



Cambridge International AS & A Level

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MATHEMATICS**9709/11**

Paper 1 Pure Mathematics 1

October/November 2022**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 [].

This document has **20** pages.



This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text present.

3

- 2** The equation of a curve is such that $\frac{dy}{dx} = 12\left(\frac{1}{2}x - 1\right)^{-4}$. It is given that the curve passes through the point $P(6, 4)$.

(a) Find the equation of the tangent to the curve at P . [2]

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(b) Find the equation of the curve. [4]

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[5]

[illegible]

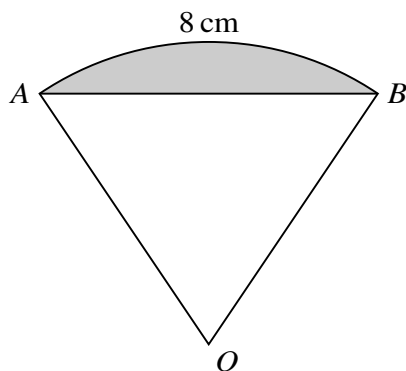
4 The coefficient of x^2 in the expansion of $\left(1 + \frac{2}{p}x\right)^5 + (1 + px)^6$ is 70.

[6]

This image shows a full page of a worksheet designed for handwriting practice. It features 20 evenly spaced, horizontal dashed lines that run across the entire width of the page. The background is plain white, providing a clear guide for letter formation and alignment. There are no margins, text, or other markings present.

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The diagram shows a sector OAB of a circle with centre O . The length of the arc AB is 8 cm . It is given that the perimeter of the sector is 20 cm .

(a) Find the perimeter of the shaded segment.

[4]

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(b) Find the area of the shaded segment.

[2]

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6 (a) Show that the equation

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

may be expressed in the form $a \sin^2 \theta + b \sin \theta + c = 0$, where a , b and c are constants to be found. [3]

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- [3]

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.

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- (b)** Find, to the nearest millimetre, the total depth of the post in the ground after 20 impacts. [2]

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- (c)** Find the greatest total depth in the ground which could theoretically be achieved. [2]

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- [illegible]

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9 Functions f and g are both defined for $x \in \mathbb{R}$ and are given by

$$\begin{aligned} f(x) &= x^2 - 4x + 9, \\ g(x) &= 2x^2 + 4x + 12. \end{aligned}$$

(a) Express $f(x)$ in the form $(x - a)^2 + b$. [1]

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(b) Express $g(x)$ in the form $2[(x + c)^2 + d]$. [2]

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- (c) Express $g(x)$ in the form $kf(x + h)$, where k and h are integers. [1]

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- (d) Describe fully the two transformations that have been combined to transform the graph of $y = f(x)$ to the graph of $y = g(x)$. [4]

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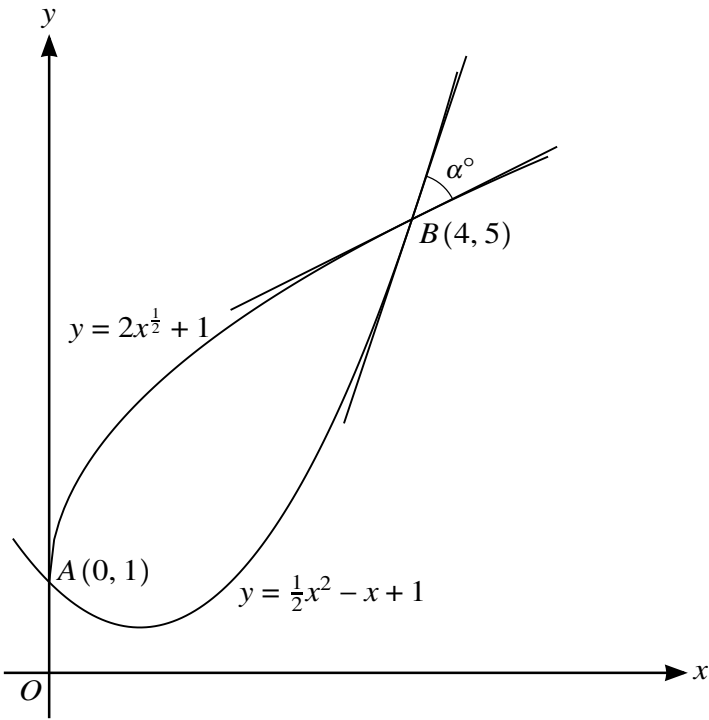
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Curves with equations $y = 2x^{\frac{1}{2}} + 1$ and $y = \frac{1}{2}x^2 - x + 1$ intersect at $A(0, 1)$ and $B(4, 5)$, as shown in the diagram.

- (a) Find the area of the region between the two curves. [5]

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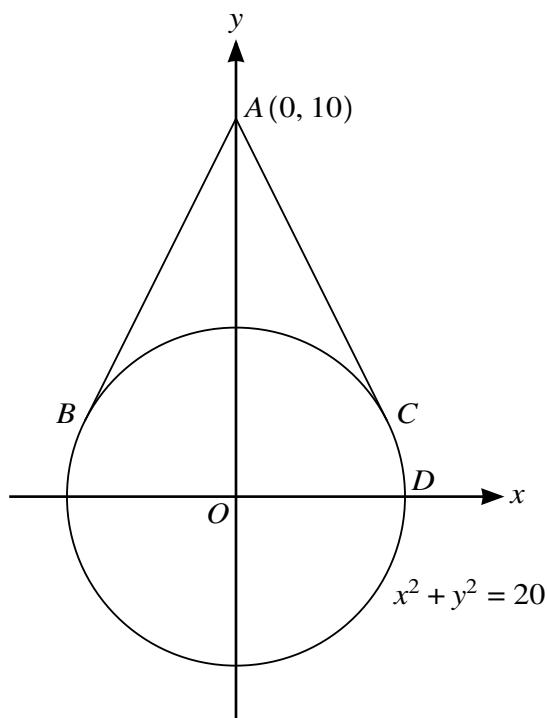
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[5]

[illegible]

11



The diagram shows the circle with equation $x^2 + y^2 = 20$. Tangents touching the circle at points B and C pass through the point A $(0, 10)$.

- (a) By letting the equation of a tangent be $y = mx + 10$, find the two possible values of m . [4]

[illegible]

(b) Find the coordinates of B and C .

[3]

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The point D is where the circle crosses the positive x -axis.

(c) Find angle BDC in degrees.

[3]

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