



Cambridge International AS & A Level

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MATHEMATICS

9709/12

Paper 1 Pure Mathematics 1

May/June 2025

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

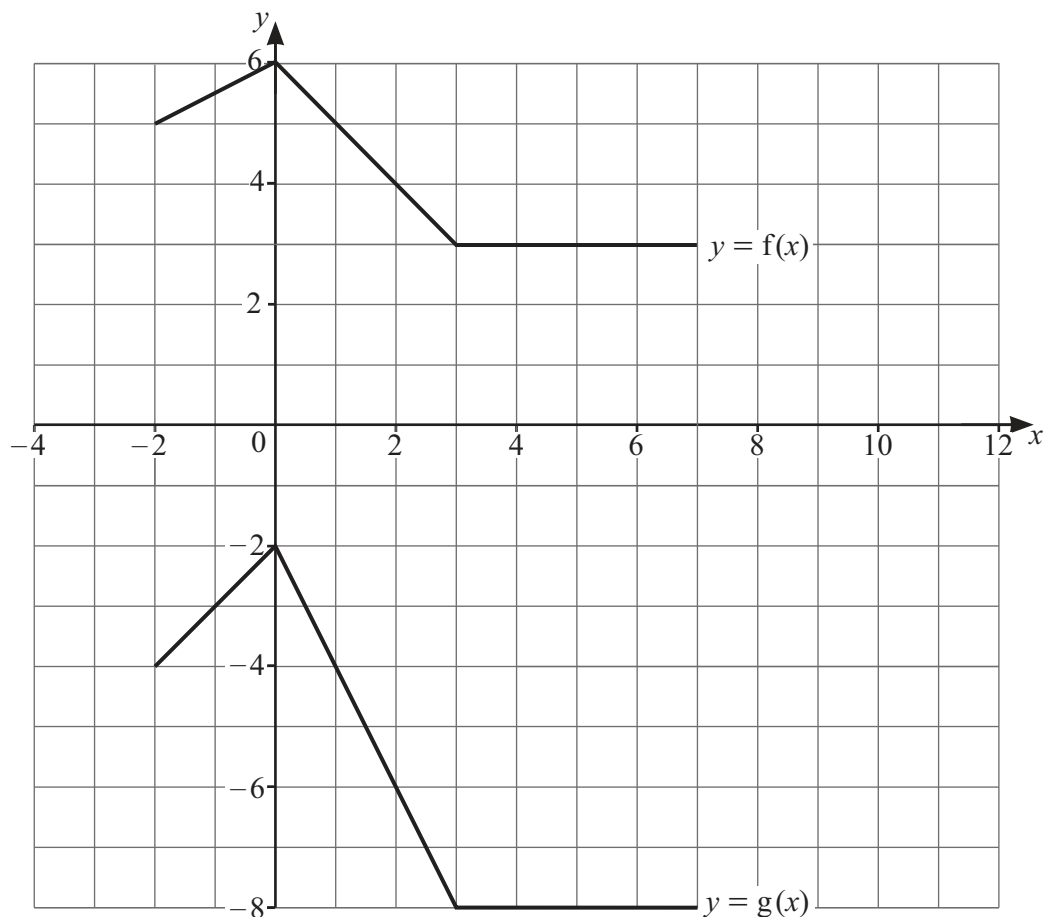
INSTRUCTIONS

- 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.



The diagram shows the graphs with equations $y = f(x)$ and $y = g(x)$.

Describe fully a sequence of two transformations which transforms the graph of $y = f(x)$ to the graph of $y = g(x)$. Make clear the order in which the transformations should be applied. [4]

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$$2xy + 5y^2 = 24 \quad \text{and} \quad 2x + y + 4 = 0. \quad [4]$$
[illegible]

[4]

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- (a) Find the rate at which the y -coordinate of P is changing when $x = 9$. Give your answer in terms of the constant a . [3]

[illegible]

- (b)** Given that the curve has a minimum point when $x = \frac{1}{4}$, find the value of a . [2]

This image shows a single sheet of white paper with ten horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and extend across the width of the page. There is no handwriting or other markings on the paper.



5 The equation of a curve is $y = 4 \cos 2x + 3$ for $0 \leq x \leq 2\pi$.

(a) State the greatest and least possible values of y . [2]

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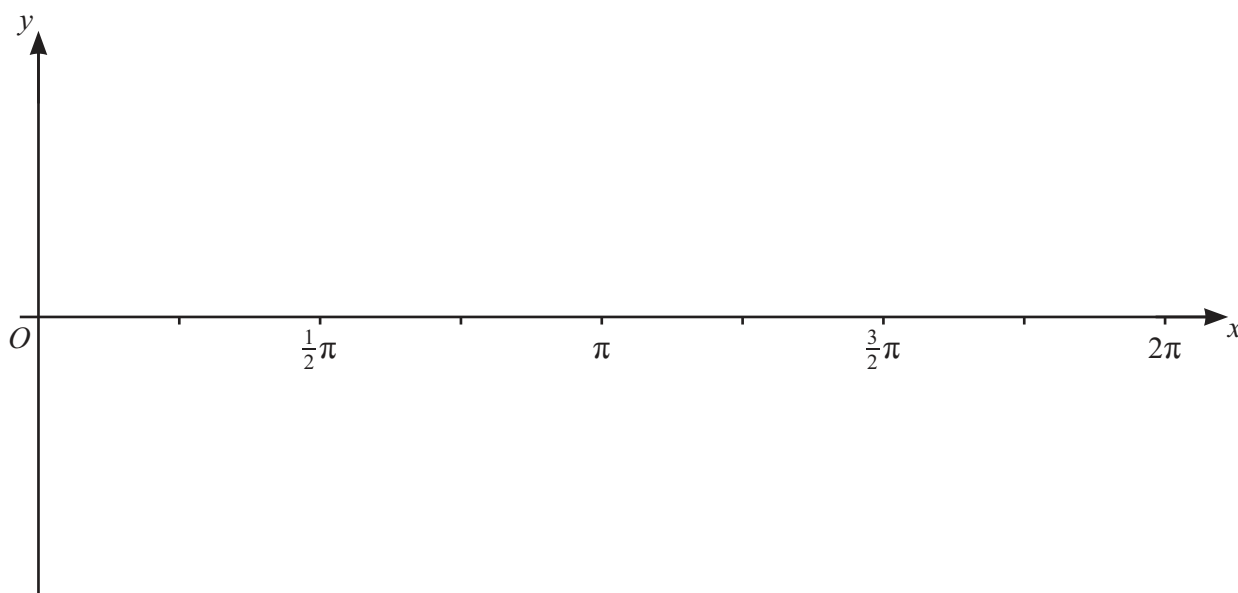
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(b) Sketch the curve. [2]



(c) Hence determine the number of solutions of the equation $4 \cos 2x + 3 = 2x - 1$ for $0 \leq x \leq 2\pi$. [1]

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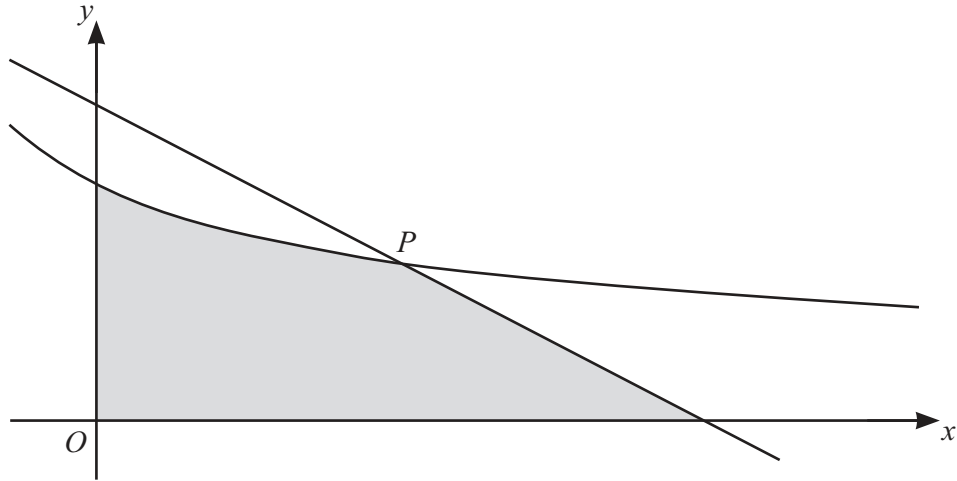
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The diagram shows the curve with equation $y = \frac{9}{(5x+4)^{\frac{1}{2}}}$ and the line $y = 6 - 3x$. The line and the curve intersect at the point P which has y -coordinate 3.

Find the area of the shaded region.

[6]

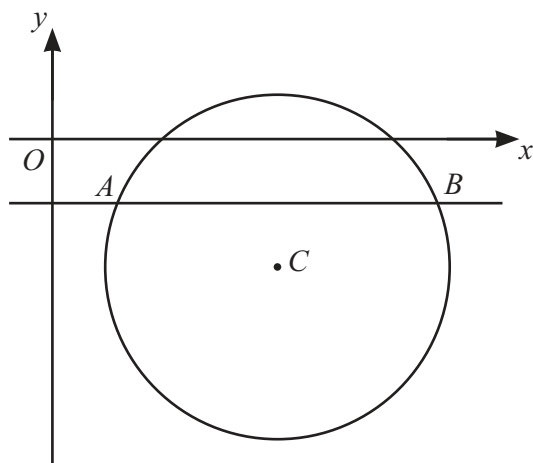
[illegible]

[3]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.



This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps for letter height. The entire page is otherwise blank, with no margins, text, or other markings.



The diagram shows the circle with equation $x^2 + y^2 - 14x + 8y + 36 = 0$ and the line $y = -2$. The line intersects the circle at the points A and B . The centre of the circle is C .

- (a) Find the coordinates of A , B and C .

[3]

[illegible]



[2]

[illegible]

Find the area of the larger segment.

[4]

[illegible]

DO NOT WRITE IN THIS MARGIN

[3]

[illegible]

[2]

This image shows a single sheet of white paper with ten evenly spaced, horizontal dashed lines. The lines are black and extend across the full width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the paper.



[3]

[illegible]

[4]

[illegible]



- 10 (a) The first, second and third terms of an arithmetic progression are $4k$, k^2 and $8k$ respectively, where k is a non-zero constant.

(i) Find the value of k .

[2]

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(ii) Find the sum of the first 20 terms of the progression.

[3]

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- Find the sum to infinity of the progression. Give your answer in the form $\frac{a}{\sqrt{b}-c}$, where a , b and c are integers. [5]

[illegible]



- 11 (a) Express $x^2 + 4x + 2$ in the form $(x + a)^2 + b$, where a and b are integers. [2]

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The functions f and g are defined as follows.

$$f(x) = x^2 + 4x + 2 \quad \text{for } x \leq -2$$

$$g(x) = -x - 4 \quad \text{for } x \geq -2$$

- (b) (i) Find an expression for $f^{-1}(x)$. [3]

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[4]

This image shows a full page of white paper with horizontal dotted lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]





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