



Cambridge International AS & A Level

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MATHEMATICS

9709/15

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 [].

This document has **16** pages.



1 Solve the simultaneous equations

$$4x^2 + 2y^2 - 3y = 21 \quad \text{and} \quad 2x - y - 5 = 0. \quad [5]$$

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.



- 2 A tank is being filled with water at a rate of $200 \text{ cm}^3 \text{ s}^{-1}$. The volume of water in the tank, $V \text{ cm}^3$, is given by

$$V = 100\pi h + \frac{1}{3}\pi h^3,$$

where h is the height of water in the tank in centimetres.

Find the exact rate at which h is increasing when $h = 30$.

[3]

[illegible]

- 3 The coefficient of x^4 in the expansion of $(p+2x)^5$ is equal to the coefficient of x^2 in the expansion of $(1-2qx)^4$, where p and q are constants.

(a) Find an expression for p in terms of q . [3]

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(b) Given that $p = \frac{6}{5}$, find the two possible values of the coefficient of x^3 in the expansion of $(3+qx)^6$. [3]

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4 The equation of a curve is $y = -4x^2 + 2x + 3$.

(a) Use differentiation to find the x -coordinate of the stationary point of the curve. [2]

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The curve is stretched by factor 3 in the y -direction and then by factor $\frac{1}{2}$ in the x -direction.

(b) Find the x -coordinate of the stationary point of the transformed curve. [1]

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(c) Find the equation of the transformed curve. Give your answer in the form $y = ax^2 + bx + c$, where a , b and c are integers to be found. [3]

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- 5 (a) Express $2x^2 - 16x - 18$ in the form $2(x + a)^2 + b$, where a and b are constants to be found. [2]

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- (b) Hence, solve the equation $2x^8 - 16x^4 - 18 = 0$. [4]

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- [4]

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7 (a) Prove the identity

$$\frac{\cos \theta}{1 - \sin \theta} - \frac{1}{\cos \theta} \equiv \tan \theta. \quad [4]$$

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(b) Hence, solve the equation

$$\frac{2 \cos \theta}{1 - \sin \theta} - \frac{2}{\cos \theta} + 3 = 0$$

for $0^\circ \leq \theta \leq 360^\circ$. [3]

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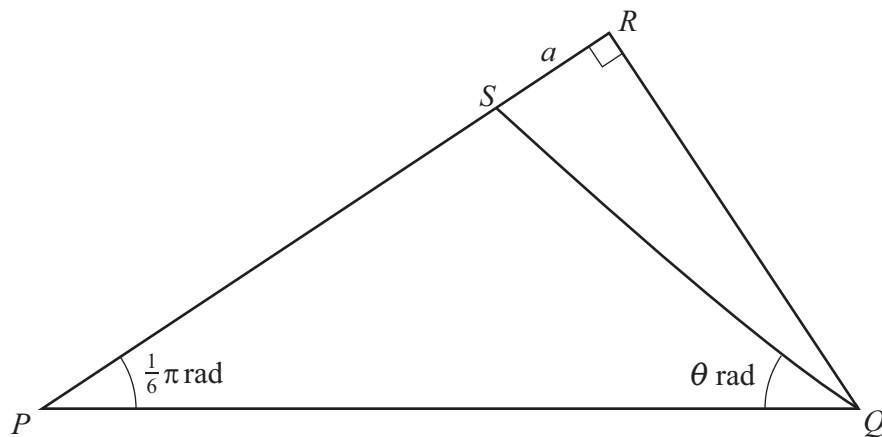
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The diagram shows a right-angled triangle PQR . The point S lies on PR and is such that $PS = 4RS$. The distance $RS = a$. The angle $QPR = \frac{1}{6}\pi$ radians, and the angle $PQS = \theta$ radians.

- (a) Find the exact distance QS in terms of a . Give your answer in the form $\sqrt{\frac{c}{d}}a$, where c and d are integers to be found. [2]

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- (b) (i) Show that the angle $RQS = \sin^{-1}\left(\frac{\sqrt{21}}{14}\right)$. [2]

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- (ii) Hence, find the exact value of θ . [1]

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- 9 A function f is defined by $f(x) = 3 - \frac{4}{2x+3}$ for $x > -\frac{3}{2}$.

(a) (i) Find $f'(x)$.

[2]

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(ii) Hence, show that f is an increasing function.

[1]

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(b) (i) Find an expression for $f^{-1}(x)$.

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(ii) State the domain and range of f^{-1} .

[2]

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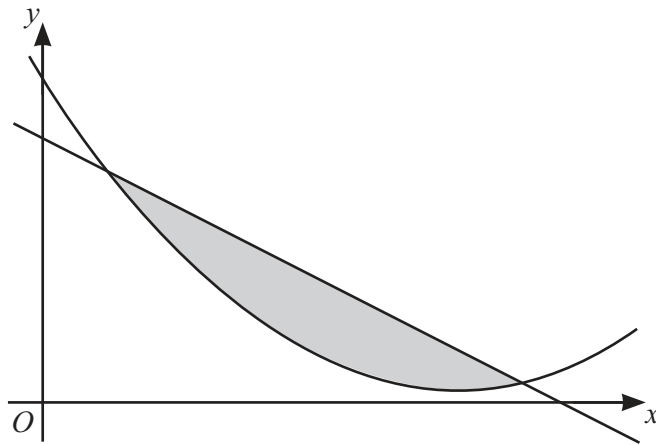
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The diagram shows the curve with equation $y = x^2 - 12x + 37$ and the line $y = -4x + 30$.

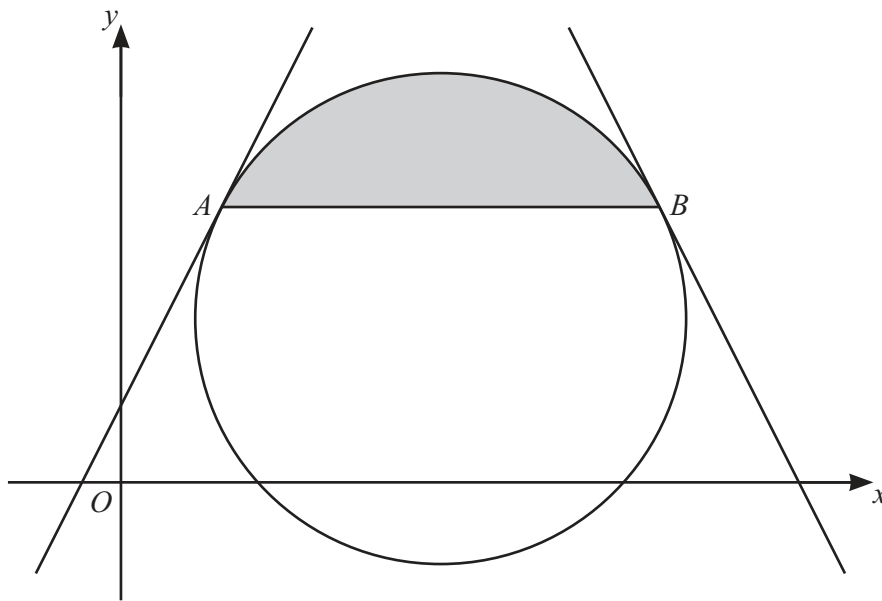
Find the area of the shaded region.

[7]

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



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In the diagram, AB is a chord of the circle with equation $(x-6)^2 + (y-3)^2 = 20$. The two tangents to the circle with equations $y = 2x + 1$ and $y = -2x + 25$ meet the circle at the points A and B respectively.

- (a) Find the coordinates of the points A and B . [4]

[illegible]



- (b)** Hence, or otherwise, find the area of the shaded region. Give your answer to 3 significant figures.

[5]

[illegible]

- 12 (a) The first term of an arithmetic progression is 5730 and the common difference is -23 .

Find the value of the first negative term.

[3]

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- (b) The first term of a geometric progression is $\sin \theta$ and the second term is $\frac{1}{2} \tan \theta$, where $0 < \theta < \frac{1}{2}\pi$.

- (i) Find the set of values of θ for which the progression is convergent.

[3]

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- (ii)** Given that $\theta = \frac{1}{6}\pi$, find the sum to infinity of the progression. Give your answer in the form $\frac{p + \sqrt{q}}{r}$, where p , q and r are integers to be found. [3]

[illegible]



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