



Cambridge International AS & A Level

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MATHEMATICS

9709/13

Paper 1 Pure Mathematics 1

May/June 2026
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. 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 75.
- The number of marks for each question or part question is shown in brackets [].

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- 1 (a)** Find the coordinates of the points of intersection of the curve $y = 3x^2 - 12x + 17$ and the line $y = 6x + 2$.

[4]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (b) Hence, solve $6x + 2 \geq 3x^2 - 12x + 17$.

[1]

[illegible]

2 (a) Express $x\sqrt{x}$ in the form x^n , where n is a rational number. [1]

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(b) Hence, solve the equation

$$x^3 - 9x\sqrt{x} + 8 = 0. \quad [3]$$

[illegible]

3 (a) Prove the identity

$$\frac{1}{\cos \theta} - \cos \theta \equiv \tan \theta \sin \theta. \qquad [3]$$

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(b) Hence, solve the equation

$$\frac{2}{\cos \theta} - 2 \cos \theta = \tan \theta$$

for $0^\circ \leq \theta \leq 360^\circ$. [4]

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4 The equation of a curve is

$$y = 3x - kx^3 + 4,$$

where k is a constant. The point P on the curve has x -coordinate 1. The normal to the curve at P is parallel to the straight line $3y = x$.

(a) Find the value of k .

[3]

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(b) The point Q is also on the curve. The normal to the curve at Q is also parallel to the line $3y = x$.

Find the coordinates of the point Q .

[4]

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5 (a) Find the first four terms, in ascending powers of x , in the expansion of $(2 + 3x)^5$. [3]

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(b) Hence, find the expansion up to and including the term in x^3 of $(1 - 3x)(2 + 3x)^5$. [2]

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(c) Use your answer to 5(b), with a suitable value of x , to find an approximation to 0.97×2.03^5 . Write down your answer to 5 decimal places. [3]

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6 The function f is defined by $f(x) = \frac{16}{x^3} + 3x + 5$ for $x \neq 0$.

(a) Find the coordinates of all stationary points on the curve $y = f(x)$. [4]

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(b) The function g is defined by $g(x) = f(x) + a$ where a is a constant. It is given that $g(-x) \equiv -g(x)$.

Find the value of a . [3]

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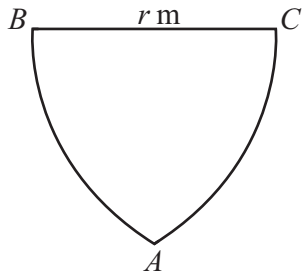
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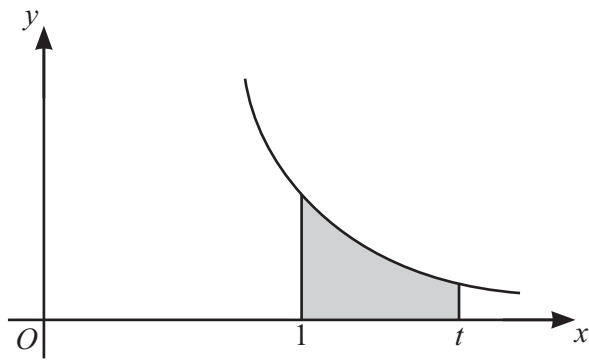
The diagram shows the design for a garden. The points A , B and C form the vertices of an equilateral triangle of side length r metres. The arcs AC and AB are parts of circles with centres B and C respectively and are both of radius r metres.

- (a) Find an expression for the perimeter of the garden. Give your answer in terms of π and r . [2]

[illegible]

- (b)** Given that $r = 18$, find the exact area of the garden. Give your answer in terms of π and $\sqrt{3}$. [4]

[illegible]



The diagram shows part of the curve with equation $y = \frac{2}{5x^3}$.

The shaded region is bounded by the curve, the x -axis and the lines $x = 1$ and $x = t$. It is given that the area of the shaded region is $\frac{1}{9}$.

Find the value of t .

[5]

[illegible]



9 The equation of a curve is $y = \sqrt{3x+1}$.

(a) Find $\frac{dy}{dx}$.

[2]

(b) A point P is moving along the curve such that its x -coordinate is increasing at a rate of 6 units per second.

Find the rate at which the y -coordinate of P is changing when $y = 4$.

[5]



- 10** The first, second and third terms of a geometric progression are equal to the first, fourth and sixth terms of an arithmetic progression respectively. The first term of both progressions is non-zero. The geometric progression has common ratio r .

(a) Show that

$$3r^2 - 5r + 2 = 0. \quad [3]$$

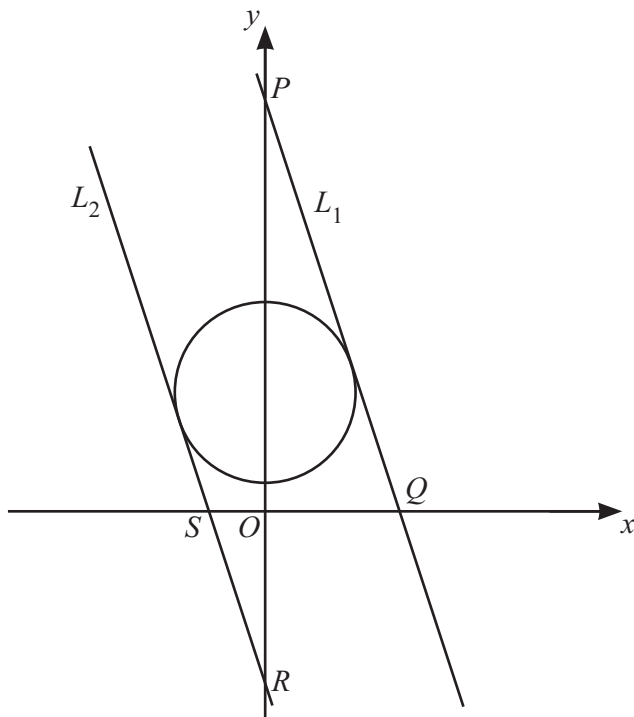
This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.



(b) It is given that the sum to infinity of the geometric progression is 54.

Find the common difference of the arithmetic progression.

[4]



The diagram shows a circle with two tangents, L_1 and L_2 . The tangent L_1 intersects the x -axis at Q and the y -axis at P . The tangent L_2 intersects the x -axis at S and the y -axis at R .

- (a) The end-points of a diameter of the circle are $(0, 4 - \sqrt{10})$ and $(0, 4 + \sqrt{10})$.

Show that the equation of the circle can be expressed as

$$x^2 + y^2 - 8y + 6 = 0. \quad [3]$$

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(b) The two tangents, L_1 and L_2 , have equations of the form $y = -3x + c$.

Show that $c^2 - 8c - 84 = 0$.

[4]

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(c) Find the exact area of quadrilateral $PQRS$.

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Additional page

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