



Cambridge International AS & A Level

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MATHEMATICS

9709/22

Paper 2 Pure Mathematics 2

May/June 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 **16** pages. Any blank pages are indicated.

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- 1 Show that $\int_2^{11} \frac{8}{4x+1} dx = \ln a$, where a is an integer to be found. [3]





- 2 (a)** Sketch on the same diagram the graphs of $y = |2x - 9|$ and $y = 4x - 5$. [2]

(b) Solve the inequality $|2x - 9| < 4x - 5$. [3]

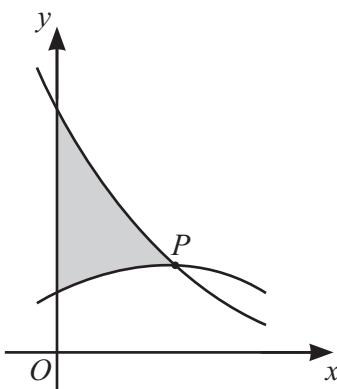




- 3 Find the coordinates of the stationary points of the curve with equation $y = \frac{8x}{2x+3} - 6x + 5$. [5]

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The diagram shows parts of the curves with equations $y = 4e^{-2x}$ and $y = 1 + 0.5 \sin 3x$. Point P is a point of intersection of the curves, and the shaded region is bounded by the two curves and the y -axis.

- (a) Show that the x -coordinate of P satisfies the equation $x = -0.5 \ln(0.25 + 0.125 \sin 3x)$. [1]

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- (b) Use an iterative formula, based on the equation in part (a), to find the x -coordinate of P correct to 4 significant figures. Use an initial value of 0.5 and give the result of each iteration to 6 significant figures. [3]





(c) Hence find the area of the shaded region. Give your answer correct to 2 significant figures. [4]





- 5** The polynomial $p(x)$ is defined by

$$p(x) = ax^4 + bx^3 + 13x^2 - 35x + 15,$$

where a and b are constants. It is given that $(2x - 1)$ and $(x - 3)$ are factors of $p(x)$.

- (a) Find the values of a and b .

[4]





(b) Hence factorise $p(x)$.

(c) Find the least positive value of θ in radians such that $p(\cot 2\theta) = 0$.

[2]





- 6** A curve has equation $(x^2 - 3)\ln y + 6x = 14$.

- (a) Show that there is no point on the curve at which the y -coordinate is e^{-1} .

[3]

- (b) Find the equation of the tangent to the curve at the point $(2, e^2)$. Give your answer in the form $y = mx + c$, where m and c are exact constants. [6]





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- 7 (a) Express $4 \cos \theta \sin(\theta + 30^\circ)$ in the form $R \cos(2\theta - \alpha) + k$, where $R > 0$, $0^\circ < \alpha < 90^\circ$ and k is a constant. [6]





(b) Hence solve the equation

$$12 \cos 2\phi \sin (2\phi + 30^\circ) = 5$$

for $0^\circ < \phi < 90^\circ$.

[5]





Additional page

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