



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]

[illegible]



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

[5]

[illegible]

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

[4]

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

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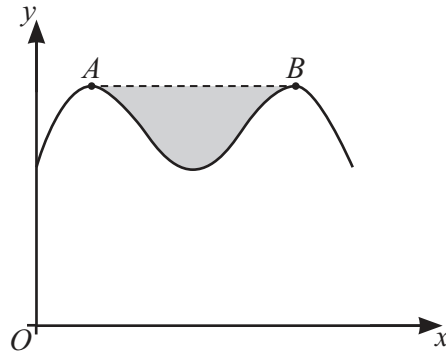
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The diagram shows the curve with equation $y = 4 \cos 2x + 8 \sin x$ for $0 \leq x \leq \pi$. The maximum points on the curve are denoted by A and B , and the shaded region is bounded by the line segment AB and the curve.

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

[5]

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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

[6]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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

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

[illegible]

(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]

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[illegible]



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