



Cambridge International AS & A Level

CANDIDATE
NAME



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MATHEMATICS

9709/22

Paper 2 Pure Mathematics 2

February/March 2025

1 hour 15 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 50.
- The number of marks for each question or part question is shown in brackets [].

This document has **12** pages.



2

1 Solve the equation $\ln(3x+1) - \ln(x-5) = \ln 7$.

[3]

[illegible]



- 2** A curve passes through the point with coordinates $\left(\frac{1}{2}\pi, 5\right)$ and is such that $\frac{dy}{dx} = 4 \sec^2\left(\frac{1}{2}x\right)$.

Find the equation of the curve.

[3]

[illegible]



- 5 (a) Sketch on the same diagram the graphs of $y = |2x - 3|$ and $y = \ln(x + 1)$. [2]

The x -coordinates of the points where the graphs intersect are denoted by α and β , where $\alpha < \beta$.

- (b) Show that $\alpha = 1.5 - 0.5 \ln(\alpha + 1)$. [1]

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- (c) Use an iterative formula, based on the equation in part (b), to find the value of α correct to 3 significant figures. Give the result of each iteration to 5 significant figures. [3]

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- (d) Show by calculation that $2.055 < \beta < 2.065$. [2]

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- 6 (a)** Find the quotient and remainder when $18x^3 - 6x^2 - 30x + 4$ is divided by $(3x - 1)$. [3]

[illegible]

- (b)** Hence find $\int_1^5 \frac{18x^3 - 6x^2 - 30x + 4}{3x - 1} \, dx$. Give your answer in the form $a - \ln b$, where a and b are integers. [5]

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- 7 (a) Express $6 \sin \theta - 4 \cos \theta$ in the form $R \sin(\theta - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$. Give the exact value of R and the value of α correct to 2 decimal places. [3]

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(b) Hence solve the equation $6 \sin \theta - 4 \cos \theta + 5 = 0$ for $0^\circ < \theta < 360^\circ$.

[4]

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(c) As the value of β varies, find the greatest possible value of

$$(3 \sin 4\beta - 2 \cos 4\beta)^2 + 15$$

and determine the smallest positive value of β , in degrees, for which this greatest value occurs.

[3]

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(b) Show that the curve has no stationary points.

[3]

[illegible]



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