



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

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.

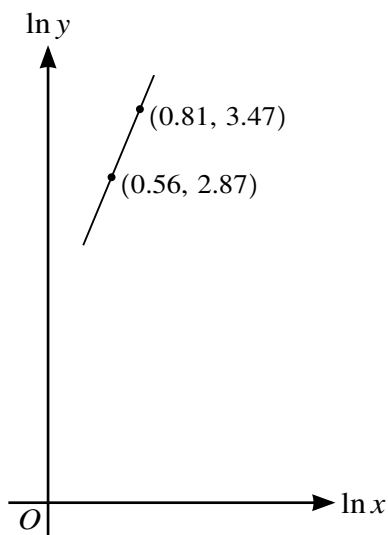


[4]

[illegible]

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.

3



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. 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.

5**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]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

7

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (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]

.....

.....

.....

.....

.....

.....

.....

.....

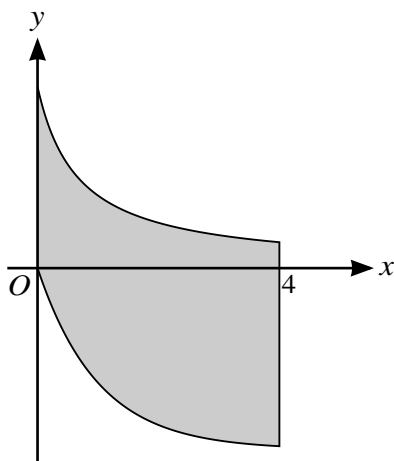
.....

.....

.....

.....

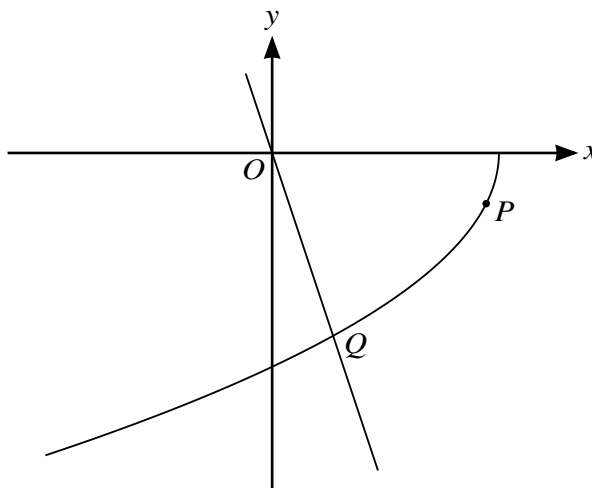
6



The diagram shows the curves $y = \frac{6}{3x+2}$ and $y = 3e^{-x} - 3$ for values of x between 0 and 4. The shaded region is bounded by the two curves and the lines $x = 0$ and $x = 4$.

Find the exact area of the shaded region, giving your answer in the form $\ln a + b + ce^d$. [9]

[illegible]



The diagram shows the curve with parametric equations

$$x = 3 \cos 2\theta, \quad y = 4 \sin \theta,$$

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 .

- (a) Find the value of θ at P , giving your answer correct to 3 significant figures. [5]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing 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.

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.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.