

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

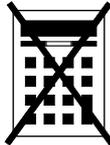
Higher Tier Paper 1 Non-Calculator
Shadow paper based on the November 2024 paper

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.

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	

Advice

In all calculations, show clearly how you work out your answer.

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

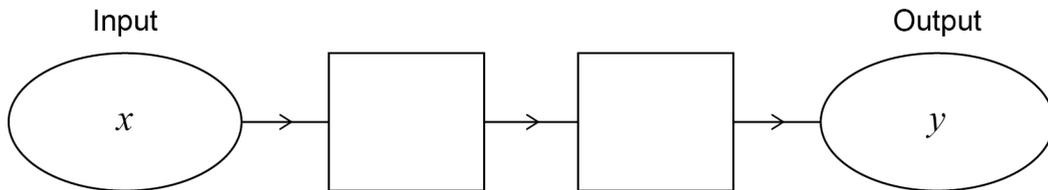
1 Work out the value of 2.5^2

[2 marks]

Answer _____

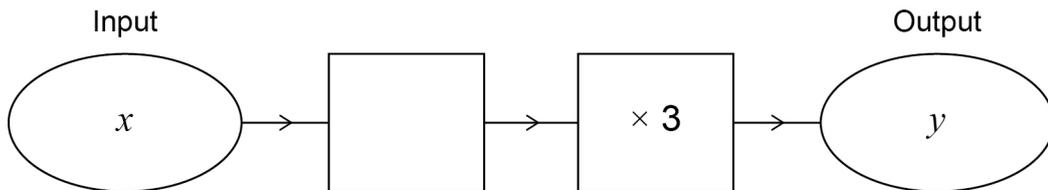
2 (a) Complete this number machine so that $y = 5x + 4$

[1 mark]



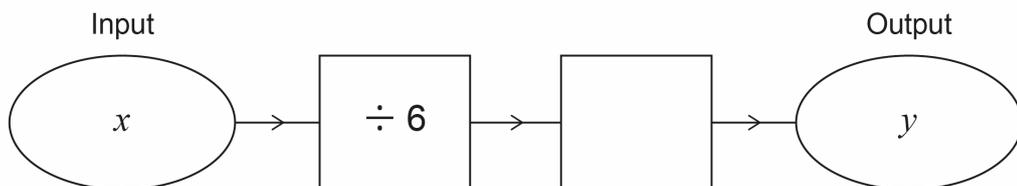
2 (b) Complete this number machine so that $y = 3x - 18$

[1 mark]



2 (c) Complete this number machine so that $y = x$

[1 mark]



3 Each number in a list is increased by 5

Tick **one** box for each statement.

[3 marks]

	True	False	Cannot tell
The range is increased by 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The mean is increased by 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The mode is increased by 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4 (a) Write the missing term in the geometric progression.

[1 mark]

3 9 27 _____ 243

4 (b) A Fibonacci-type sequence begins

−15 3

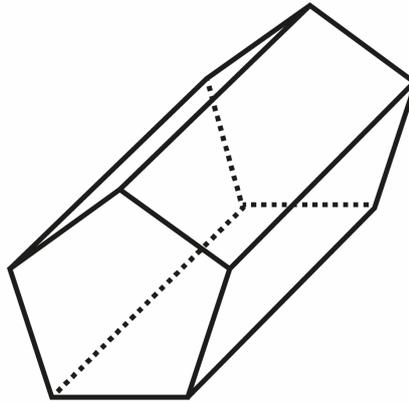
The sequence is continued by adding the previous two terms.

Work out the next **two** terms.

[2 marks]

Answer _____ and _____

5 Here is a solid prism.



5 (a) How many faces does the prism have?

[1 mark]

Answer _____

5 (b) The prism has

$$\text{volume} = 2500 \text{ cm}^3$$

and

$$\text{length} = 20 \text{ cm}$$

Work out the area of the cross-section of the prism.

[2 marks]

Answer _____ cm^2

6

Work out $1\frac{1}{10} - \frac{3}{20}$

Give your answer as a fraction.

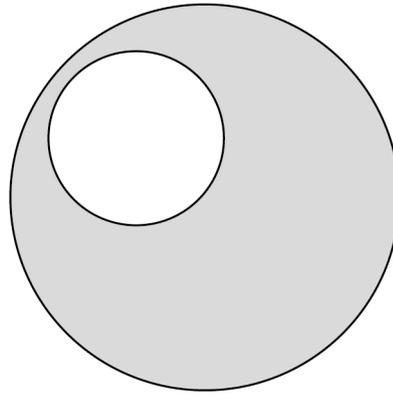
[2 marks]

Answer _____

Turn over for the next question

- 7 A large circle and a small circle are shown.
The radius of the large circle is 15 cm

$$\text{radius of large circle} : \text{radius of small circle} = 3 : 1$$



Not drawn
accurately

Work out the shaded area.

Give your answer in terms of π

[4 marks]

Answer _____ cm^2

8 (a) In this part, assume that each person works at the same rate.

10 people can complete a job in 12 hours.

If 15 people work on the same job, how many hours will it take to complete the job?

[2 marks]

Answer _____ hours

8 (b) In fact, of the 15 people

6 work at the original rate in (a)

9 work at a faster rate.

What does this mean about the number of hours it will take to complete the job?

Tick **one** box.

[1 mark]

It is greater than the answer to (a)

It is the same as the answer to (a)

It is less than the answer to (a)

It is not possible to say

7

Turn over ►

9 $\begin{pmatrix} a \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ 3b \end{pmatrix} = \begin{pmatrix} 4 \\ 17 \end{pmatrix}$

Work out the values of a and b .

[3 marks]

$a =$ _____ $b =$ _____

10

Clive owns two coffee shops, A and B.

Out of 150 people

- 12 people use both shops
- 36% use shop A
- $\frac{3}{5}$ use shop B **only**.

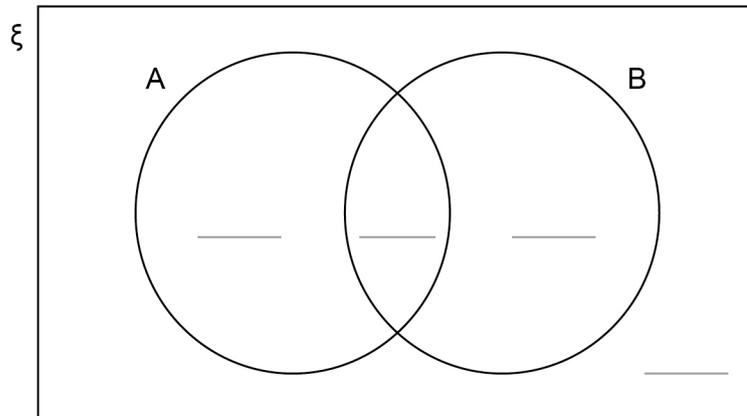
Complete the Venn diagram to represent the information.

[4 marks]

$\xi = 150$ people

A = people who use shop A

B = people who use shop B



Turn over ►

11 Construct the region that lies within 4 cm of the line.

[3 marks]



13 (a) By rounding each number to one significant figure,

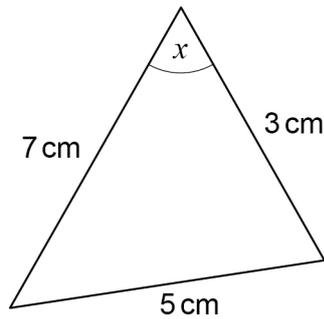
estimate the value of $\frac{\sqrt{901} + 3.9^3}{\sin 34.7^\circ}$

You **must** show your working.

[3 marks]

Answer _____

13 (b) Here is a triangle.



Not drawn
accurately

Sam attempts to find the value of $\cos x$ using the cosine rule.

Here is his working.

$$5^2 = 3^2 + 7^2 - 2 \times 3 \times 7 \times \cos x$$

$$25 = 9 + 14 - 42 \times \cos x$$

$$25 = -19 \cos x$$

Therefore $\cos x = -\frac{19}{25}$

Identify **two** errors Sam has made.

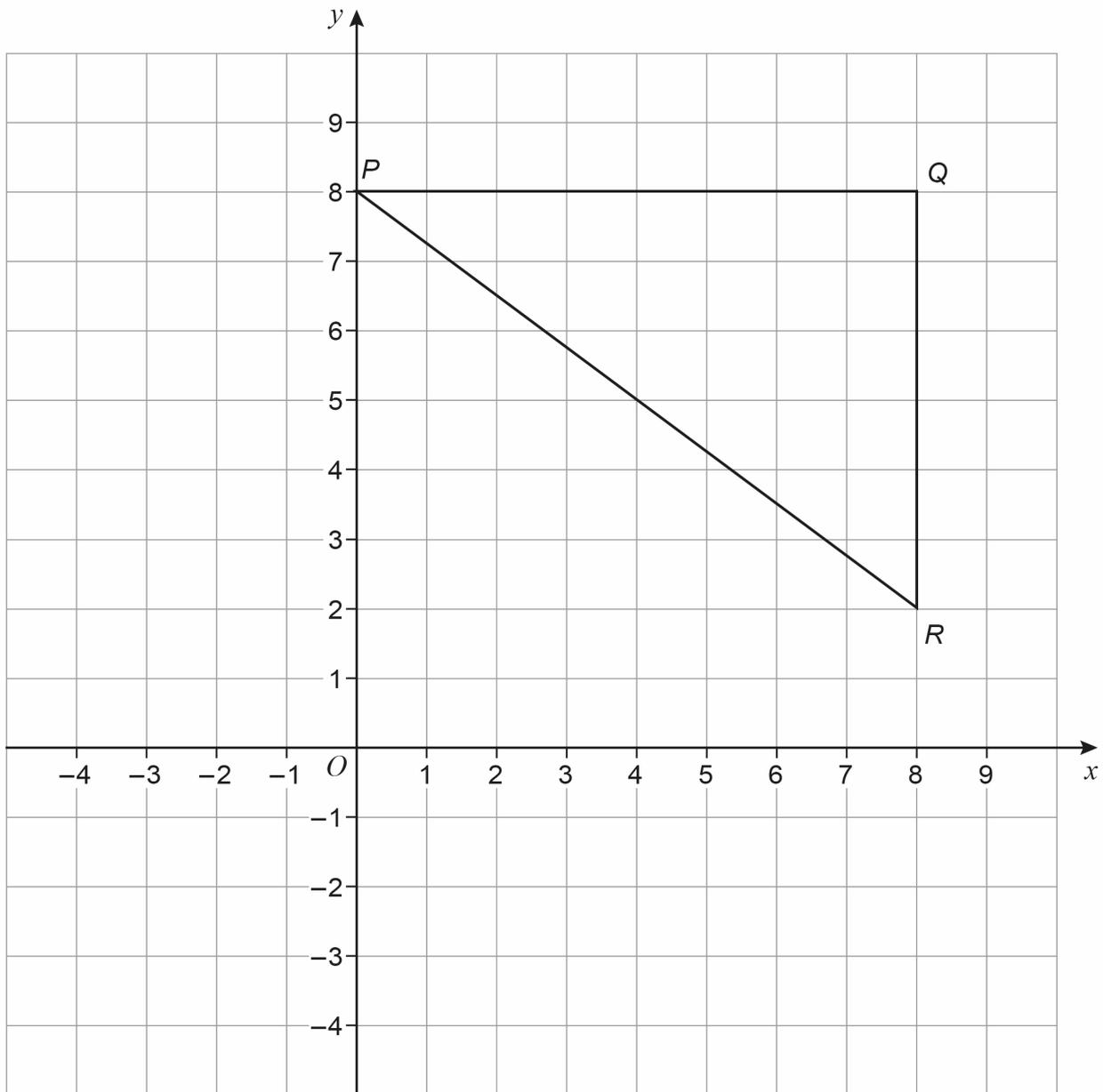
[2 marks]

Error 1 _____

Error 2 _____

14 Enlarge triangle PQR by scale factor $-\frac{1}{2}$ with centre $(0, 0)$

[3 marks]



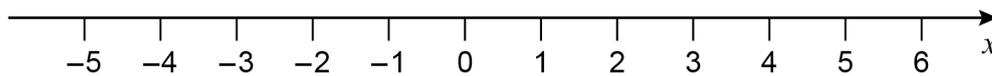
15 (a) Solve the inequality $30 - 5x \leq 50$

[3 marks]

Answer _____

15 (b) Represent $x \leq -1$ on the number line.

[1 mark]



16 When w is **truncated** the answer is 7

Sacha writes the error interval due to truncation as $6.5 \leq w < 7.5$

Give a reason why Sacha is wrong and state the correct error interval for w .

[2 marks]

Reason _____

Correct error interval _____ $\leq w <$ _____

17 (a) A circle has centre $(0, 0)$ and circumference 64π

Work out the equation of the circle.

[2 marks]

Answer _____

17 (b) Point J has coordinates $(15, 0)$ and point K has coordinates $(40, -5)$

Work out the equation of the straight line through J and K .

[4 marks]

Answer _____

18 (a) Express $x^2 + 6x - 5$ in the form $(x + a)^2 - b$ where a and b are integers.

[2 marks]

Answer _____

18 (b) A curve has the equation $y = (x - 9)^2 + 6$

Write down the coordinates of the turning point of the curve.

[2 marks]

Answer (_____ , _____)

Turn over for the next question

20 (a) Show that $\frac{\sqrt{432}}{\sqrt{3}}$ simplifies to an integer.

[2 marks]

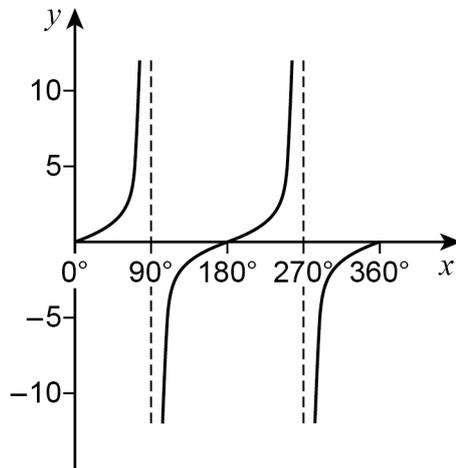
20 (b) Rationalise the denominator and simplify $\frac{30}{\sqrt{5}}$

[2 marks]

Answer _____

Turn over for the next question

21 Here is a sketch of the graph of $y = \tan x$ where $0^\circ \leq x \leq 360^\circ$



You are given that $\tan 84.29^\circ = 10$

21 (a) Work out the other value of x where $\tan x = 10$ and $0^\circ \leq x \leq 360^\circ$

[1 mark]

Answer _____^o

21 (b) Work out the **two** values of x where $\tan x = -10$ and $0^\circ \leq x \leq 360^\circ$

[2 marks]

Answer _____^o and _____^o

22

$$7^n = x$$

Match each expression on the left to the correct expression on the right.

One has been done for you.

[3 marks]

$$7^{-n}$$

$$7^{3n}$$

$$7^n - 1$$

$$\frac{1}{7^3}n$$

$$x^3$$

$$\frac{1}{x}$$

$$\frac{1}{7}x$$

$$\sqrt[3]{x}$$

$$\frac{1}{3}x$$

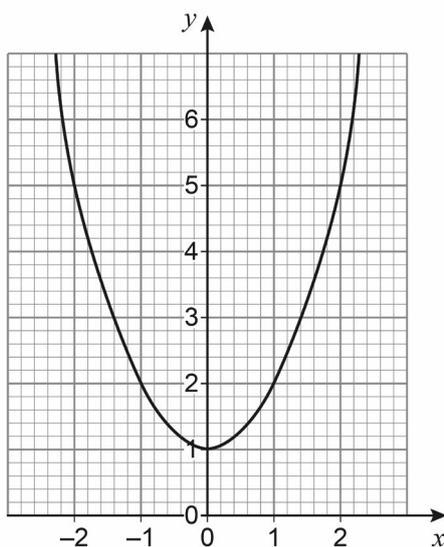
Turn over for the next question

Turn over ►

23 In each part, the graph shown is a transformation of the graph $y = x^2$

23 (a) Write down the equation of the graph shown.

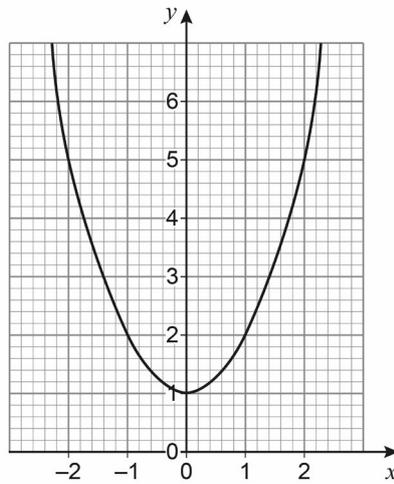
[1 mark]



Answer _____

23 (b) Write down the equation of the graph shown.

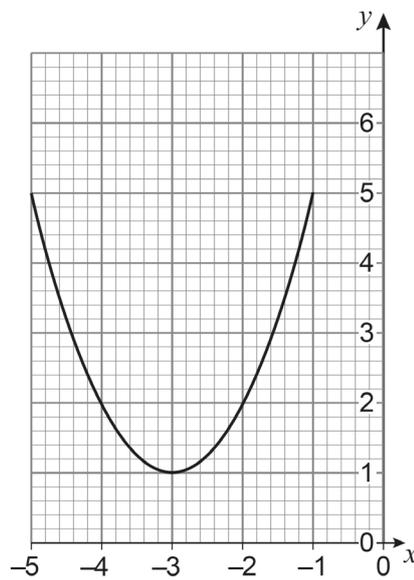
[1 mark]



Answer _____

23 (c) Write down the equation of the graph shown.

[1 mark]



Answer _____

END OF QUESTIONS

*Do not write
outside the
box*

A large, empty rectangular box with a thin black border, occupying most of the page. It is intended for the student to write their answer to the question on page 23.

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**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

There are no questions printed on this page

*Do not write
outside the
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