



Cambridge International AS & A Level

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MATHEMATICS

9709/22

Paper 2 Pure Mathematics 2

October/November 2025

1 hour 15 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 50.
- The number of marks for each question or part question is shown in brackets [].

This document has **12** pages. Any blank pages are indicated.



1 Solve the equation $\ln(3x+5) - \ln(x-2) = 4$. Give your answer in an exact form.

[4]

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2 Solve the equation $2 \tan^2 \theta + 3 \sec \theta = 18$ for $-180^\circ < \theta < 180^\circ$.

[5]

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3 (a) Solve the inequality $|3x - 4| \leq |2x + 5|$.

[4]

(b) Hence find the largest integer N satisfying the inequality $|3 \times 7^{0.01N} - 4| \leq |2 \times 7^{0.01N} + 5|$. [3]



4 The polynomial $p(x)$ is defined by

$$p(x) = x^4 - 10x^3 + 20x^2 - 30x + 40.$$

- (a) Find the quotient when $p(x)$ is divided by $(x^2 + 3)$ and show that the remainder is -11 . [3]

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- (b) Hence find the real roots of the equation $p(x) + 11 = 0$. Give your answers in exact form. [3]

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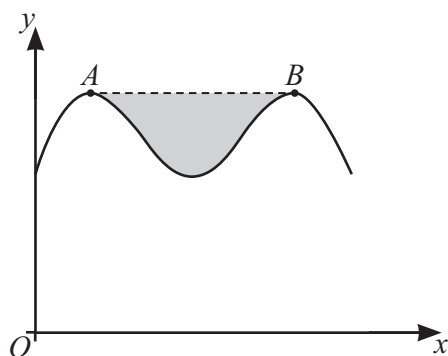
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The diagram shows the curve with equation $y = 4 \cos 2x + 8 \sin x$ for $0 \leq x \leq \pi$. The maximum points on the curve are denoted by A and B , and the shaded region is bounded by the line segment AB and the curve.

- (a) Find the coordinates of A and B .

[5]





(b) Find the exact area of the shaded region.

[6]

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- 6 (a) Given that $\int_{-2a}^a \left(\frac{1}{2}e^{2x} + \frac{1}{4}e^{-x} \right) dx = 5$, where a is a positive constant, show that

$$a = \frac{1}{2} \ln \left(10 + \frac{1}{2}e^{-a} + \frac{1}{2}e^{-4a} \right). \quad [4]$$

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(b) Hence show by calculation that the value of a lies between 1.0 and 1.2.

[2]

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(c) Use the iterative formula

$$a_{n+1} = \frac{1}{2} \ln \left(10 + \frac{1}{2} e^{-a_n} + \frac{1}{2} e^{-4a_n} \right)$$

to find the value of a correct to 4 significant figures. Give the result of each iteration to 6 significant figures.

[3]

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7 A curve has equation $5x^2y + 4e^{2y} - 7x + 10 = 0$.

- (a) Find an expression in terms of x and y for $\frac{dy}{dx}$ and hence find the gradient of the curve at the point for which $y = 0$. [6]

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- (b)** Show that there is no point on the curve at which the tangent is parallel to the y -axis. [2]

[illegible]



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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