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CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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MATHEMATICS **9709/21**

Paper 2 Pure Mathematics 2 **May/June 2026**

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

This document has **12** pages.

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1 The variables x and y satisfy the equation $3^{x+y} = 2^{4x+1}$. Using natural logarithms, the equation can be transformed to the form $y = mx + c$.

Determine the exact values of m and c. Give each value in the form $\frac{\ln p}{\ln q}$. [4]

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2 **(a)** Solve the equation $|3x+7| = |4x-1|$. [3]

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(b) Hence, solve the equation $|3\cot\theta+7| = |4\cot\theta-1|$ for $0 < \theta < \pi$. Give each solution correct to 3 decimal places. [3]

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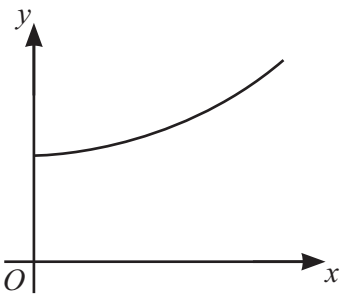

The diagram shows the curve with equation $y = \sqrt{x^3 + 9}$ for $0 \leqslant x \leqslant 3$.

(a) Use the trapezium rule with three intervals to find an approximate value of $\int_0^3 \sqrt{x^3 + 9}\,\mathrm{d}x$.

Give your answer correct to 3 significant figures. [3]

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(b) State, with a reason, whether your answer to **3(a)** is an over-estimate or under-estimate of the true value of $\int_0^3 \sqrt{x^3 + 9}\,\mathrm{d}x$. [1]

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4 **(a)** Express $5\cos\theta + 3\sin\theta$ in the form $R\cos(\theta - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give the exact value of R, and give the value of α correct to 2 decimal places. [3]

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(b) Hence, solve the equation $5\cos\theta + 3\sin\theta = 2$ for $-180° < \theta < 180°$. [4]

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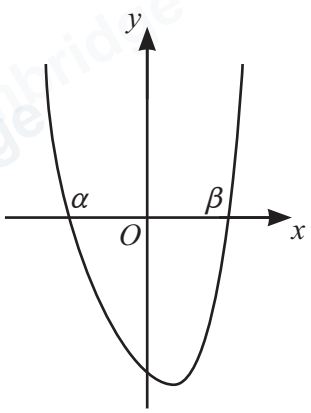
5 The polynomial $\mathrm{p}(x)$ is defined by

$$\mathrm{p}(x) = 2x^4 + 3x^3 + 4x^2 - 8x.$$

(a) Find the quotient when $\mathrm{p}(x)$ is divided by $(2x+3)$, and show that the remainder is 21. [3]



The diagram shows the curve with equation $y = \mathrm{p}(x) - 21$. The curve crosses the x-axis at the points $(\alpha, 0)$ and $(\beta, 0)$.

(b) State the value of α, and show that β satisfies the equation $x = \sqrt[3]{7-2x}$. [2]

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(c) Show by calculation that the value of β lies between 1.5 and 1.6. [2]

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(d) Use an iterative formula, based on the equation in **5(b)**, to find the value of β correct to 4 significant figures. Give the result of each iteration to 6 significant figures. [3]

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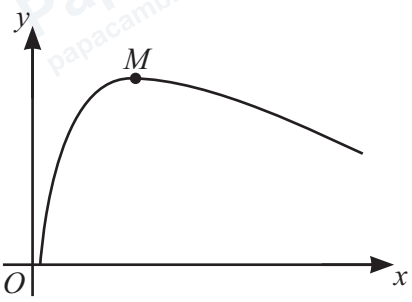

The diagram shows the curve with parametric equations

$$x = 1 + 2e^{2t}, \qquad y = \frac{e^{t}}{9 + e^{2t}}.$$

The curve has a maximum point M.

(a) Find an expression for $\frac{dy}{dx}$ in terms of t. [4]

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(b) Find the coordinates of M. [3]

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(c) Find the gradient of the curve at the point for which $x = 33$. [3]

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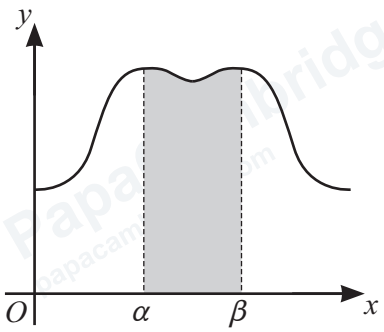

The diagram shows the curve with equation

$$y = 3 + \sin^2 2x - \cos 2x$$

for $0 \leqslant x \leqslant \pi$. The x-coordinates of the two maximum points on the curve are α and β. The shaded region is bounded by the curve, the x-axis and the lines $x = \alpha$ and $x = \beta$.

Find the exact area of the shaded region. [9]

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Additional page

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