



Cambridge International AS & A Level

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MATHEMATICS**9709/21**

Paper 2 Pure Mathematics 2

May/June 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 **16** pages. Any blank pages are indicated.





[2]

[illegible]



- 2 (a) Use logarithms to solve the inequality $4^x < 0.05$. Give your answer in the form $x < a$, where the value of a is correct to 3 significant figures. [2]

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- (b) Solve the inequality $|3x + 8| < 9$. [3]

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- (c) Hence state the integers that satisfy both of the inequalities in parts (a) and (b). [1]

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- 3 (a) Sketch, on a single diagram, the graphs of $y = 3e^{-2x}$ and $y = \sec x$ for values of x such that $0 \leq x < \frac{1}{2}\pi$. [2]

- (b) Show that the x -coordinate of the point of intersection of the two graphs satisfies the equation $x = \frac{1}{2} \ln(3 \cos x)$. [2]

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- (c) Use an iterative formula, based on the equation in part (b), to find the x -coordinate of the point of intersection correct to 3 decimal places. Give the result of each iteration to 5 decimal places. [3]

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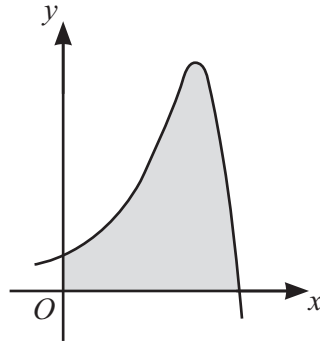
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The diagram shows the curve with equation $y = 6e^{2x} - e^{3x}$. The shaded region is bounded by the axes and the curve.

- (a) Find the exact x -coordinate of the maximum point. [3]

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

[illegible]

5

$$p(x) = ax^3 + bx^2 - ax - 24,$$

where a and b are constants. It is given that $(2x-3)$ is a factor of $p(x)$ and that the remainder is -15 when $p(x)$ is divided by $(x+1)$.

(a) Find the values of a and b .

[4]

[illegible]



(b) Hence factorise $p(x)$ completely.

[3]

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(c) Hence solve the equation $p(3\operatorname{cosec}\theta) = 0$ for $90^\circ < \theta < 270^\circ$.

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$$x = \frac{2t+1}{3t+4}, \quad y = 2\ln(3t+4),$$

where $t > -\frac{4}{3}$.

(a) Show that $\frac{dy}{dx}$ can be expressed in the form $c(3t+4)$ and state the value of the constant c . [5]

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.



- [4]

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page, typical of notebook or legal stationery. There are no margins, text, or other markings present.

- [1]

[illegible]

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DO NOT WRITE IN THIS MARGIN

[illegible]



[4]

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 writing. The lines are evenly spaced across the entire page, providing a guide for letter height and placement. There is no 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 lines are evenly spaced and extend across the entire width of the page, providing a guide for consistent letter formation. There is no text or other markings on the page.





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