AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

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Forename(s) _____

Candidate signature _____

I declare this is my own work.

# GCSE MATHEMATICS

**H**

Higher Tier Paper 1 Non-Calculator

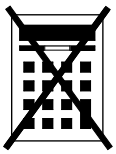
Time allowed: 1 hour 30 minutes

**Materials**

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.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or 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.

| For Examiner's Use | |
|---|---|
| Pages | Mark |
| 2–3 | |
| 4–5 | |
| 6–7 | |
| 8–9 | |
| 10–11 | |
| 12–13 | |
| 14–15 | |
| 16–17 | |
| 18–19 | |
| 20–21 | |
| 22–23 | |
| 24–25 | |
| 26 | |
| **TOTAL** | |

Answer **all** questions in the spaces provided.

*Do not write outside the box*

**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]**

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

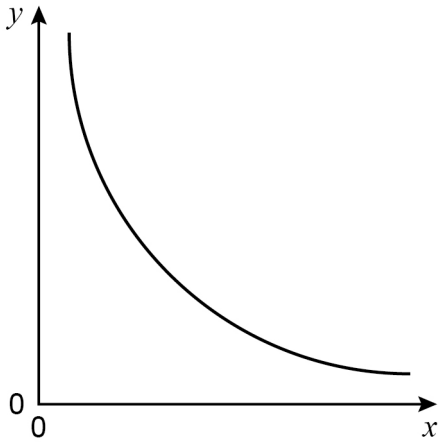
**3** Circle the solid that has 7 vertices.

**[1 mark]**

hexagonal prism | hexagon-based pyramid | pentagonal prism | pentagon-based pyramid

*Do not write outside the box*

**4** Here is a sketch of a graph.




Circle the equation of the graph.

$k$ is a constant.

**[1 mark]**

$y = kx$ $\quad$ $y = k + x$ $\quad$ $y = k - x$ $\quad$ $y = \frac{k}{x}$

**5** Write 200 as a product of prime factors.

Give your answer in index form.

**[3 marks]**

Answer _____

7

**Turn over ►**

*Do not write outside the box*

**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 $\dfrac{\sqrt{97} + 2.014^3}{0.49}$

**[3 marks]**

Answer _____

*Do not write outside the box*

**8 (a)** Solve $5x + 6 > 3x + 15$

**[3 marks]**

Answer _____

**8 (b)** Write down the inequality represented by the number line.

**[2 marks]**

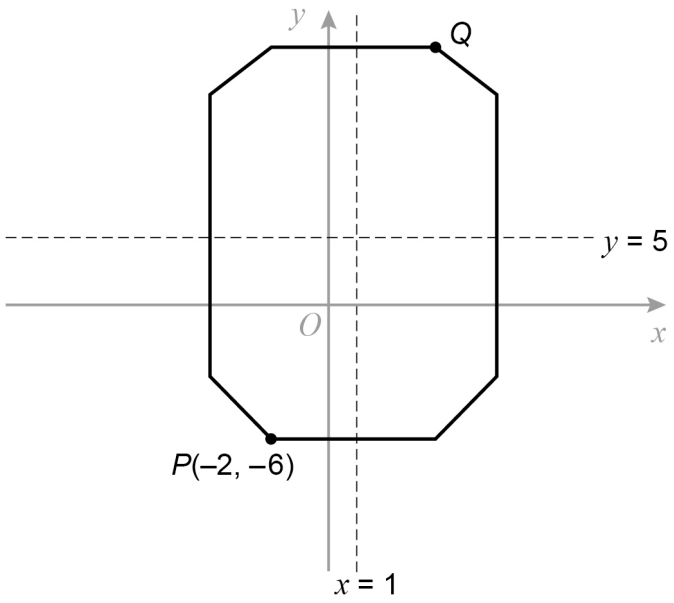
Answer _____

**10**

**Turn over ►**

*Do not write outside the box*

**9** The diagram shows an octagon.




Not drawn accurately

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

Work out the coordinates of point $Q$.

**[2 marks]**

Answer ( _____ , _____ )

*Do not write outside the box*

**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

**Turn over ►**

*Do not write outside the box*

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

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.

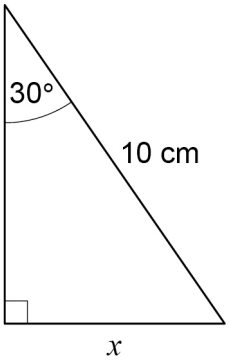
Work out the distance *AD*.

**[4 marks]**

Answer _____ miles

*Do not write outside the box*

**12** Here is a right-angled triangle.




Not drawn accurately

Use trigonometry to work out the value of $x$.

**[3 marks]**

Answer _____ cm

**Turn over for the next question**

7

*Do not write outside the box*

**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]**

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

*Do not write outside the box*

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

Work out the **two** possible values of $b$.

**[3 marks]**

Answer _____ and _____

6

**Turn over ►**

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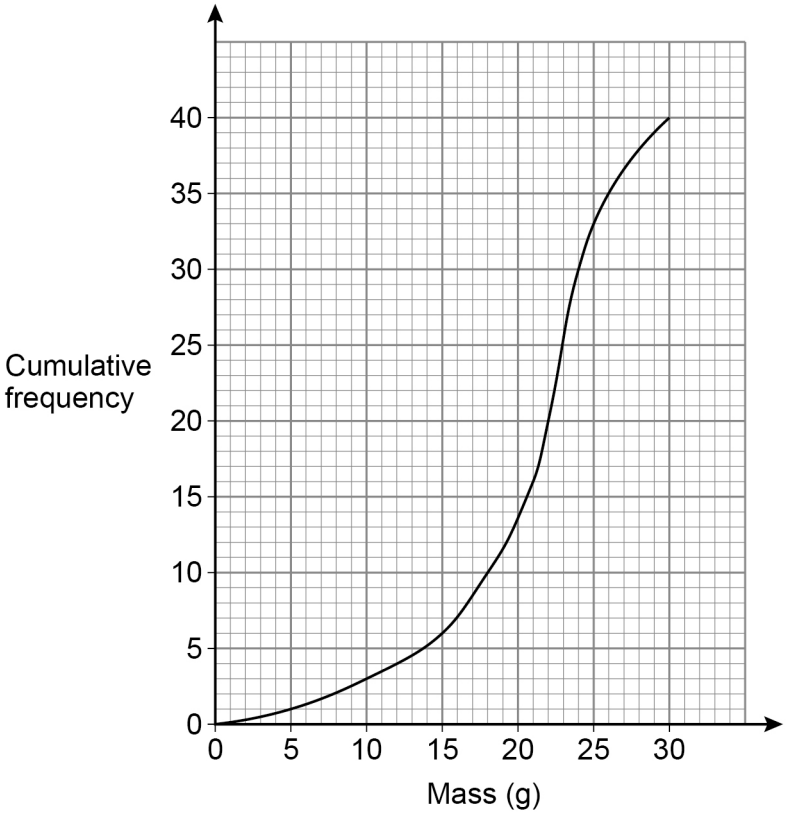
**16** The cumulative frequency graph represents the masses of 40 necklaces.




**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 _____

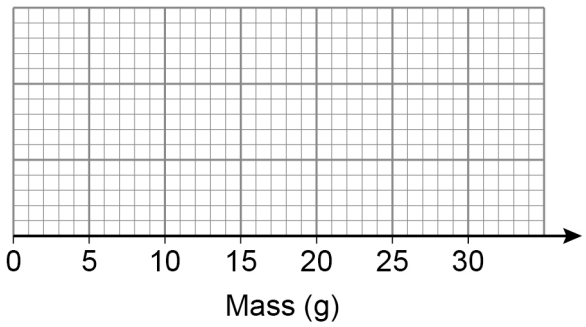
*Do not write outside the box*

**16 (b)** The lowest mass was 3 grams.

The highest mass was 28 grams.

Draw a box plot to represent the data.

**[3 marks]**




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

**[1 mark]**

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

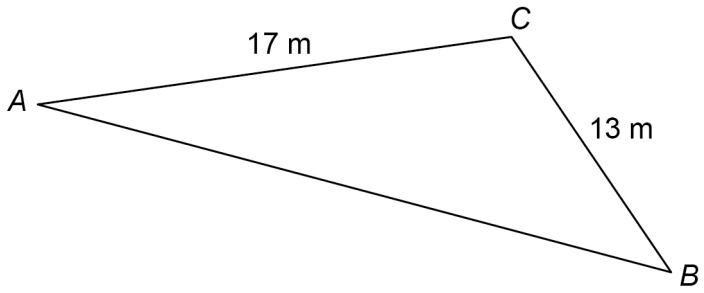
**Turn over for the next question**

**6**

*Do not write outside the box*

**18 (a)** Here is a triangle.

Not drawn accurately



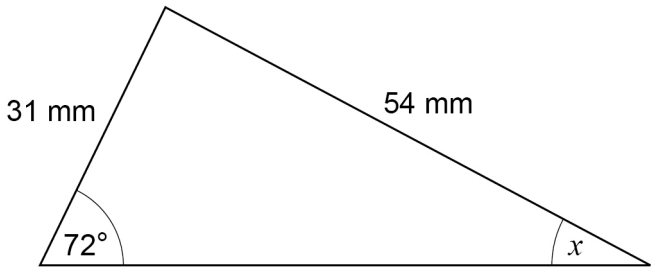

Give a reason why the length of side *AB* **cannot** be 35 m

**[1 mark]**

*Do not write outside the box*

**18 (b)** Here is a different triangle.

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]**

2

**Turn over ►**

*Do not write outside the box*

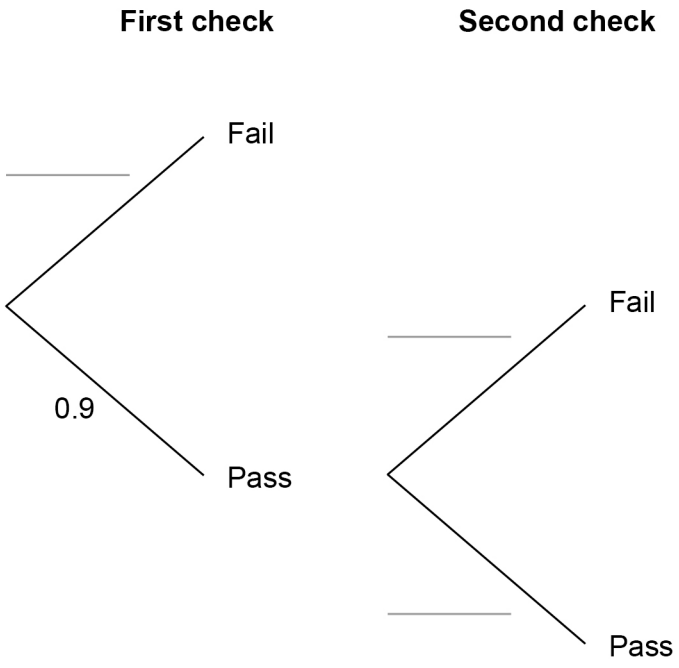
**19** Items made at a factory have to pass two checks.

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.

**[2 marks]**



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**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]**

$cm^2/g$ $cm^3/g$ $g/cm^2$ $g/cm^3$

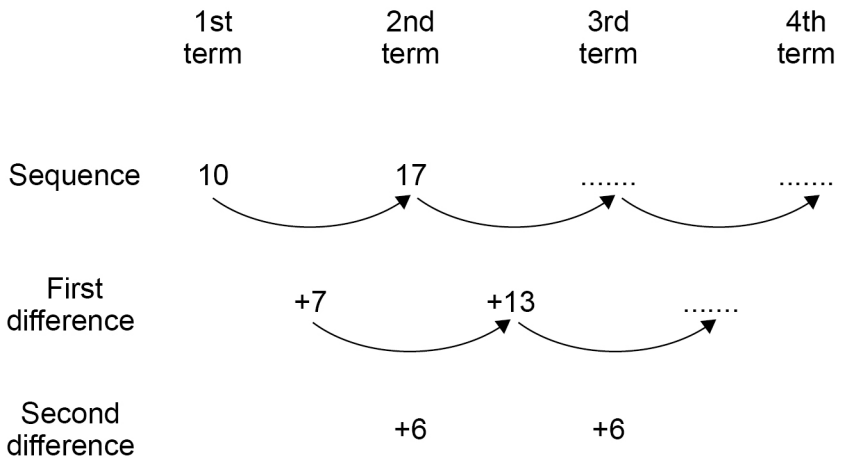
**Turn over for the next question**

6

*Do not write outside the box*

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

Here is some information about the sequence.




Work out an expression for the $n$th term of the sequence.

**[4 marks]**

Answer _____

*Do not write outside the box*

**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 _____

**10**

**Turn over ►**

*Do not write outside the box*

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

$f(4) = 7$

$f(10) = 22$

Work out the values of $c$ and $d$.

**[3 marks]**

$c =$ _____ $d =$ _____

*Do not write outside the box*

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

Circle the expression for $hg(x)$

**[1 mark]**

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

**25** Show that $\dfrac{\sqrt{150} - \sqrt{6}}{\sqrt{2} \times \sqrt{3}}$ simplifies to an integer.

**[3 marks]**

**Turn over for the next question**

7

*Do not write outside the box*

**26** $d = 2f$

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

Work out the ratio $e : f$

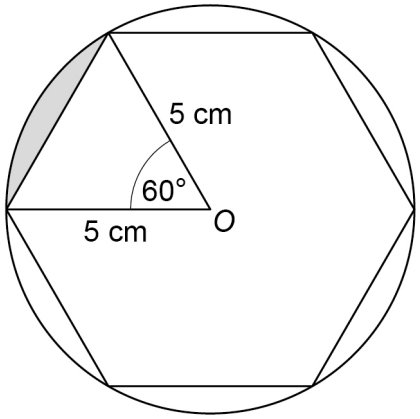
**[3 marks]**

Answer _____ : _____

*Do not write outside the box*

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

Not drawn accurately




Work out the shaded area.

Give your answer in the form $\dfrac{a\pi - b\sqrt{c}}{12}$ where $a$, $b$ and $c$ are integers.

**[4 marks]**

Answer _____ $cm^2$

7

**Turn over ►**

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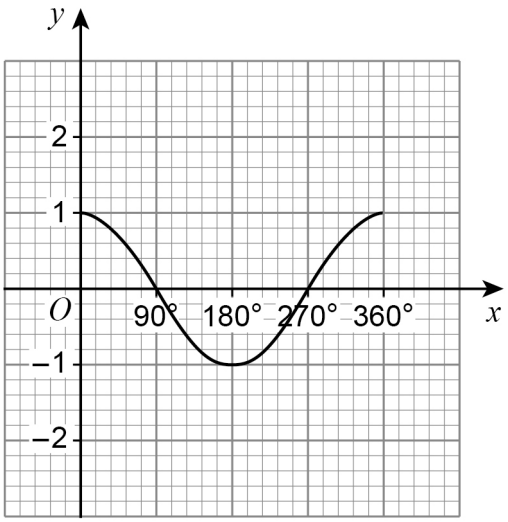
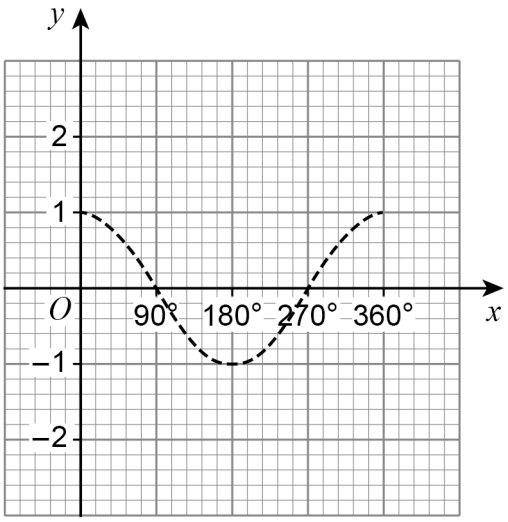
**28** Here is the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$




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]**



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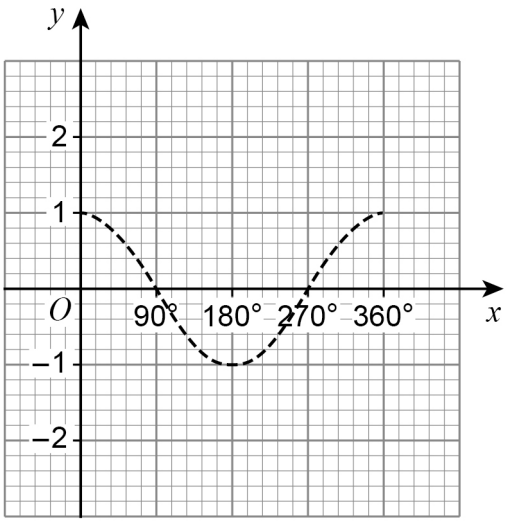
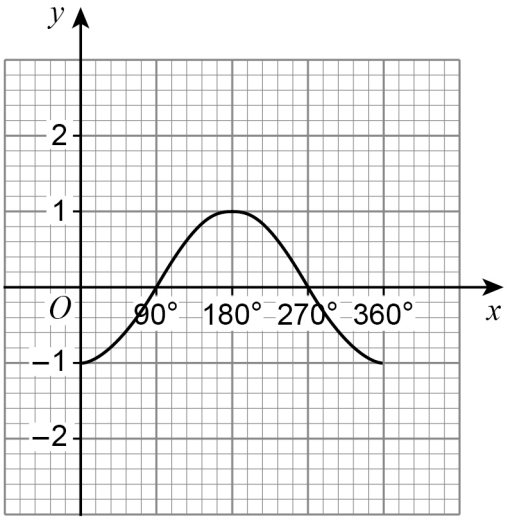
**28 (b)** On the grid below, draw the graph of $y = 1 + \cos x$ for $0° \leqslant x \leqslant 360°$

**[1 mark]**




**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

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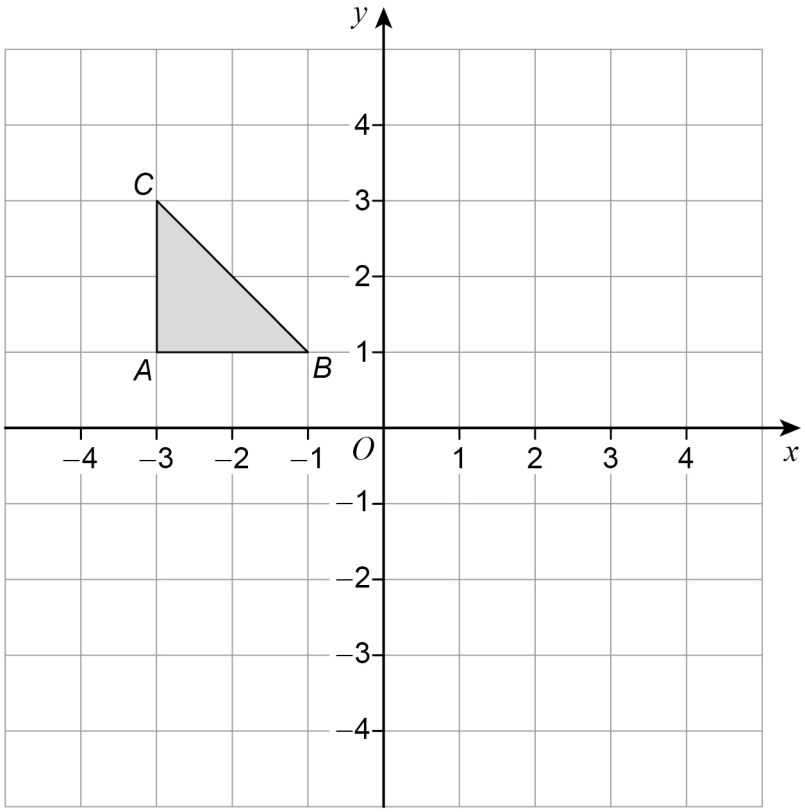
**29** Here is triangle *ABC* on a grid.




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

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| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
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