



# Cambridge International AS & A Level

CANDIDATE NAME



CENTRE NUMBER

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**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.





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



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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]

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(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]

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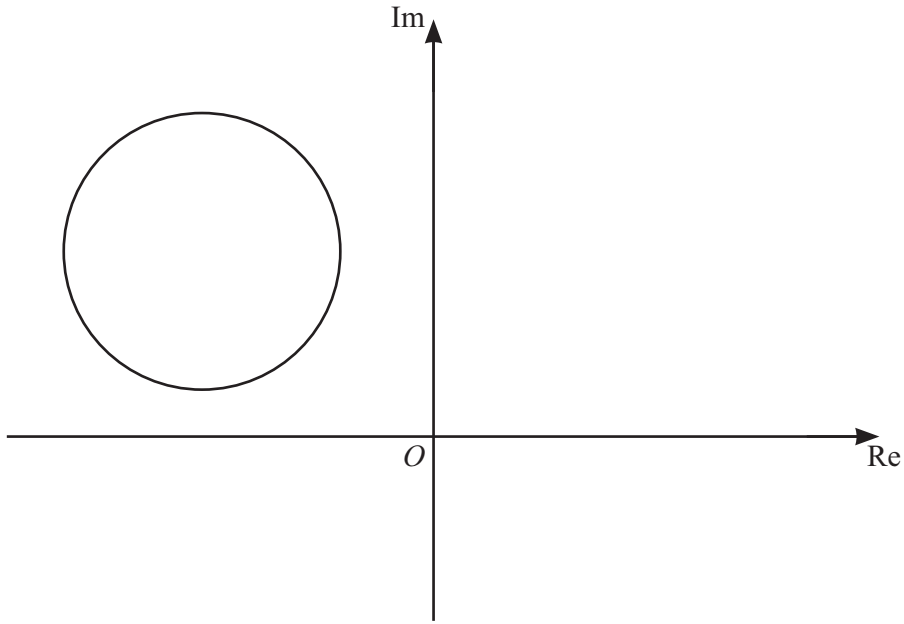
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The diagram shows the locus of points representing the complex numbers,  $z$ , satisfying  $|z + 5 - 4i| = 3$ .

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

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

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(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]

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(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]

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