



Cambridge International AS & A Level

CANDIDATE
NAMECENTRE
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.

* 0000800000002 *



BLANK PAGE





- 1** Solve the equation $3^{4-2x} = 5(6^{x-1})$. Give your answer correct to 3 significant figures. [4]

[illegible]



2 Solve the equation $3 \cot \theta - 4 \operatorname{cosec}^2 \theta + 5 = 0$ for $-\pi \leq \theta \leq \pi$. [5]

[illegible]

* 0000800000005 *



5

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]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

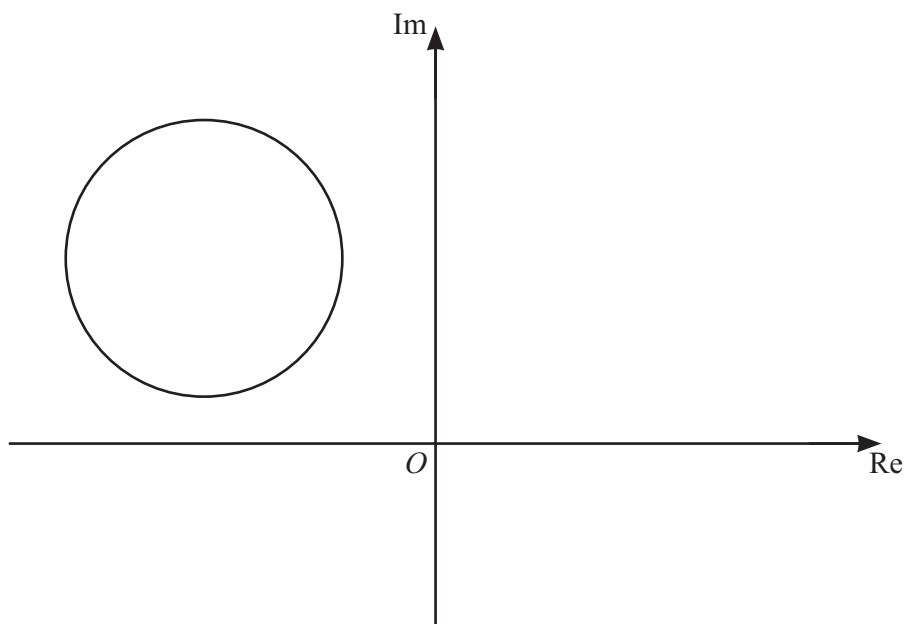


* 0000800000007 *



7

5



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]

.....

.....

.....

.....

.....

.....

.....





- (b)** Find an equation of the normal to the curve at the point where $t = \frac{1}{12}\pi$. Give your answer in the form $y = mx + c$, where the constants m and c are exact. [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.



7 The equation of a curve is $y = \tan^{-1}(4x)$.

(a) Find the exact values of x when the gradient of the curve is $\frac{1}{4}$. [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.



(b) Find the exact value of $\int_0^{0.25} y \, dx$.

[5]

[illegible]



- 8 (a)** By sketching a suitable pair of graphs, show that the equation $\sec 2x = -2x - \frac{1}{2}$ has exactly one root in the interval $0 \leq x \leq \frac{1}{2}\pi$. [2]

- (b)** Show by calculation that this root lies between 0.8 and 1.2. [2]

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



- (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 a document template. It consists of approximately 28 evenly spaced horizontal dotted lines across the entire width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings present.



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

Find the position vector of D .

[2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (c) Calculate angle ABC .

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





- DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

[8]

DO NOT WRITE IN THIS MARGIN

* 0000800000019 *



DO NOT WRITE IN THIS MARGIN

Handwriting practice area with 20 sets of horizontal dotted lines.





If you use the following page to complete the answer to any question, the question number must be clearly shown.

[illegible]

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.