

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# GCSE MATHEMATICS

# H

Higher Tier Paper 1 Non-Calculator

Friday 19 May 2023

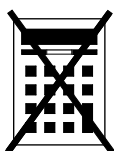
Morning

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	
22–23	
<b>TOTAL</b>	



J U N 2 3 8 3 0 0 1 H 0 1

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

Do not write  
outside the  
box

1 (a) Work out  $0.7 \times 0.5$

[1 mark]

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Answer \_\_\_\_\_

1 (b) Work out  $\frac{5}{6} \div 3$

[1 mark]

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Answer \_\_\_\_\_

1 (c) Work out  $27 \div 0.6$

[1 mark]

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Answer \_\_\_\_\_



2 Solve  $2x < 26$

[1 mark]

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Answer \_\_\_\_\_

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

Give your answer as a mixed number.

[1 mark]

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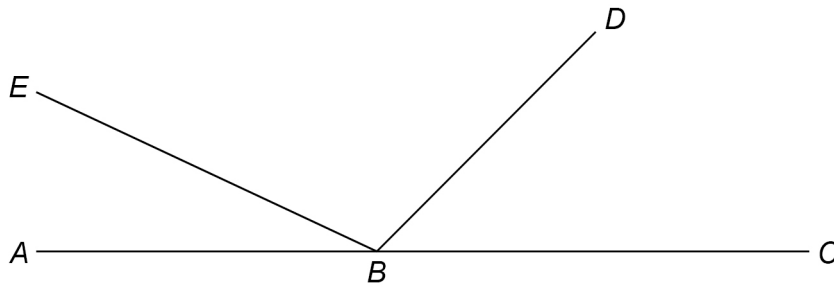
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Answer \_\_\_\_\_

Turn over for the next question



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



Not drawn  
accurately

$$\text{angle } EBD = 5 \times \text{angle } ABE$$

$$\text{angle } DBC = 3 \times \text{angle } ABE$$

Work out the size of angle  $EBD$ .

[3 marks]

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Answer \_\_\_\_\_ °



- 5** Two prime numbers are multiplied together.  
The answer is an **even** number between 50 and 60  
Complete the calculation.

**[3 marks]**

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

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- 6** Andrew and Bruce share some money in the ratio 5 : 6  
Bruce gets £96

Andrew gives  $\frac{1}{4}$  of his share to Carl.

Bruce gives  $\frac{2}{3}$  of his share to Carl.

How much money does Carl receive?

**[4 marks]**


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Answer £ \_\_\_\_\_



7

$$2^a \times 3 \times 5^2 = 600$$

Work out the value of  $a$ .

You **must** show your working.

**[3 marks]**

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$$a = \underline{\hspace{10em}}$$

8

Expand and simplify fully  $5(3x + 4) - 2(x - 1)$

**[2 marks]**

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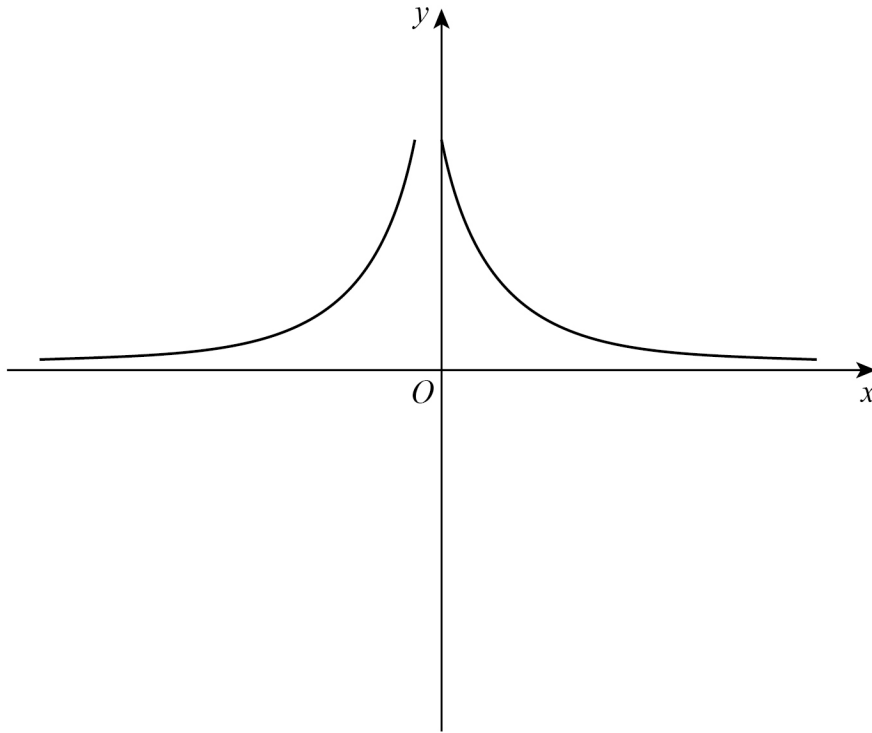
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Answer  $\underline{\hspace{10em}}$



- 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 \_\_\_\_\_

\_\_\_\_\_

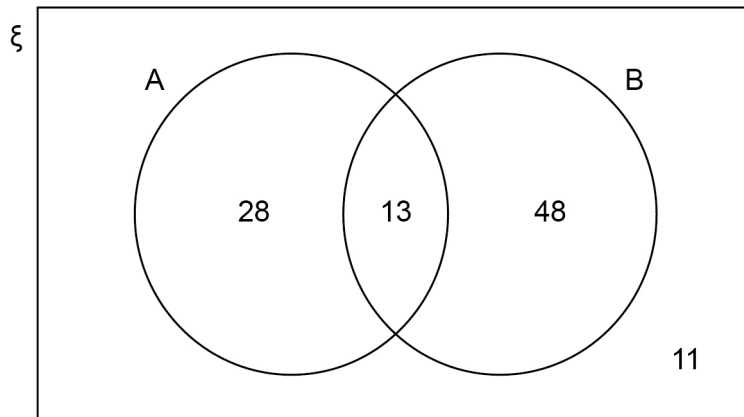
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- 11 The Venn diagram represents 100 items.



- 11 (a) Write down  $P(A \cap B)$

[1 mark]

Answer \_\_\_\_\_

- 11 (b) Work out  $P(A')$

[1 mark]

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Answer \_\_\_\_\_

- 11 (c) Work out  $P(A \cup B)$

[1 mark]

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Answer \_\_\_\_\_



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

Complete the inequality for the value of  $a$ .

[1 mark]

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$$\text{_____} \leq a < \text{_____}$$

**12 (b)**  $b \times 10^n$  is the number 7200 written in standard form.

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

Write your answer as an ordinary number.

[2 marks]

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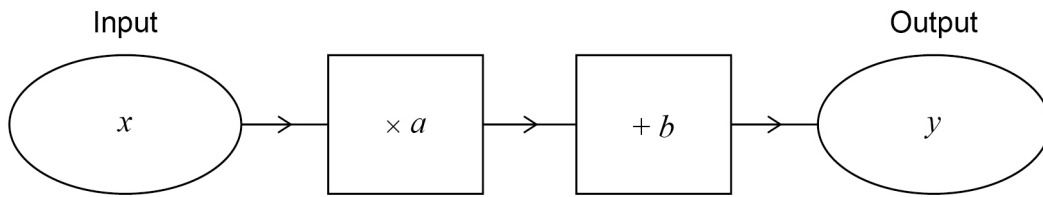
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Answer \_\_\_\_\_



13 (a) Here is a number machine.



Show that when the input increases by 2 the output increases by  $2a$ .

[2 marks]

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13 (b)  $f(x) = kx^2$  where  $k$  is a constant.

Kai says that  $\frac{f(6)}{f(2)}$  is equal to  $f(3)$  because  $\frac{6}{2} = 3$

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.

5	8		13	19		25	28		34	
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- median =  $2 \times$  lower quartile
- upper quartile =  $2.5 \times$  lower quartile
- range =  $2 \times$  interquartile range

Complete the list.

**[2 marks]**

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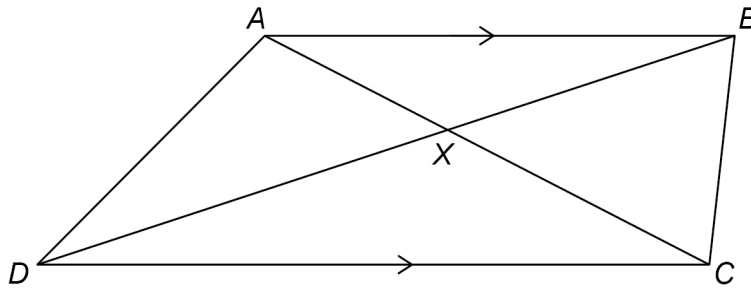
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15

 $ABCD$  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 $AXB$ and $CXD$ are similar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triangles $AXD$ and $BXC$ are congruent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angle $ADB =$ angle $BDC$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Area of triangle $ABC =$ area of triangle $ABD$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turn over for the next question

Turn over ►







18

$$6 < \sqrt[3]{x} < 7$$

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

1.9

20

45

290

19

Work out how many 5-digit **odd** 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 \_\_\_\_\_

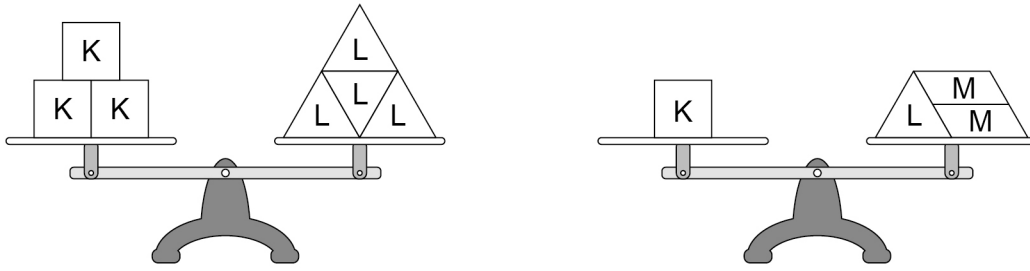




20

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 \_\_\_\_\_

**Turn over for the next question****Turn over ►**

21 Express  $x^2 - 6x - 15$  in the form  $(x - a)^2 - b$  where  $a$  and  $b$  are integers.

[2 marks]

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Answer \_\_\_\_\_

22  $a = \sqrt{2}$  and  $b = \sqrt{18}$

Match each expression to its value.

One has been done for you.

[3 marks]

$a^2$	2
$a + b$	3
$ab$	6
$\frac{b}{a}$	36
	$4\sqrt{2}$
	$10\sqrt{20}$



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23 Write 0.1 $\dot{3}$  as a fraction in its simplest form.

[3 marks]

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Answer \_\_\_\_\_

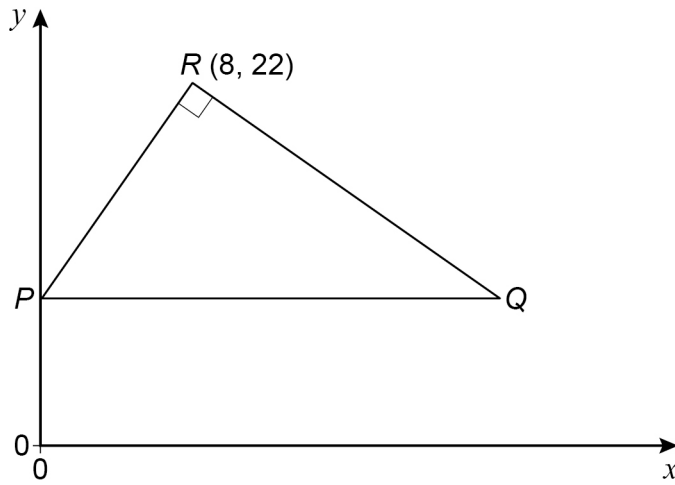
8

Turn over ►



24

Points  $P$ ,  $Q$  and  $R(8, 22)$  form a triangle.



Not drawn  
accurately

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

Angle  $PRQ$  is a right angle.

The gradient of  $PR$  is 2

Work out the coordinates of  $Q$ .

[5 marks]

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



25 Show that  $\frac{4 \sin 30^\circ - \tan 45^\circ}{2 \cos 30^\circ}$  can be written as  $\tan x$ , where  $x$  is an acute angle.

[4 marks]

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Turn over for the next question



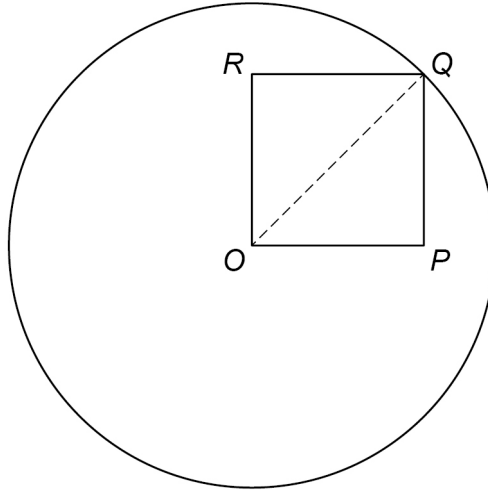
26

A circle, centre  $O$ , has circumference  $20\pi$  cm

$Q$  is a point on the circle.

$OPQR$  is a **square**.

Not drawn  
accurately



perimeter of the square : circumference of the circle =  $\sqrt{a} : \pi$  where  $a$  is an integer.

Work out the value of  $a$ .

You **must** show your working.

[4 marks]

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



27 A journey has two stages.

	Distance (km)	Average speed (km/h)	Time (h)
Stage 1	30	$a$	$\frac{30}{a}$
Stage 2	30	$b$	$\frac{30}{b}$

Show that the average speed for the **whole** journey, in km/h, is  $\frac{2ab}{a+b}$

[3 marks]

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**END OF QUESTIONS**



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2 8



2 3 6 G 8 3 0 0 / 1 H

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