

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier Paper 1 Non-Calculator

Friday 19 May 2023

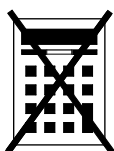
Morning

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	
TOTAL	



Answer **all** questions in the spaces provided.1 (a) Work out 0.7×0.5 **[1 mark]**

Answer _____

1 (b) Work out $\frac{5}{6} \div 3$ **[1 mark]**

Answer _____

1 (c) Work out $27 \div 0.6$ **[1 mark]**

Answer _____



2 Solve $2x < 26$

[1 mark]

Answer _____

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

Give your answer as a mixed number.

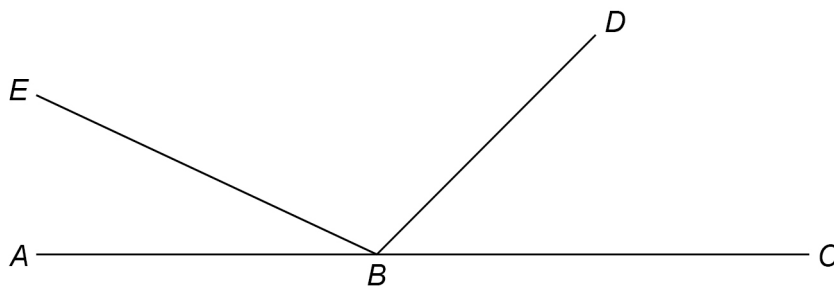
[1 mark]

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]

Answer _____ °



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

[3 marks]

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

- 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]

Answer £ _____



7

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

Work out the value of a .

You **must** show your working.

[3 marks]

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

8

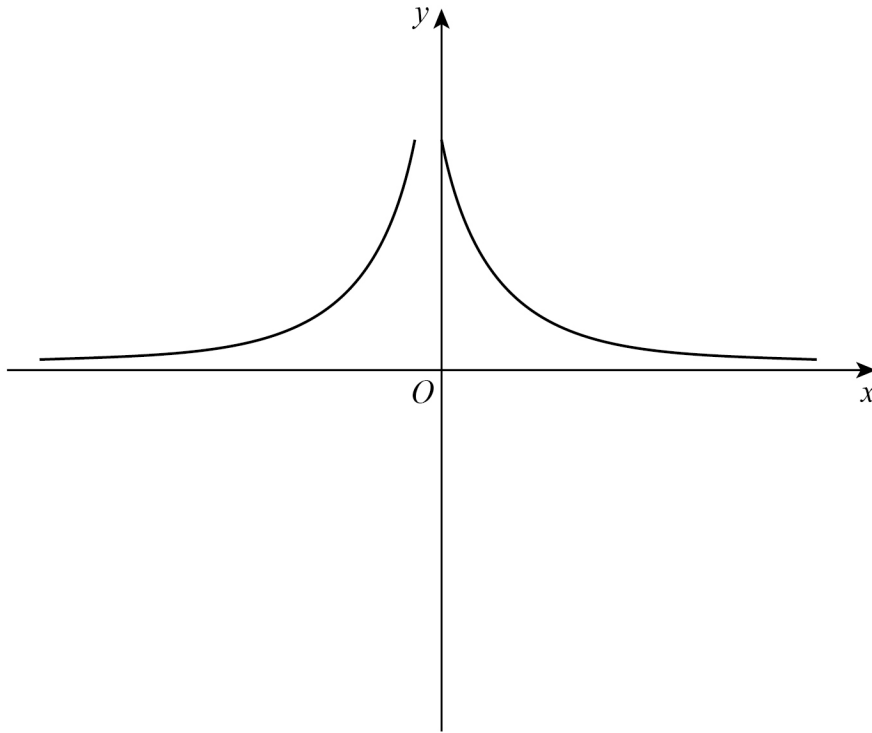
Expand and simplify fully $5(3x + 4) - 2(x - 1)$

[2 marks]

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 _____



10 Sunita is x years old.

Beth is one year younger than Sunita.

Joel is double Sunita's age.

The mean of their ages is 5

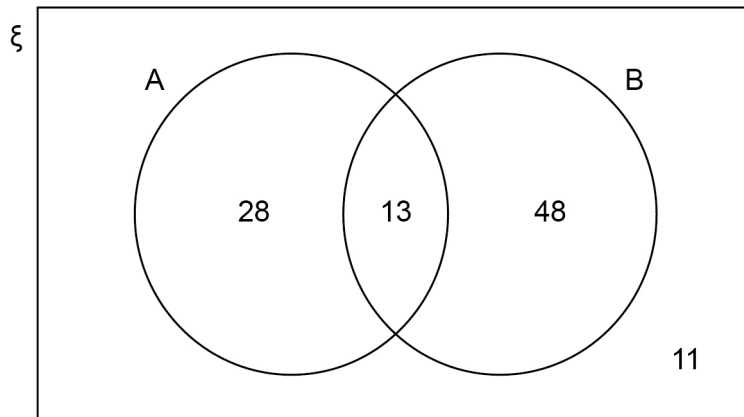
How old is **Joel**?

[5 marks]

Answer _____



- 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]

Answer _____

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

[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]

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

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

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

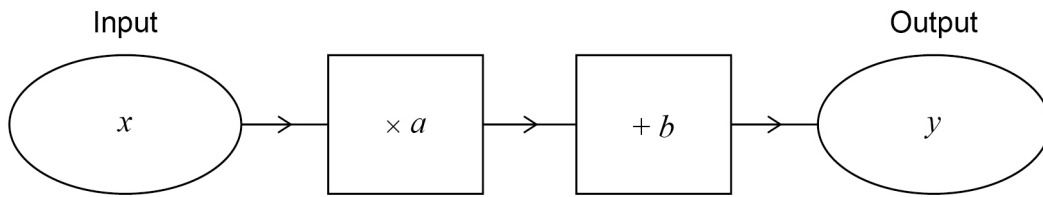
Write your answer as an ordinary number.

[2 marks]

Answer _____



13 (a) Here is a number machine.



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

[2 marks]

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]



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	
---	---	--	----	----	--	----	----	--	----	--

- median = $2 \times$ lower quartile
- upper quartile = $2.5 \times$ lower quartile
- range = $2 \times$ interquartile range

Complete the list.

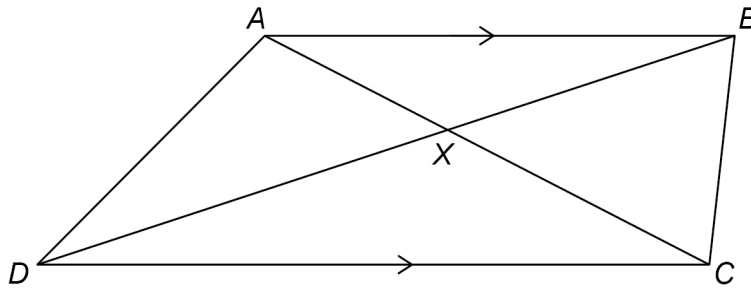
[2 marks]



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 ►



16 Solve the simultaneous equations

$$2x - 5y = 13$$

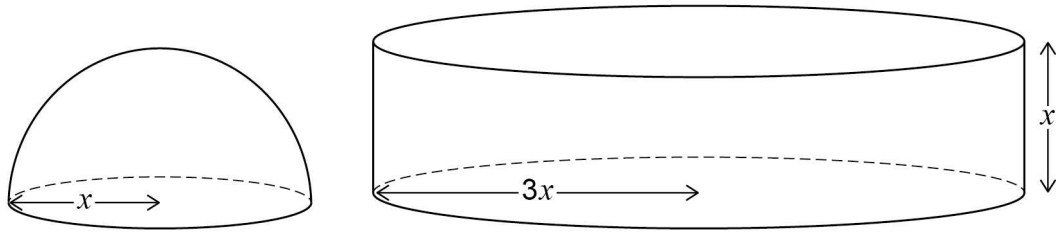
$$3x + 4y = 8$$

[4 marks]

$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}}$$



17

A solid hemisphere has radius x .A solid cylinder has radius $3x$ and height x .

Surface area of a sphere = $4\pi r^2$
 where r is the radius

Work out the ratio

total surface area of the hemisphere : total surface area of the cylinder

Give your answer in its simplest form.

You **must** show your working.**[3 marks]**

Answer _____ : _____

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.

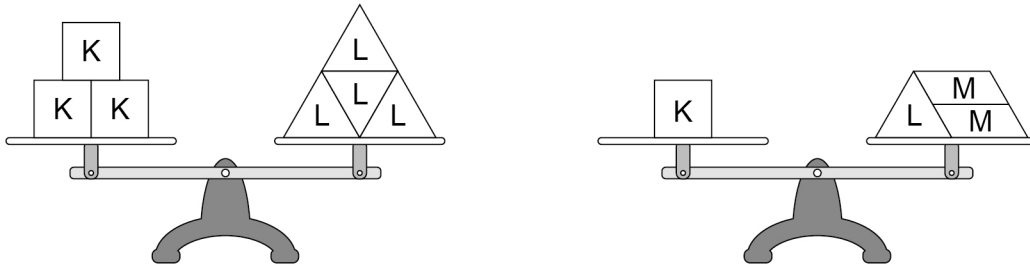
[2 marks]

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]

Answer _____

Turn over for the next question



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

[2 marks]

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
	$4\sqrt{2}$
	$10\sqrt{20}$



23

Write $0.\dot{1}\dot{3}$ as a fraction in its simplest form.

[3 marks]

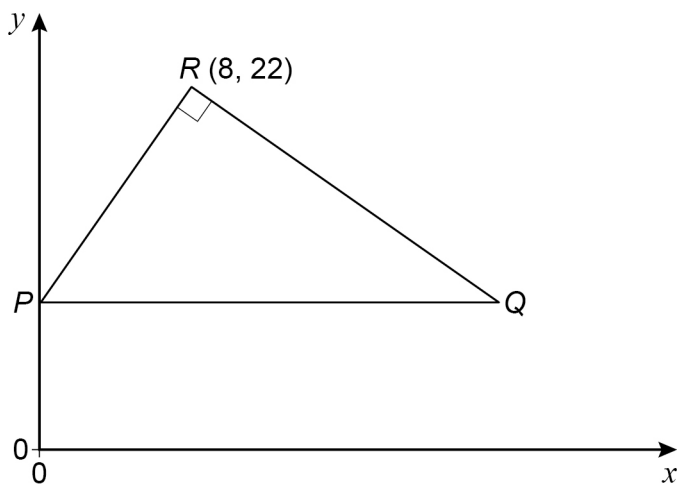
Answer _____

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]

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]

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

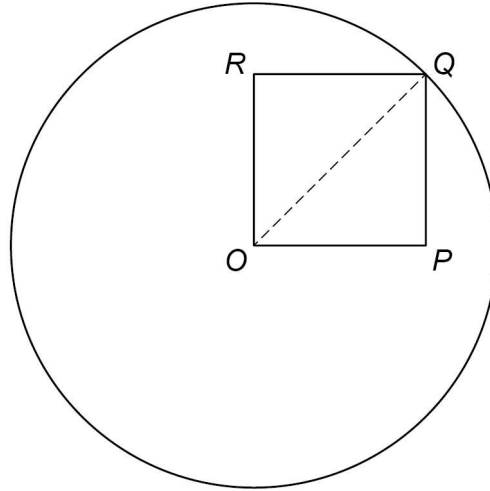
26

A circle, centre O , has circumference 20π 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]

$a =$ _____



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]

END OF QUESTIONS

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2 8



2 3 6 G 8 3 0 0 / 1 H

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