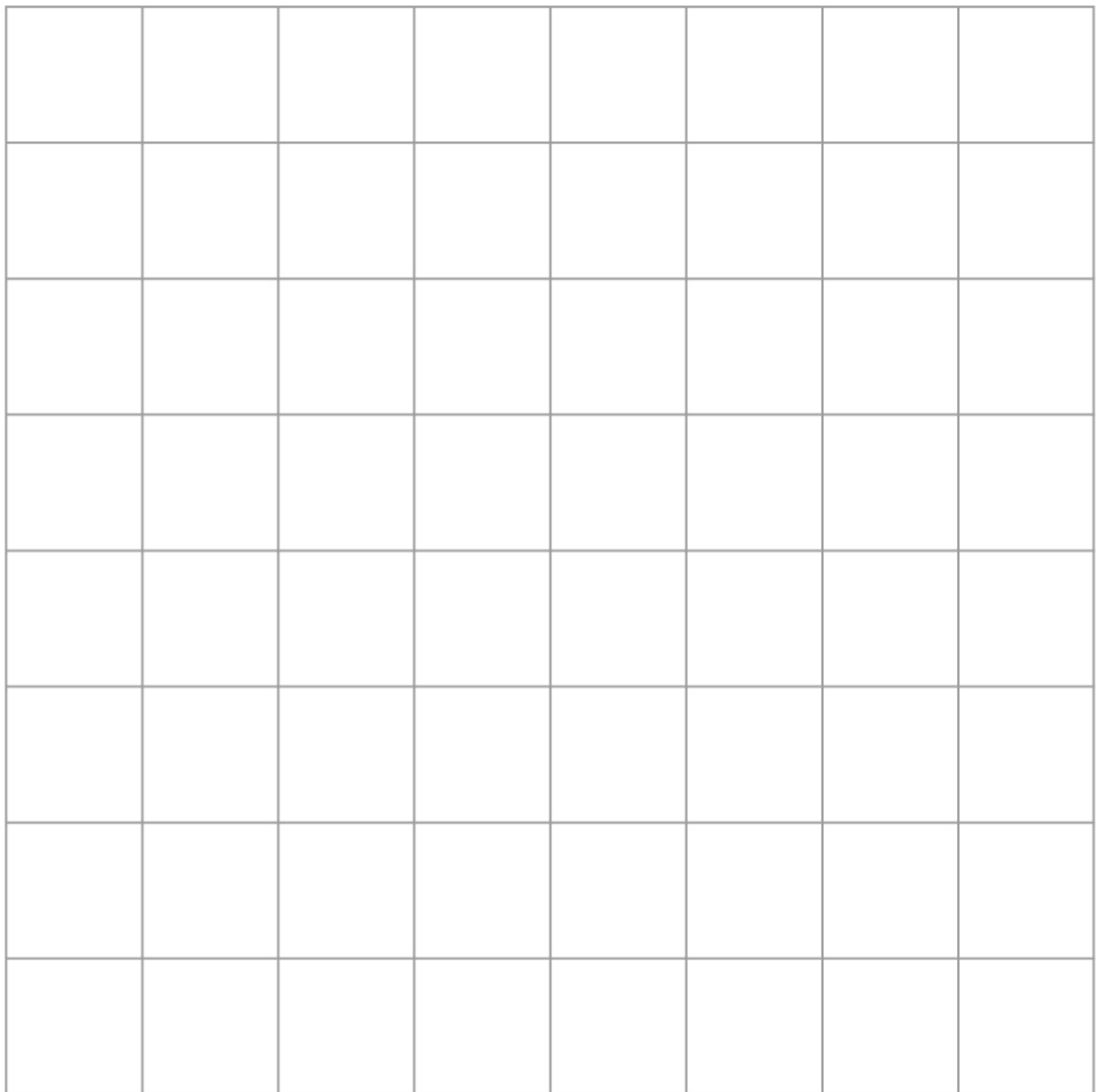


REPEAT OF DIAGRAM



10(b) On the grid, draw a plan of the shape.

The side of each square on the grid represents 1 centimetre. [1 mark]



[Turn over]

11 Erik thinks of a prime number between 20 and 30

His number is $x\%$ of 125

Work out ONE possible value of x .
[3 marks]

Answer _____

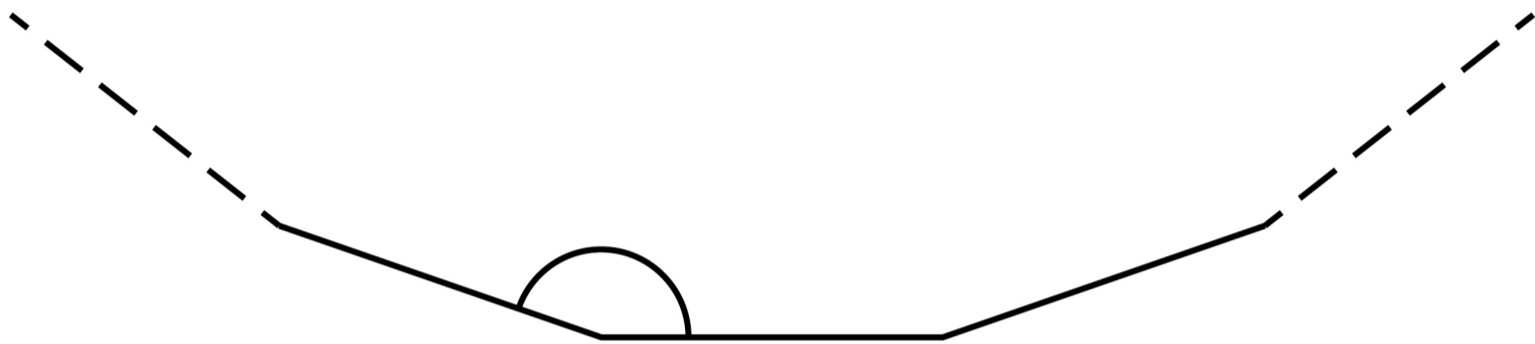
[Turn over]

5



12 Part of a regular polygon with 15 sides is shown.

The diagram is not drawn accurately.



Work out the size of an INTERIOR angle. [2 marks]



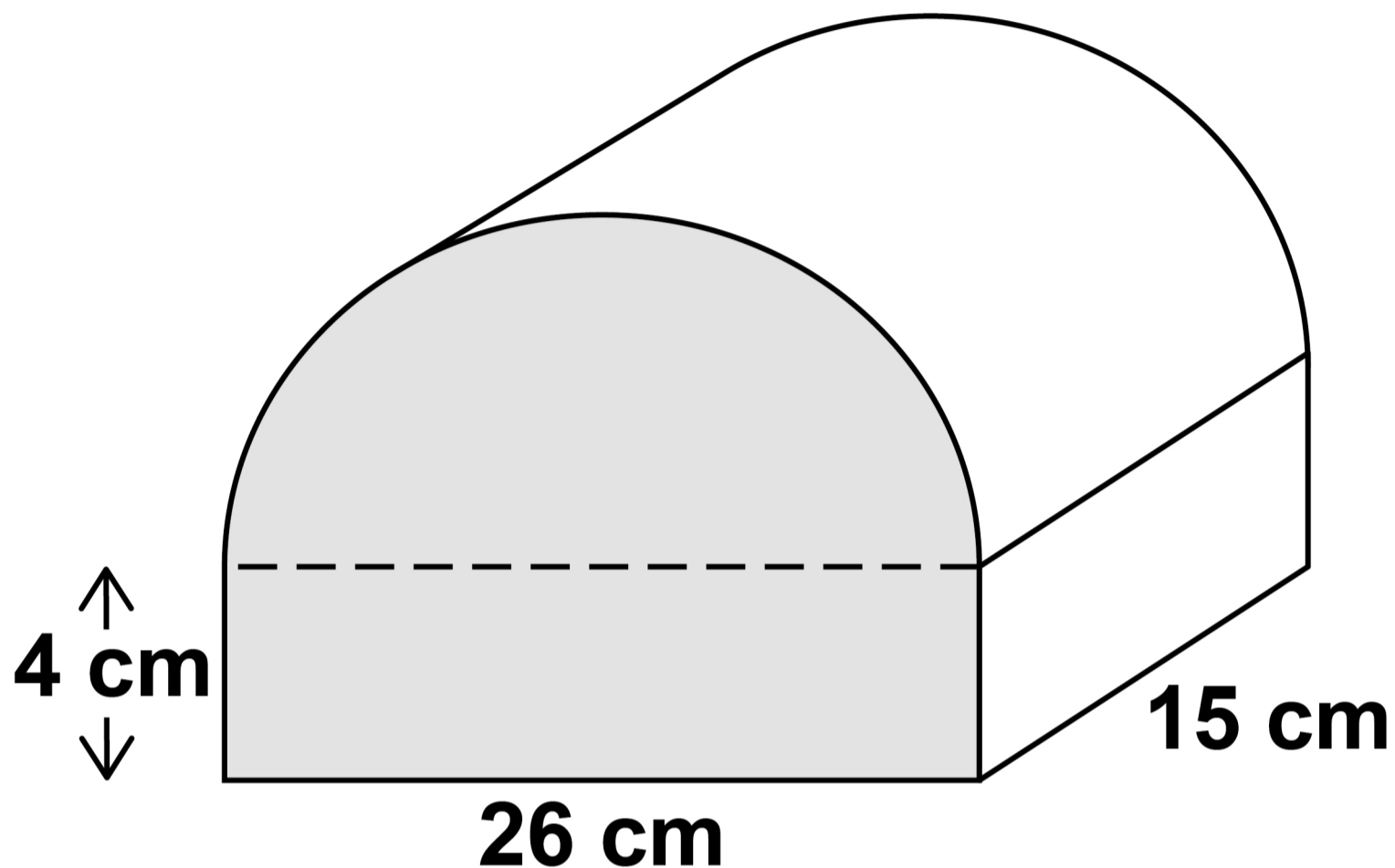
23

Answer _____ **degrees**

[Turn over]



- 13 A box is the shape of half a cylinder on top of a cuboid.**



**Work out the volume of the box.
[4 marks]**



Answer _____ **cm³**

[Turn over]

6



14 Phil sells ties.

He increases the original price of each tie by 10% to £13.20

A month later he announces a sale.

<p>SALE 10% OFF ALL TIES</p>
--

Phil says,

“The ties will be back to their original price, because each change was by 10%”

Is he correct?

Tick a box.

Yes

No



Show working to support your answer. [3 marks]

[Turn over]



15 A biased spinner can land on A, B or C.

The table shows the probabilities, in terms of k , of A, B and C.

	A	B	C
Probability	$0.5k$	$7k - 0.15$	$2.5k$

**Work out the probability of B.
[3 marks]**



Answer _____

[Turn over]

<hr/>
6

16 *P* is the point (2, 14)

Q is the point (6, 8)

R is the point (2, 5)

Use gradients to show that angle *PQR* is NOT a right angle. [3 marks]

[Turn over]



17 $m^2 > 9$

Circle the possible value of m .
[1 mark]

$-2\frac{7}{8}$

2.8

3

$-\frac{7}{2}$

18 Simplify $w^1 \times w^0$

Circle your answer. [1 mark]

1

0

w

w^2



19 The equation of a circle is
 $x^2 + y^2 = 11$

Work out the length of the DIAMETER.

Circle your answer. [1 mark]

$\sqrt{11}$

$2\sqrt{11}$

$\sqrt{22}$

22

[Turn over]

6



$$20 \quad \frac{a}{b} = 3c$$

$$\frac{b}{c} = 2$$

**Work out the value of a when $c = 8$
[3 marks]**

Answer _____



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[Turn over]

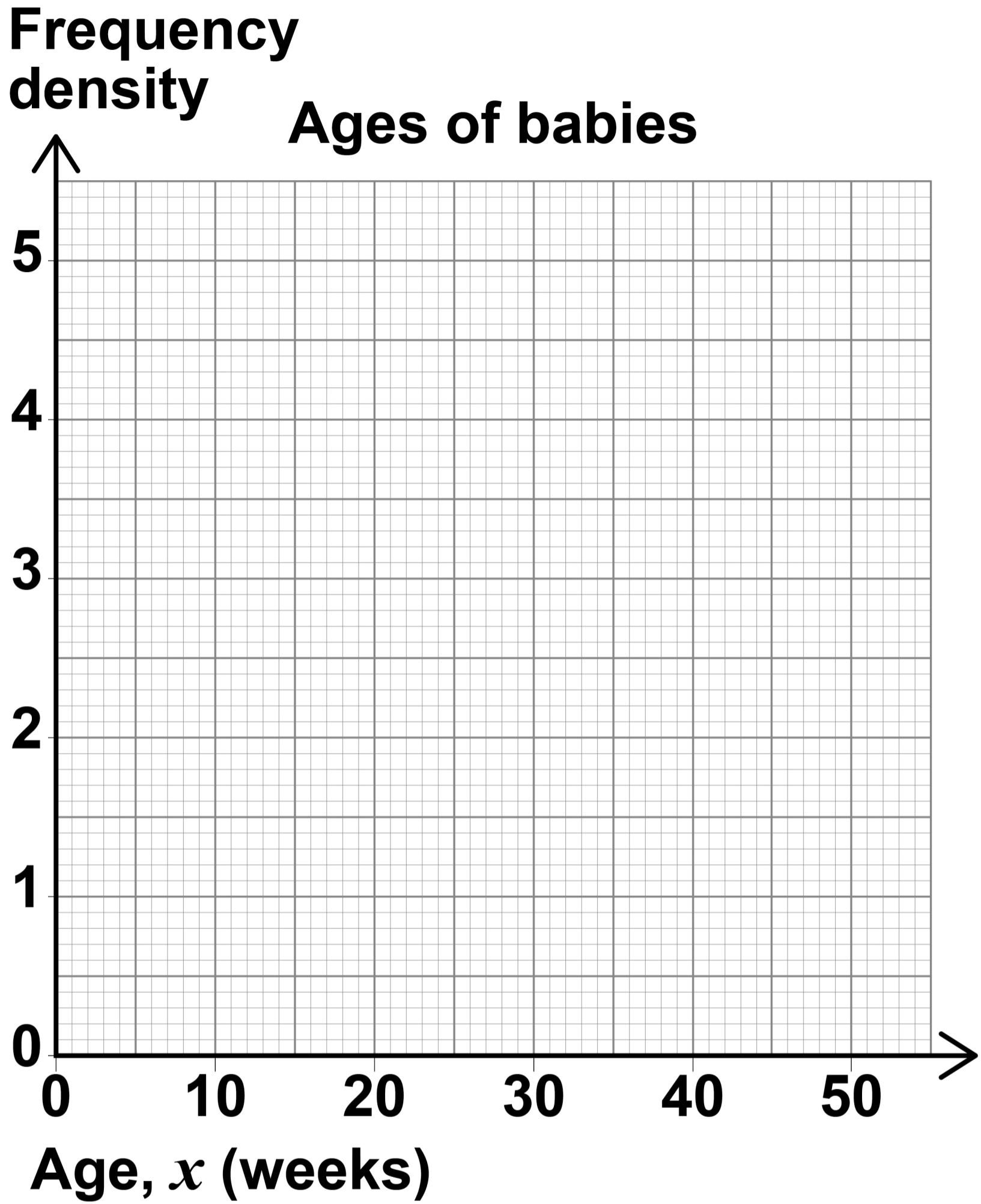


21 Here is some information about the ages of babies at a clinic.

Age, x (weeks)	Frequency		
$0 \leq x < 5$	18		
$5 \leq x < 10$	23		
$10 \leq x < 20$	17		
$20 \leq x < 50$	21		

On the opposite page, draw a histogram to represent the information. [4 marks]





[Turn over]

$\frac{\quad}{7}$



22 A sequence of patterns is made using horizontal sticks and vertical sticks.

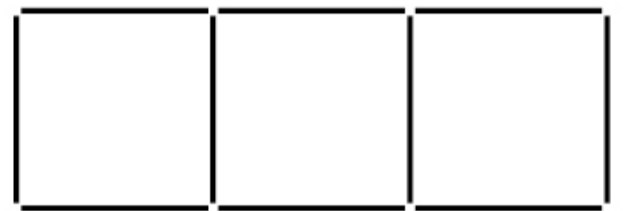
Pattern 1



Pattern 2



Pattern 3



The table shows the number of horizontal sticks and vertical sticks in each pattern.

Pattern	Number of horizontal sticks	Number of vertical sticks
1	2	2
2	4	3
3	6	4

What fraction of the total number of sticks in Pattern n are horizontal?



Give your answer in terms of n .
[3 marks]

Answer _____

[Turn over]



23 The equation of a curve is $y = 16^x$

23(a) Circle the point that lies on the curve. [1 mark]

(2, 32)

(32, 2)

(2, 256)

(256, 2)

23(b) A different point on the curve has y -coordinate $\frac{1}{16}$

Work out the x -coordinate. [1 mark]

Answer _____



24 $a^b = 3$ where a is an integer and b is a proper fraction.

Work out ONE possible pair of values of a and b . [1 mark]

$a =$ _____ $b =$ _____

[Turn over]

6



25 Expand and simplify fully
 $(x - 3)(x + 2)(x + 5)$ [3 marks]

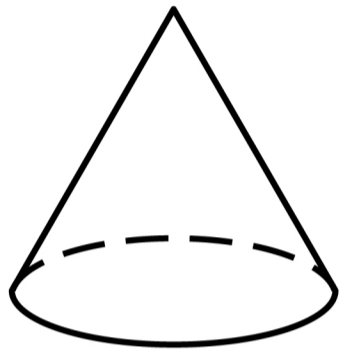


Answer _____

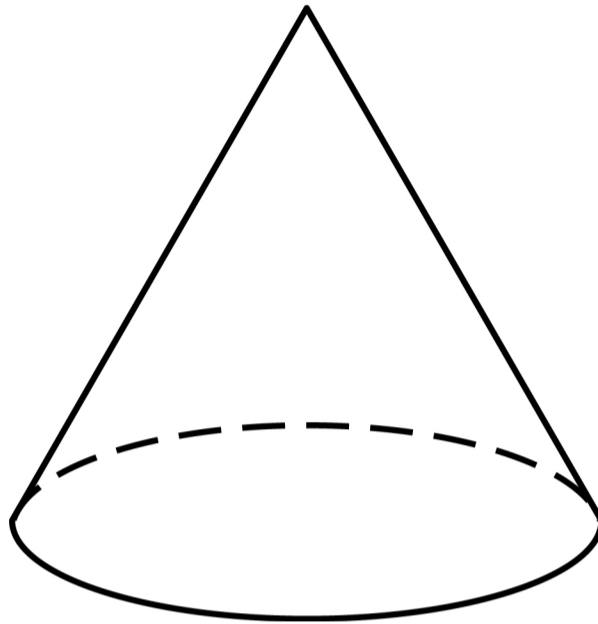
[Turn over]

26 Here are two similar cones.

Cone A



Cone B



The surface area of cone A is 2 m^2

The surface area of cone B is 4.5 m^2

**Work out the ratio
radius of cone A : radius of cone B**

**Give your answer in the form $1 : n$
[3 marks]**



Answer _____ :

[Turn over]

<hr/>
6



27 In the diagram

$$\overrightarrow{DE} = a$$

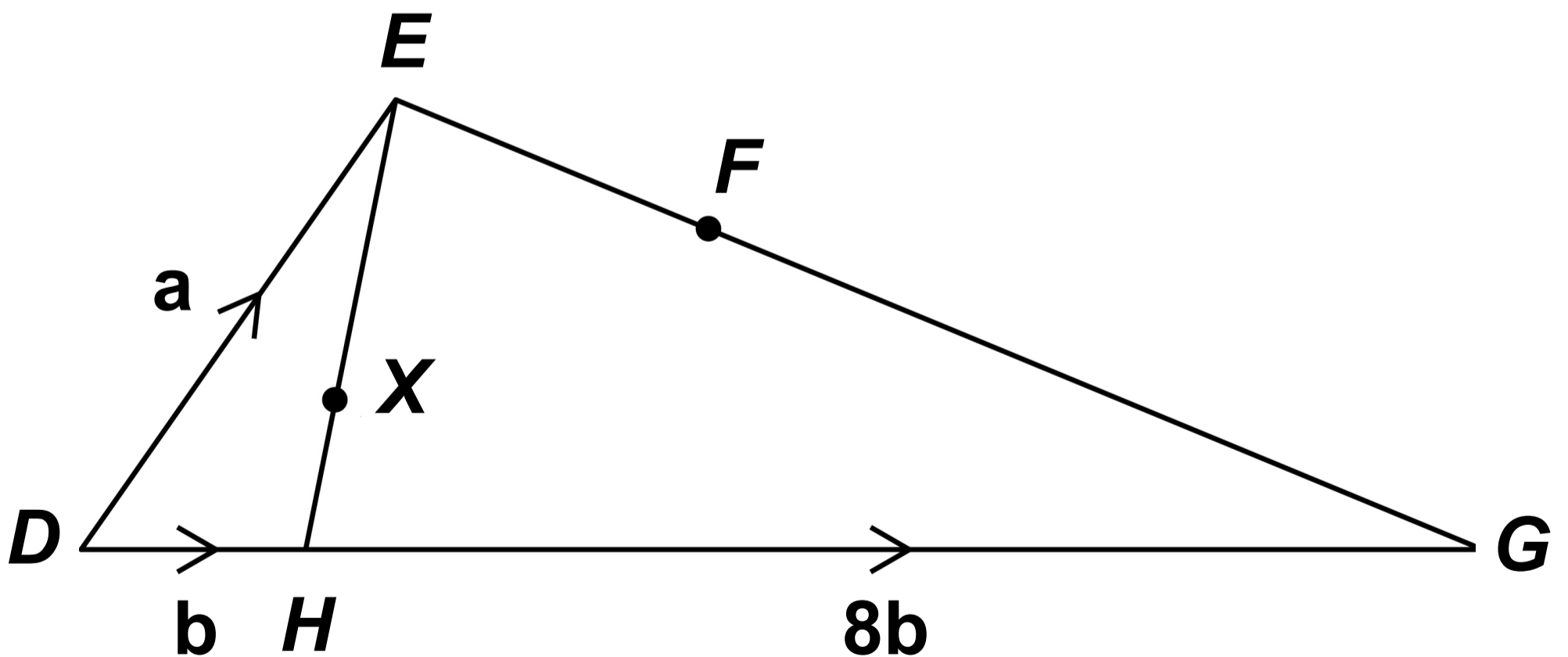
$$\overrightarrow{DH} = b$$

$$\overrightarrow{HG} = 8b$$

$$EX : XH = 3 : 1$$

$$EF : FG = 1 : 3$$

The diagram is not drawn accurately.



27(a) Show that $\overrightarrow{DX} = \frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$
[2 marks]

[Turn over]



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27(b) Is *DXF* a straight line?

Show working to support your answer. [4 marks]

[Turn over]



28 $a = 4.72$ to 3 significant figures.

$b = 158$ to 3 significant figures.

Work out the upper bound of $\frac{a}{b}$

You **MUST** show your working.
[3 marks]

Answer _____



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[Turn over]



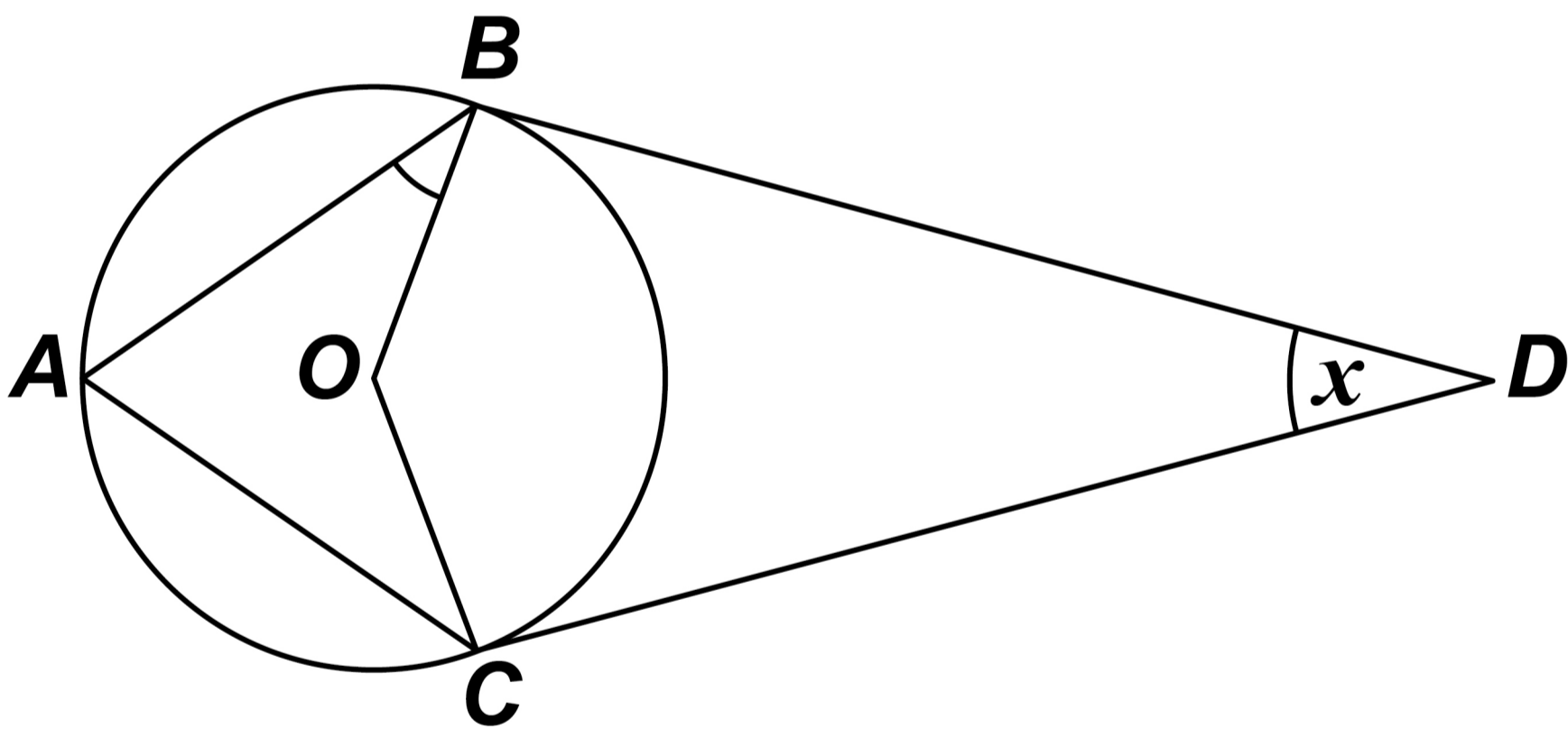
29 A , B and C are three points on the circumference of a circle, centre O .

BD and CD are tangents to the circle.

$ABDC$ is a kite.

Angle BDC is x

The diagram is not drawn to scale.



Prove that angle ABO is $45^\circ - \frac{x}{4}$

[4 marks]



[Turn over]



30 A sphere has radius r cm

An approximate value of r can be found using the iterative formula

$$r_{n+1} = \sqrt{\frac{239}{r_n}}$$

The starting value is $r_1 = 7$

30(a) Work out the values of r_2 and r_3
[2 marks]

$$r_2 = \underline{\hspace{10em}}$$

$$r_3 = \underline{\hspace{10em}}$$



30(b) Continue the iteration to work out the radius to 1 decimal place.
[1 mark]

Answer _____ **cm**

END OF QUESTIONS

3



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

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For Examiner's Use	
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TOTAL	

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