



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)

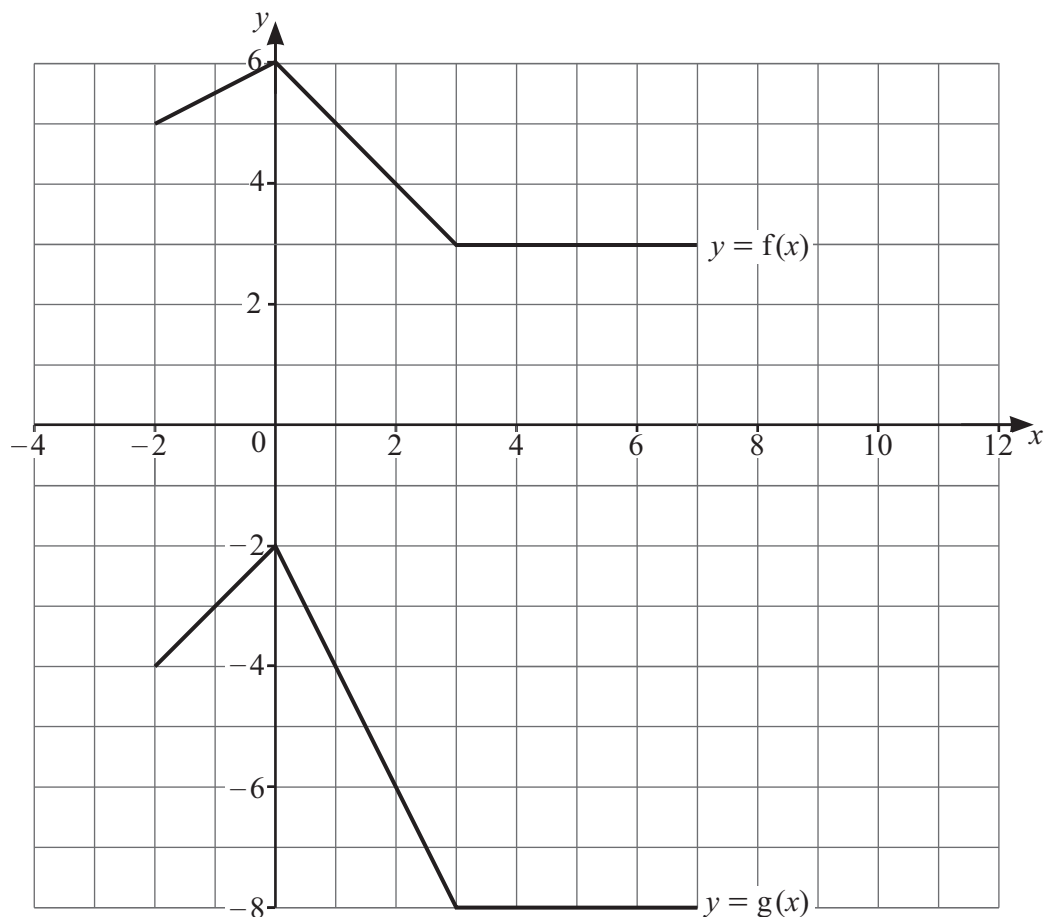
INSTRUCTIONS

- 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]

- 3** The coefficient of x^7 in the expansion of $\left(px^2 + \frac{4}{p}x\right)^5$ is 1280.

Find the value of the constant p .

[4]

[illegible]



4 A point P is moving along the curve with equation $y = ax^{\frac{3}{2}} - 12x$ in such a way that the x -coordinate of P is increasing at a constant rate of 5 units per second.

(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]

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

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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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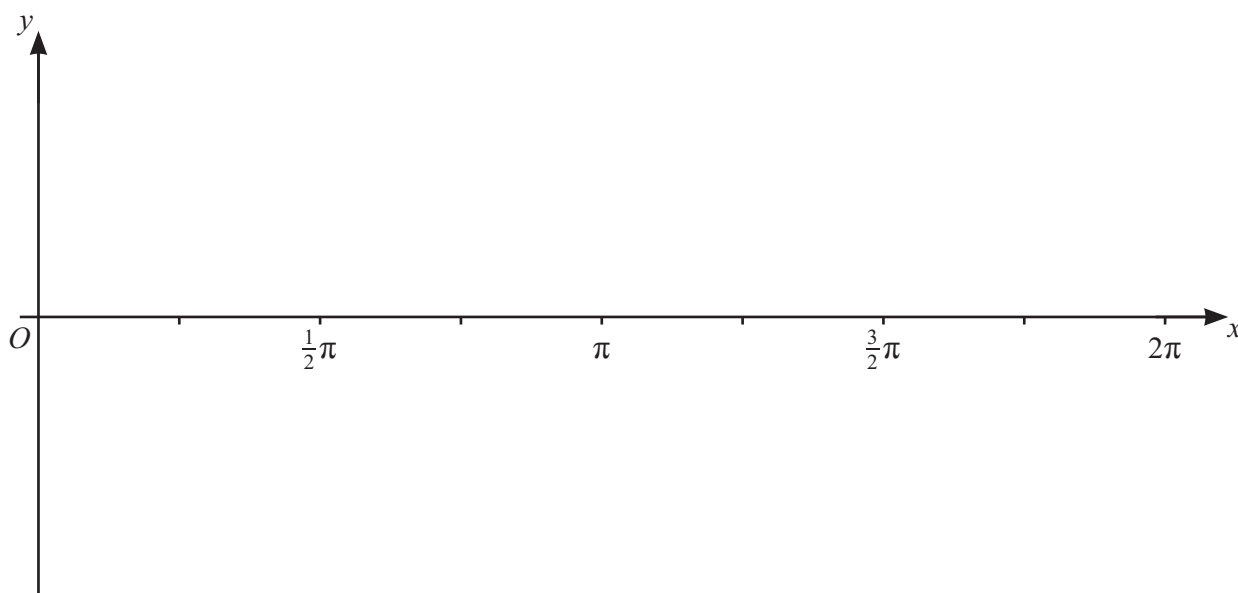
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(b) Sketch the curve. [2]



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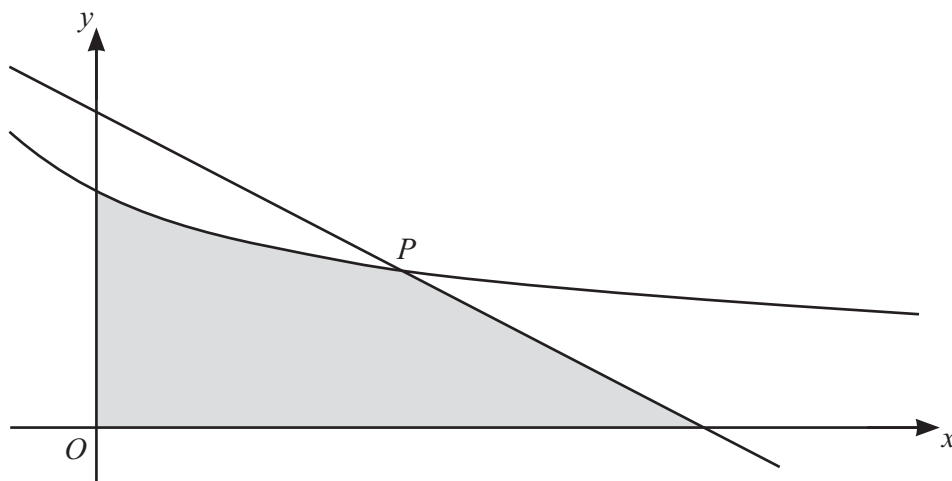
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The diagram shows the curve with equation $y = \frac{9}{(5x+4)^{\frac{1}{2}}}$ and the line $y = 6 - 3x$. The line and the curve intersect at the point P which has y -coordinate 3.

Find the area of the shaded region.

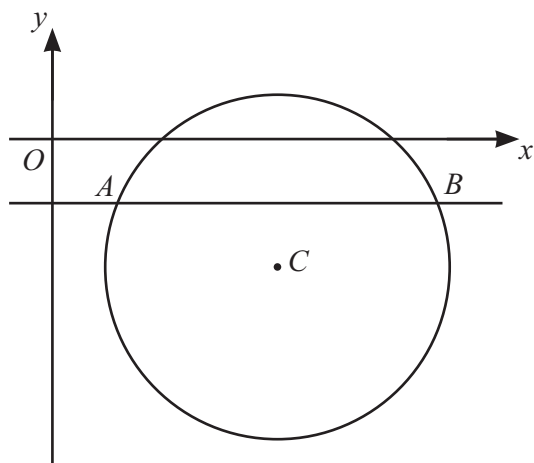
[6]

[illegible]

[3]

This image shows a full page of 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.

[illegible]



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]

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[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]

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- 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]

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[illegible]





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