



Cambridge International AS & A Level

CANDIDATE NAME	
CENTRE NUMBER	CANDIDATE NUMBER

MATHEMATICS

9709/32

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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301vC t1	ne equation $\frac{e^x + e^x}{e^x}$	-3	e your answer	correct to 5 d	eemar places.	
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3 On an Argand diagram shade the region whose points represent complex numbers z which satisfy both the inequalities $|z-3i| \le 2$ and $\frac{1}{4}\pi \le \arg(z-1-2i) \le \frac{3}{4}\pi$. [5]

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4	Solve the equation $3 \cot x - 4 \cot 2x = 3$ for $0^{\circ} \le x \le 180^{\circ}$.	[6]
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5 The square roots of $-1 - 4\sqrt{5}i$ can be expressed in the Cartesian form x + iy, where x and y are real and exact.

By first forming a quartic equation in x or y, find the square roots of $-1 - 4\sqrt{5}i$ in exact Cartesian form. [5]

[2]

[2]

6 (a) By sketching a suitable pair of graphs, show that the equation

(b) Show by calculation that this root lies between 1 and 1.5.

$$|x-2| = 2\sin\frac{1}{2}x$$

has only one root in the interval $0 < x < \pi$.

(c)

Use the iterative formula $x_{n+1} = 2 - 2\sin\frac{1}{2}x_n$ with an initial value of 1.03 to calculat correct to 2 decimal places. Give the result of each iteration to 4 decimal places.	e the root [3]
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7	(a)	Express $7 \sin \theta + 24 \cos \theta$ in the form of α correct to 4 decimal places.	$R\cos(\theta-\alpha)$, where $R>0$ and $0<\alpha<\frac{1}{2}\pi$. Give the value [3]
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(b)



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Hence solve the equation $7 \sin \frac{1}{3}x + 24 \cos \frac{1}{3}x = 24.5$ for $0 < x < \pi$.	[4]
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8 The variables x and θ satisfy the differential equation

$\sin 2\theta \frac{\mathrm{d}x}{\mathrm{d}\theta} = (4x+3)\cos 2\theta,$	$\sin 2\theta \frac{\mathrm{d}x}{\mathrm{d}\theta} =$	$= (4x+3)\cos 2\theta,$
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and $x = 0$ when $\theta = \frac{1}{12}\pi$.	
Solve the differential equation and obtain an expression for x in terms of θ .	7]
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9 With respect to the origin O, the points A, B and C have position vectors given by

$$\overrightarrow{OA} = \begin{pmatrix} 1 \\ -4 \\ 2 \end{pmatrix}, \qquad \overrightarrow{OB} = \begin{pmatrix} -2 \\ 1 \\ 3 \end{pmatrix} \qquad \text{and} \qquad \overrightarrow{OC} = \begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix}.$$

(a)	Find a vector equation for the line through A and B .	[2]
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(b)	Using a scalar product, find the exact value of $\cos BAC$.	[4]
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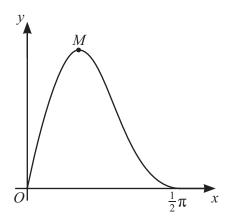
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(c)	Hence find the exact area of triangle ABC .	3]
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(a)	Find the quotient and remainder when x^2 is divided by $1 + 4x^2$.	[2]
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(b)	Find the exact value of $\int_0^{0.5} x \tan^{-1}(2x) dx.$	[6]
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The diagram shows the graph of $y = 5 \sin 2x \cos^2 x$ for $0 \le x \le \frac{1}{2}\pi$ and its maximum point M.

Find the exact x -coordinate of M .	[6]
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1	By using the substitution $u = \cos x$, find the area of the region bounded by the curve, the x between $x = 0$ and $x = \frac{1}{4}\pi$, and the line $x = \frac{1}{4}\pi$.

Additional page

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