



Cambridge International AS & A Level

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MATHEMATICS**9709/12**

Paper 1 Pure Mathematics 1

February/March 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 [].

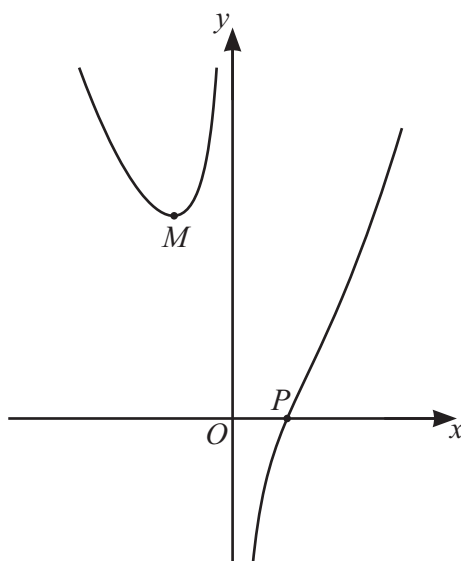
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The diagram shows the curve with equation $y = 2x^2 - \frac{5}{x} + 3$. The curve crosses the x -axis at the point $P(1, 0)$ and M is a minimum point.

- (a) Find the gradient of the curve at P . [2]

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- (b) Find the coordinates of M . Give each coordinate correct to 3 significant figures. [3]

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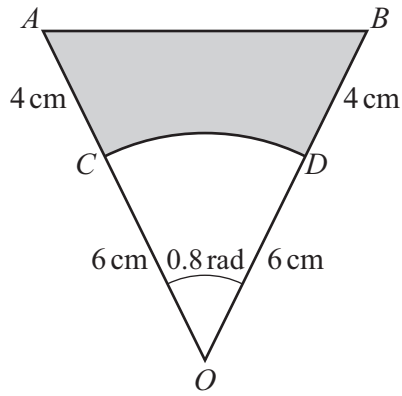
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This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



The diagram shows a triangle OAB where $OA = OB = 10$ cm and angle $AOB = 0.8$ radians. Points C and D on OA and OB respectively are such that the arc CD is part of a circle with centre O and radius 6 cm. The shaded region is bounded by the arc CD and the line segments CA , AB and BD .

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

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

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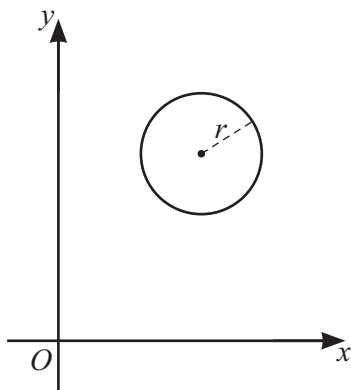


5 An arithmetic progression has first term 5 and common difference 6.

For this progression, find the sum of all the terms that lie between 150 and 400. [6]

[6]

[illegible]



The diagram shows a circle C of radius r , where $x > 0$ and $y > 0$ for all points on C . The least distance between any point on C and the x -axis is 8 units, and the least distance between any point on C and the y -axis is 5 units.

- (a) State the coordinates of the centre of the circle in terms of r . [1]

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- (b) Given that the distance between the origin and the centre of the circle is 15 units, find the value of r . [3]

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- (c) The point on the circle furthest from the origin is denoted by P .

Find the gradient of the tangent to the circle at P . [2]

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[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 width of the page. There are no margins, text, or other markings on the paper.



[4]

[illegible]



8 A geometric progression is such that its second term is -120 and its sum to infinity is 160 .

(a) Find the common ratio.

[4]

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(b) The first nine terms of the progression are now removed.

Find the sum to infinity of the remaining terms of the progression.

[3]

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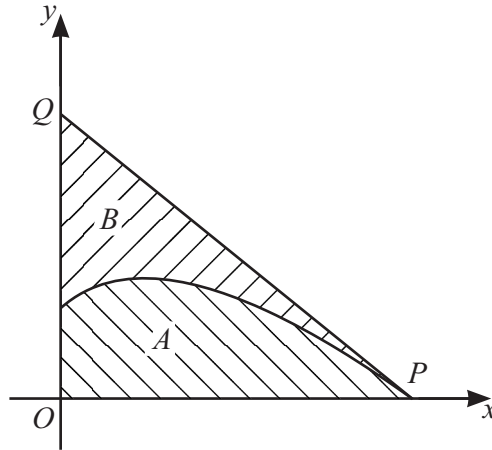
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- (a) Use the expression for $\frac{d^2y}{dx^2}$ to determine whether the stationary point is a maximum or a minimum point. [2]

- (b)** Find the equation of the curve. [7]



The diagram shows the curve with equation

$$y = 4(3x + 4)^{\frac{1}{2}} - 2x - 6$$

for values of x such that $0 \leq x \leq 7$. The tangent to the curve at the point $P(7, 0)$ meets the y -axis at the point Q . Region A is bounded by the curve and the two axes. Region B is bounded by the curve, the line segment PQ and the y -axis.

- (a) Find the area of region A .

[4]

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[5]

This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps for letter height. The entire page is otherwise blank, with no margins, text, or other markings.

where c and k are positive constants. It is given that $g^{-1}(3k+1) = c$.

$$f(x) = 4x^2 - c \quad \text{and} \quad g(x) = 2x + k,$$

where c and k are positive constants. It is given that $g^{-1}(3k+1) = c$.

(a) Show that $gf(x) = 8x^2 - k - 1$.

[4]

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- (b) The curve with equation $y = 8x^2 - k - 1$ is transformed to the curve with equation $y = h(x)$ by the following sequence of transformations.

Translation of $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Stretch in the y -direction by scale factor k

Reflection in the x -axis

Find an expression for $h(x)$ in terms of x and k .

[3]

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- (c) The range of h is given by $h(x) \leq 15$.

Find the values of c and k .

[3]

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