



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

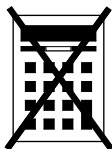
Higher Tier Paper 1 Non-Calculator

Wednesday 6 November 2024 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.

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>	

## Advice

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



N 0 V 2 4 8 3 0 0 1 H 0 1

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

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outside the  
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1 Work out the value of  $1.5^2$

[2 marks]

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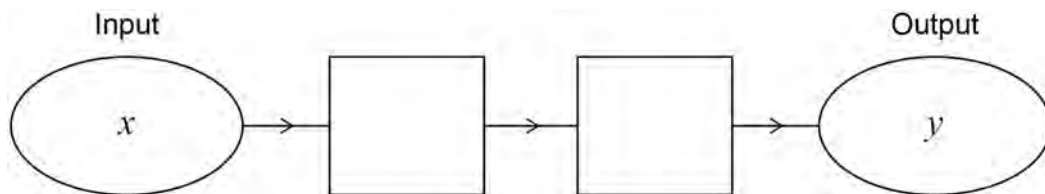


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Answer \_\_\_\_\_

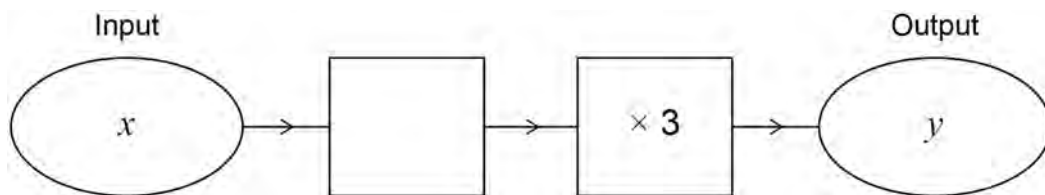
2 (a) Complete this number machine so that  $y = 4x + 5$

[1 mark]



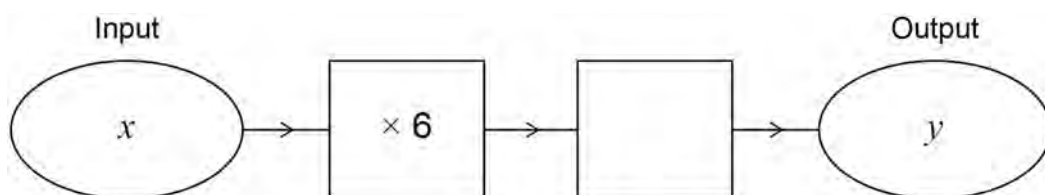
2 (b) Complete this number machine so that  $y = 3x - 24$

[1 mark]



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

[1 mark]



**3** Each number in a list is increased by 10

Tick **one** box for each statement.

[3 marks]

	True	False	Cannot tell
The mode is increased by 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The median is increased by 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The range is increased by 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

[1 mark]

1      4      16      \_\_\_\_\_      256

**4 (b)** A Fibonacci-type sequence begins

5      -9

The sequence is continued by adding the previous two terms.

Work out the next **two** terms.

[2 marks]

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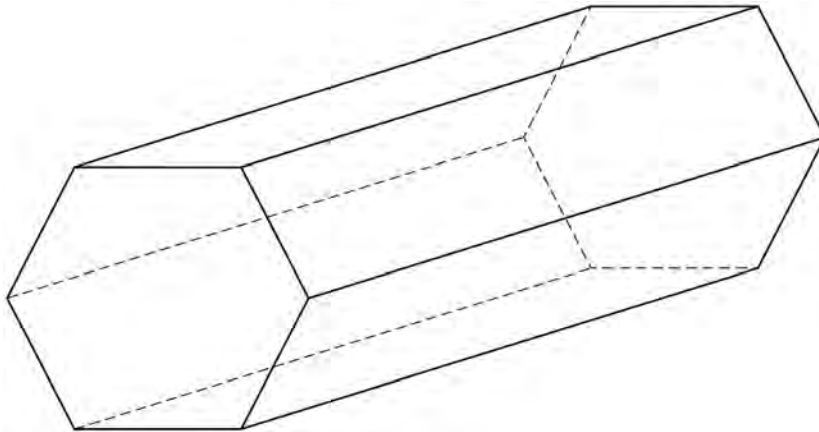
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Answer \_\_\_\_\_ and \_\_\_\_\_



5 Here is a solid prism.

Do not write  
outside the  
box



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

[1 mark]

Answer \_\_\_\_\_

5 (b) The prism has

$$\text{volume} = 3500 \text{ cm}^3$$

and

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

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

[2 marks]

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Answer \_\_\_\_\_  $\text{cm}^2$



Do not write  
outside the  
box

6 Work out  $1\frac{1}{5} - \frac{3}{10}$

Give your answer as a fraction.

[2 marks]

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Answer \_\_\_\_\_

Turn over for the next question

5

Turn over ►

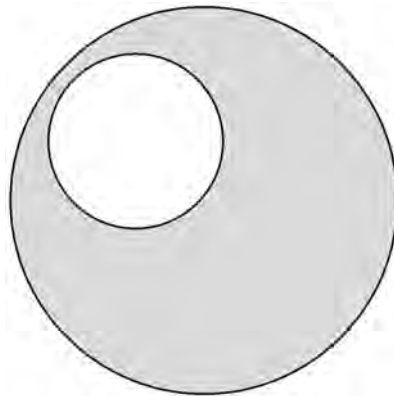


7

A large circle and a small circle are shown.

The radius of the large circle is 12 cm

$$\text{radius of large circle} : \text{radius of small circle} = 4 : 1$$



Not drawn  
accurately

Work out the shaded area.

Give your answer in terms of  $\pi$

**[4 marks]**

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Answer \_\_\_\_\_  $\text{cm}^2$



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

10 people can complete a job in 9 hours.

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

**[2 marks]**

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Answer \_\_\_\_\_ hours

**8 (b)** In fact, of the 15 people

6 work at a slower rate

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

$$\begin{pmatrix} a \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ 3b \end{pmatrix} = \begin{pmatrix} 5 \\ 20 \end{pmatrix}$$

Work out the values of  $a$  and  $b$ .

**[3 marks]**

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



10

Clive owns two coffee shops, A and B.

Out of 150 people

- 18 people use both shops
- 46% use shop A
- $\frac{2}{5}$  use shop B **only**.

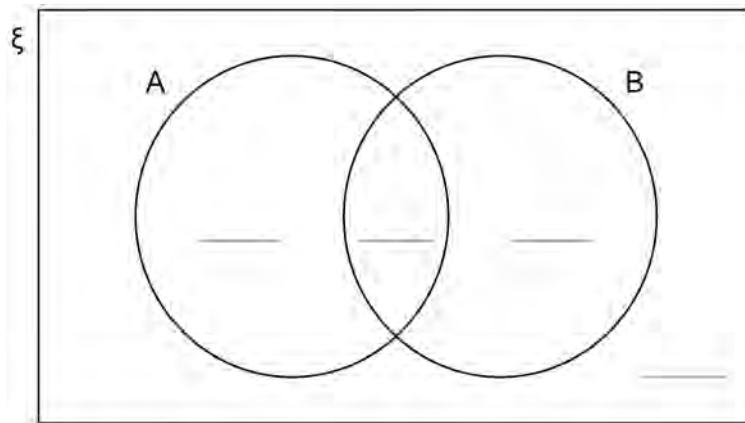
Complete the Venn diagram to represent the information.

[4 marks]

$\xi = 150$  people

A = people who use shop A

B = people who use shop B




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Turn over ►

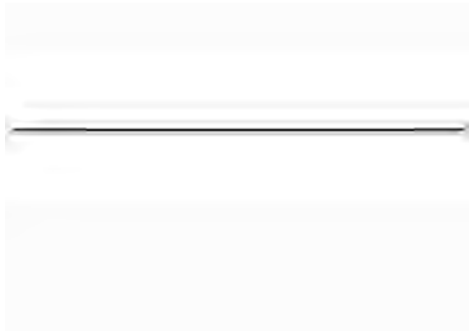


11

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

**[3 marks]**

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

estimate the value of  $\frac{\sqrt{401} + 1.9^3}{\cos 58.7^\circ}$

You **must** show your working.

**[3 marks]**

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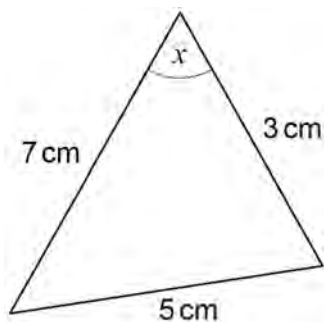
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Answer \_\_\_\_\_

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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.

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

$$5^2 = 10^2 + 42 \times \cos x$$

$$25 = 142 \cos x$$

$$\text{Therefore } \cos x = \frac{25}{142}$$

Identify **two** errors Sam has made.

[2 marks]

Error 1 \_\_\_\_\_  
 \_\_\_\_\_

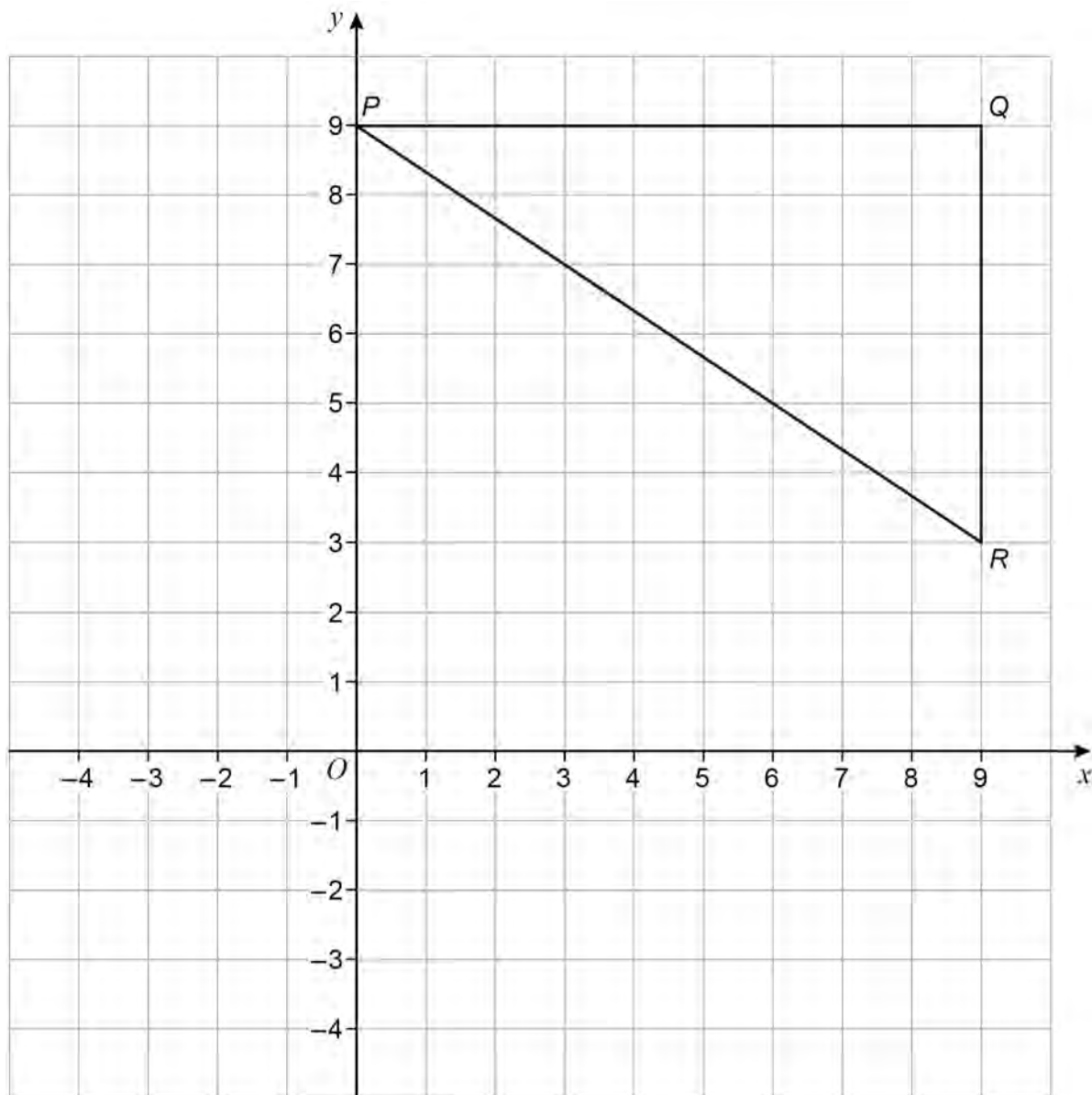
Error 2 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



- 14 Enlarge triangle  $PQR$  by scale factor  $-\frac{1}{3}$  with centre  $(0, 0)$

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[3 marks]



15 (a) Solve the inequality  $20 - 5x \leq 30$

[3 marks]

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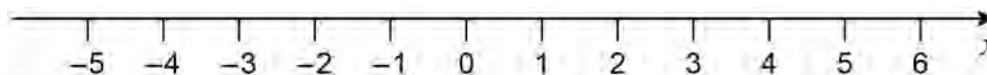


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Answer \_\_\_\_\_

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

[1 mark]



16 When  $w$  is **truncated** the answer is 8

Sacha writes the error interval due to truncation as  $7.5 \leq w < 8.5$

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

[2 marks]

Reason \_\_\_\_\_

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Correct error interval \_\_\_\_\_  $\leq w <$  \_\_\_\_\_



**17 (a)** A circle has centre  $(0, 0)$  and circumference  $36\pi$

Work out the equation of the circle.

**[2 marks]**

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Answer \_\_\_\_\_

**17 (b)** Point  $J$  has coordinates  $(15, 0)$  and point  $K$  has coordinates  $(30, -5)$

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

**[4 marks]**

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Answer \_\_\_\_\_



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**18 (a)** Express  $x^2 + 8x - 5$  in the form  $(x + a)^2 - b$  where  $a$  and  $b$  are integers.

**[2 marks]**

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Answer \_\_\_\_\_

**18 (b)** A curve has the equation  $y = (x - 7)^2 + 8$

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

**[2 marks]**

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

**Turn over for the next question**

**Turn over ►**





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20 (a) Show that  $\frac{\sqrt{363}}{\sqrt{3}}$  simplifies to an integer.

[2 marks]

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

[2 marks]

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Answer \_\_\_\_\_

Turn over for the next question

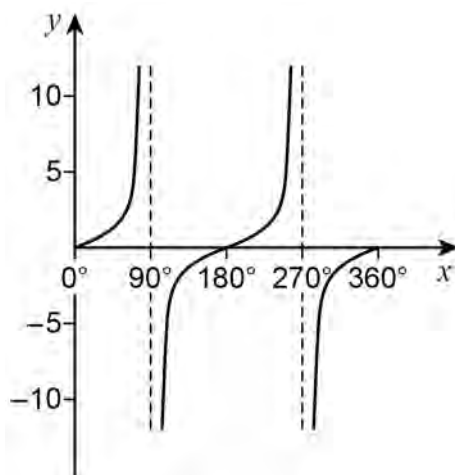
9

Turn over ►



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

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outside the  
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You are given that  $\tan 78.69^\circ = 5$

21 (a) Work out the other value of  $x$  where  $\tan x = 5$  and  $0^\circ \leq x \leq 360^\circ$

[1 mark]

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

21 (b) Work out the **two** values of  $x$  where  $\tan x = -5$  and  $0^\circ \leq x \leq 360^\circ$

[2 marks]

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



22

$$7^n = x$$

Do not write  
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Match each expression on the left to the correct expression on the right.  
One has been done for you.

[3 marks]

$$7^{-n}$$

$$7^{2n}$$

$$7^{n+1}$$

$$7^{\frac{1}{2}n}$$

$$7x$$

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

$$\frac{1}{2}x$$

$$\sqrt{x}$$

$$x^2$$

Turn over for the next question

6

Turn over ►



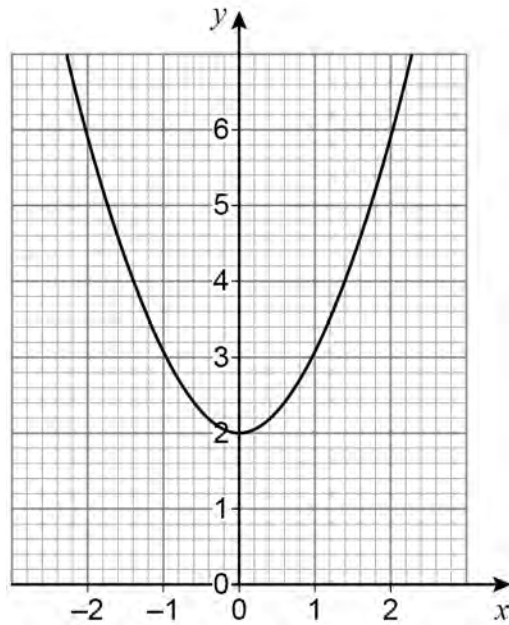
2 1

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

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

[1 mark]

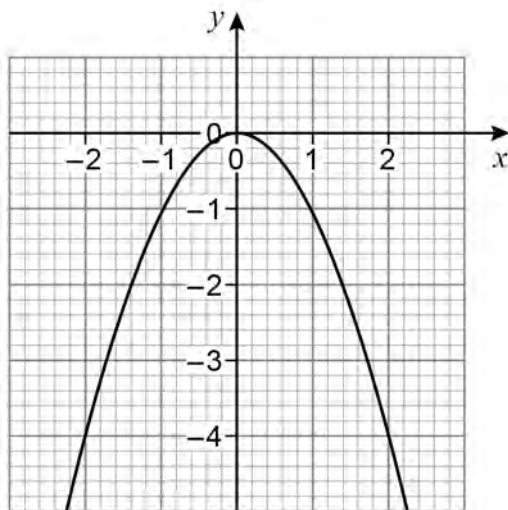


Answer \_\_\_\_\_



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

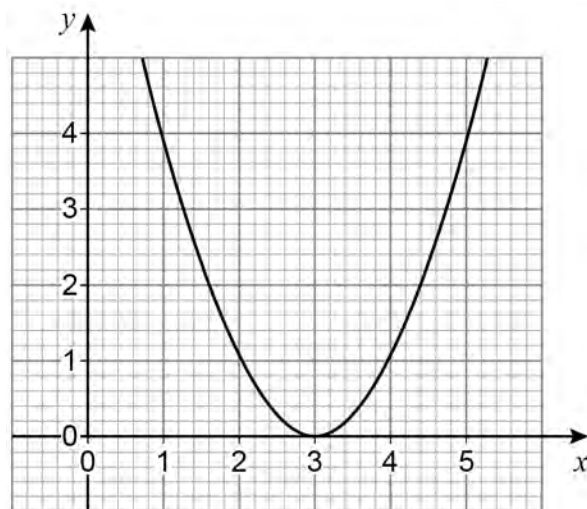
[1 mark]



Answer \_\_\_\_\_

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

[1 mark]



Answer \_\_\_\_\_

END OF QUESTIONS



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