

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 June 2023 question paper

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	
<b>TOTAL</b>	

Answer **all** questions in the spaces provided.1 (a) Work out  $0.3 \times 0.2$ **[1 mark]**

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Answer \_\_\_\_\_

1 (b) Work out  $\frac{4}{5} \div 7$ **[1 mark]**

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Answer \_\_\_\_\_

1 (c) Work out  $16 \div 0.2$ **[1 mark]**

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Answer \_\_\_\_\_

2 Solve  $5x < 60$ **[1 mark]**

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Answer \_\_\_\_\_

3 Work out the value of  $\left(\frac{5}{3}\right)^2$

Give your answer as a mixed number.

[1 mark]

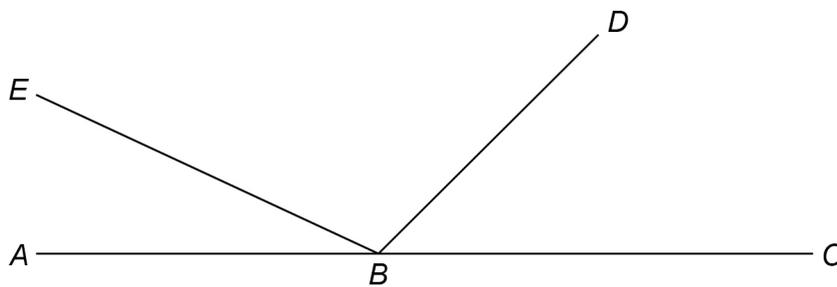
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Answer \_\_\_\_\_

4  $ABC$ ,  $BD$  and  $BE$  are straight lines.



Not drawn  
accurately

angle  $EBD = 6 \times$  angle  $ABE$

angle  $DBC = 3 \times$  angle  $ABE$

Work out the size of angle  $DBC$ .

[3 marks]

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Answer \_\_\_\_\_<sup>o</sup>

- 5** Two prime numbers are multiplied together.  
The answer is an **even** number between 40 and 50  
Complete the calculation.

**[3 marks]**

$$\square \times \square = \square$$

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- 6** Chloe and Mikey share some money in the ratio 3 : 4  
Mikey gets £72

Chloe gives  $\frac{1}{6}$  of her share to Pippa.

Mikey gives  $\frac{4}{9}$  of his share to Pippa.

How much money does Pippa receive?

**[4 marks]**


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Answer £ \_\_\_\_\_

7  $2^a \times 3^2 \times 5 = 360$

Work out the value of  $a$ .

You **must** show your working.

[3 marks]

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$a =$  \_\_\_\_\_

8 Expand and simplify fully  $2(5x + 6) - 3(x - 2)$

[2 marks]

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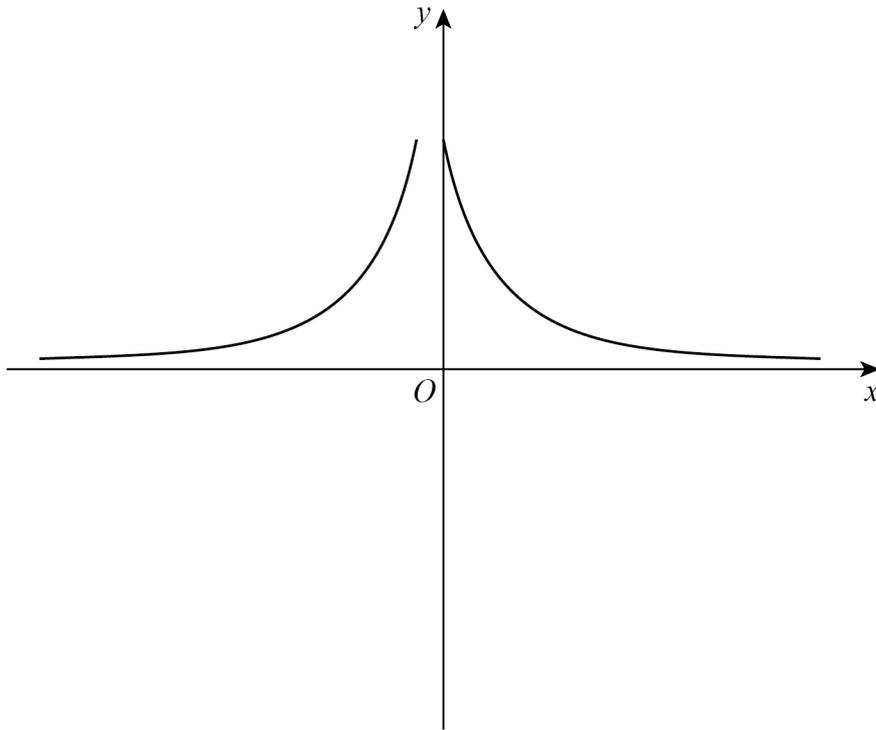
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Answer \_\_\_\_\_

**Turn over for the next question**

- 9 Erika tries to sketch the graph  $y = \frac{1}{x}$  with  $x \neq 0$



Make **two** different criticisms of her sketch.

**[2 marks]**

Criticism 1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

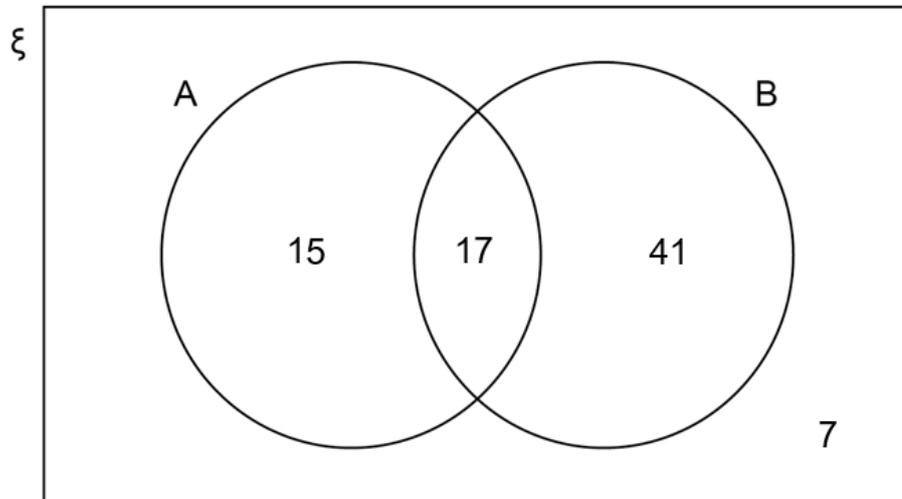
Criticism 2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



11 The Venn diagram represents 80 items.



11 (a) Write down  $P(B)$

[1 mark]

Answer \_\_\_\_\_

11 (b) Work out  $P(A \cup B)$

[1 mark]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

11 (c) Work out  $P(A' \cap B)$

[1 mark]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**12 (a)**  $a \times 10^n$  is a number in standard form.

Complete the inequality for the value of  $a$ .

[1 mark]

\_\_\_\_\_  $\leq a <$  \_\_\_\_\_

**12 (b)**  $b \times 10^n$  is the number 45 000 written in standard form.

Work out  $b \times 10^{-n}$

Write your answer as an ordinary number.

[2 marks]

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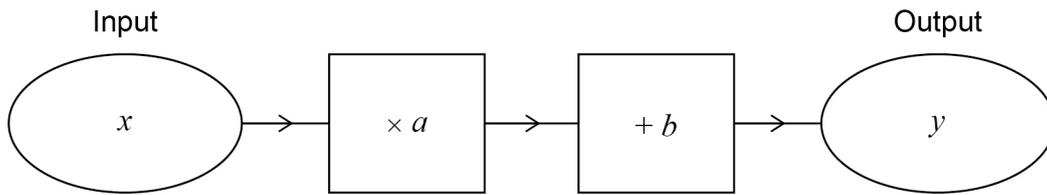
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Answer \_\_\_\_\_

**Turn over for the next question**

**13 (a)** Here is a number machine.



Show that when the input decreases by 3 the output decreases by  $3a$ .

**[2 marks]**

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**13 (b)**  $f(x) = kx^3$  where  $k$  is a constant.

Josh says that  $f(2) \times f(1)$  is equal to  $f(2)$  because  $2 \times 1 = 2$

Is he correct?

Show working to support your answer.

**[2 marks]**

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14

Here is a list of 11 whole numbers in numerical order.

The lower quartile, median, upper quartile and highest value are missing.

1	3		9	13		23	32		44	
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- median =  $3.5 \times$  lower quartile
- upper quartile =  $6 \times$  lower quartile
- range =  $1.5 \times$  interquartile range

Complete the list.

**[2 marks]**

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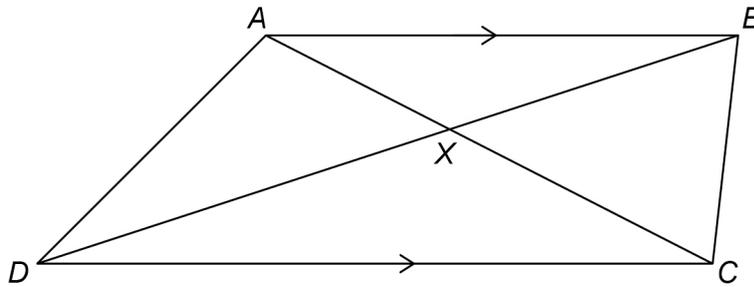
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**Turn over for the next question**

15

 $ABCD$  is a trapezium.

All four sides are different lengths.

 $AB$  is parallel to  $CD$ .The diagonals intersect at  $X$ .Not drawn  
accurately

For each statement, tick the correct box.

[4 marks]

	True	May be true	Not true
Triangles $AXD$ and $BCX$ are similar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triangles $ABX$ and $CDX$ are congruent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angle $BAC =$ angle $ACD$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Area of triangle $BCD =$ area of triangle $ACD$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





18

$$4 < \sqrt[3]{x} < 5$$

Circle the possible value of  $x$ .

[1 mark]

1.4

64

102

500

19

Work out how many 5-digit **even** numbers can be made using these digits **once** each.

2

4

6

7

9

Do **not** list them.

[2 marks]

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Answer \_\_\_\_\_

**Turn over for the next question**

20

K, L and M are weights.

Both of the scales balance exactly.

How many M weights are needed to balance **one** L weight?**[3 marks]**


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Answer \_\_\_\_\_

21 Express  $x^2 - 8x + 9$  in the form  $(x - a)^2 - b$  where  $a$  and  $b$  are integers.

[2 marks]

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Answer \_\_\_\_\_

22  $a = \sqrt{3}$  and  $b = \sqrt{12}$

Match each expression to its value.

One has been done for you.

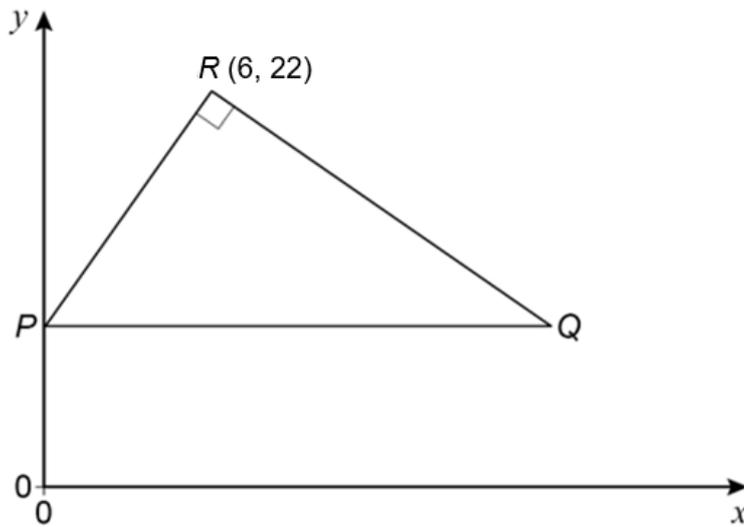
[3 marks]

$a^2$	3
$a + b$	2
$ab$	6
$\frac{b}{a}$	$3\sqrt{3}$
	36
	$10\sqrt{20}$

Turn over for the next question



24 Points  $P$ ,  $Q$  and  $R(6, 22)$  form a triangle.



$PQ$  is a horizontal line, with  $P$  on the  $y$ -axis.

Angle  $PRQ$  is a right angle.

The gradient of  $PR$  is 3

Work out the coordinates of  $Q$ .

[5 marks]

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Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

8

Turn over ►



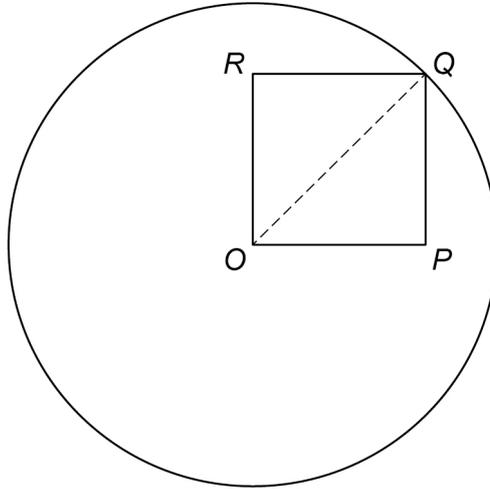
26

A circle, centre  $O$ , has an area of  $36\pi$  cm

$Q$  is a point on the circle.

$OPQR$  is a **square**.

Not drawn  
accurately



area of the square : area of the circle =  $\frac{1}{a} : \pi$  where  $a$  is an integer.

Work out the value of  $a$ .

You **must** show your working.

[4 marks]

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$a =$  \_\_\_\_\_

Turn over ►

