



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS**9709/35**

Paper 3 Pure Mathematics 3

May/June 2025**1 hour 50 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 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.



BLANK PAGE



[illegible]

[illegible]



3 The complex numbers s and t are given by

$$s = 5(\cos 0.25 + i \sin 0.25) \quad \text{and} \quad t = 6e^{3i}.$$

- (a) Express $\frac{s}{t}$ in the form $re^{i\theta}$, where $-\pi < \theta \leq \pi$ and $r > 0$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) In an Argand diagram with origin O , the points A and B represent the complex numbers s and $\frac{s}{t}$ respectively.

By considering the line segments OA and OB , or otherwise, state the two geometric effects of dividing a complex number by $6e^{3i}$. [2]

.....

.....

.....

.....

.....

.....

.....

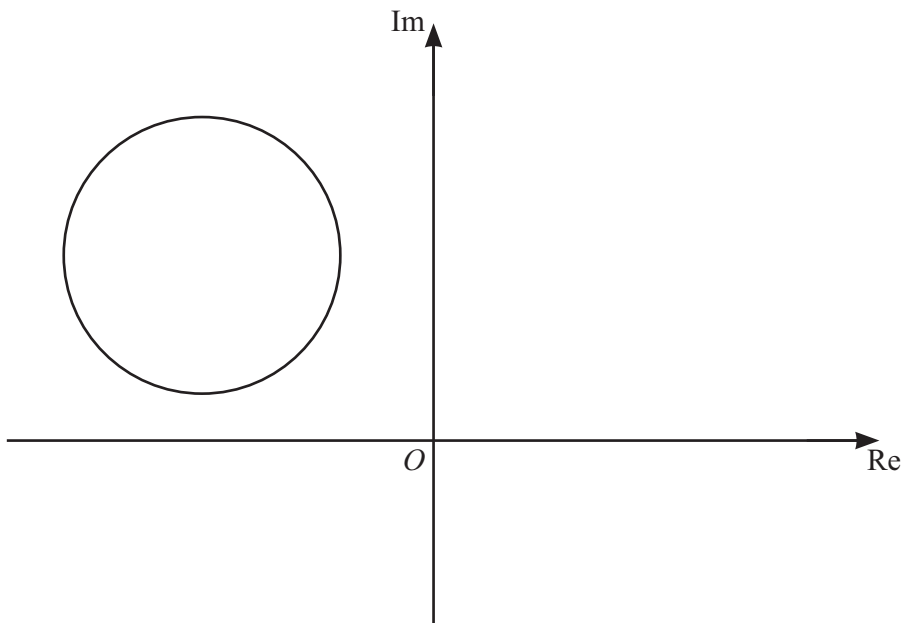
.....

.....

.....



-
- 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.



The diagram shows the locus of points representing the complex numbers, z , satisfying $|z + 5 - 4i| = 3$.

- (a) For the points on this locus, determine the maximum and minimum possible values of $|z|$. [3]

.....

.....

.....

.....

.....

.....

.....

- (b) For the points on this locus, determine the minimum possible value of $\arg z$. [3]

.....

.....

.....

.....

.....

.....

.....



6

and

for $0 \leq t \leq 2\pi$.

(a) Show that $\frac{dy}{dx}$ can be written as $A \operatorname{cosec} 3t$, where A is a constant to be found.

[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 or typing. There are no margins, text, or other markings on the page.



-
- 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.

7

(a)

[3]

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.



[5]

[illegible]

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN



- (c) Show that, if a sequence of real values given by the iterative formula

$$x_{n+1} = \frac{1}{2} \cos^{-1} \left(\frac{-2}{4x_n + 1} \right)$$

converges, then it converges to the root of the equation in part (a).

[2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (d) Use this iterative formula to calculate this root correct to 3 decimal places. Give the result of each iteration to 5 decimal places.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



[5]

[illegible]



(b) Hence obtain the expansion of $\frac{12x^2+55x-2}{(3x-2)(x+6)}$ in ascending powers of x , up to and including the term in x^2 . [4]

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.

(a) It is given that $|\overrightarrow{AB}| = |\overrightarrow{BC}|$.

$$\overrightarrow{OA} = 2\mathbf{i} - \mathbf{j} - 6\mathbf{k}, \quad \overrightarrow{OB} = b\mathbf{i} - 2\mathbf{j} + 3\mathbf{k} \quad \text{and} \quad \overrightarrow{OC} = -4\mathbf{i} + 5\mathbf{j} - 2\mathbf{k}.$$

(a) It is given that $|\overrightarrow{AB}| = |\overrightarrow{BC}|$.

Find the value of b .

[3]

[illegible]



(b) A, B, C and D are the vertices of a rhombus.

Find the position vector of D .

[2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) Calculate angle ABC .

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



- $$(x^2 + 3) \frac{dy}{dx} = e^{3y}(x - 2).$$

Solve the differential equation, and find the value of y when $x = 2$.

[8]

[illegible]

This image shows a full page of white paper with horizontal dotted 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 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 margins or additional markings.

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.