



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS
9709/13

Paper 1 Pure Mathematics 1

May/June 2024
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. Any blank pages are indicated.



Kambridge Math & Physics
kambridgemp.com




$$(2-5x)(1+3x)^{10}.$$

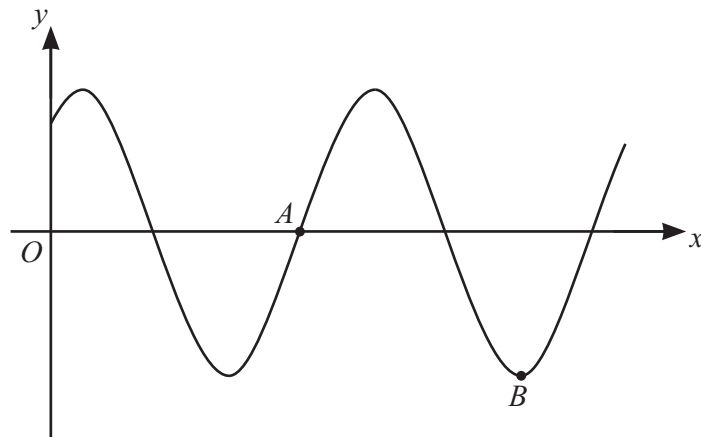
[4]

Cambridge Math & Physics

kambridgemp.com



2 (a)



The diagram shows the curve $y = k \cos(x - \frac{1}{6}\pi)$ where k is a positive constant and x is measured in radians. The curve crosses the x -axis at point A and B is a minimum point.

Find the coordinates of A and B .

[3]

.....

.....

.....

.....

.....

.....

.....

(b) Find the exact value of t that satisfies the equation

$$3 \sin^{-1}(3t) + 2 \cos^{-1}\left(\frac{1}{2}\sqrt{2}\right) = \pi.$$

[2]

.....

.....

.....

.....

.....

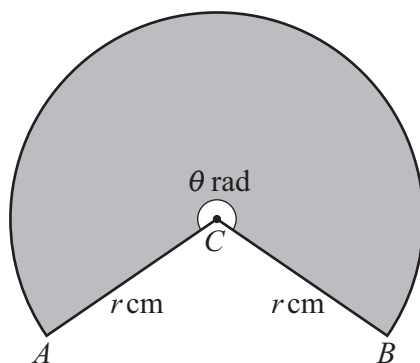
.....

.....





3



The diagram shows a sector of a circle with centre C . The radii CA and CB each have length r cm and the size of the reflex angle ACB is θ radians. The sector, shaded in the diagram, has a perimeter of 65 cm and an area of 225 cm^2 .

- (a) Find the values of r and θ . [4]

Cambridge Math & PM

kambridgemp.com

- (b)** Find the area of triangle ACB . [2]





- 4 (a) Show that the equation $\cos \theta (7 \tan \theta - 5 \cos \theta) = 1$ can be written in the form $a \sin^2 \theta + b \sin \theta + c = 0$, where a , b and c are integers to be found. [3]

& Physics

- (b)** Hence solve the equation $\cos 2x(7 \tan 2x - 5 \cos 2x) = 1$ for $0^\circ < x < 180^\circ$. [3]

[illegible]



5 The equation of a curve is $y = 2x^2 - \frac{1}{2x} + 3$.

(a) Find the coordinates of the stationary point.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Determine the nature of the stationary point.

[2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) For positive values of x , determine whether the curve shows a function that is increasing, decreasing or neither. Give a reason for your answer.

[2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



[4]

[3]



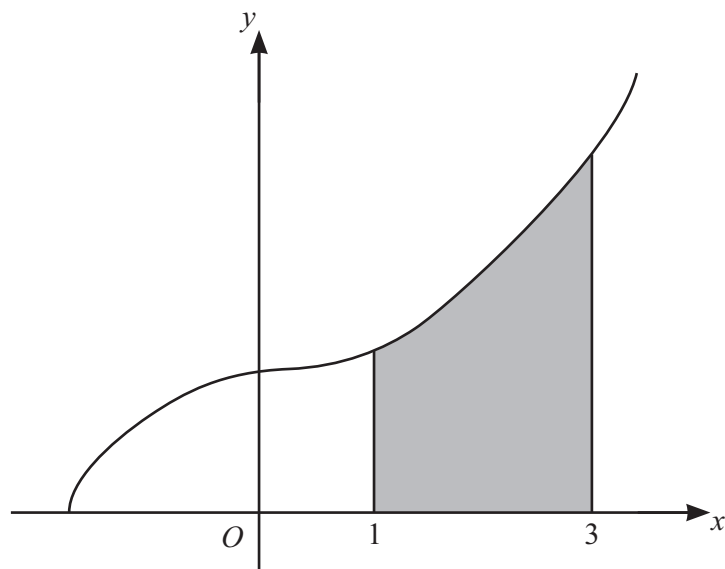
[2]

[illegible]

Cambridge Math &
kambriqemp.com



Kambridge Math & Physics
kamdbridgemp.com



The diagram shows the curve with equation $y = \sqrt{2x^3 + 10}$.

- (a) Find the equation of the tangent to the curve at the point where $x = 3$. Give your answer in the form $ax + by + c = 0$ where a , b and c are integers. [5]





- (b)** The region shaded in the diagram is enclosed by the curve and the straight lines $x = 1$, $x = 3$ and $y = 0$.

Find the volume of the solid obtained when the shaded region is rotated through 360° about the x -axis. [3]

[3]



[illegible]



[3]

Cambridge Math & Physics
kambriqemp.com

(a) By completing the square, find the range of f . [3]

Cambridge Math & Physics

kambridgemp.com



DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

- DO NOT WRITE IN THIS MARGIN
- DO NOT WRITE IN THIS MARGIN
- DO NOT WRITE IN THIS MARGIN
- DO NOT WRITE IN THIS MARGIN

[6]

Kambridge Math & Physics
kambridgemp.com

If you use the following page to complete the answer to any question, the question number must be clearly shown.

Kambridge Math & Physics
kamdridgemp.com



Kambridge Math & Physics
kambridgemp.com





Kambridge Math & Physics
kambridgemp.com

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

