

Cambridge International AS & A Level

CANDIDATE
NAME

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CENTRE
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MATHEMATICS

9709/22

Paper 2 Pure Mathematics 2

October/November 2022

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.

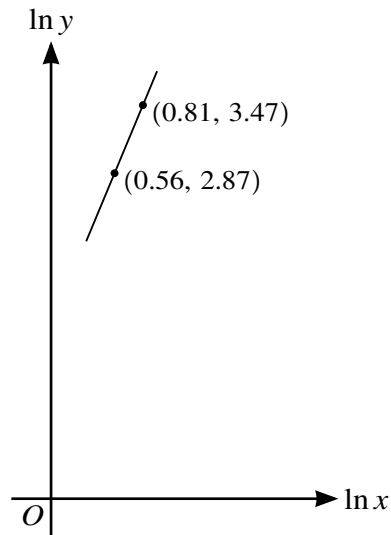
- 1** Solve the equation $\sec \theta = 5 \operatorname{cosec} \theta$ for $0^\circ < \theta < 360^\circ$. [4]

[illegible]

- 2** The solutions of the equation $|4x - 1| = |x + 3|$ are $x = p$ and $x = q$, where $p < q$.

Find the exact values of p and q , and hence determine the exact value of $|p - 2| - |q - 1|$. [5]

This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.



The variables x and y satisfy the equation $y = Ax^k$, where A and k are constants. The graph of $\ln y$ against $\ln x$ is a straight line passing through the points $(0.56, 2.87)$ and $(0.81, 3.47)$, as shown in the diagram.

Find the value of k , and the value of A correct to 2 significant figures.

[5]

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook 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.

- 4 The polynomial $p(x)$ is defined by

$$p(x) = ax^3 + 23x^2 - ax - 8,$$

where a is a constant. It is given that $(2x + 1)$ is a factor of $p(x)$.

- (a) Find the value of a and hence factorise $p(x)$ completely. [5]

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- (b) Hence solve the equation $p(e^{4y}) = 0$, giving your answer correct to 3 significant figures. [2]

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- 5** The curve with equation $y = x \ln(4x + 1) - 3x$ has one stationary point P .

- (a)** Show that the x -coordinate of P satisfies the equation

$$x = \frac{2x + 0.75}{\ln(4x + 1)} - 0.25. \quad [4]$$

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

- (b) Show by calculation that the x -coordinate of P lies between 1.8 and 1.9. [2]

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

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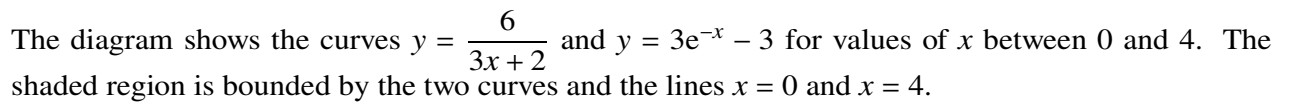
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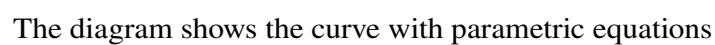
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for $\pi \leq \theta \leq \frac{3}{2}\pi$. Points P and Q lie on the curve. The gradient of the curve at P is 2. The straight line $3x + y = 0$ meets the curve at Q .

- [illegible]

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[illegible]

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