



Cambridge International AS & A Level

CANDIDATE
NAME
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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 [].

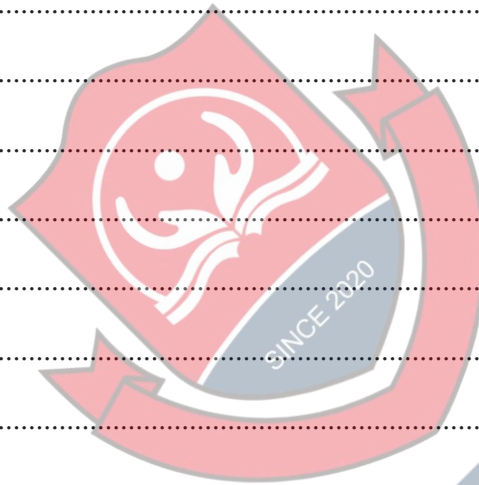
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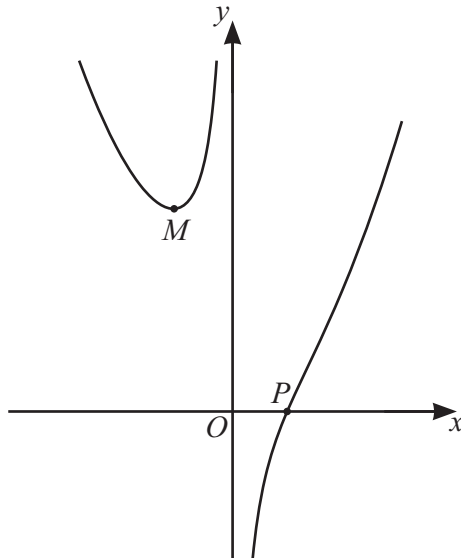
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The diagram shows the curve with equation $y = 2x^2 - \frac{5}{x} + 3$. The curve crosses the x -axis at the point $P(1, 0)$ and M is a minimum point.

- (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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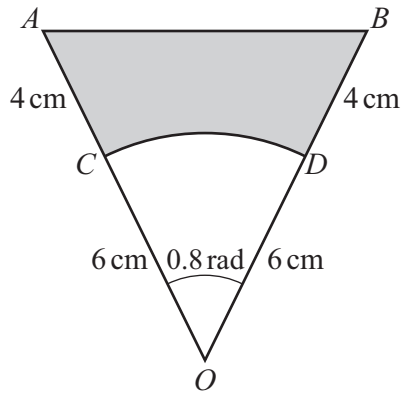
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[illegible]



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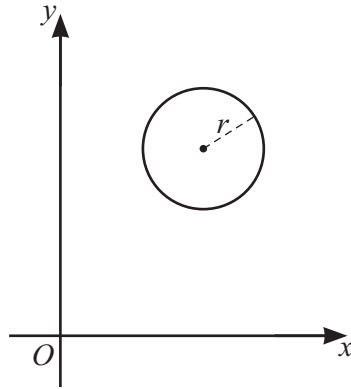
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- For this progression, find the sum of all the terms that lie between 150 and 400.



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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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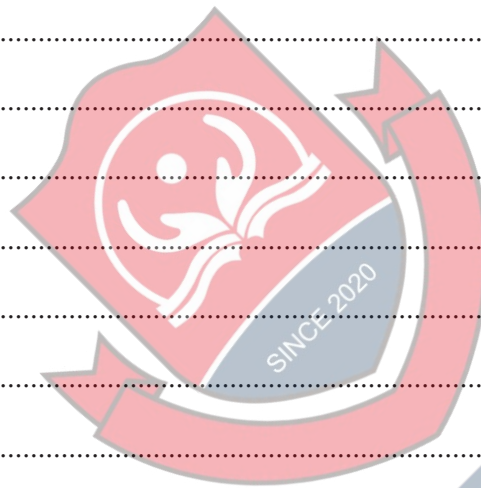
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7 (a) Show that $3 \tan^2 \theta + 5 \sin^2 \theta \equiv \frac{8 \sin^2 \theta - 5 \sin^4 \theta}{1 - \sin^2 \theta}$.

[3]



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[4]



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The image shows a portion of the University of Utah logo in the top left corner, featuring a red and white shield with a blue banner that reads "SINCE 1890". A large, light blue diagonal watermark reading "4Uadmission" is overlaid across the entire page. The page is ruled with horizontal dotted lines.

- (a)** Find the common ratio.

[4]

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

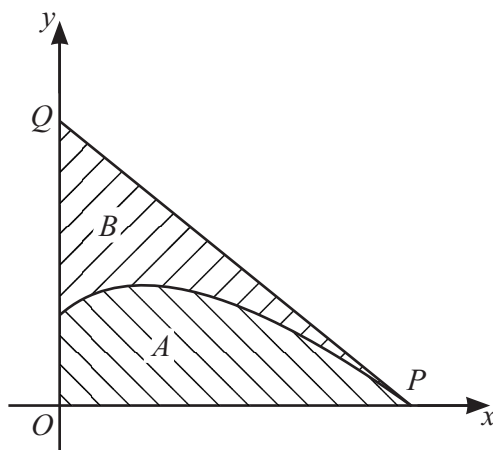
[3]



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



10



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]



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[4]



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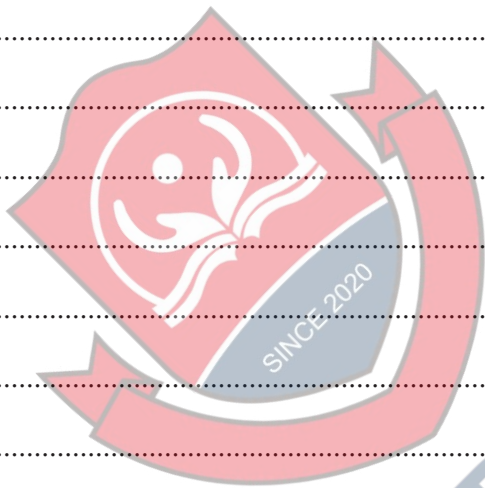
- Translation of $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

Reflection in the x -axis



- Find the values of c and k . [3]

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