

Please write clearly in block capitals.

Centre number

Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

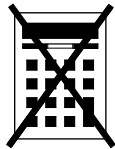
Higher Tier Paper 1 Non-Calculator

Tuesday 1 November 2022 Morning 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	



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

1 Work out $-4 \times -\frac{7}{9}$

Circle your answer.

[1 mark]

$$-\frac{28}{36}$$

$$-\frac{28}{9}$$

$$\frac{28}{36}$$

$$\frac{28}{9}$$

2 Circle the value of $(\sqrt{6})^4$

[1 mark]

12

36

10

 $\sqrt{24}$

3 $0.203 = \frac{1}{5} + x$

Circle the value of x .**[1 mark]**

$$\frac{1}{300}$$

$$\frac{1}{3000}$$

$$\frac{3}{100}$$

$$\frac{3}{1000}$$



4 Circle the correct statement.

[1 mark]

$3x \equiv x + 2x$

$3x \equiv 2$

$3x + x \equiv 2 - x$

$3x + x - 2 \equiv 0$

5 Divide 62 in the ratio 3 : 7

[3 marks]

Answer _____ and _____

Turn over for the next question

7

Turn over ►



6

Here is some information about the time spent on social media by 40 women and 40 men last week.

Time spent, t (hours)	Number of women	Number of men
$2 < t \leq 5$	12	10
$5 < t \leq 8$	11	17
$8 < t \leq 11$	14	9
$11 < t \leq 14$	2	4
$14 < t \leq 17$	1	0

Tick **one** box for each statement.

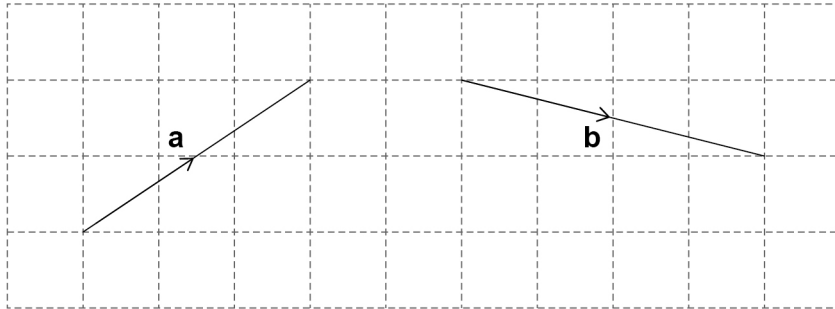
[3 marks]

	Definitely true	Might be true	Cannot be true
Three of the women spent more than 11 hours on social media.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The range for the men is 15 hours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The women have a higher median than the men.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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

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



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

[2 marks]

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

7 (b) Work out $4\mathbf{a}$ as a column vector.

[1 mark]

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

7 (c) $\mathbf{a} + \mathbf{c} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$

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

Circle your answer.

[1 mark]

$$\begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 \\ 2 \end{pmatrix}$$

$$\begin{pmatrix} -2 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 \\ -2 \end{pmatrix}$$



8 Work out $\left(\frac{7}{10} - \frac{4}{15}\right) \div \frac{2}{3}$

Give your answer as a fraction.

[3 marks]

Answer _____

9 Work out all the **integer** values of x for which $12 \leq 4x < 25$

[2 marks]

Answer _____



10

Here is some information about 120 people who visit a shop.

$\frac{3}{4}$ of the people buy neither a coat nor a dress.

19 people buy a coat.

14 people buy a dress.

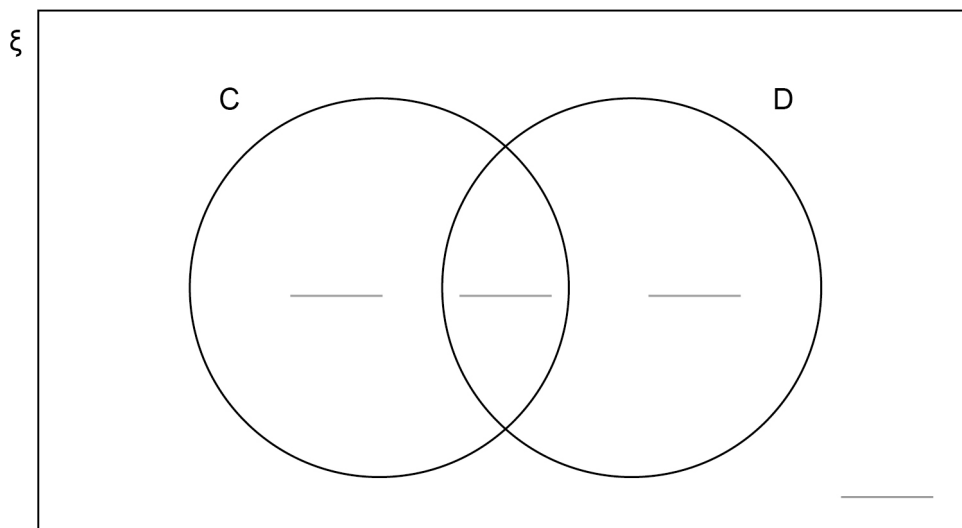
Complete this Venn diagram to represent the information.

[3 marks]

ξ = 120 people who visit the shop

C = people who buy a coat

D = people who buy a dress





11 Write $(3^6 \times 3^5) : 3^7$ in the form $n : 1$ where n is an integer.

[3 marks]

Answer _____ : 1

12 a is 10% more than b .

Circle the ratio $a : b$

[1 mark]

10 : 11

10 : 1

11 : 10

1 : 10

13 Work out $0.4\dot{7} + 0.312$

Circle your answer.

[1 mark]

0.782

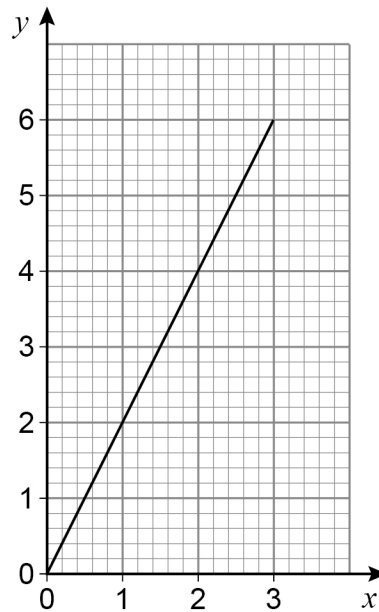
0.789

0.789 $\dot{7}$

0.78 $\ddot{9}$



- 14** Craig wants to draw a graph, for values of x from -3 to 3 , where the x -coordinate and y -coordinate are always in the ratio $2 : 1$
- Here is his graph.



Make two criticisms of Craig's graph.

[2 marks]

Criticism 1 _____

Criticism 2 _____



15 Show that $(3x + 4)(2x - 5) - 11x(x - 2) + 5(x^2 - 3x - 1)$ simplifies to an integer. **[4 marks]**



16 A graph has the equation $y = x^2 + px + r$ where p and r are constants.
The graph passes through the points (0, 4), (1, 3) and (8, w)

Work out the value of w .

[4 marks]

$w =$ _____

Turn over for the next question



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

Height, h (cm)	Frequency
$150 < h \leq 160$	4
$160 < h \leq 170$	12
$170 < h \leq 180$	35
$180 < h \leq 190$	7
$190 < h \leq 200$	2

- 17 (a)** Complete the cumulative frequency table.

[1 mark]

Height, h (cm)	Cumulative frequency
$h \leq 150$	0
$h \leq 160$	4
$h \leq 170$	16
$h \leq 180$	
$h \leq 190$	
$h \leq 200$	

- 17 (b)** Circle the class interval that contains the lower quartile.

[1 mark]

$150 < h \leq 160$

$160 < h \leq 170$

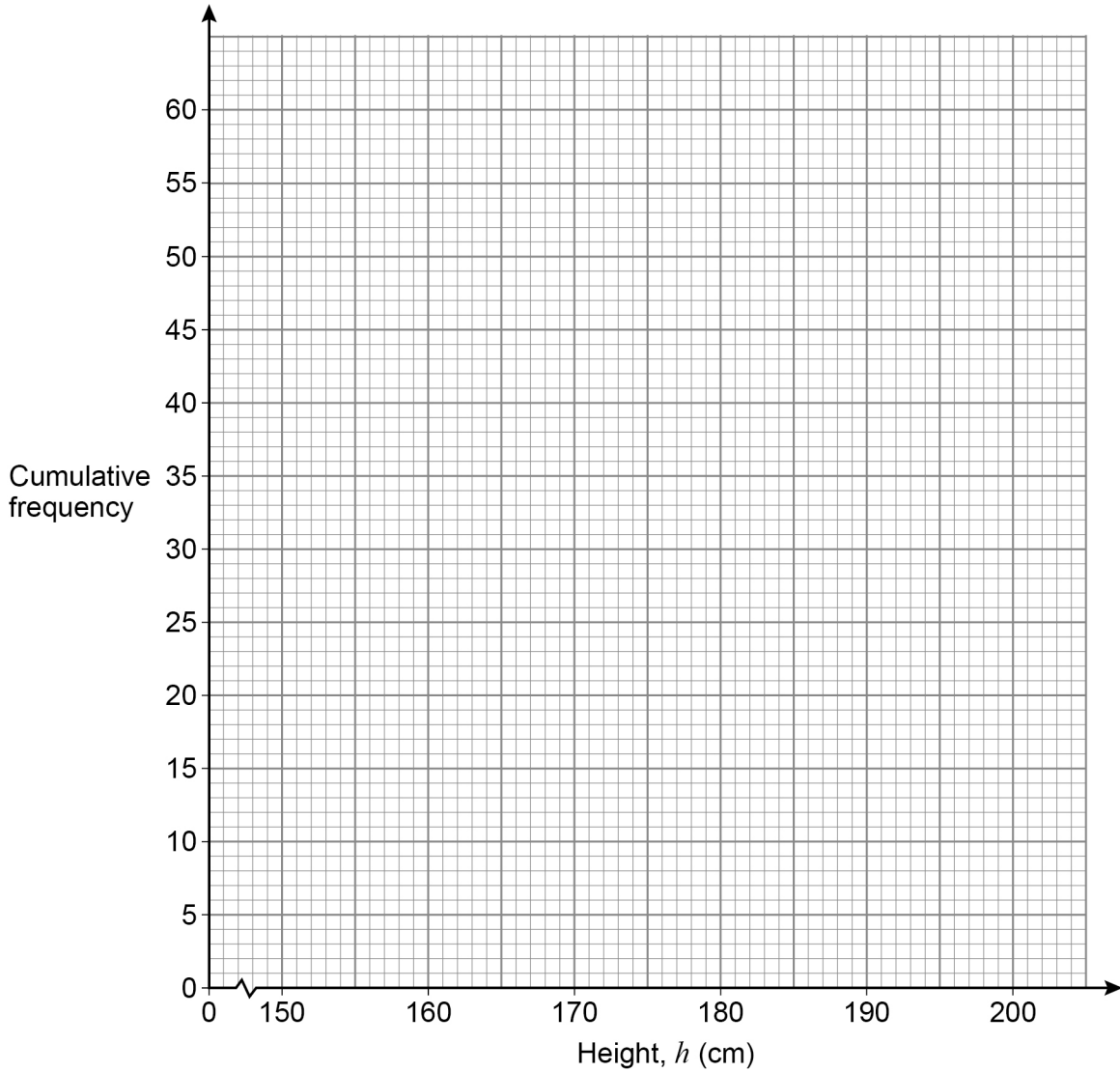
$170 < h \leq 180$

$180 < h \leq 190$



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

[2 marks]



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

[2 marks]

Answer _____

6

Turn over ►



18

A road has three sections, D, E and F.

The lengths of D, E and F are in the ratios

$$D : E = 3 : 5 \quad E : F = 7 : 4$$

What fraction of the length of the road is section D?

[3 marks]

Answer _____



19 (a) Work out the value of $\left(\frac{5}{4}\right)^{-2}$

[2 marks]

Answer _____

19 (b) Work out the value of $\left(\frac{9}{100}\right)^{\frac{3}{2}}$

[2 marks]

Answer _____

Turn over for the next question

7

Turn over ►



20 The only solution to $x^2 + bx + c = 0$ is $x = -15$

Work out the values of b and c .

[3 marks]

$b =$ _____ $c =$ _____

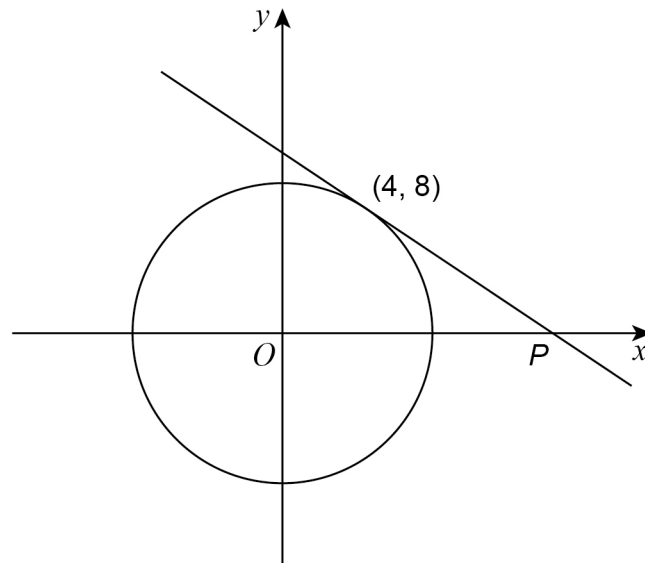
21 Convert $0.6\dot{1}$ to a fraction.

[3 marks]

Answer _____



22

 $(4, 8)$ is a point on a circle, centre O .The tangent at $(4, 8)$ intersects the x -axis at P .Not drawn
accuratelyWork out the x -coordinate of P .**[5 marks]**

Answer _____



23

$$4 \times \sin 30^\circ \times \tan 30^\circ \times \cos 30^\circ = \sin y$$

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

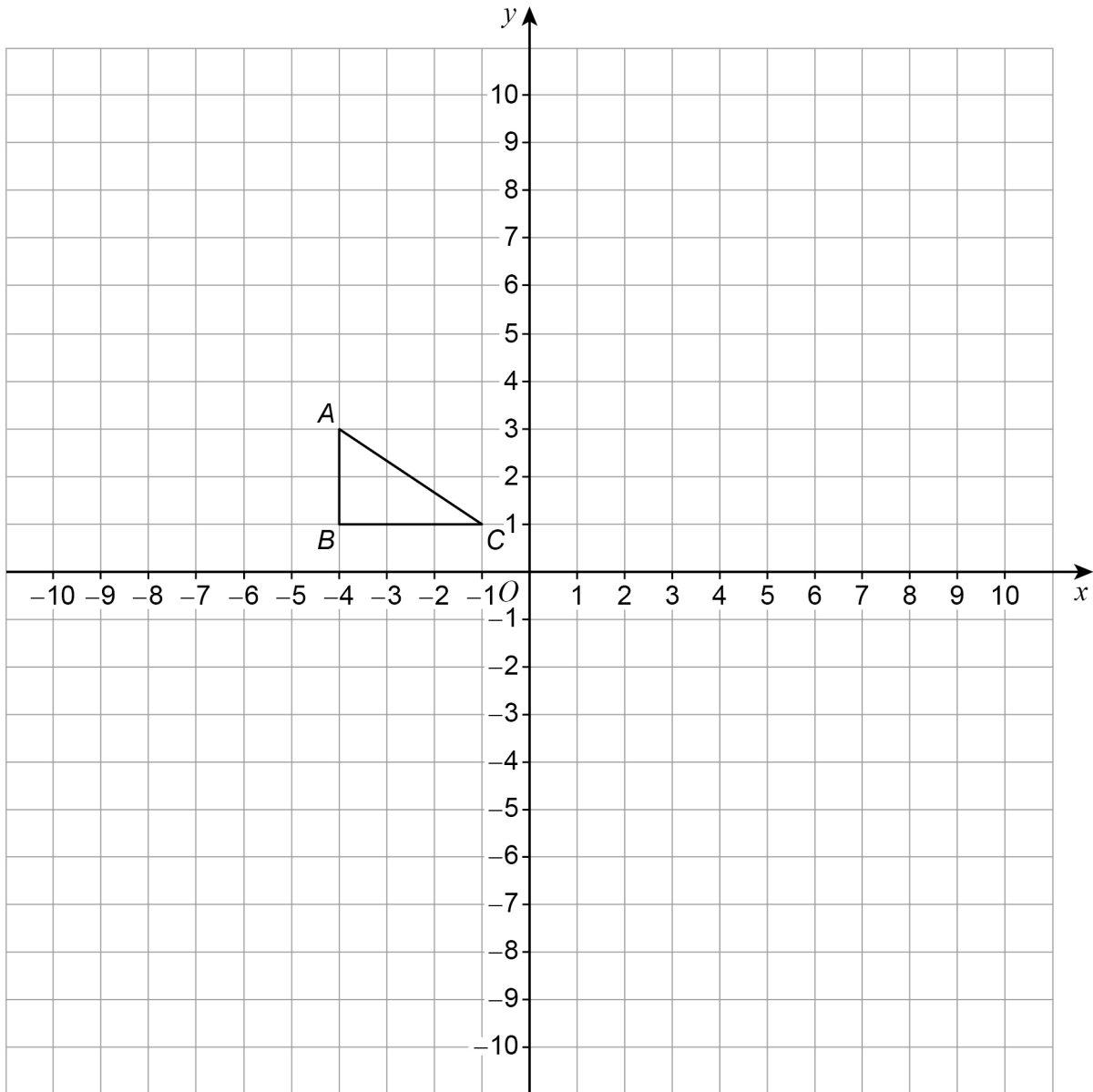
You **must** show your working.

[4 marks]

Answer _____ degrees



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 $(1, -4)$

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 _____

Turn over ►



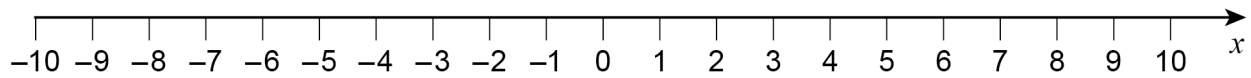
25 (a) Solve $x^2 - 5x - 6 < 0$

[2 marks]

Answer _____

25 (b) Show the solution to $x^2 - 5x - 6 < 0$ on the number line.

[1 mark]

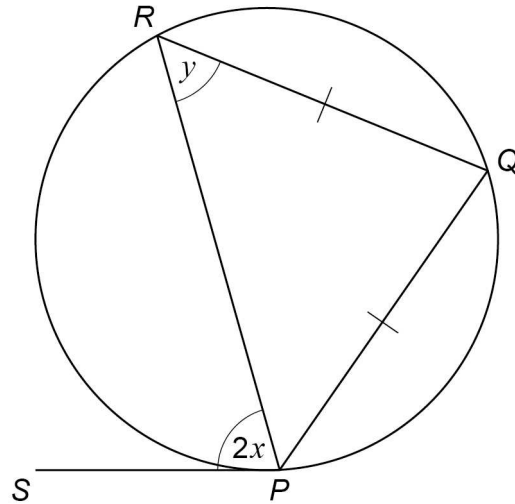


26

P , Q and R are points on a circle.

SP is a tangent to the circle.

$RQ = PQ$



Not drawn
accurately

Prove that $y = 90^\circ - x$

[4 marks]



27

Work out $\sqrt{2\frac{13}{16}} - \frac{2}{\sqrt{5}}$ Give your answer in the form $\frac{a\sqrt{5}}{b}$ where a and b are integers.**[4 marks]**

Answer _____

END OF QUESTIONS

4



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2 8



2 2 B G 8 3 0 0 / 1 H

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