



Cambridge International AS & A Level

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MATHEMATICS

9709/32

Paper 3 Pure Mathematics 3

February/March 2026

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. Do **not** use correction fluid or tape.
- 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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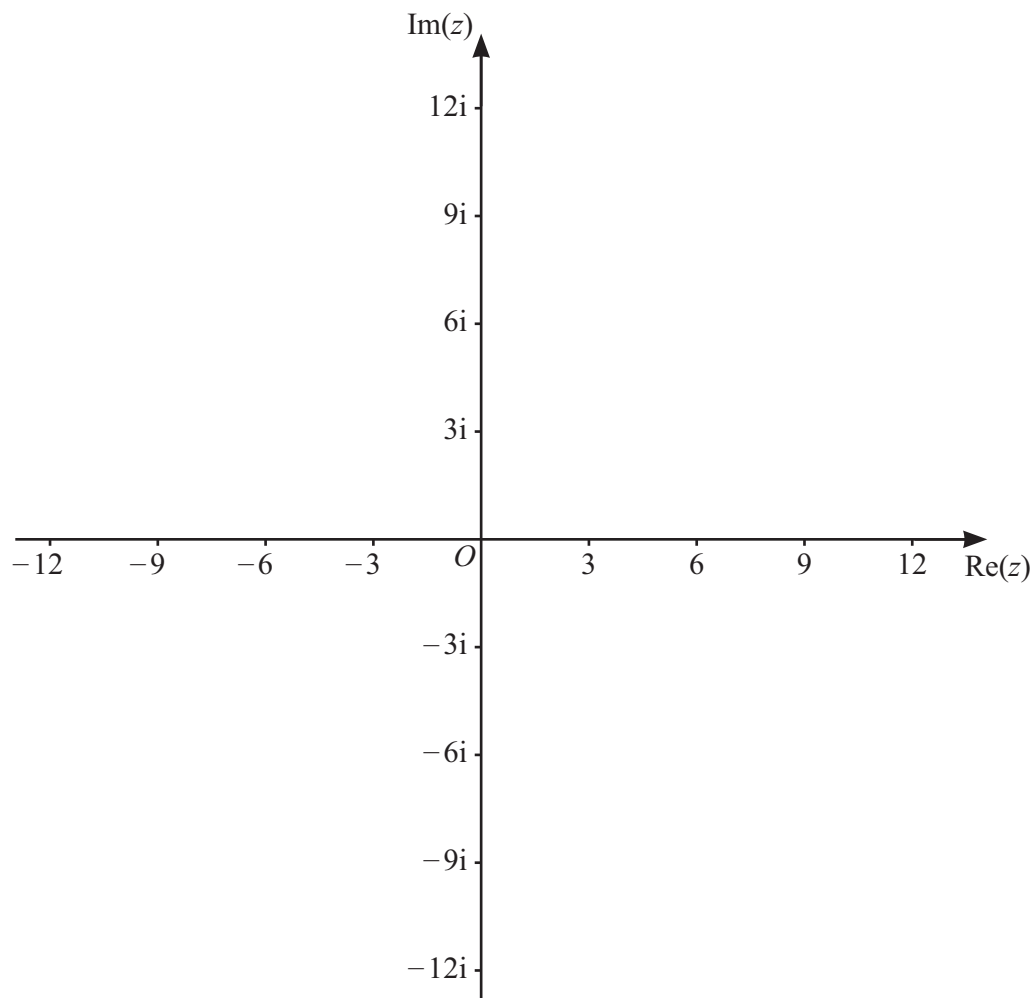
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- 2 The complex number z satisfies $|z| = 9$ and $\frac{1}{2}\pi \leq \arg z \leq \pi$.

(a) On the Argand diagram, sketch the locus of the points representing z . [2]

(b) On the **same diagram**, sketch the locus of the points representing $z^* + 3$. [2]





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

Give your answer in the form $p\sqrt{3} + q\sqrt{2}$, where p and q are rational.

[4]

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4 The coefficient of x^3 in the expansion of $(1 - ax)^{\frac{2}{5}}$ is 1.

(a) Find the value of a .

[2]

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(b) Hence, find the coefficient of x^4 in the expansion of $(2x + 1)(1 - ax)^{\frac{2}{5}}$.

[3]

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(c) State the set of values of x for which the expansion in 4(b) is valid.

[1]

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5 It is given that $z = \frac{3 + \lambda i}{\lambda + 2i}$, where λ is a real constant.

(a) Find the value of λ for which $\arg z = \frac{1}{4}\pi$.

[4]

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(b) When λ has the value found in 5(a), find the exact value of $|z|$, making your method clear.

[2]

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6 The polynomial $2x^4 + ax^3 + 4x^2 + bx - 3$ is denoted by $p(x)$.

It is given that $(x^2 + x + 1)$ is a factor of $p(x)$.

(a) Find the values of a and b .

[4]

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(b) Hence, show that $(x + 3)$ is a factor of $p(x)$.

[2]

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- 7 (a) By sketching a suitable pair of graphs, show that the equation $\ln x = \operatorname{cosec} \frac{1}{2}x$ has exactly one root in the interval $0 < x < \pi$. [2]

- (b) Verify by calculation that this root lies between 2.6 and 2.9. [2]

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- (c) Use the iterative formula $x_{n+1} = \exp\left(\operatorname{cosec}\frac{1}{2}x_n\right)$ to determine the root correct to 3 decimal places. Give the result of each iteration to 5 decimal places. [3]

[$\exp(x)$ is an alternative notation for e^x .]

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8 The variables x and y satisfy the differential equation

$$ye^{3x} \frac{dy}{dx} = x(y+5).$$

It is given that $y = 0$ when $x = 0$.

Solve the differential equation to obtain an equation in x and y .

[8]

[illegible]



11

[illegible]



9 Let $I = \int_1^3 \frac{x^3}{3+x^2} dx$.

(a) Using the substitution $x = \sqrt{3} \tan u$, show that $I = \int_{\frac{1}{6}\pi}^{\frac{1}{3}\pi} 3 \tan^3 u \, du$. [4]

[illegible]



- (b)** Hence, or otherwise, find the exact value of I . Give your answer in the form $p + q \ln r$, where p, q and r are rational.

[5]

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(a) Show that $\frac{dy}{dx} = \frac{2y}{x^2 - 4}$.

[5]

[illegible]



(b) Given that $k = 5$, find the angle between the tangents to the curve when $x = 3$.

Give your answer in the form $a \tan^{-1}\left(\frac{b}{c}\right)$, where a , b and c are integers.

[4]





11 The points A and B have position vectors $\overrightarrow{OA} = 2\mathbf{i} + 2\mathbf{j} - \mathbf{k}$ and $\overrightarrow{OB} = 4\mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$ relative to the origin, O .

(a) Show that the perpendicular distance from A to the line through O and B is $\frac{1}{3}\sqrt{65}$. [5]

[illegible]



[7]

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