



Cambridge International AS & A Level

CANDIDATE
NAME



CENTRE
NUMBER

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MATHEMATICS

9709/33

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.

[1]

[3]

This image shows a blank sheet of white paper with horizontal dotted lines for writing. The lines are evenly spaced and run across the width of the page. There is a faint watermark in the top left corner that reads "ambin kambi".



[4]

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3 Find the exact value of $\int_{\frac{1}{5}\pi}^{\frac{1}{4}\pi} 3 \cos^2 5x \, dx$.

[4]

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- 4 (a) It is given that $z_1 = r_1 e^{i\theta_1}$ and $z_2 = r_2 e^{i\theta_2}$.

Show that $(z_1 z_2)^* = z_1^* z_2^*$.

[3]

- (b) $z = 3e^{\frac{1}{4}\pi i}$ is a root of the equation $z^2 + bz + c = 0$, where b and c are real.

State the other root and hence find the values of b and c .

[3]



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7 Let $f(x) = \frac{3a-5x}{(3a+2x)(2a-x)}$, where a is a positive constant.

[3]

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[illegible]

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[4]

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- 9 With respect to the origin O , the points A , B and C have position vectors given by

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

The line l passes through B and C .

- (a) Find a vector equation for l .

[2]

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- (b) The point P is the foot of the perpendicular from A to l .

Find the position vector of P .

[4]

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- (c) The point D is the reflection of A in l .

Find the position vector of D .

[2]



- $$\sin 4y \frac{dy}{dx} = x \sin 2y \sin 3x.$$

(a) Solve the differential equation, obtaining a relation between x and y . [8]

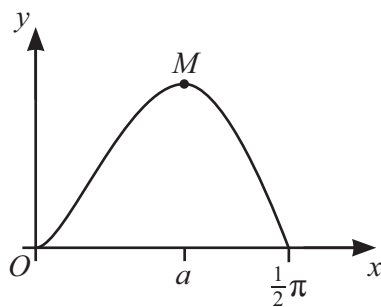
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- (b) Given that $0 < y < \frac{1}{2}\pi$, find the values of y when $x = 0$. [2]





The diagram shows the curve $y = \sqrt{x} \sin 2x$ for $0 \leq x \leq \frac{1}{2}\pi$. The curve has a maximum point at M , where $x = a$.

- (a) Show that $\tan 2a = -4a$ [4]

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- (b)** Show by calculation that $0.9 < a < 0.95$. [2]

[illegible]



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

[2]

- (d) Use the iterative formula in part (c) to calculate a correct to 4 decimal places. Give the result of each iteration to 6 decimal places. [3]

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