A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

8300/1H

Time allowed: 1 hour 30 minutes

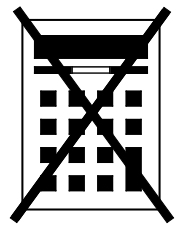
At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

JUN218300 1H01

For this paper you must have:
- **mathematical instruments.**

You must NOT use a calculator.



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 Simplify $\left(a^5\right)^3$

Circle your answer. [1 mark]

$8a$ $15a$ a^8 a^{15}

2 $x \neq 0.4$

Circle the possible value of x. [1 mark]

$\frac{4}{10}$ $\frac{20}{50}$ $\frac{26}{70}$ $\frac{120}{300}$

3 Circle the solid that has 7 vertices.
[1 mark]

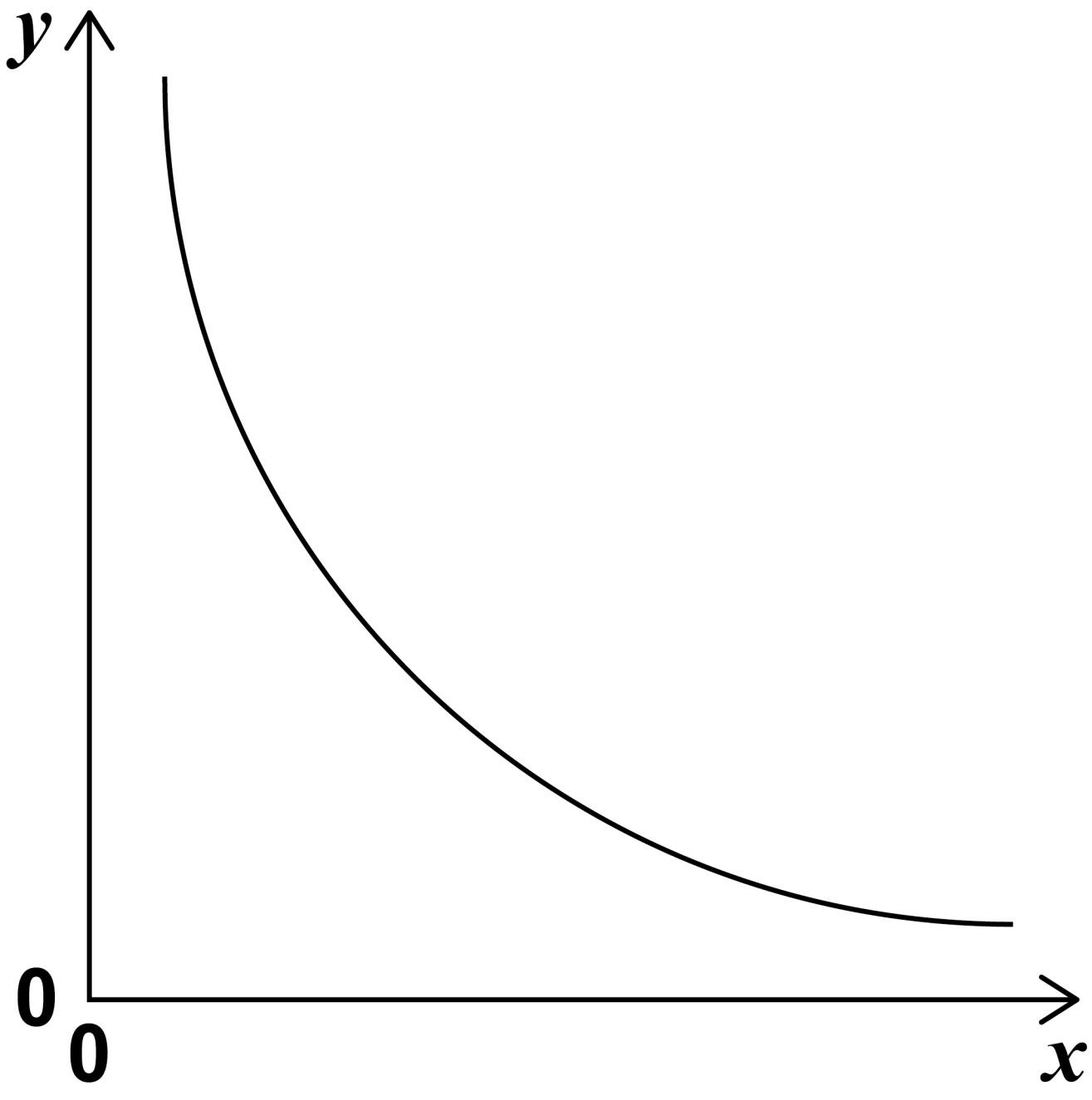
hexagonal prism

hexagon-based pyramid

pentagonal prism

pentagon-based pyramid

4 Here is a sketch of a graph.



Circle the equation of the graph.

k is a constant. [1 mark]

$y = kx$

$y = k + x$

$y = k - x$

$y = \frac{k}{x}$

5 Write 200 as a product of prime factors.

Give your answer in index form.
[3 marks]

Answer _____

6 Lily's age is 2 years and 4 months.

Hugo's age is 1 year and 8 months.

Write Lily's age in months as a fraction of Hugo's age in months.

Give your fraction in its simplest form.
[2 marks]

Answer

7 Use approximations to estimate the answer to

$$\frac{\sqrt{97}+2.014^3}{0.49}$$

[3 marks]

Answer _____

[Turn over]

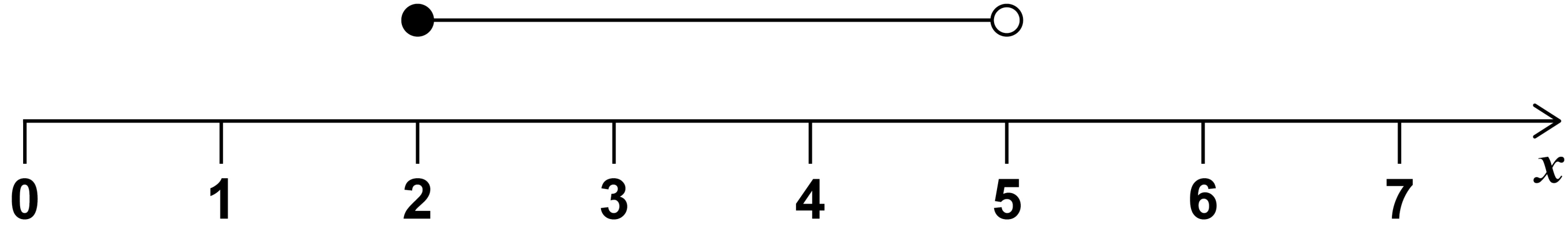
8(a) Solve $5x + 6 > 3x + 15$ [3 marks]

Answer

BLANK PAGE

[Turn over]

8 (b) Write down the inequality represented by the number line. [2 marks]



Answer _____

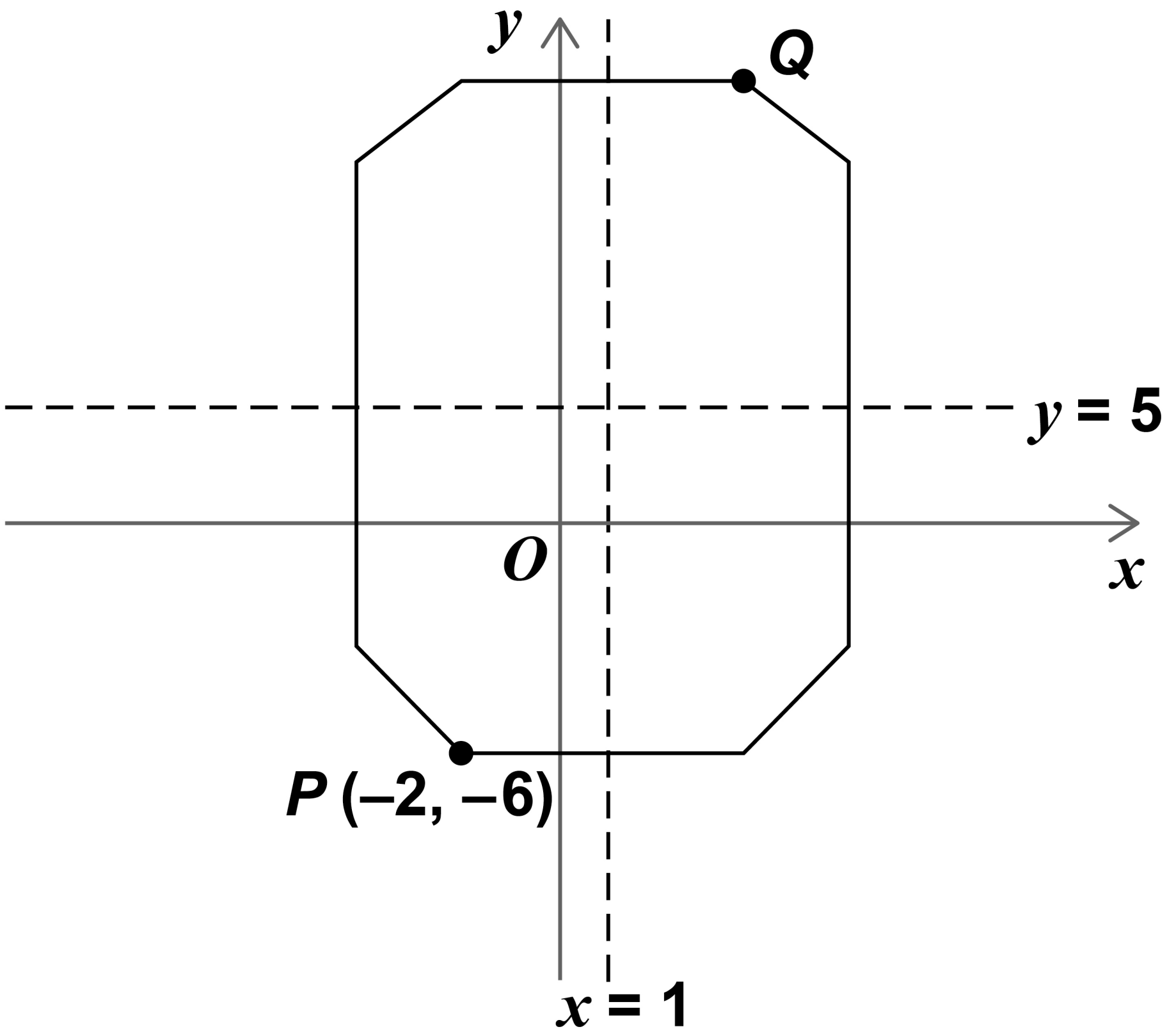
10

BLANK PAGE

[Turn over]

9 The diagram shows an octagon.

The diagram is not drawn accurately.



$x = 1$ and $y = 5$ are lines of symmetry.

Work out the coordinates of point *Q*.
[2 marks]

Answer (_____, _____)

10(a) Work out $2000 \times 70\,000$

Give your answer in standard form.
[2 marks]

Answer

10(b) Work out $\dfrac{1.8 \times 10^2}{3 \times 10^{-1}}$

Give your answer as an ordinary number. [2 marks]

Answer _____

6

11 ***A*, *B*, *C* and *D* are junctions on a motorway.**

The diagram is not drawn accurately.

distance *CD* = 3 × distance *AB*

distance *BC* = 25 miles

Salma drives from *A* to *C*.

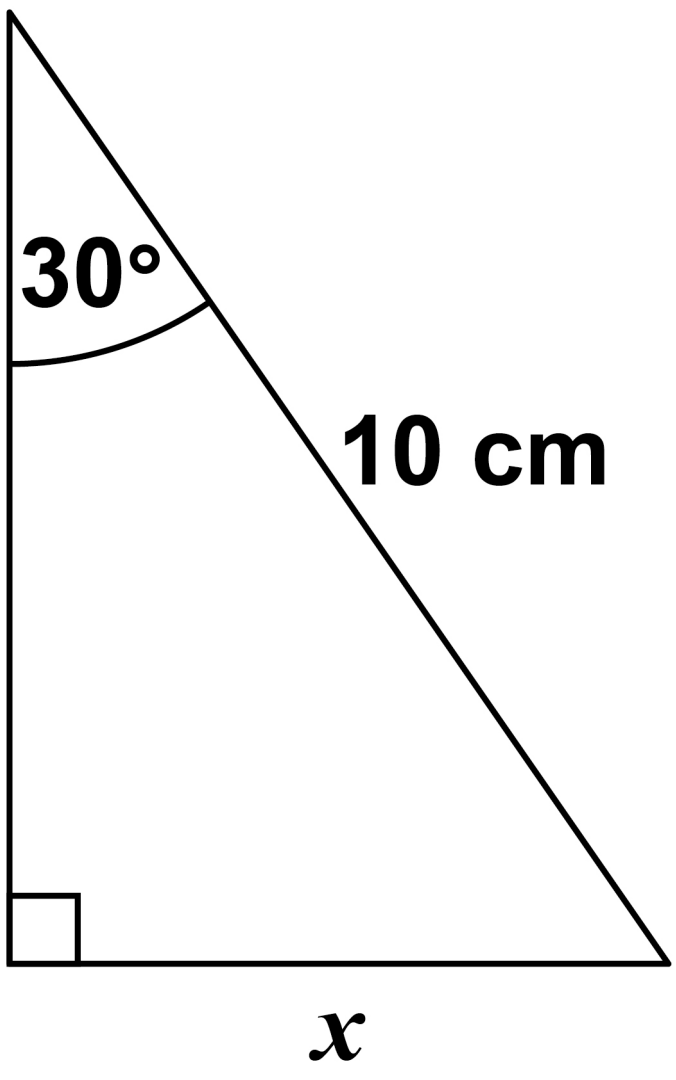
She drives for 30 minutes at an average speed of 62 miles per hour.

Work out the distance *AD*. [4 marks]

Answer _____ miles

12 Here is a right-angled triangle.

The diagram is not drawn accurately.



Use trigonometry to work out the value of x. [3 marks]

Answer _____ **cm**

[Turn over]

7

13 Convert $\frac{5}{6}$ to a recurring decimal.

[2 marks]

Answer

14 Simplify $\frac{3}{x} + \frac{4}{x}$

Circle your answer. [1 mark]

$\frac{7}{x}$ $\frac{7}{2x}$ $\frac{12}{x}$ $\frac{12}{x^2}$

BLANK PAGE

[Turn over]

15 $(x + a)(x + 3a) \equiv x^2 + bx + 75$

Work out the TWO possible values of b. [3 marks]

Answer _____ and _____

[Turn over]

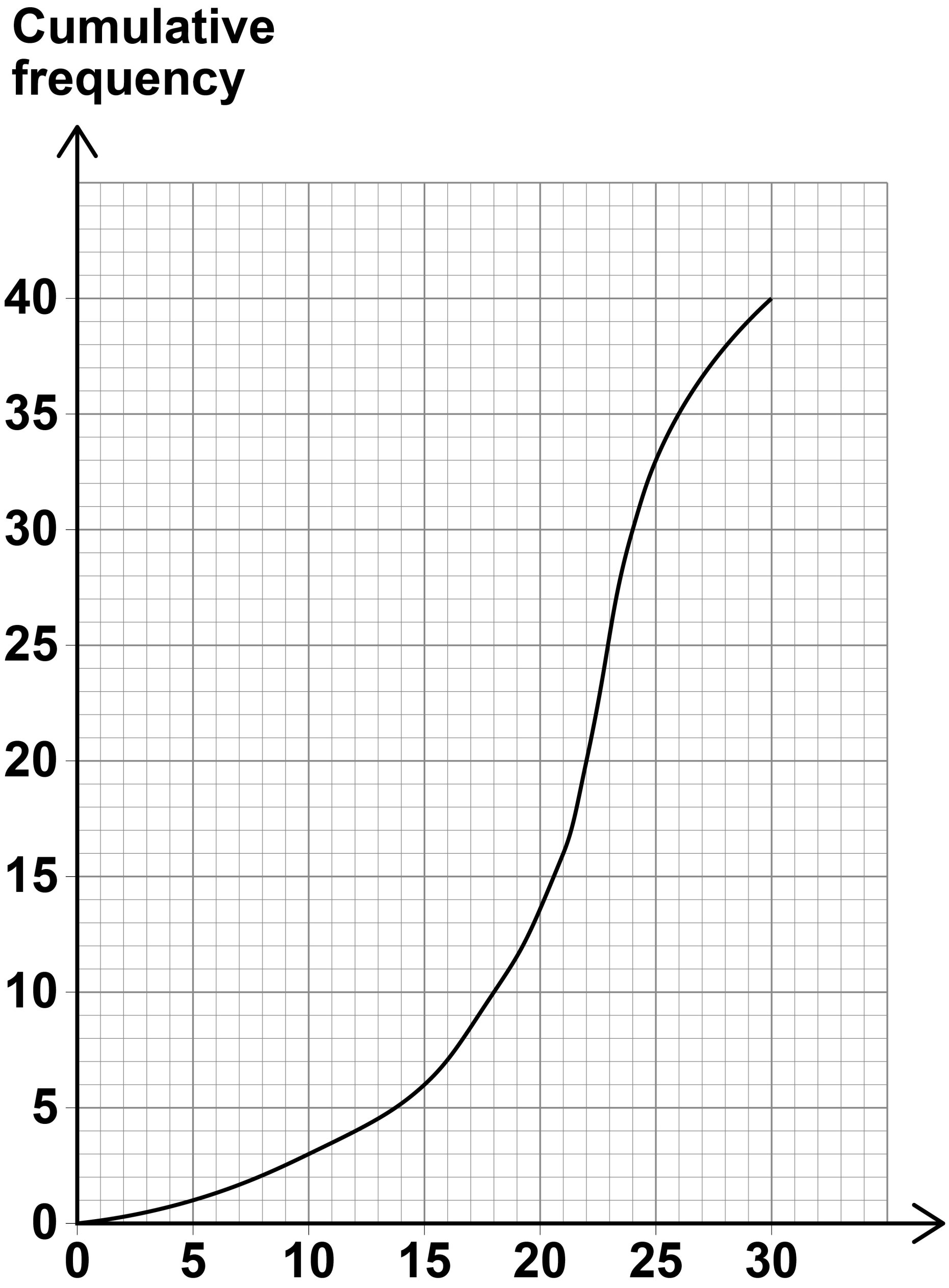
6

16 The cumulative frequency graph, on the opposite page, represents the masses of 40 necklaces.

16(a) A jeweller buys every necklace with mass GREATER THAN 21 grams.

Use the graph to estimate how many she buys. [2 marks]

Answer _____


Cumulative frequency
40
35
30
25
20
15
10
5
0
0
5
10
15
20
25
30
Mass (g)

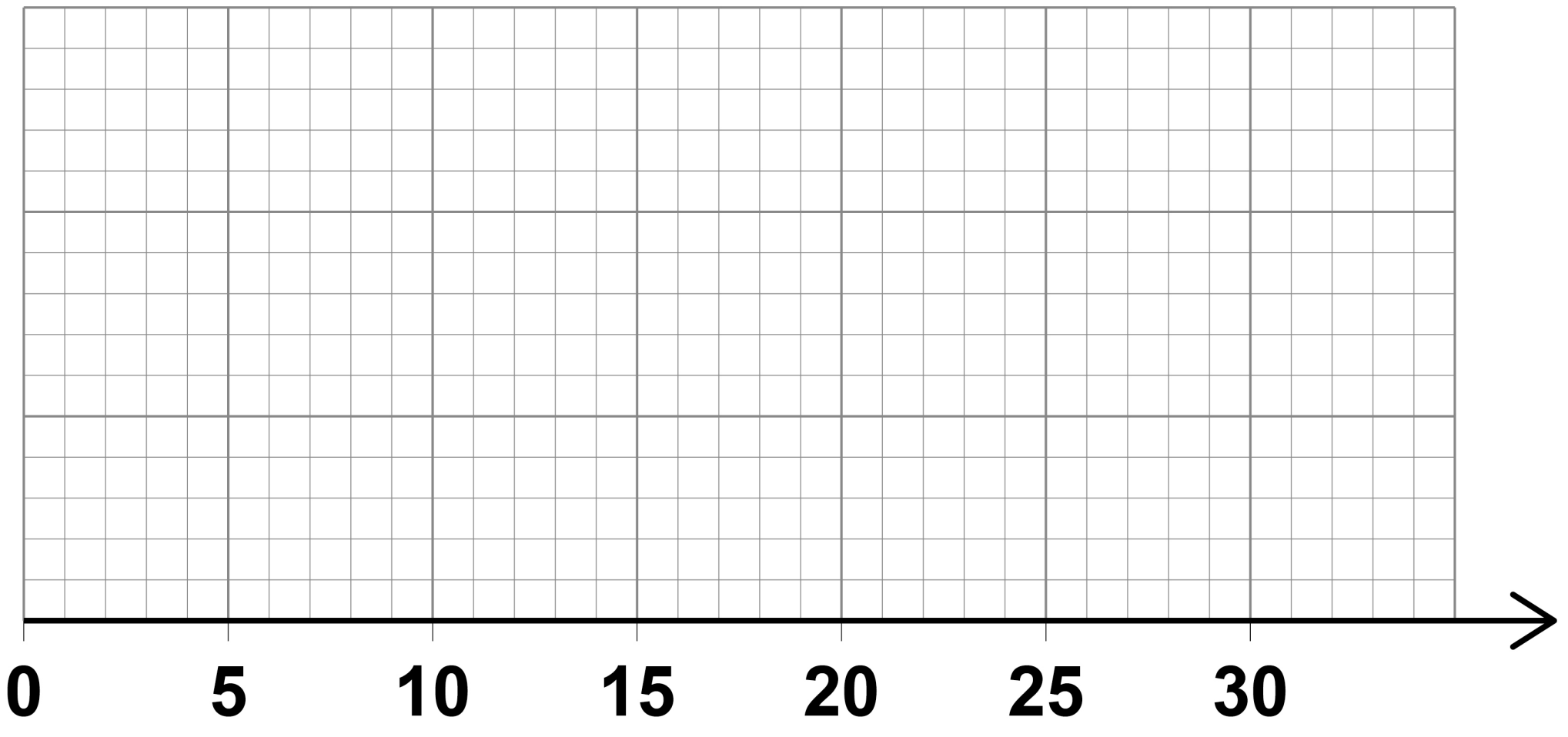
[Turn over]

BLANK PAGE

16(b) The lowest mass was 3 grams.

The highest mass was 28 grams.

Draw a box plot to represent the data. [3 marks]



[Turn over]

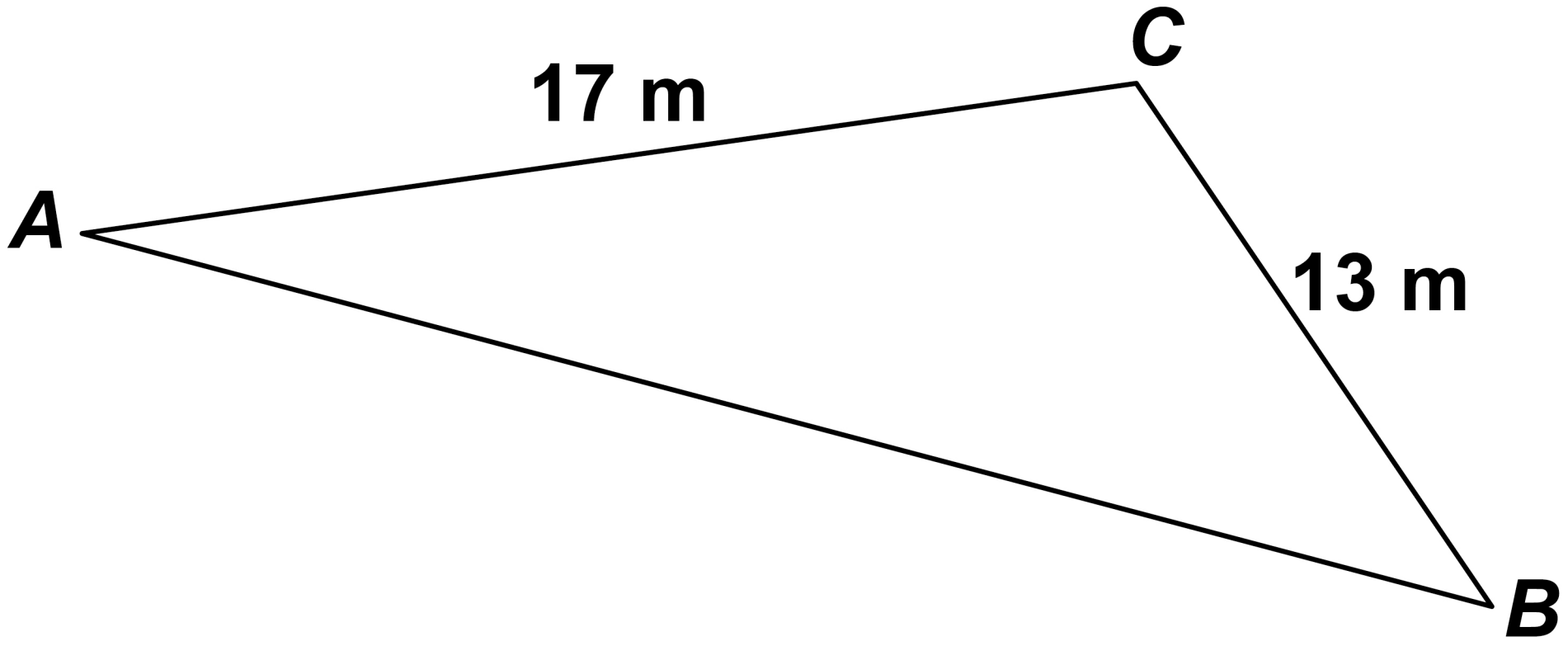
17 Circle the vector that translates the point (–2, 7) to the point (3, –1)
[1 mark]

$\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ $\begin{pmatrix} 5 \\ -8 \end{pmatrix}$ $\begin{pmatrix} -5 \\ 8 \end{pmatrix}$ $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$

6

18(a) Here is a triangle.

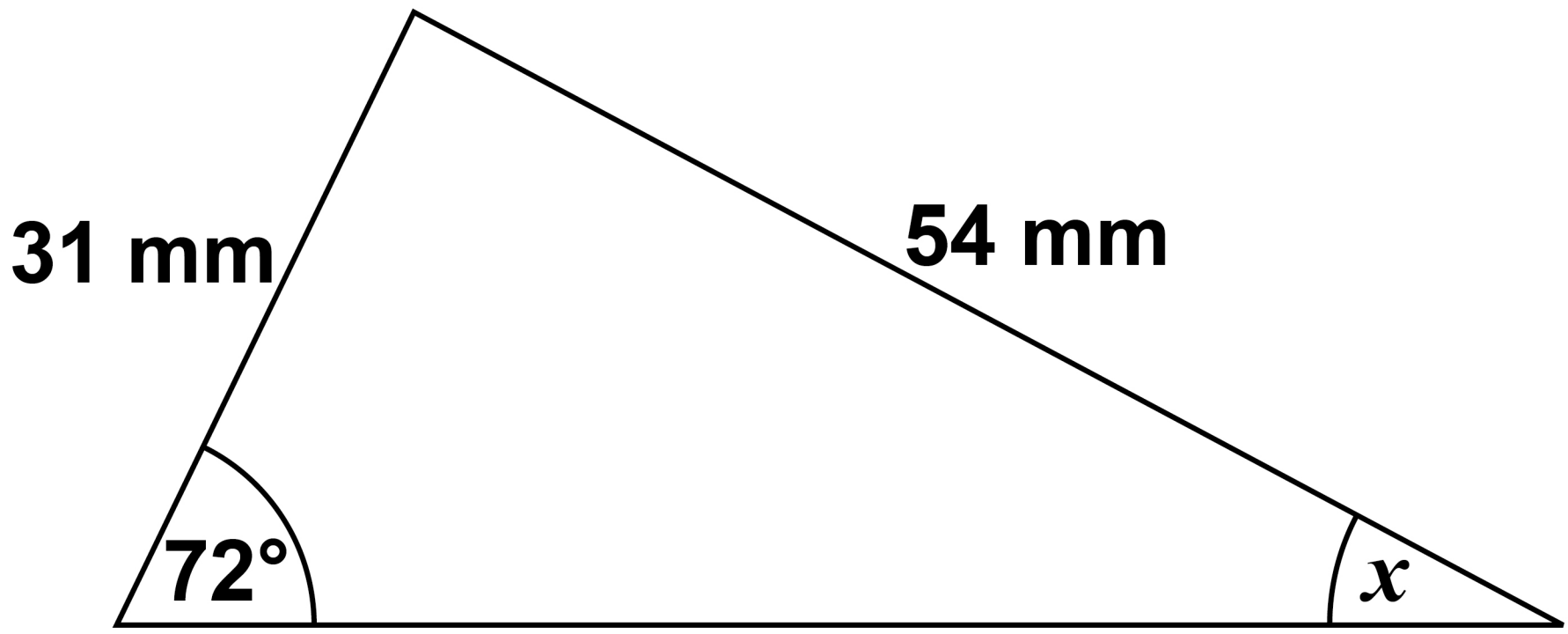
The diagram is not drawn accurately.



Give a reason why the length of side *AB* CANNOT be 35 m [1 mark]

18(b) Here is a different triangle.

The diagram is not drawn accurately.



Leah tries to use the sine rule to work out the size of angle x.

Here are the first two lines of her working.

$$\frac{x}{\sin 31} = \frac{54}{\sin 72}$$

$$x = \frac{54 \sin 31}{\sin 72}$$

What error has she made in this working? [1 mark]

[Turn over]

2

19 Items made at a factory have to pass two checks.

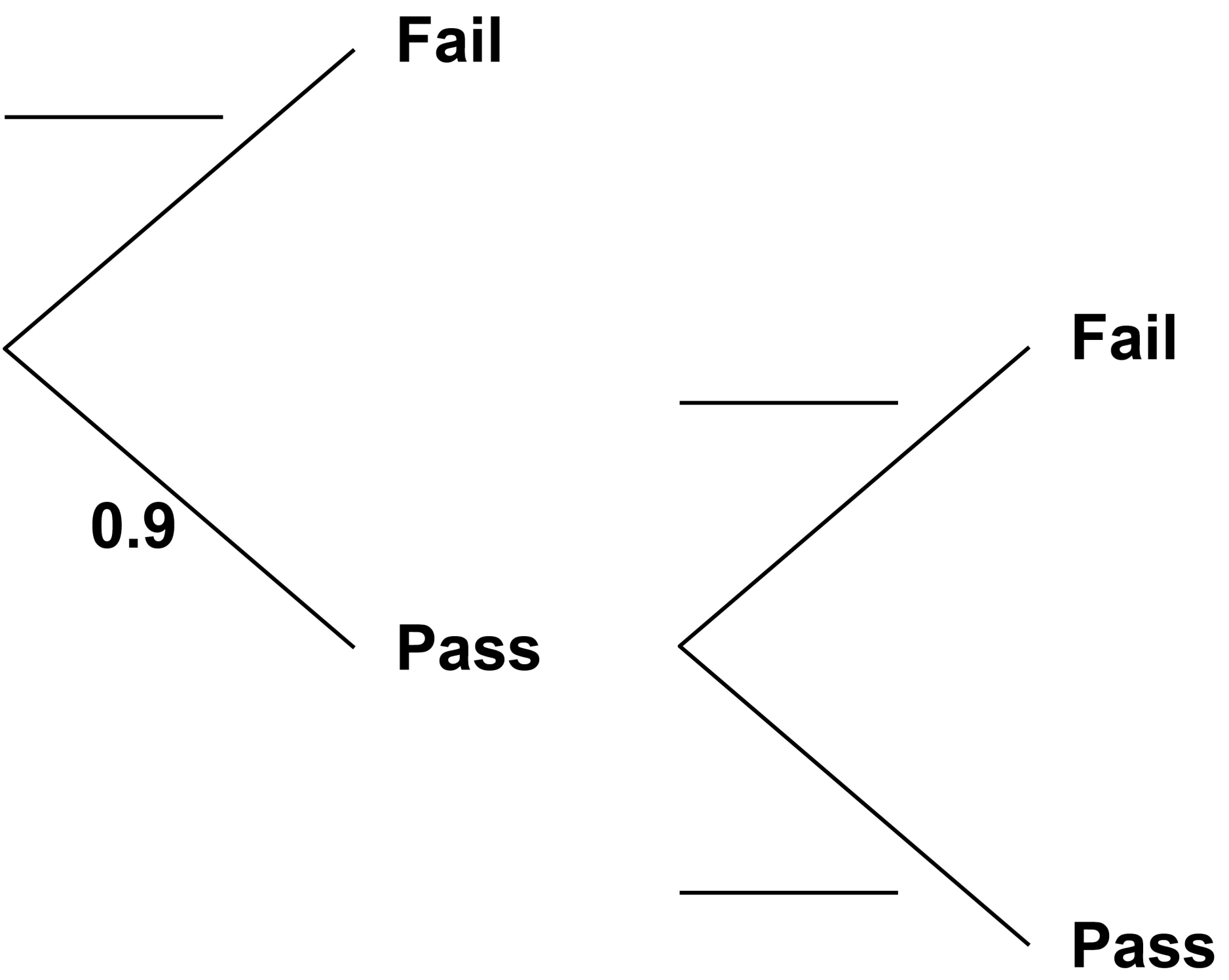
90% pass the first check.

The items that fail are scrapped.

99% of the items that pass the first check pass the second check.

The items that fail are scrapped.

19(a) Complete the tree diagram, on the opposite page. [2 marks]



[Turn over]

19(b) An item is chosen at random before the checks.

Work out the probability that the item is scrapped. [3 marks]

Answer

20 Which ONE of these is a unit of density?

Circle your answer. [1 mark]

cm^2/g cm^3/g

g/cm^2 g/cm^3

[Turn over]

6

21 The first two terms of a quadratic sequence are 10 and 17

Here is some information about the sequence.

	1st term	2nd term	3rd term	4th term
Sequence	10	17	.....	.....
First difference		+7	+13	.....
Second difference			+6	+6

Work out an expression for the nth term of the sequence.
[4 marks]

Answer _____

BLANK PAGE

[Turn over]

22 Work out the value of $\left(\frac{5}{7}\right)^{-2}$

Give your answer as a mixed number.
[3 marks]

Answer _____

23 Rearrange $y = \frac{1}{\sqrt{x} + 1}$ to make x the subject. [3 marks]

Answer

24 (a) **f(x) = $cx + d$**

f(4) = 7

f(10) = 22

Work out the values of c and d.

[3 marks]

24 (b) $g(x) = 2x$ **and** $h(x) = \dfrac{x-1}{2}$

Circle the expression for $hg(x)$
[1 mark]

$\dfrac{2x^2 - x}{2}$ $\qquad$ $\dfrac{2x-1}{2}$

$x^2 - x$ $\qquad$ $x - 1$

25 Show that $\frac{\sqrt{150} - \sqrt{6}}{\sqrt{2} \times \sqrt{3}}$ simplifies to an integer. [3 marks]

7

BLANK PAGE

[Turn over]

26 $d = 2f$

$$\frac{e - f}{d - e} = \frac{1}{4}$$

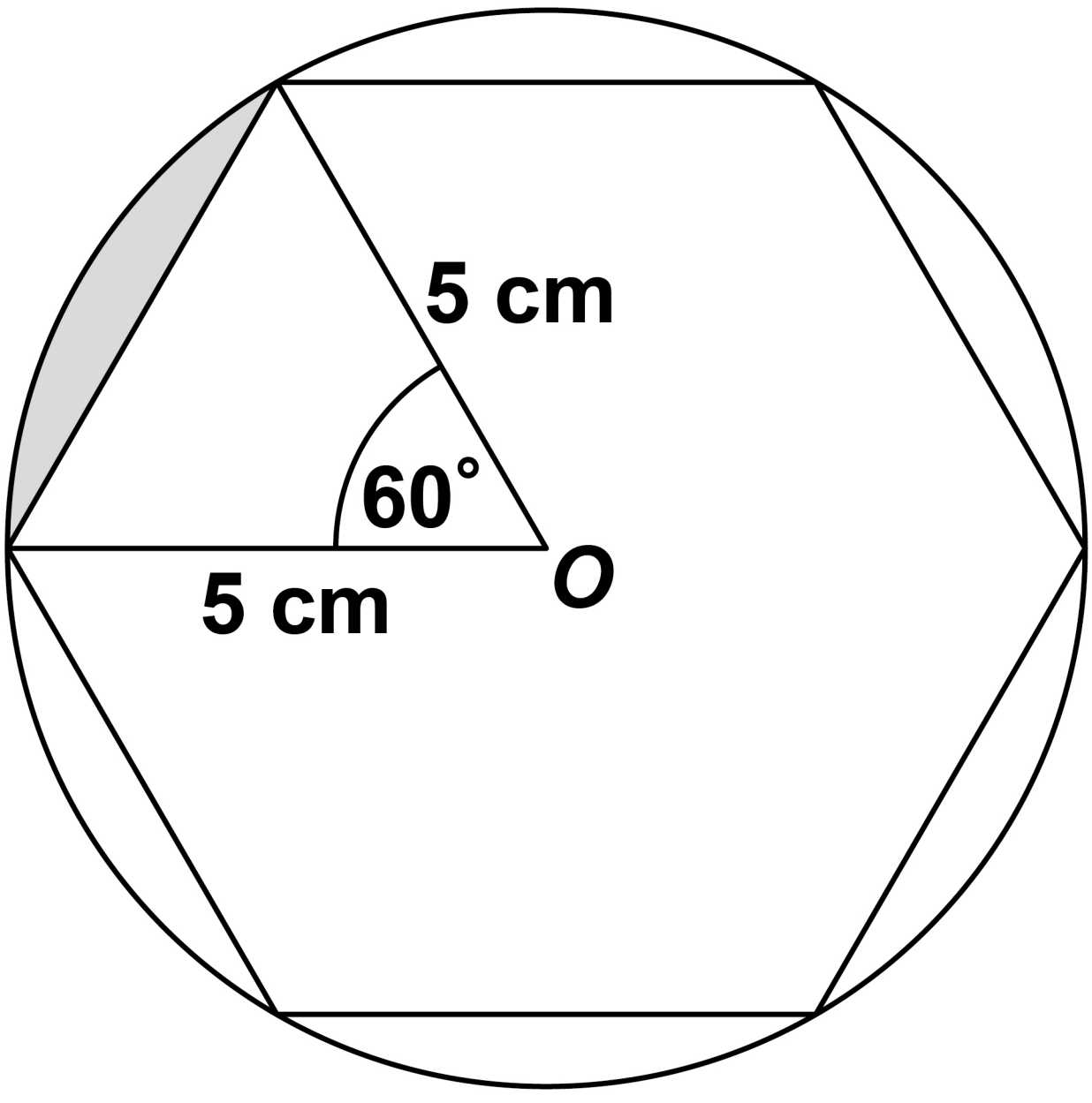
Work out the ratio $e : f$ **[3 marks]**

Answer :

[Turn over]

27 The vertices of a regular hexagon lie on a circle with centre O and radius 5 cm

The diagram is not drawn accurately.



Work out the shaded area.

Give your answer in the form $\frac{a\pi - b\sqrt{c}}{12}$

where a, b and c are integers. [4 marks]

[Turn over]

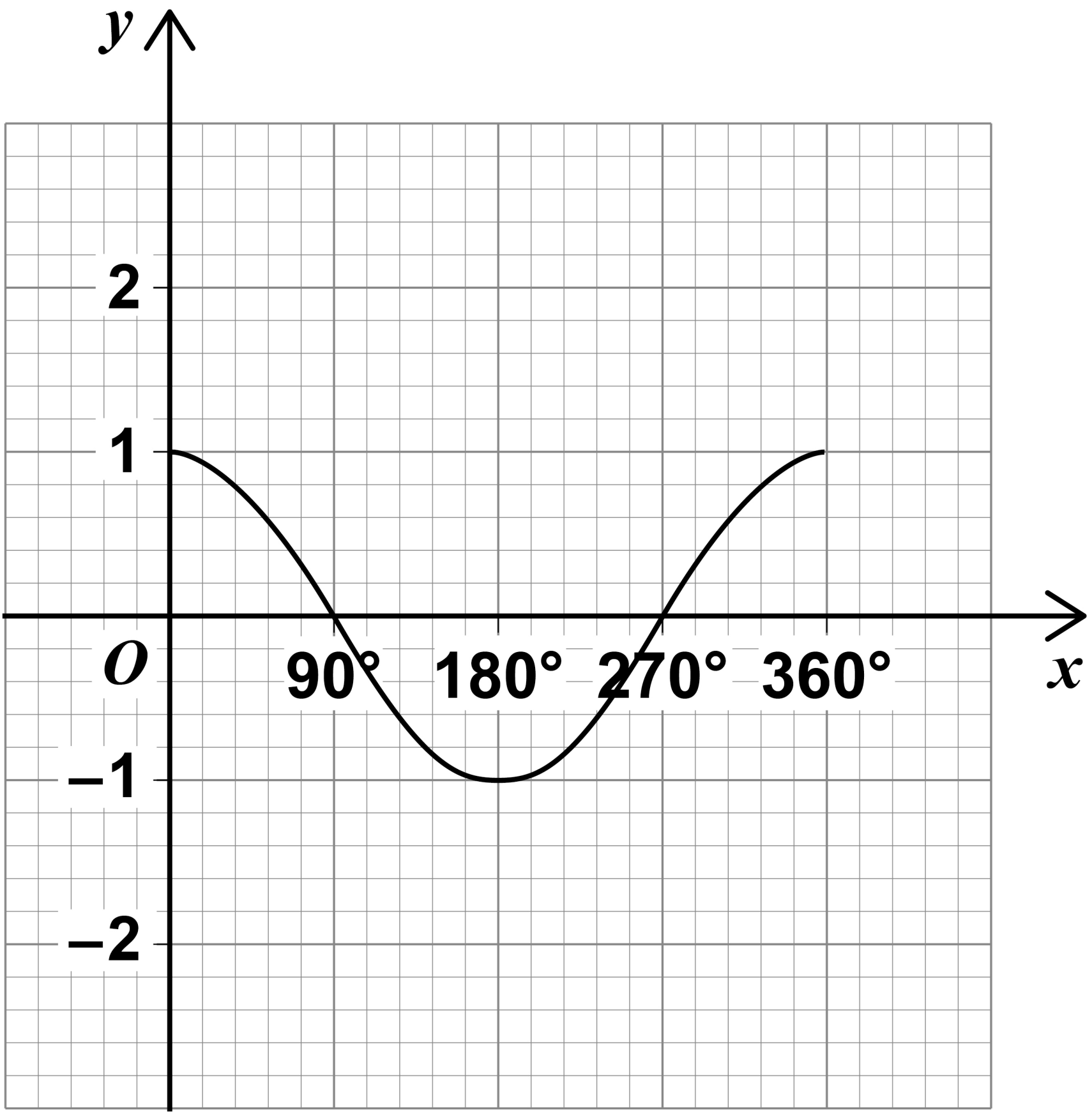
Answer cm^2

7

BLANK PAGE

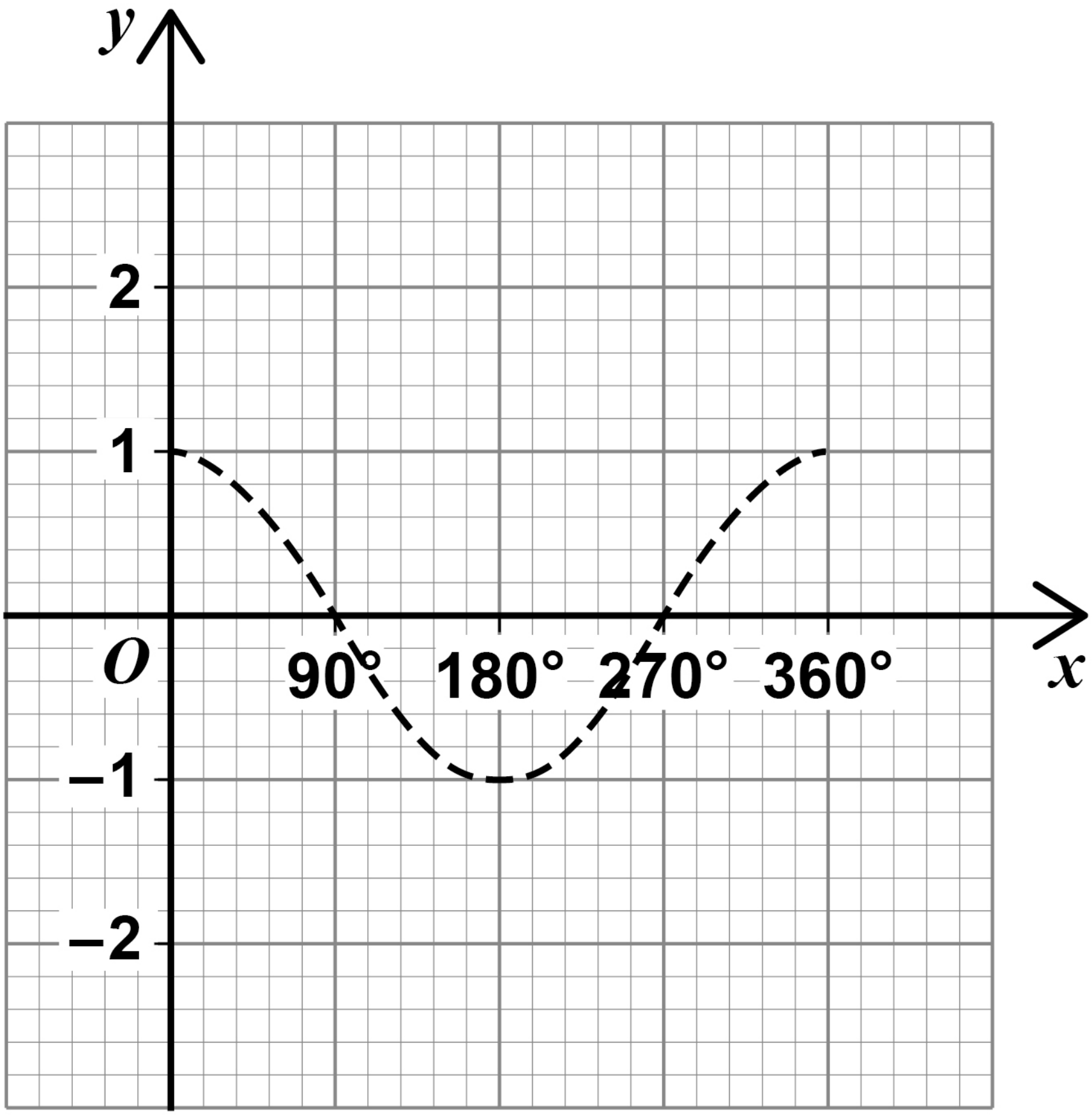
[Turn over]

28 Here is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$



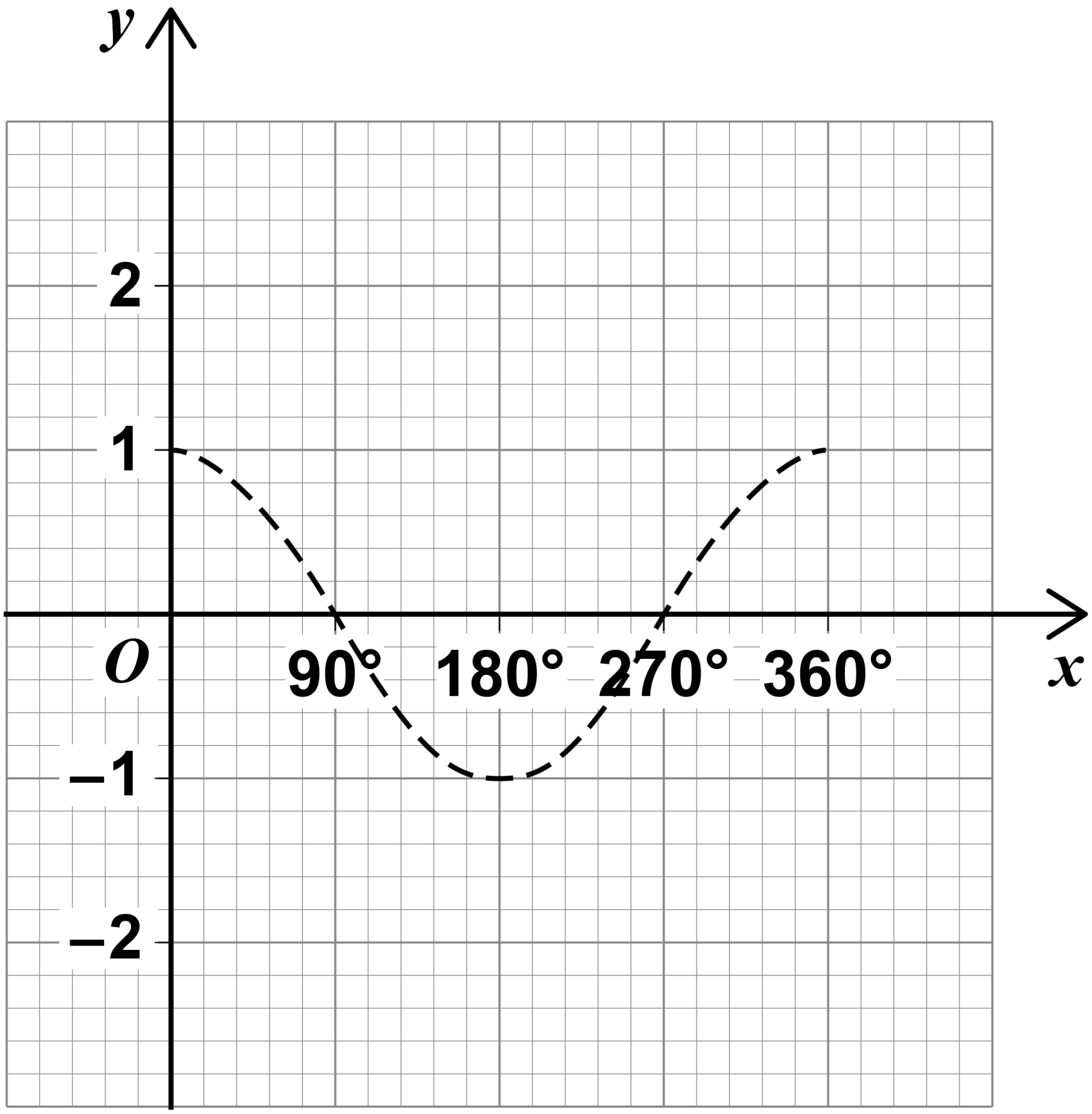
In parts (a) and (b) the graph of $y = \cos x$ is shown as a dashed line.

28(a) On the grid below, draw the graph of $y = \cos(x - 90°)$ for $0° \leqslant x \leqslant 360°$ [1 mark]



[Turn over]

28(b) On the grid below, draw the graph of $y = 1 + \cos x$ for $0° \leqslant x \leqslant 360°$ [1 mark]



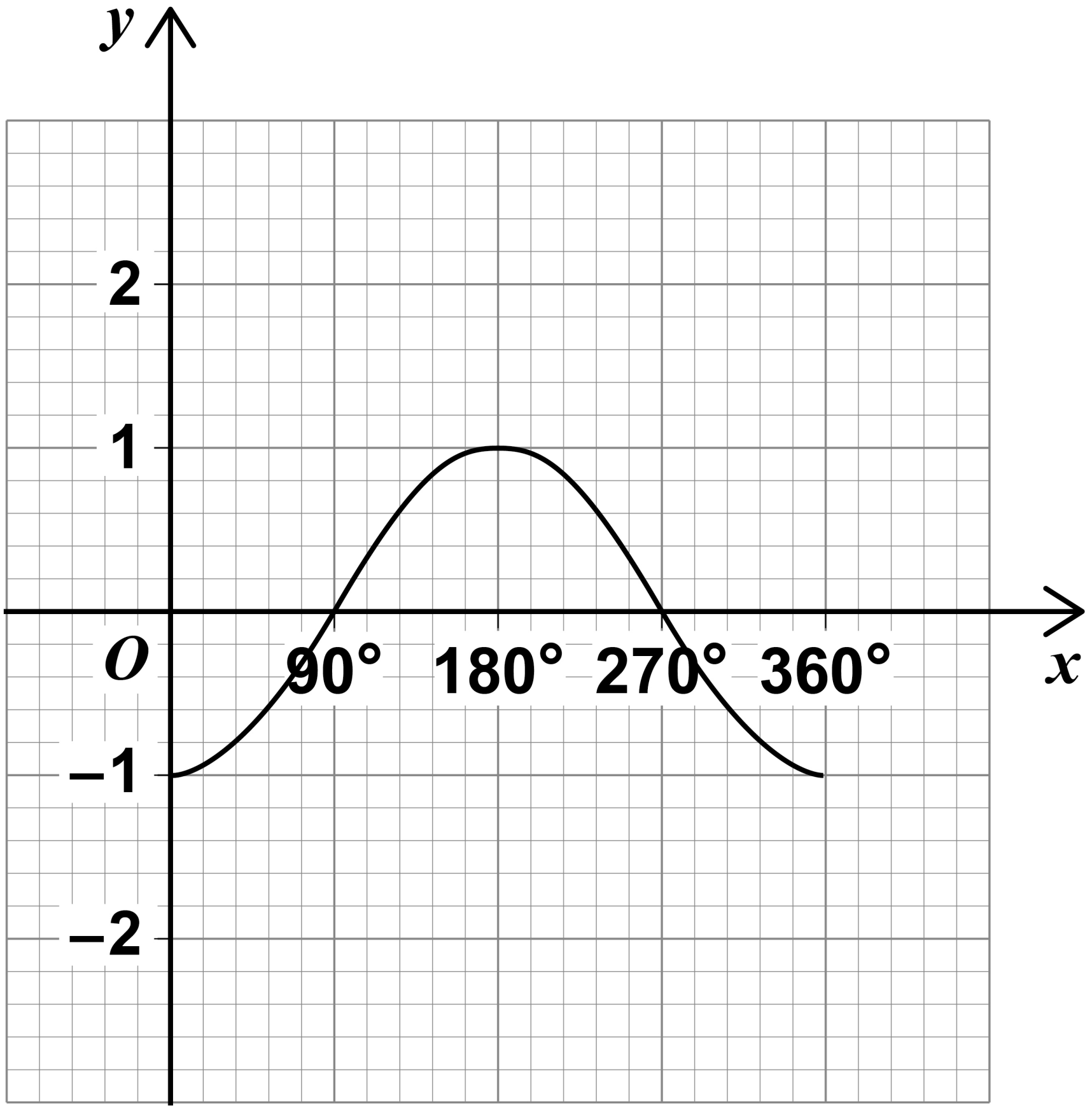
BLANK PAGE

[Turn over]

28(c) Rita tries to draw the graph of

$y = \cos(-x)$ for $0° \leqslant x \leqslant 360°$

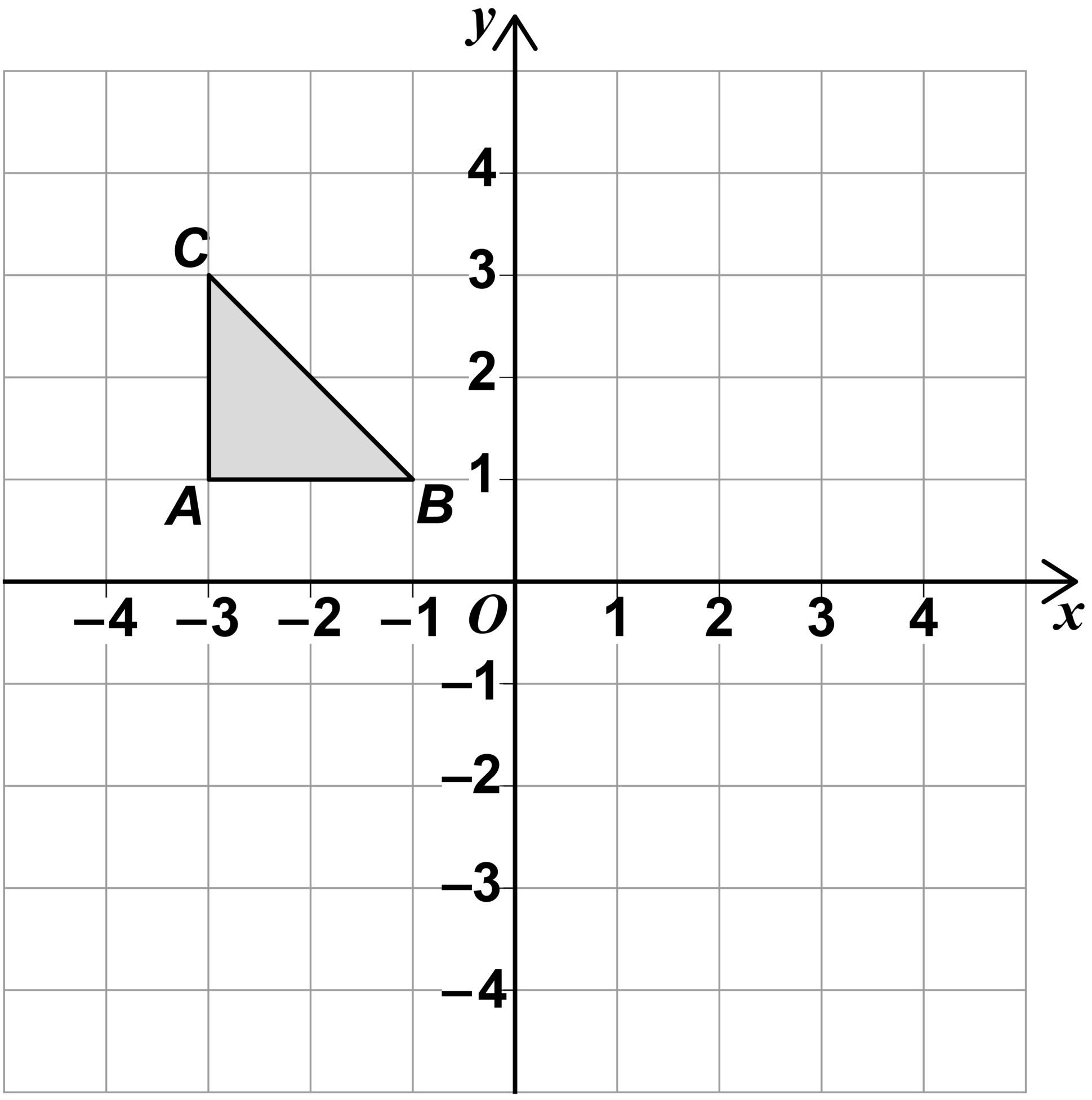
Here is her graph.



Give a reason why Rita's graph is incorrect. [1 mark]

3

29 Here is triangle *ABC* on a grid.



Describe a SINGLE transformation of the triangle so that

point *B* is invariant

point *A* moves to (1, 1)

point *C* moves to (1, –1)

[3 marks]

END OF QUESTIONS

3

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

BLANK PAGE

For Examiner's Use	
Pages	Mark
4–7	
8–12	
14–17	
18–21	
22–25	
26–30	
31–33	
34–37	
38–43	
44–46	
48–52	
54–59	
60–61	
TOTAL	