



Cambridge International AS & A Level

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MATHEMATICS

9709/23

Paper 2 Pure Mathematics 2

May/June 2022

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.

2 (a) Sketch, on the same diagram, the graphs of $y = |2x - 9|$ and $y = 5x - 3$. [2]

(b) Solve the equation $|2x - 9| = 5x - 3$. [2]

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- 4 (a) Use the trapezium rule with three intervals to show that the value of $\int_1^4 \ln x \, dx$ is approximately $\ln 12$. [4]

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- (b) Use a graph of $y = \ln x$ to show that $\ln 12$ is an under-estimate of the true value of $\int_1^4 \ln x \, dx$. [2]

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

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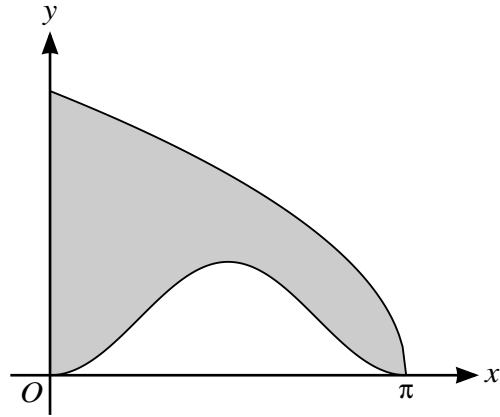
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The diagram shows the curves $y = \sqrt{2\pi - 2x}$ and $y = \sin^2 x$ for $0 \leq x \leq \pi$. The shaded region is bounded by the two curves and the line $x = 0$.

Find the exact area of the shaded region. [8]

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