

SMIYL GCEALevelMaths9709

CANDIDATE
NAME

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CENTRE
NUMBER

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MATHEMATICS

Paper 1 Guess Paper

9709 Pure 1

October/November 2024

1 hour and 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 18 pages.

1. A curve with equation $y = f(x)$ is such that $f'(x) = \frac{4}{3}x^{-\frac{2}{3}} - 2x^{-\frac{1}{3}}$. It is given that $f(1) = 8$. Find $f(x)$.

[4]

2. In the expansion of $(x^2 + \frac{a}{x})^5$, the coefficient of x is twice the coefficient of x^4 .

(a) Find the value of the non-zero constant a .

[4]

- (b) Find the coefficient of x^4 in the expansion of $(1 - x^3) \left(x^2 + \frac{a}{x}\right)^5$. [1]

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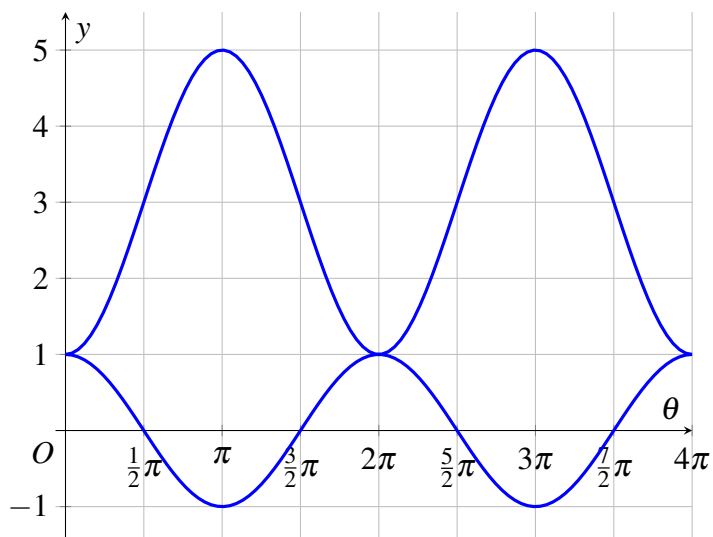
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3. A curve has equation $y = \frac{1}{4}(2x - 3)^2$ and a point is moving along the curve.

Find the x -coordinate of the point on the curve at which x - and y -coordinates are increasing at the same rate. [4]

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The diagram shows two curves. One curve has equation $y = \cos x$ and the other curve has equation $y = f(x)$.

In order to transform the curve $y = \cos x$ to the curve $y = f(x)$, the curve $y = \cos x$ is first reflected in the x -axis.

Describe fully a sequence of two further transformations which are required.

[4]



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- (a) Find the values of a and b and hence find the coordinates of the centre of the circle. [4]

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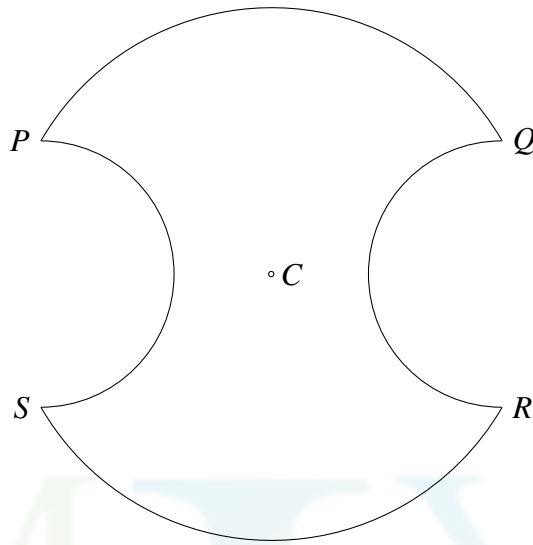
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- This image shows a blank sheet of primary-ruled paper. It features several horizontal dotted lines spaced evenly apart. A single vertical dashed line runs down the center of the page, dividing it into two equal halves. The background is white, and there are no other markings or text present.

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7.



The diagram shows a symmetrical metal plate. The plate is made by removing two identical pieces from a circular disc with centre C . The boundary of the plate consists of two arcs PQ and RS of the original circle and two semicircles with PS and QR as diameters. The radius of the circle with centre C is 6cm, and $PS = QR = 6$ cm also.

- (a) Show that the angle $PCQ = \frac{2}{3}\pi$ radians. [2]

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- (b) Find the exact perimeter of the plate. [3]

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8. The equation of a circle is $(x-2)^2 + (y+1)^2 = 20$. The line with equation $y = mx + c$ passes through the point $(0, 13)$ and is tangent to the circle.

Find the two possible values of m and, for each value of m , find the coordinates of the point at which the tangent touches the circle. [8]

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9. Functions f and g are defined by

$$f(x) = x + \frac{4}{x} \quad \text{for } x > 0,$$

$$g(x) = ax + 1 \quad \text{for } x \in \mathbb{R}$$

where a is a constant.

- (a) Find an expression for $gf(x)$. [1]

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- (b) Given that $gf(1) = 26$, find the value of a . [2]

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- (c) Given that the graph of $y = f(x)$ has a minimum point when $x = 2$, explain whether or not f has an inverse. [1]

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(e) Explain why the composite fg cannot be formed. [1]

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10. (a) The first three terms of an arithmetic progression are 17 , $2p + 3$, $31 - 3p$. Find the value of the eighth term of the progression.

[4]

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- (b) The first three terms of a geometric progression are 16 , $5q - 8$, $13 - q$, where q is a positive constant.

Find the sum to infinity of the progression.

[4]

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- (b) A triangle is formed from the tangent to the curve at B , the normal to the curve at B and the x -axis.

Find the area of this triangle.

[6]

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