

Cambridge International AS & A Level

CANDIDATE
NAME

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CENTRE
NUMBER

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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.

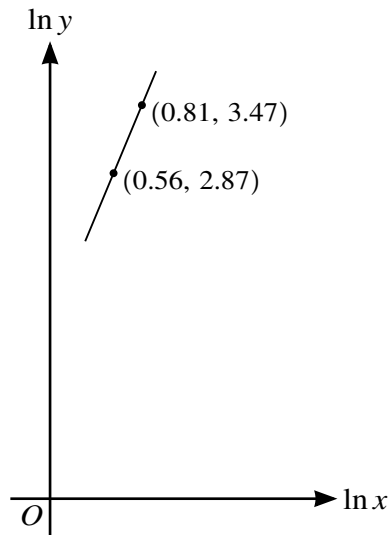
- 1** Solve the equation $\sec \theta = 5 \operatorname{cosec} \theta$ for $0^\circ < \theta < 360^\circ$. [4]

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- 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]

[illegible]



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]

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- 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

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

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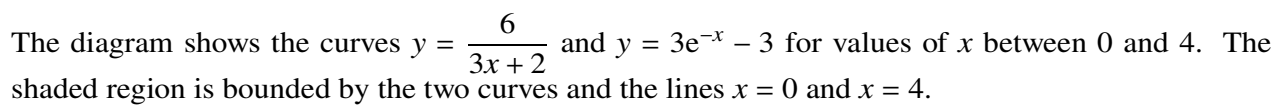
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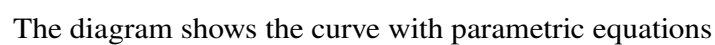
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for $\pi \leq \theta \leq \frac{3}{2}\pi$. Points P and Q lie on the curve. The gradient of the curve at P is 2. The straight line $3x + y = 0$ meets the curve at Q .

- [illegible]

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[illegible]

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