



Cambridge International AS & A Level

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MATHEMATICS**9709/13**

Paper 1 Pure Mathematics 1

May/June 2025**1 hour 50 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 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages.

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$$4 \sin^2 \theta, \quad 8 \sin^3 \theta,$$

Given that the sum to infinity of the progression is $\frac{1}{2}$, find the value of θ . Give your answer in the form $\sin^{-1} k$, where k is a rational number. [4]

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

[4]

This image shows a full page of primary-ruled paper. It features approximately 20 horizontal dotted lines spaced evenly down the page, providing a guide for handwriting practice. The paper is otherwise blank, with no margins, text, or other markings.



- 4 (a) Find the first three terms in the expansion of $\left(2 - \frac{3}{2}x\right)^5$ in ascending powers of x . [3]

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- (b) Use your answer to part (a), with a suitable value of x , to find an approximation to 1.985^5 . [3]

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$$4 \sin \theta \tan \theta = 1 + 5 \cos \theta$$

for $-180^\circ < \theta < 180^\circ$.

[6]

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.



- Find the values of N and a .

[6]

[illegible]



7 A curve is such that $\frac{dy}{dx} = 3x^2 + 10x - 8$.

(a) Find the set of values of x for which y decreases as x increases. [3]

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(b) It is given that the maximum point of the curve has y -coordinate 27.
Find the equation of the curve. [4]

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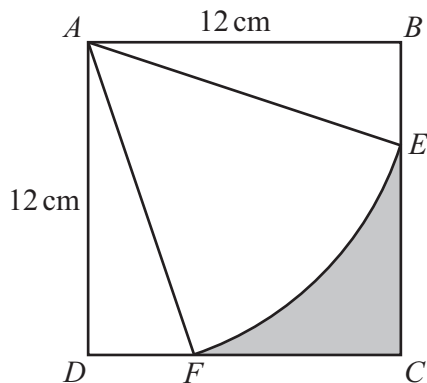
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The diagram shows a square $ABCD$ where each side has length 12 cm . Points E and F lie on the sides BC and CD respectively and are such that $BE = \frac{1}{3}BC$ and $DF = \frac{1}{3}DC$. The arc EF is part of a circle with centre A . The shaded region is bounded by the arc EF and the line segments EC and FC .

- (a) Show that the size of angle EAF is 0.9273 radians, correct to 4 significant figures. [2]

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- (b) Find the perimeter of the shaded region. [3]

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- (c) Find the area of the shaded region. [3]

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- (a) Show that one of the possible values of k is 10, and find the other possible value. [4]

[illegible]



Find the equation of the tangent to the circle at R . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. [5]

This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.



10 A curve C has equation $y = \frac{9}{2x-5} + 2x - 5$.

(a) Find the coordinates of the two stationary points.

[4]

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(b) Find $\frac{d^2y}{dx^2}$ and hence determine the nature of each stationary point.

[3]

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- (i) State the coordinates of the maximum point of C_1 . [1]

- (ii) Find the equation of C_1 in the form $y = \frac{a}{bx+c} + dx + e$, where a, b, c, d and e are integers. [3]

[illegible]

- The function g is such that $g^{-1}(x) = \sqrt[3]{2x-4}$ for $x \in \mathbb{R}$.

- [illegible]



[6]

[illegible]

This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, which is otherwise blank.

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