



Cambridge International AS & A Level

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MATHEMATICS

9709/15

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 **20** pages. Any blank pages are indicated.

- DO NOT WRITE IN THIS MARGIN

[4]

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Find the possible values of the constant a .

[5]

[illegible]



- 3 (a) Use completing the square to find the exact solutions of the equation $4x^2 - 4x - 1 = 0$. [2]

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- (b) Hence solve the equation $4 \tan \theta = 4 + \frac{1}{\tan \theta}$ for $0^\circ < \theta < 180^\circ$. [3]

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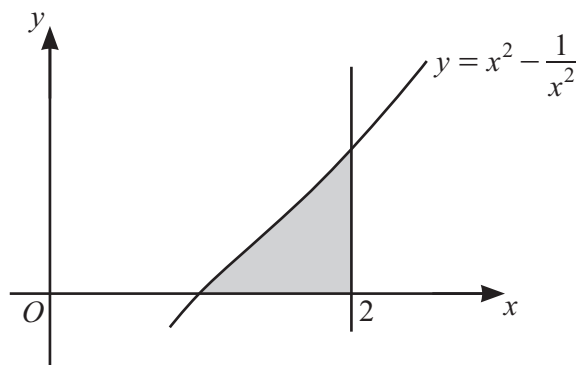




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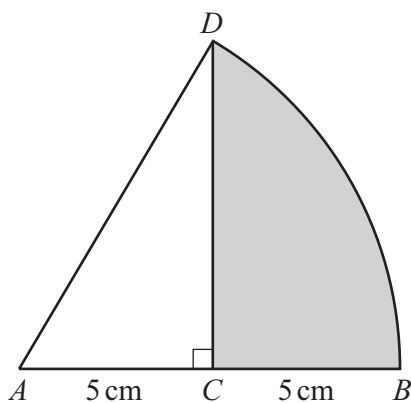
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The diagram shows part of the curve $y = x^2 - \frac{1}{x^2}$. The shaded region is bounded by the curve, the line $x = 2$ and the x -axis.

Find the volume formed when the shaded region is rotated through 360° about the x -axis, giving your answer correct to 2 decimal places. [5]

[illegible]



The diagram shows a sector ABD of a circle with centre A and radius 10 cm. The perpendicular bisector of AB passes through D .

- (a) Find the perimeter of the shaded region BCD , giving your answer correct to 1 decimal place. [4]

[illegible]



[2]

[illegible]

- On Ananya's first birthday, her father gives her \$10. Every subsequent year, her father gives her \$5 more than he gave her the previous year.

On Ananya's first birthday, her mother also gives her \$10. Every subsequent year, her mother gives her 20% more than she gave her the previous year.

- (a) Show that on Ananya's eleventh birthday she receives more from her mother than from her father. [3]

[illegible]

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- 7 In the parallelogram $ABCD$, the coordinates of A are $(3, 7)$, the coordinates of B are $(6, p)$ and the coordinates of D are $(1, p)$. It is given that the gradient of AB is $-\frac{2}{3}$.

(a) Find the value of p . [2]

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(b) Find the coordinates of C . [2]

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[illegible]

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

[5]

[illegible]



(b) Find the coordinates of the other stationary point.

[3]

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(c) A point P is moving along part of the curve in such a way that the y -coordinate of P is increasing at a constant rate of 6 units per second.

Find the rate at which the x -coordinate of P is increasing when $x = 5$. [3]

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9 Functions f and g are defined as follows.

$$f(x) = \cos x \text{ for } 0 \leq x \leq \pi$$

$$g(x) = 3 \cos(x - \pi) + 2 \text{ for } \pi \leq x \leq 2\pi$$

- (a) Describe fully the transformations that have been combined to transform the graph of $y = f(x)$ to the graph of $y = g(x)$. [4]

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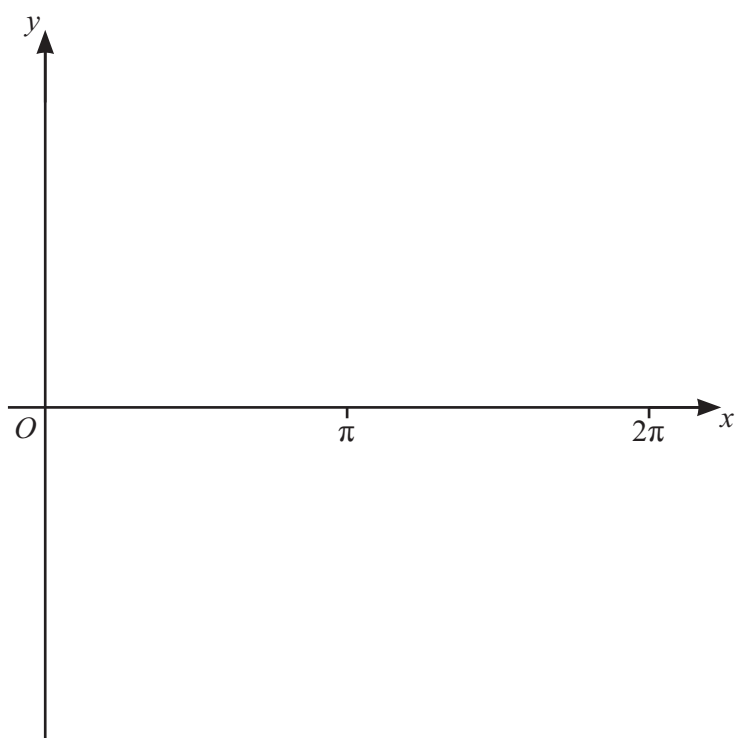
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- (b) On the given axes, sketch the graphs of $y = f(x)$ and $y = g(x)$. [4]





[4]

[illegible]

[1]

[illegible]

(a) Find an equation of the tangent to the circle at the point $(2, 8)$, giving your answer in the form $ax + by + c = 0$. [4]

[illegible]



(b) Given that the line $x + 3y = k$ does **not** intersect the circle, show that $k^2 - 20k - 220 > 0$. [5]

[illegible]

[illegible]





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