



# Cambridge International AS & A Level

 CANDIDATE  
NAME


 CENTRE  
NUMBER

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

 CANDIDATE  
NUMBER

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

## MATHEMATICS

9709/11

Paper 1 Pure Mathematics 1

May/June 2026

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. Do **not** use correction fluid or tape.
- 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.





2 (a) Find the expansion of each of the following expressions, in ascending powers of  $x$ , up to and including the term in  $x^2$ .

(i)  $(1 + 2x)^5$  [2]

.....

.....

.....

.....

.....

.....

.....

.....

(ii)  $(3 + x^2)^6$  [1]

.....

.....

.....

.....

.....

.....

.....

.....

(b) Hence, find the coefficient of  $x^2$  in the expansion of  $(1 + 2x)^5(3 + x^2)^6$ . [2]

.....

.....

.....

.....

.....

.....

.....

.....



- 3 The curve with equation  $y = x^3$  is stretched with scale factor 4 in the  $x$ -direction and then translated by  $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ .

Find the equation of the transformed curve. You do not need to simplify your answer.

[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** Solve the equation

$$8 \sin^4 \theta - 6 \cos^2 \theta + 1 = 0$$

for  $0 \leq \theta \leq 2\pi$ .

[5]

[illegible]

**5** The equation of a curve is

$$y = -\frac{1}{2}x + \sqrt{x^3 - 3x - 2}.$$

Find an equation of the normal to the curve at the point  $(6, 11)$ . Give your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers to be found.

[5]

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** The 10th, 11th and 12th terms of two different arithmetic progressions are  $p+6$ ,  $4p$  and  $p^2$  respectively.

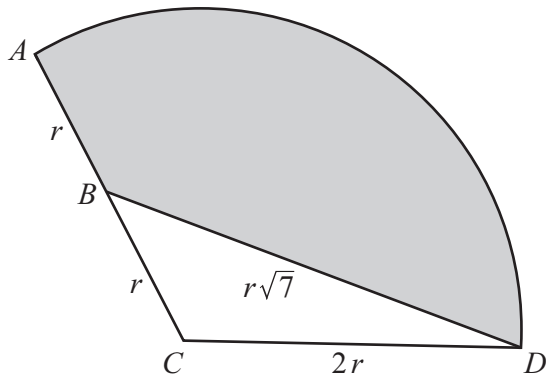
Find the difference between the 20th terms of the two progressions.

[6]

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



7



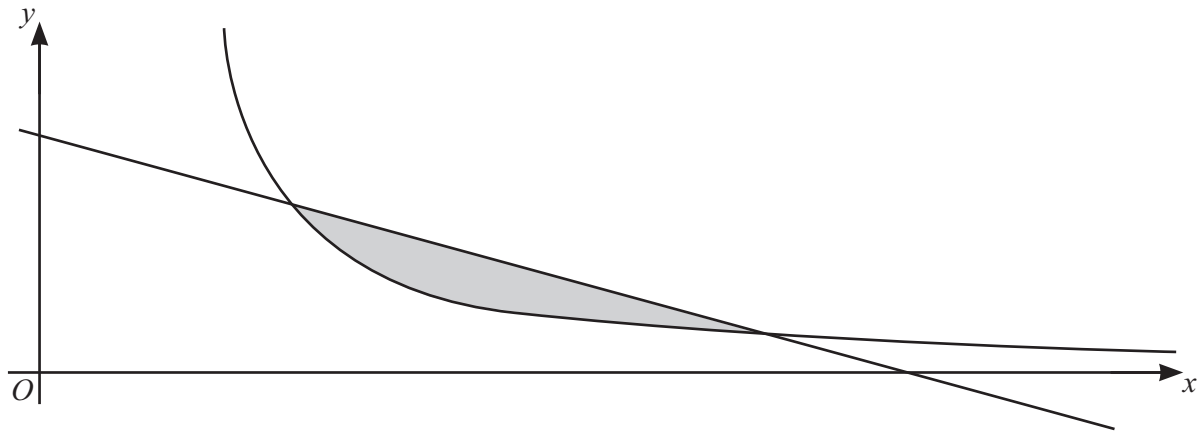
The diagram shows a sector  $ACD$  of a circle with centre  $C$  and radius  $2r$ . The midpoint of  $AC$  is  $B$ . The length of  $BD$  is  $r\sqrt{7}$ .

- (a) Find the exact perimeter of the shaded region. Give your answer in terms of  $\pi$  and  $r$ . [4]

[illegible]



8



The diagram shows part of the curve with equation  $y = \frac{5}{2x-1}$  and the line  $y = 7 - 2x$ .

Find the exact volume formed when the shaded region is rotated through  $360^\circ$  about the  $x$ -axis. [8]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

DO NOT WRITE IN THIS MARGIN



Handwriting practice area with 20 horizontal dotted lines.

[Turn over



9 Functions  $f$  and  $g$  are defined by

$$f(x) = x - 3 \quad \text{for } x \in \mathbb{R},$$

$$g(x) = x^3 - 8a \quad \text{for } x \in \mathbb{R},$$

where  $a$  is a positive constant.

(a) Find an expression for  $g^{-1}(x)$ . [2]

.....

.....

.....

.....

.....

.....

(b) It is given that  $gf(-1) + 20a^2 = 0$ .

(i) Find the value of  $a$ . [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





- (ii) Find the set of values of the constant  $k$  for which the equation  $gf(x) = fg(x) + k$  has no real solutions.

[5]

[illegible]



- 10** The equation of a curve is such that  $\frac{d^2y}{dx^2} = 3x^2 - 6$ . The point  $P(2, 3)$  is a stationary point on the curve.
- (a)** By evaluating  $\frac{d^2y}{dx^2}$  at  $P$ , determine the nature of this stationary point. [1]

.....

.....

.....

- (b) Find the equation of the curve. [5]

This image shows a full page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.



(c) (i) Find the exact  $x$ -coordinates of any other stationary points. You may use the relationship  $x^3 - (k+4)x + 2k \equiv (x-2)(x^2 + 2x - k)$  if necessary. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Determine the nature of these stationary points. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

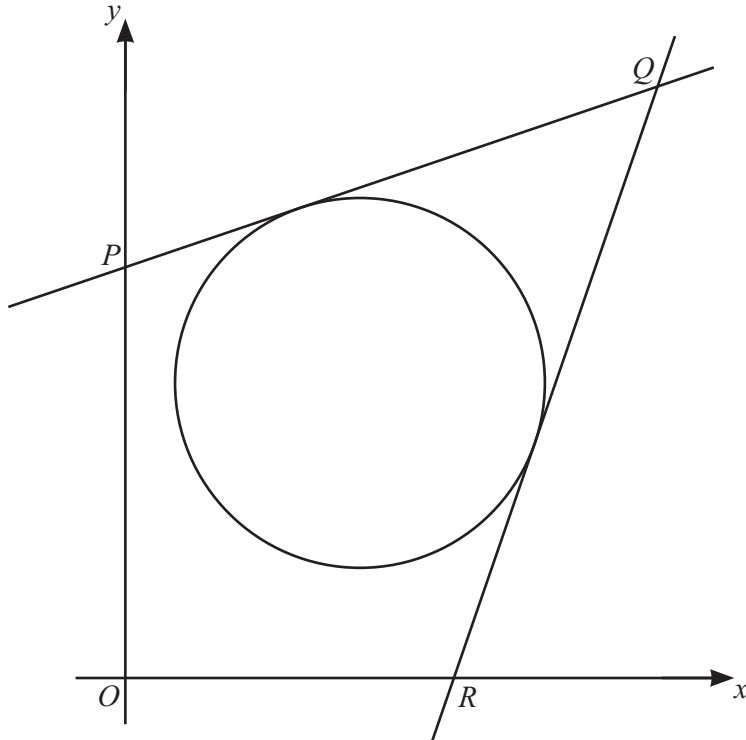
.....

.....

.....



11



The diagram shows a circle with equation

$$(x-8)^2 + (y-10)^2 = 40.$$

The tangent to the circle at the point  $(6, 16)$  meets the  $y$ -axis at the point  $P$ . The tangent to the circle at the point  $(14, 8)$  meets the  $x$ -axis at the point  $R$ . The two tangents meet at the point  $Q$ .

Find the exact area of the quadrilateral  $OPQR$ .

[9]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



DO NOT WRITE IN THIS MARGIN



Handwriting practice area with 20 horizontal dotted lines.





\* 0000800000019 \*

DFD



BLANK PAGE

DO NOT WRITE IN THIS MARGIN



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 (Cambridge University Press & Assessment) 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 our Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cambridgeinternational.org](http://www.cambridgeinternational.org) after the live examination series.

Cambridge International Education is the name of our awarding body and a part of Cambridge University Press & Assessment, which is a department of the University of Cambridge.

