A

AQA

Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

MATHEMATICS

H

Higher Tier **Paper 1 Non-Calculator**

8300/1H

Tuesday 1 November 2022 **Morning**

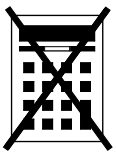
Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

[Turn over]

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.**
- **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 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 $\left(\sqrt{6}\right)^4$ [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]

7

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

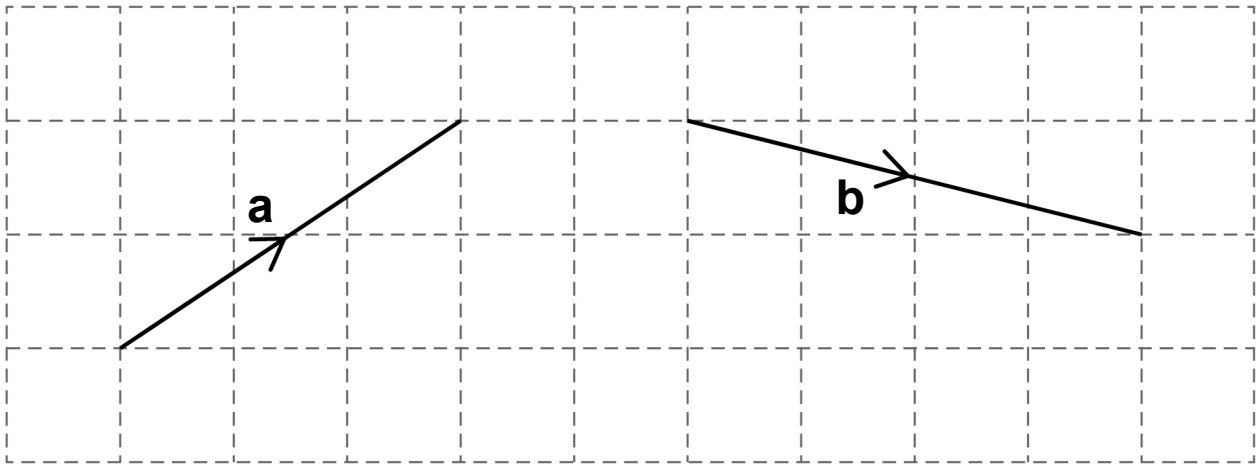
Time spent, t (hours)	Number of women	Number of men
$2 < t \leqslant 5$	12	10
$5 < t \leqslant 8$	11	17
$8 < t \leqslant 11$	14	9
$11 < t \leqslant 14$	2	4
$14 < t \leqslant 17$	1	0

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.	☐	☐	☐
The range for the MEN is 15 hours.	☐	☐	☐
The women have a higher median than the men.	☐	☐	☐

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

7 (b) Work out 4a as a column vector. [1 mark]

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

[Turn over]

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

Work out c as a column vector.

Circle your answer. [1 mark]

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

7

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[Turn over]

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

Give your answer as a fraction. [3 marks]

Answer _____

[Turn over]

9 **Work out all the INTEGER values of x for which $12 \leqslant 4x < 25$ [2 marks]**

Answer _____

BLANK PAGE

[Turn over]

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.

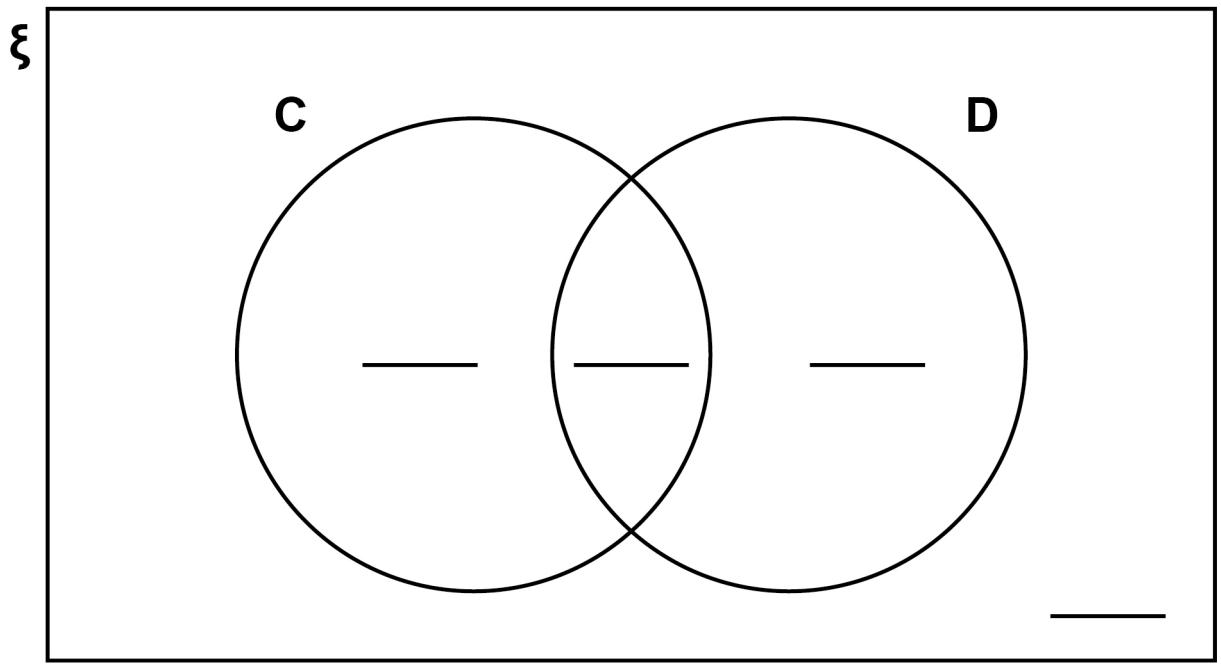
14 people buy a dress.

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



[Turn over]

8

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]

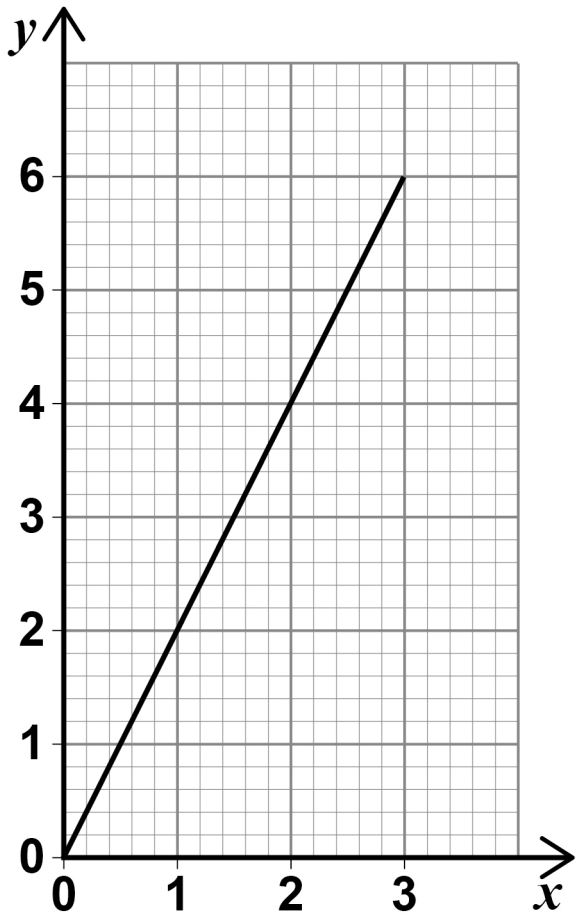
0.782 0.789 $0.789\dot{7}$ $0.7\dot{8}\dot{9}$

[Turn over]

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 _____

_____

_____

_____

7

15 **Show that**

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

[Turn over]

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]

$w =$ _____

8

[Turn over]

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

Height, h (cm)	Frequency
$150 < h \leqslant 160$	4
$160 < h \leqslant 170$	12
$170 < h \leqslant 180$	35
$180 < h \leqslant 190$	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
$h \leqslant 170$	16
$h \leqslant 180$	
$h \leqslant 190$	
$h \leqslant 200$	

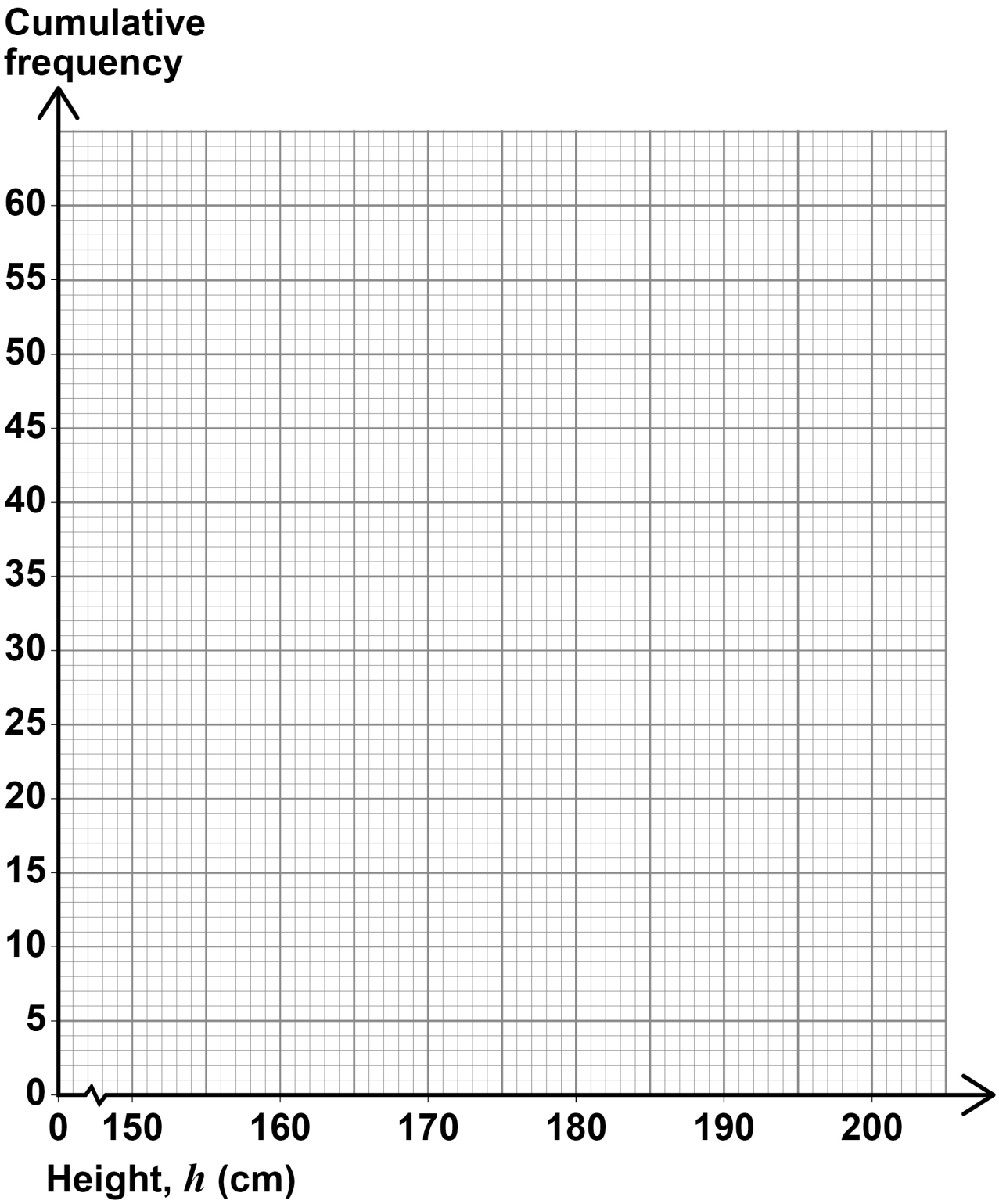
17 (b) Circle the class interval that contains the lower quartile. [1 mark]

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

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

[Turn over]

17 (c) **Draw a cumulative frequency diagram to represent the data shown on page 24. [2 marks]**



17 (d) Estimate the number of the athletes whose height is MORE than 176 cm [2 marks]

Answer _____

[Turn over]

6

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 E : F = 7 : 4

What fraction of the length of the road is section D? [3 marks]

Answer _____

[Turn over]

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]

7

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

Work out the values of b and c. [3 marks]

$b =$ _____

$c =$ _____

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[Turn over]

21 Convert $0.6\dot{1}$ to a fraction. [3 marks]

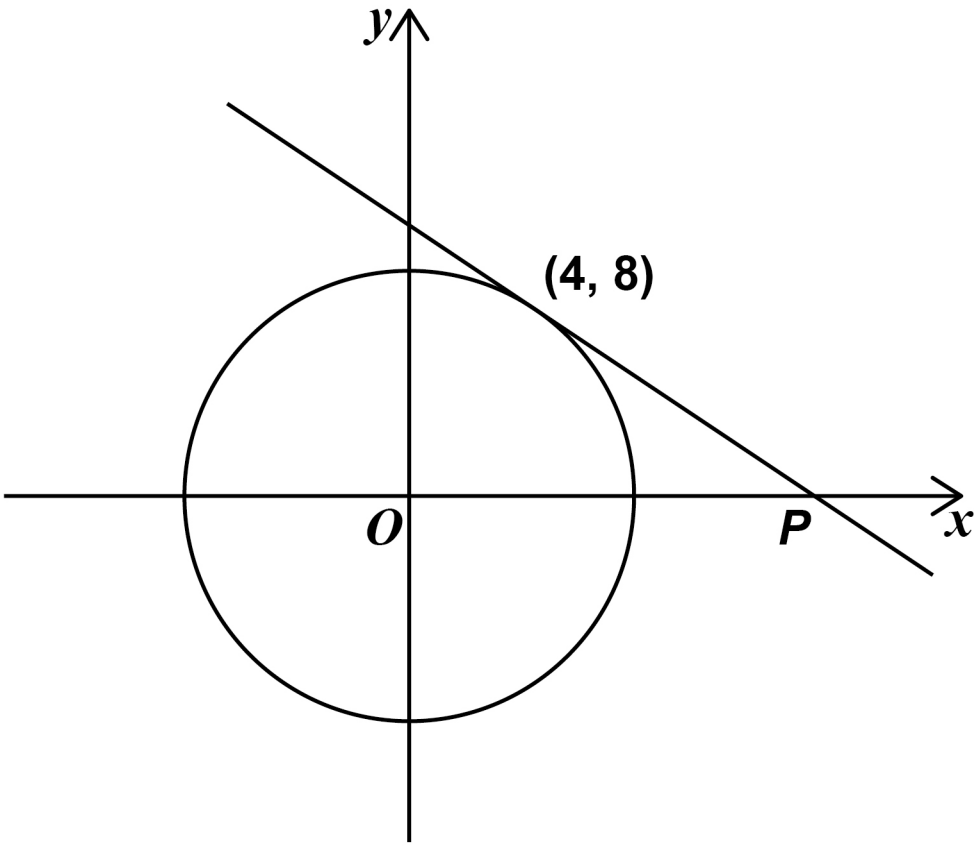
Answer _____

[Turn over]

22 **(4, 8) is a point on a circle, centre O.**

The tangent at (4, 8) intersects the x-axis at P.

The diagram is not drawn accurately.



Work out the x-coordinate of P. [5 marks]

Answer _____

11

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

[Turn over]

24 **Triangle *ABC* is drawn on a grid on the opposite page.**

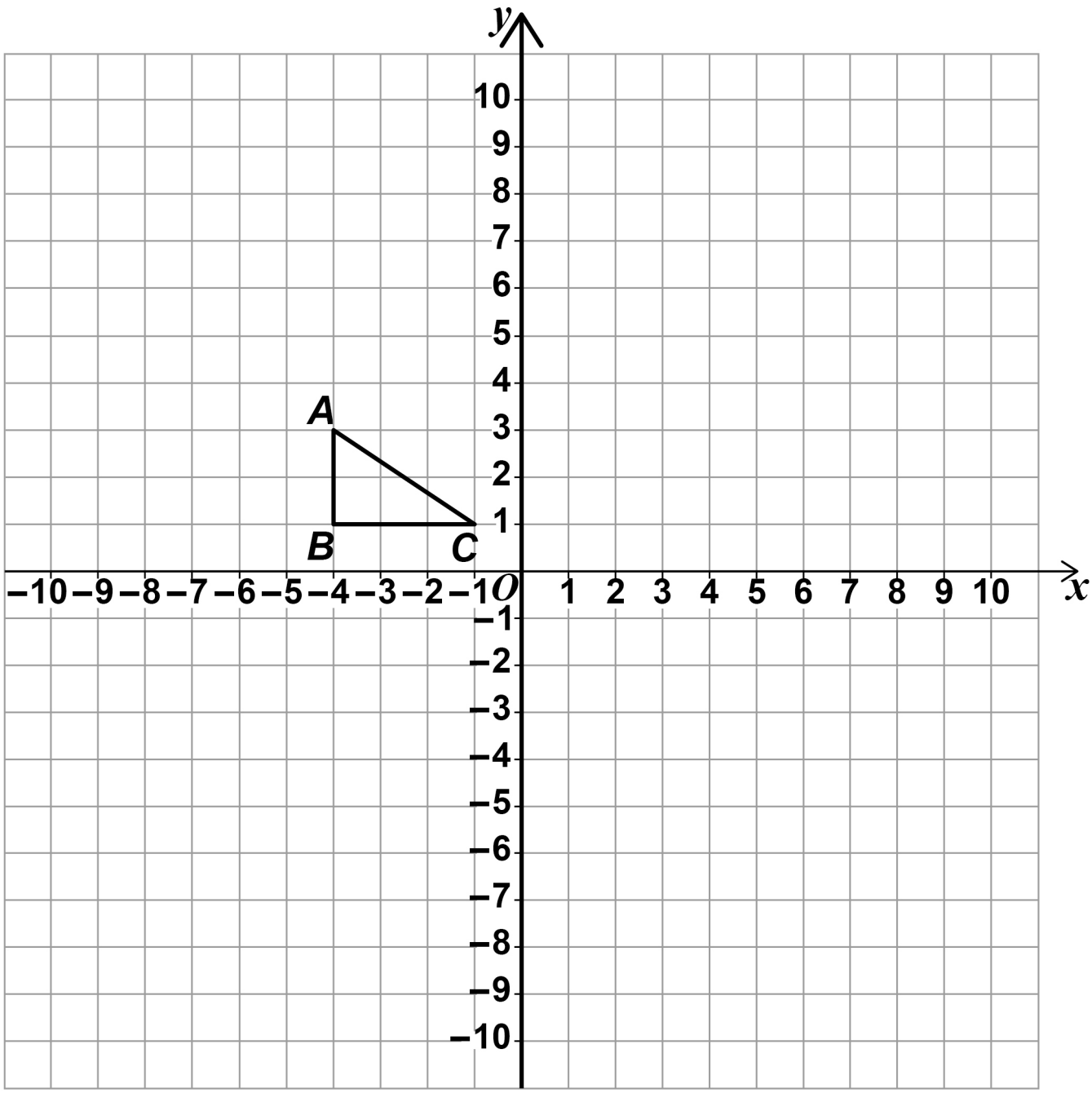
***ABC* is transformed to *A'B'C'* by a reflection in the line $x = 1$**

***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 on the opposite page.
[4 marks]

Answer _____


y
x
O
A
B
C
10
9
8
7
6
5
4
3
2
1
−1
−2
−3
−4
−5
−6
−7
−8
−9
−10
−10 −9 −8 −7 −6 −5 −4 −3 −2 −1
1 2 3 4 5 6 7 8 9 10

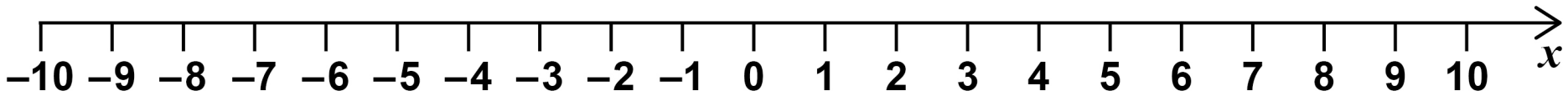
[Turn over]

8

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]

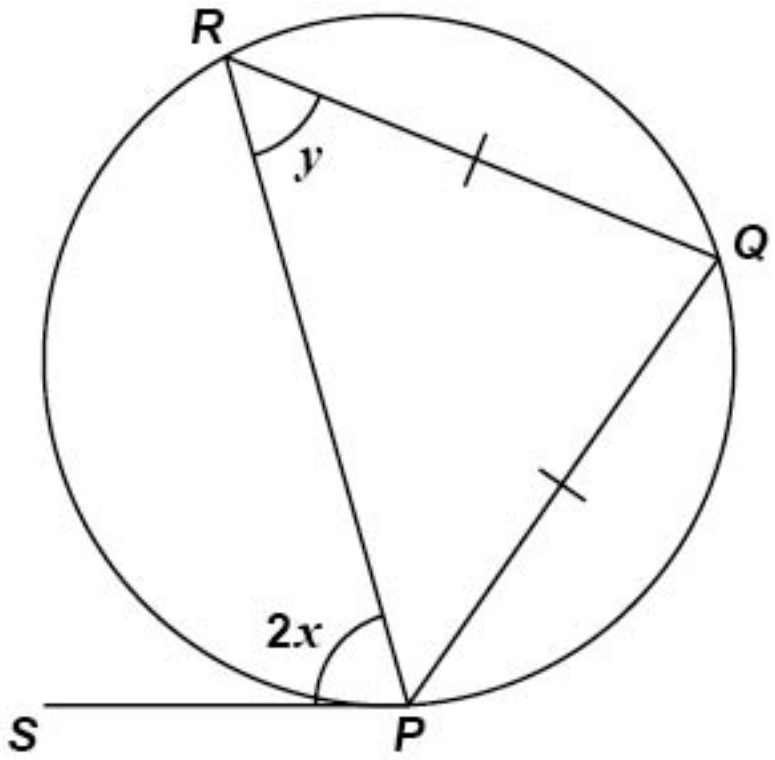


26 ***P*, *Q* and *R* are points on a circle.**

***SP* is a tangent to the circle.**

RQ* = *PQ

The diagram is not drawn accurately.



Prove that $y = 90° - x$ [4 marks]

7

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 _____

4

END OF QUESTIONS

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

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Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
4–5	
6–8	
10–15	
16–19	
20–23	
24–27	
28–31	
32–37	
38–41	
42–45	
46–47	
TOTAL	