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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2277721531 6

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.

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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 $-180° < \theta < 180°$. [5]

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3 **(a)** Solve the inequality $|3x-4| \leqslant |2x+5|$. [4]

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

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4 The polynomial $\mathrm{p}(x)$ is defined by

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

(a) Find the quotient when $\mathrm{p}(x)$ is divided by $\left(x^2 + 3\right)$ and show that the remainder is –11. [3]

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

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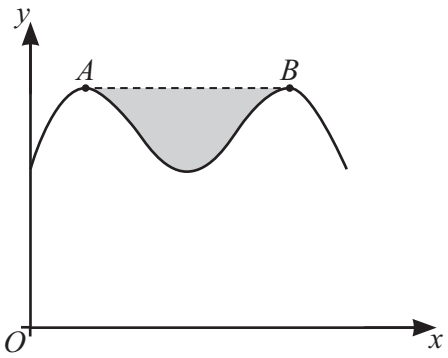
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The diagram shows the curve with equation $y = 4\cos 2x + 8\sin x$ for $0 \leqslant x \leqslant \pi$. The maximum points on the curve are denoted by A and B, and the shaded region is bounded by the line segment AB and the curve.

(a) Find the coordinates of A and B. [5]

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(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

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

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

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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Additional page

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