



# Cambridge International AS & A Level

CANDIDATE NAME



CENTRE NUMBER

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CANDIDATE NUMBER

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**MATHEMATICS**

**9709/12**

Paper 1 Pure Mathematics 1

**October/November 2024**

**1 hour 50 minutes**

You must answer on the question paper.

You will need: List of formulae (MF19)

## INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

## INFORMATION

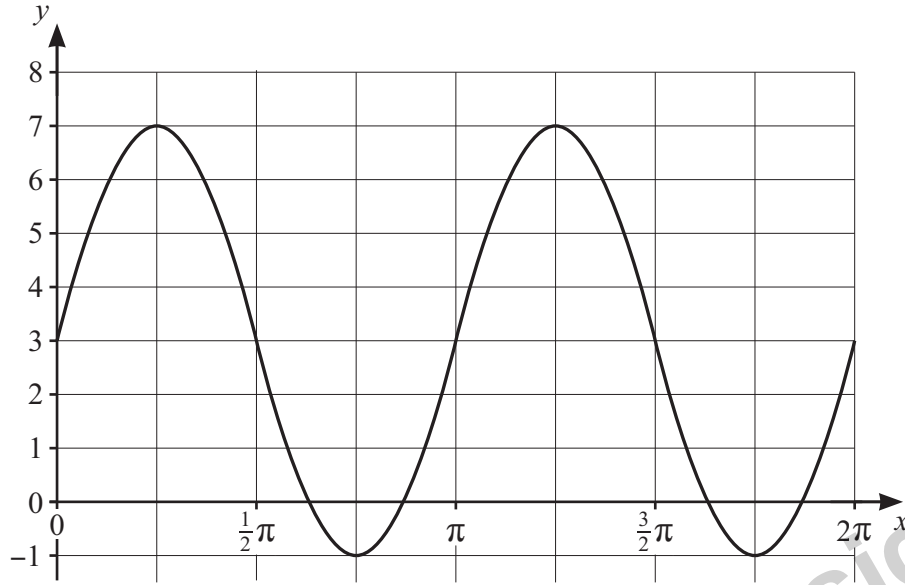
- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.





1



The diagram shows the curve with equation  $y = a \sin(bx) + c$  for  $0 \leq x \leq 2\pi$ , where  $a$ ,  $b$  and  $c$  are positive constants.

(a) State the values of  $a$ ,  $b$  and  $c$ . [3]

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(b) For these values of  $a$ ,  $b$  and  $c$ , determine the number of solutions in the interval  $0 \leq x \leq 2\pi$  for each of the following equations:

(i)  $a \sin(bx) + c = 7 - x$  [1]

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(ii)  $a \sin(bx) + c = 2\pi(x - 1)$ . [1]

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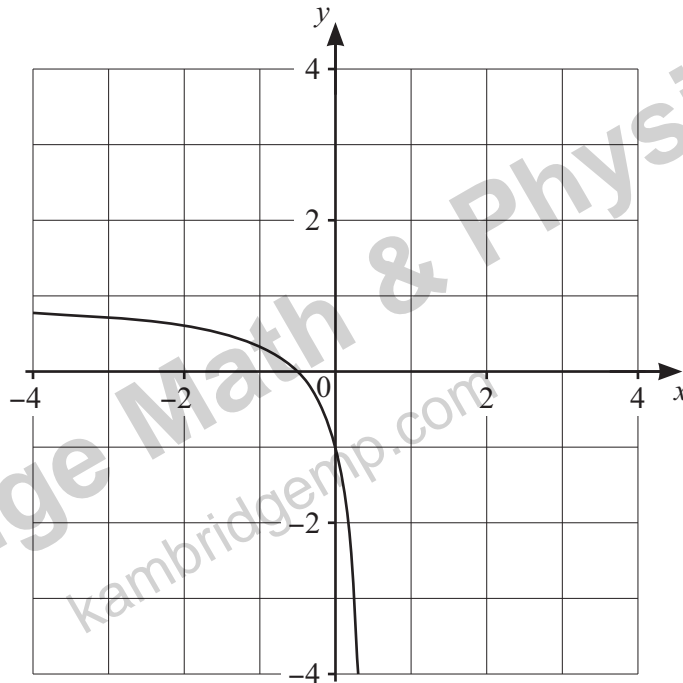


5 The function  $f$  is defined by  $f(x) = \frac{2x+1}{2x-1}$  for  $x < \frac{1}{2}$ .

(a) (i) State the value of  $f(-1)$ . [1]

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(ii)



The diagram shows the graph of  $y = f(x)$ . Sketch the graph of  $y = f^{-1}(x)$  on this diagram. Show any relevant mirror line. [2]

(iii) Find an expression for  $f^{-1}(x)$  and state the domain of the function  $f^{-1}$ . [4]

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(b) It is given instead that the line and the curve do **not** intersect.

Find the set of possible values of  $p$ .

[3]

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