AQA

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier

Paper 1 Non-Calculator

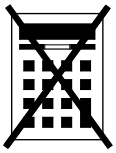
Shadow paper based on November 2022 question paper

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have**:**

- mathematical instruments
- the Formulae Sheet (enclosed).



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	
TOTAL	

Do not write outside the box

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

1 Work out $-5 \times -\frac{3}{7}$

Circle your answer.

[1 mark]

$-\frac{15}{35}$ $-\frac{15}{7}$ $\frac{15}{35}$ $\frac{15}{7}$

2 Circle the value of $\left(\sqrt{8}\right)^4$

[1 mark]

16 64 12 $\sqrt{32}$

3 $0.197 = \frac{1}{5} - x$

Circle the value of x.

[1 mark]

$\frac{1}{300}$ $\frac{1}{3000}$ $\frac{3}{100}$ $\frac{3}{1000}$

Do not write outside the box

4 Circle the correct statement.

[1 mark]

$5x \equiv 2x + 3x$	$5x \equiv 2$	$5x + 2x \equiv 3 - x$	$5x + 3x - 2 \equiv 0$

5 Divide 68 in the ratio 3 : 5

[3 marks]

Answer _____ and _____

Turn over for the next question

7

Do not write outside the box

6 Here is some information about the time spent at work by 45 women and 45 men last week.

Time spent, t (hours)	Number of women	Number of men
$25 < t \leqslant 30$	13	11
$30 < t \leqslant 35$	12	18
$35 < t \leqslant 40$	15	10
$40 < t \leqslant 45$	3	5
$45 < t \leqslant 50$	2	1

Tick **one** box for each statement.

[3 marks]

	Definitely true	**Might be true**	**Cannot be true**
Five of the **women** spent more than 40 hours at work.	☐	☐	☐
The range for the **men** is 25 hours.	☐	☐	☐
The men have a higher median than the women.	☐	☐	☐

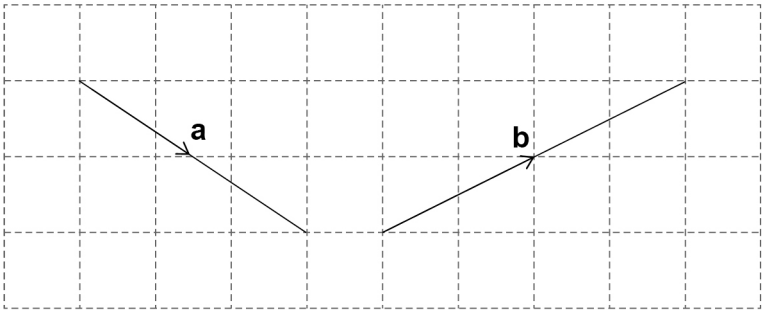
Turn over for the next question

8

Do not write outside the box

7 The diagram shows the vectors **a** and **b**.

As a column vector $\mathbf{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$



8 (a) What is **b** as a column vector?

[2 marks]

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

7 (b) Work out 3**a** as a column vector.

[1 mark]

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

7 (c) $\mathbf{a} + \mathbf{c} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$

Work out **c** as a column vector.

Circle your answer.

[1 mark]

$\begin{pmatrix} -2 \\ -1 \end{pmatrix}$	$\begin{pmatrix} 2 \\ -1 \end{pmatrix}$	$\begin{pmatrix} -1 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 1 \\ -2 \end{pmatrix}$

Turn over ►

Do not write outside the box

8 Work out $\left(\frac{11}{15} - \frac{3}{10}\right) \div \frac{5}{6}$

Give your answer as a fraction.

[3 marks]

Answer _____

9 Work out all the **integer** values of x for which $10 \leqslant 5x < 36$

[2 marks]

Answer _____

9

Do not write outside the box

10 Here is some information about 150 people who visit a museum which has a shop and a cafe.

$\frac{2}{3}$ of the people visit neither the museum shop nor the museum cafe.

24 people visit the museum shop.

29 people visit the museum cafe.

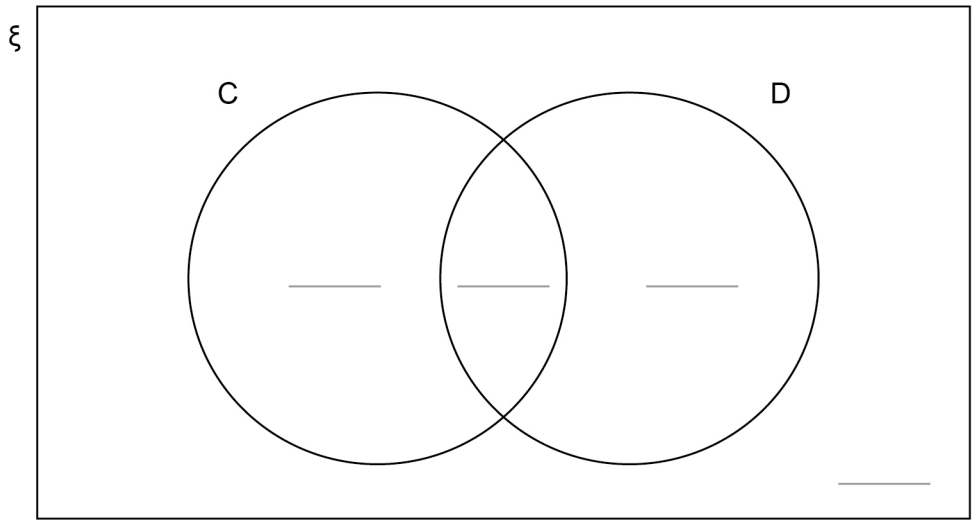
Complete this Venn diagram to represent the information.

[3 marks]

ξ = 150 people who visit the museum

C = people visit the museum shop

D = people visit the museum cafe



Do not write outside the box

11 Write $(2^7 \times 2^4) : 2^5$ in the form $n : 1$ where n is an integer.

[3 marks]

Answer _____ : 1

12 a is 20% less than b.

Circle the ratio $a : b$

[1 mark]

10 : 8 | 8 : 2 | 8 : 10 | 2 : 8

13 Work out $2.5\dot{4} + 1.243$

Circle your answer.

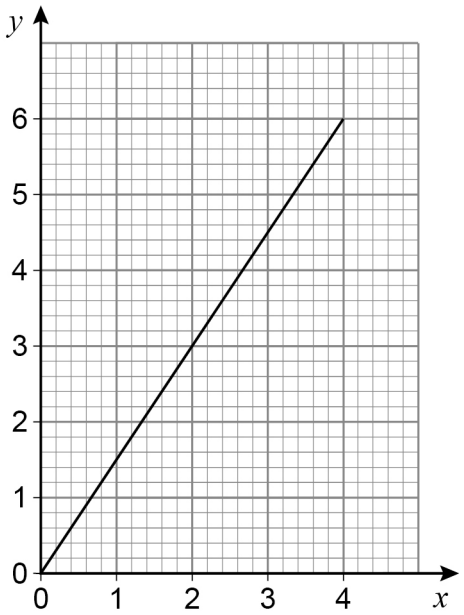
[1 mark]

3.783 | 3.7834 | $3.787\dot{4}$ | $3.78\dot{7}$

Do not write outside the box

14 Joanna wants to draw a graph, for values of x from -4 to 4,
where the x-coordinate and y-coordinate are always in the ratio 3 : 2

Here is her graph.



Make two criticisms of Joanna's graph.

[2 marks]

Criticism 1 _____

_____

_____

Criticism 2 _____

_____

_____

7

Turn over ►

Do not write outside the box

15 Show that $(5x - 4)(3x + 3) - 9x(x + 1) - 6(x^2 - x - 3)$ simplifies to an integer.

[4 marks]

Do not write outside the box

16 A graph has the equation $y = x^2 - px + r$ where p and r are constants.

The graph passes through the points (0, 5), (1, 2) and (3, u)

Work out the value of u.

[4 marks]

$u =$ _____

Turn over for the next question

8

Do not write outside the box

17 The table shows information about the heights of 60 athletes.

Height, h (cm)	**Frequency**
$150 < h \leqslant 160$	4
$160 < h \leqslant 170$	15
$170 < h \leqslant 180$	32
$180 < h \leqslant 190$	7
$190 < h \leqslant 200$	2

17 (a) Complete the cumulative frequency table.

[1 mark]

Height, h (cm)	**Cumulative frequency**
$h \leqslant 150$	0
$h \leqslant 160$	4
$h \leqslant 170$	19
$h \leqslant 180$	
$h \leqslant 190$	
$h \leqslant 200$	

17 (b) Circle the class interval that contains the upper quartile.

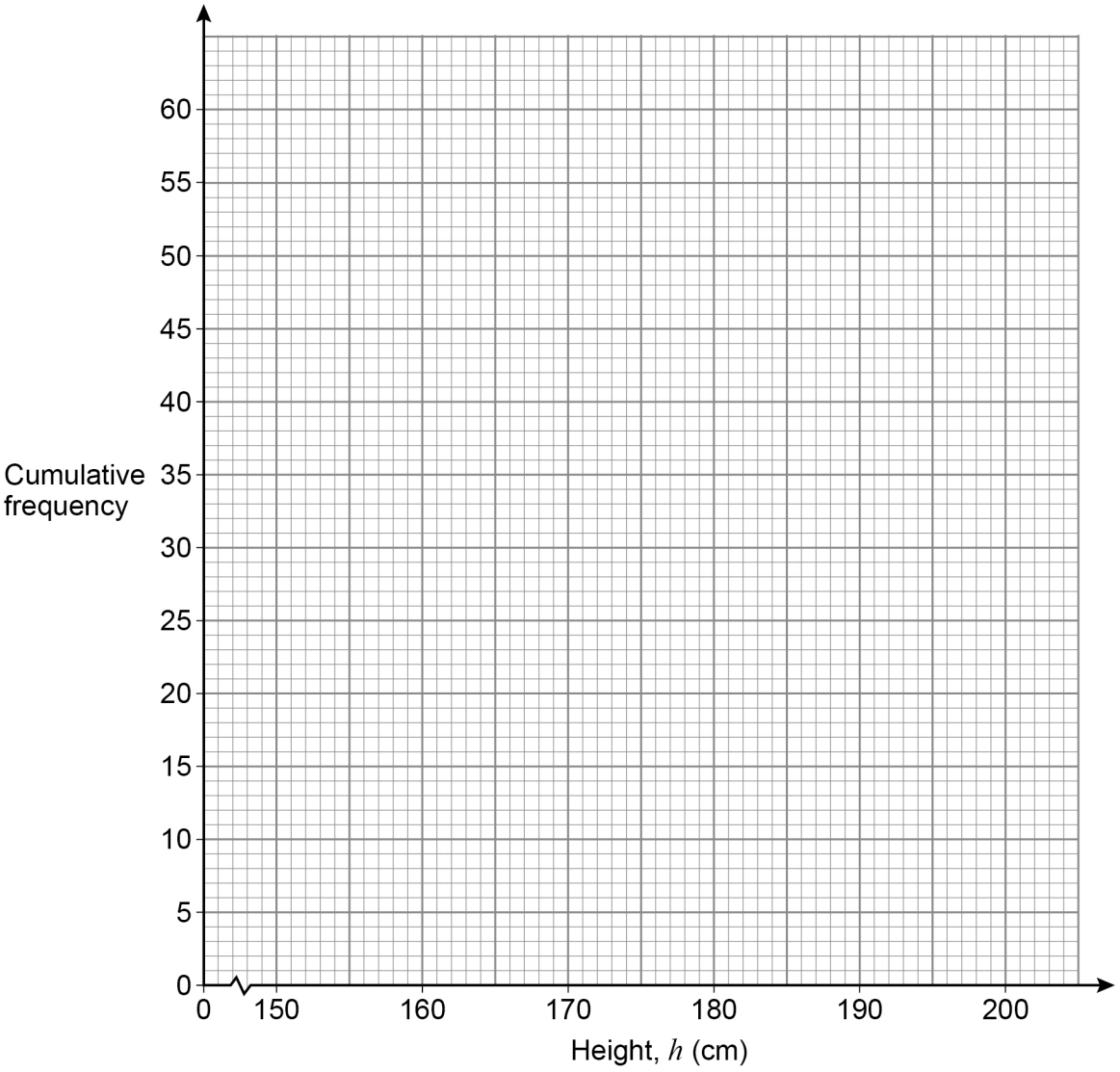
[1 mark]

$150 < h \leqslant 160$	$160 < h \leqslant 170$	$170 < h \leqslant 180$	$180 < h \leqslant 190$

Do not write outside the box

17 (c) Draw a cumulative frequency diagram to represent the data.

[2 marks]



17 (d) Estimate the number of the athletes whose height is **less** than 176 cm

[2 marks]

Answer _____

6

Turn over ►

Do not write outside the box

18 A rod has three sections, A, B and C.

The lengths of A, B and C are in the ratios

A : B = 2 : 7 B : C = 3 : 4

What fraction of the length of the rod is section C?

[3 marks]

Answer _____

Do not write outside the box

19 (a) Work out the value of $\left(\frac{3}{2}\right)^{-3}$

[2 marks]

Answer _____

19 (b) Work out the value of $\left(\frac{16}{25}\right)^{\frac{3}{2}}$

[2 marks]

Answer _____

Turn over for the next question

7

Do not write outside the box

20 The only solution to $x^2 - bx + c = 0$ is $x = 12$

Work out the values of b and c.

[3 marks]

$b =$ $c =$

21 Convert $0.7\dot{3}$ to a fraction.

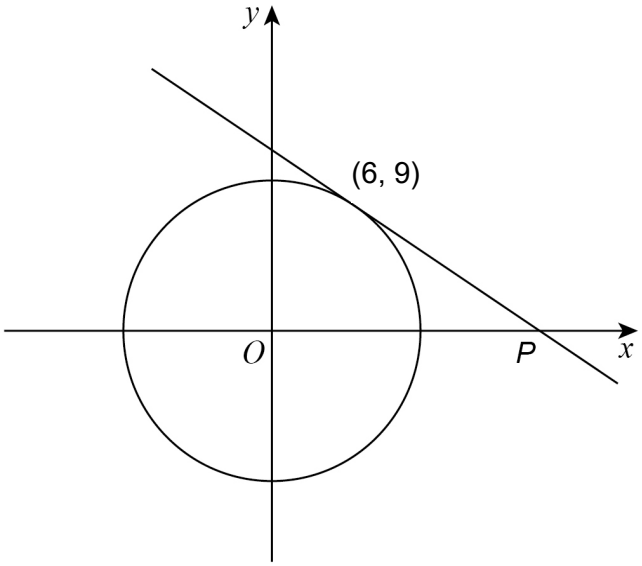
[3 marks]

Answer

Do not write outside the box

22 (6, 9) is a point on a circle, centre O.

The tangent at (6, 9) intersects the x-axis at P.



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Work out the x-coordinate of P.

[5 marks]

Answer _____

11

Turn over ►

Do not write outside the box

23 $\frac{2}{3} \times \sin 60° \times \cos 60° \times \tan 60° = \sin y$

Work out **one** possible value of y.

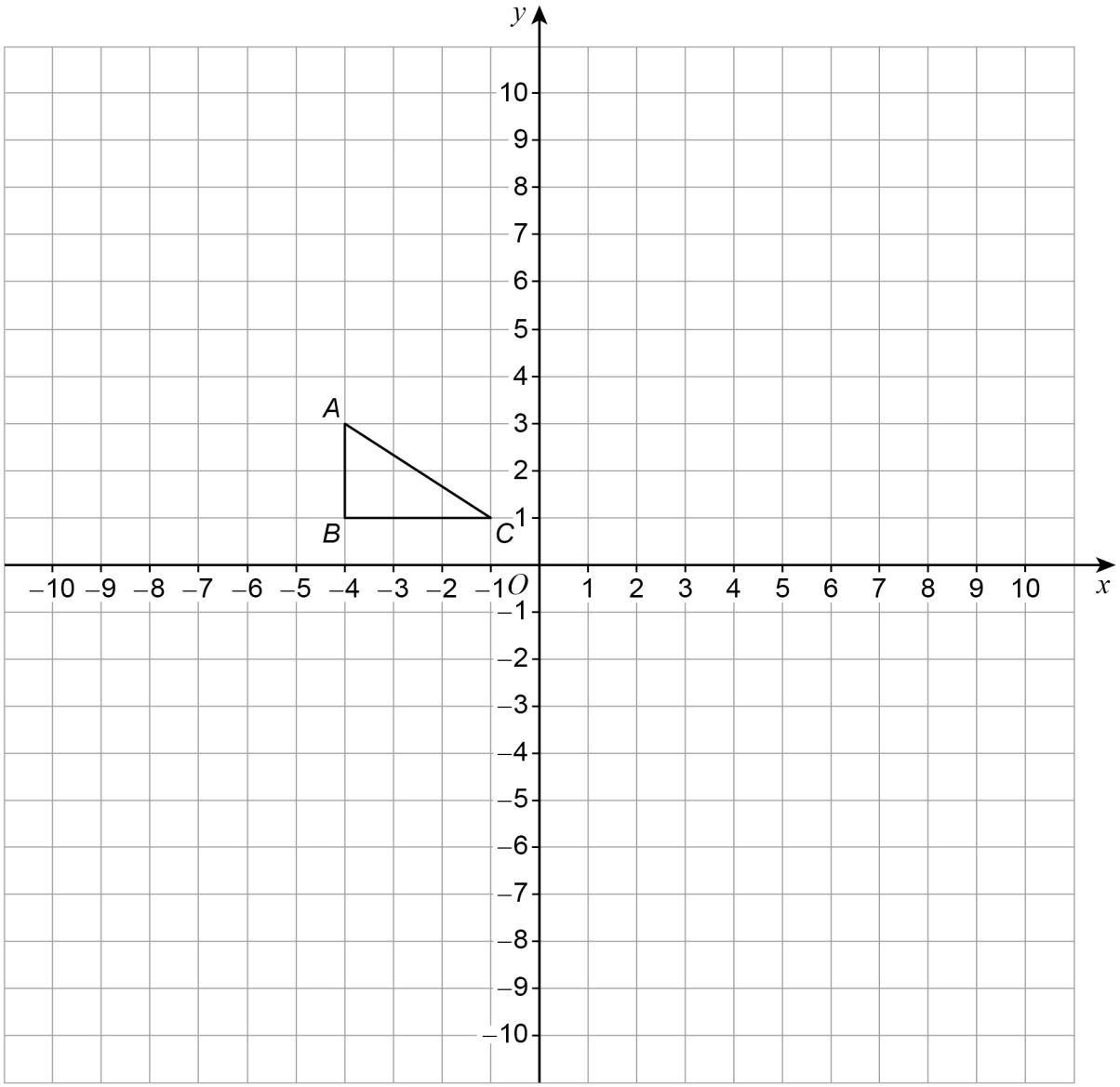
You **must** show your working.

[4 marks]

Answer _____ degrees

Do not write outside the box

24 Triangle *ABC* is drawn on a grid.



ABC is transformed to *A'B'C'* by a reflection in the line $x = 1$

A'B'C' is transformed to *A''B''C''* by a rotation 90° anticlockwise about (1, –1)

Which **one** point on *ABC* is invariant under the combined transformation?

You **must** show the result of each transformation on the grid.

[4 marks]

Answer _____

8

Turn over ►

Do not write outside the box

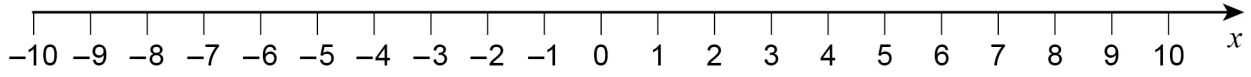
25 (a) Solve $x^2 - 3x - 10 < 0$

[2 marks]

Answer _____

25 (b) Show the solution to $x^2 - 3x - 10 < 0$ on the number line.

[1 mark]



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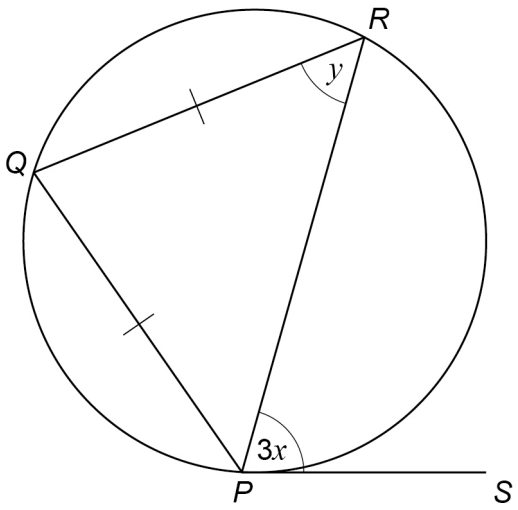
26 *P*, *Q* and *R* are points on a circle.

SP is a tangent to the circle.

RQ = *PQ*



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Prove that $y = 90° - \frac{3}{2}x$

[4 marks]

7

Turn over ►

Do not write outside the box

27 Work out $\sqrt{2\frac{4}{25}} - \frac{4}{\sqrt{6}}$

Give your answer in the form $\frac{a\sqrt{6}}{b}$ where a and b are integers.

[4 marks]

Answer _____

END OF QUESTIONS

4