



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS

9709/11

Paper 1 Pure Mathematics 1

May/June 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 [].

This document has **20** pages. Any blank pages are indicated.





[4]

[illegible]

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings present.

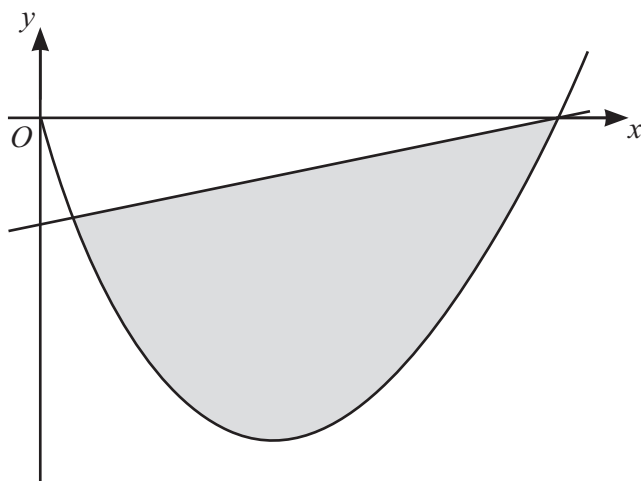


- (a) Find the tenth term of the progression. Give your answer correct to 3 significant figures. [5]

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.

- (b)** Find the exact value of the sum to infinity of the progression. [2]

[illegible]



Find the area of the shaded region between the curve and the line.

[5]

This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three 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.



- (i) $(2 - px)^5$ [2]

(i) $(2-px)^5$ [2]

[illegible]

$$\textbf{(ii)} \quad \left(1 - \frac{1}{2}x\right)^4 \qquad [2]$$

$$\textbf{(ii)} \quad \left(1 - \frac{1}{2}x\right)^4 \qquad [2]$$

[illegible]

- (b) Given that the coefficient of x^2 in the expansion of $(2 - px)^5 \left(1 - \frac{1}{2}x\right)^4$ is 93, find the possible values of the constant p . [3]

(b) Given that the coefficient of x^2 in the expansion of $(2 - px)^5 \left(1 - \frac{1}{2}x\right)^4$ is 93, find the possible values of the constant p . [3]

[illegible]

- [illegible]



(b) Given instead that $p = 4$, find the set of values of k for which the curve and the line do not intersect. [5]

[illegible]

DO NOT WRITE IN THIS MARGIN

- DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN



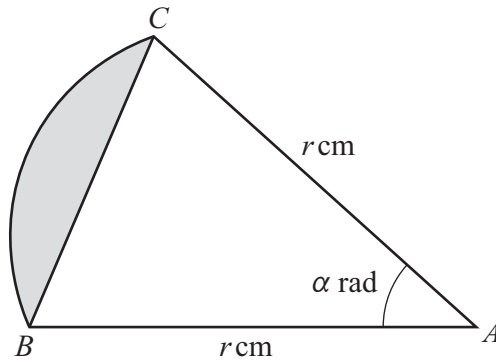
[5]

[illegible]

- Find the area of the triangle formed by the tangents to the circle at P and Q , and the line $x = -2$. [8]

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.

[illegible]



The diagram shows a sector ABC of a circle with centre A and radius r cm. The angle BAC is α radians, where $0 < \alpha < \frac{1}{2}\pi$.

- (a) It is given that the area of the triangle ABC is 4 cm^2 and the area of the sector ABC is $8\alpha \text{ cm}^2$.

Find the exact area of the shaded segment.

[4]

[illegible]



Find the area of the shaded segment. Give your answer correct to 3 significant figures. [4]

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.



10 The functions f and g are defined by

$$f(x) = \sqrt{x} \quad \text{for } x \geq 0,$$

$$g(x) = 3\sqrt{x+2} - 5 \quad \text{for } x \geq -2.$$

- (a) Describe fully a sequence of transformations which transforms the graph of $y = f(x)$ to the graph of $y = g(x)$. You should make clear the order in which the transformations are applied. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

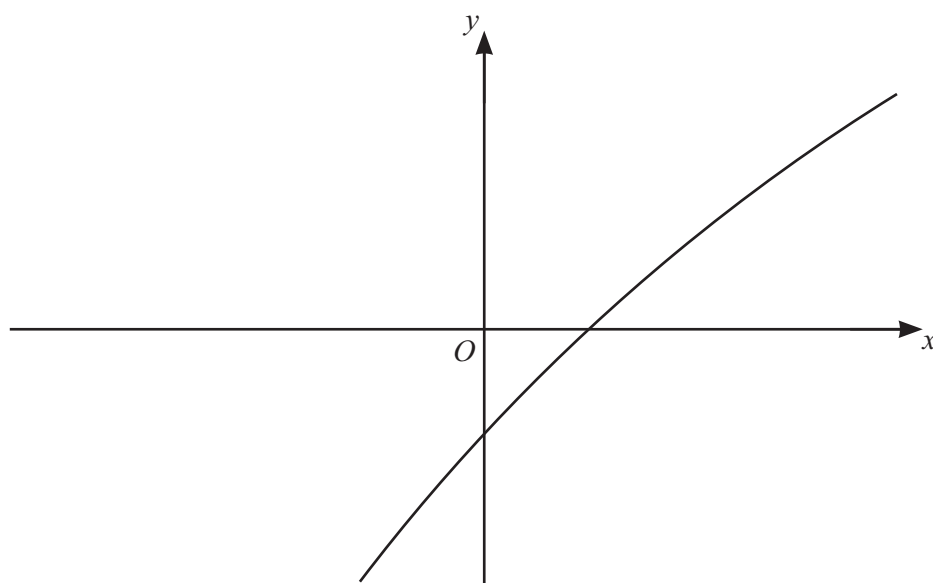
.....

.....

.....

.....

.....



The diagram shows the graph of $y = g(x)$.

- (b) On the diagram sketch the graph of $y = g^{-1}(x)$ together with any relevant mirror line. [2]





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

.....

.....

.....

.....

.....

.....

.....

.....

- (d) State the range of g^{-1} . [1]

.....

.....

The function h is defined by

$$h(x) = x - 2 \quad \text{for } x \geq 0.$$

- (e) Find the value of $g^{-1}h(4)$. [1]

.....

.....

.....

.....

.....

.....

- (f) Explain why the composite function hg^{-1} cannot be formed. [1]

.....

.....

.....

.....

.....

.....



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.





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.





Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS**9709/12**

Paper 1 Pure Mathematics 1

May/June 2025**1 hour 50 minutes**

You must answer on the question paper.

You will need: List of formulae (MF19)

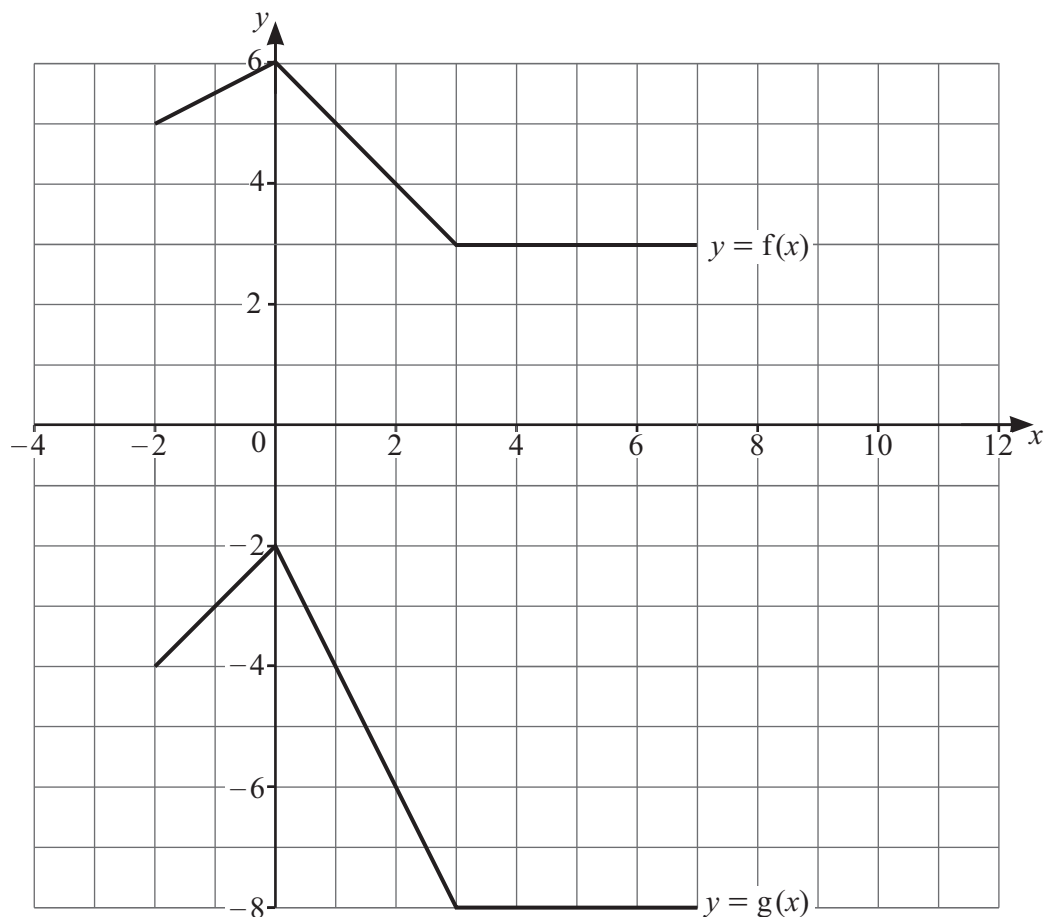
INSTRUCTIONS

- 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 [].

This document has **20** pages. Any blank pages are indicated.



The diagram shows the graphs with equations $y = f(x)$ and $y = g(x)$.

Describe fully a sequence of two transformations which transforms the graph of $y = f(x)$ to the graph of $y = g(x)$. Make clear the order in which the transformations should be applied. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....




$$2xy + 5y^2 = 24 \quad \text{and} \quad 2x + y + 4 = 0. \quad [4]$$
This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dotted lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, leaving ample room for writing practice. There is no text or other markings on the page.

- 3** The coefficient of x^7 in the expansion of $\left(px^2 + \frac{4}{p}x\right)^5$ is 1280.

Find the value of the constant p .

[4]

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.



- (a) Find the rate at which the y -coordinate of P is changing when $x = 9$. Give your answer in terms of the constant a . [3]

[illegible]

- (b)** Given that the curve has a minimum point when $x = \frac{1}{4}$, find the value of a . [2]

[illegible]



5 The equation of a curve is $y = 4 \cos 2x + 3$ for $0 \leq x \leq 2\pi$.

(a) State the greatest and least possible values of y . [2]

.....

.....

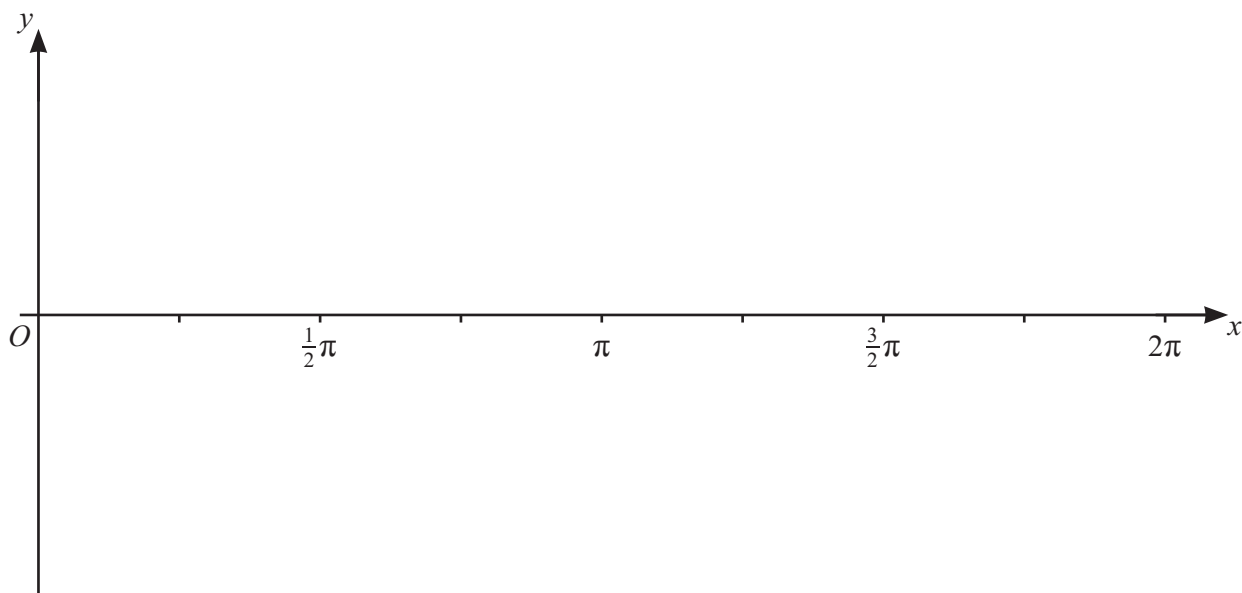
.....

.....

.....

.....

(b) Sketch the curve. [2]



(c) Hence determine the number of solutions of the equation $4 \cos 2x + 3 = 2x - 1$ for $0 \leq x \leq 2\pi$. [1]

.....

.....

.....

.....

.....

.....

.....

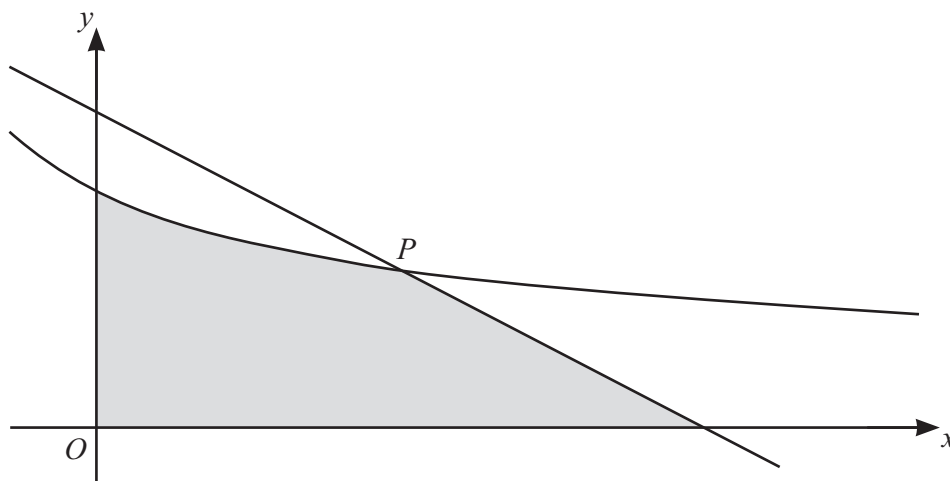
.....

.....

.....



6



The diagram shows the curve with equation $y = \frac{9}{(5x+4)^{\frac{1}{2}}}$ and the line $y = 6 - 3x$. The line and the curve intersect at the point P which has y -coordinate 3.

Find the area of the shaded region.

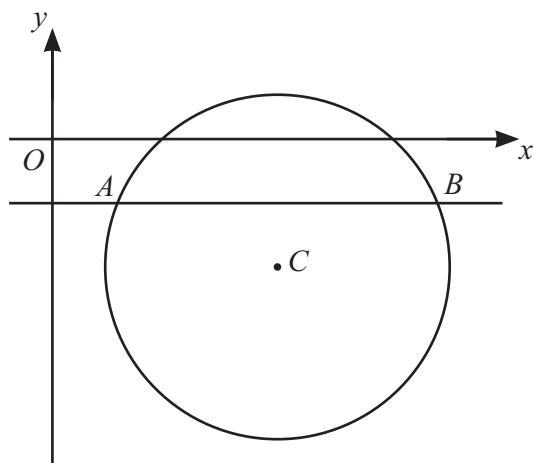
[6]

This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, which is otherwise blank.

[3]

[illegible]

[illegible]



The diagram shows the circle with equation $x^2 + y^2 - 14x + 8y + 36 = 0$ and the line $y = -2$. The line intersects the circle at the points A and B . The centre of the circle is C .

- (a) Find the coordinates of A , B and C .

[3]

[illegible]



[2]

[illegible]

Find the area of the larger segment.

[4]

[illegible]



- 9 The equation of a curve is such that $\frac{d^2y}{dx^2} = -\frac{24}{x^3}$. It is given that the curve has a stationary point at $(-2, 19)$.

(a) Find an expression for $\frac{dy}{dx}$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Find the x -coordinate of the other stationary point of the curve, and determine the nature of this stationary point. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





(c) Find the equation of the curve.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

(d) Find the equation of the normal to the curve at the point where $\frac{dy}{dx} = -\frac{9}{4}$ and x is positive. Express your answer in the form $px + qy + r = 0$, where p , q and r are integers.

[4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





- 10 (a) The first, second and third terms of an arithmetic progression are $4k$, k^2 and $8k$ respectively, where k is a non-zero constant.

(i) Find the value of k . [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Find the sum of the first 20 terms of the progression. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





- Find the sum to infinity of the progression. Give your answer in the form $\frac{a}{\sqrt{b}-c}$, where a , b and c are integers. [5]

[illegible]

DO NOT WRITE IN THIS MARGIN

[illegible]

DO NOT WRITE IN THIS MARGIN

$$g(x) = -x - 4 \quad \text{for } x \geq -2$$

DO NOT WRITE IN THIS MARGIN

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook 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]

This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps for letter height. The entire page is otherwise blank, with no margins, text, or other markings.

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.





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.





Cambridge International AS & A Level

CANDIDATE
NAMECENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS**9709/13**

Paper 1 Pure Mathematics 1

May/June 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 [].

This document has **16** pages.

- DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

 $4 \sin^2 \theta, \quad 8 \sin^3 \theta,$

Given that the sum to infinity of the progression is $\frac{1}{2}$, find the value of θ . Give your answer in the form $\sin^{-1} k$, where k is a rational number. [4]

[illegible]

[4]

[illegible]



- 4 (a) Find the first three terms in the expansion of $\left(2 - \frac{3}{2}x\right)^5$ in ascending powers of x . [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Use your answer to part (a), with a suitable value of x , to find an approximation to 1.985^5 . [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



5

$$4 \sin \theta \tan \theta = 1 + 5 \cos \theta$$

for $-180^\circ < \theta < 180^\circ$.

[6]

[illegible]



- Find the values of N and a .

[6]

This image shows a full page of a document template. It consists of approximately 28 evenly spaced horizontal dotted lines across the entire width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings present.

DO NOT WRITE IN THIS MARGIN

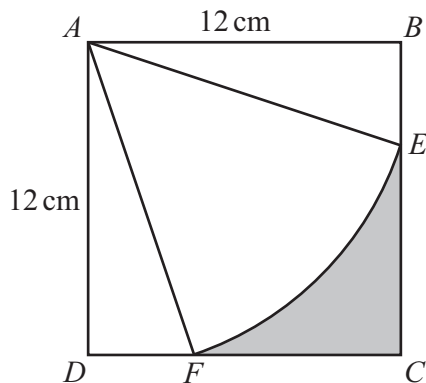
[3]

[illegible]

DO NOT WRITE IN THIS MARGIN

[4]

[illegible]



The diagram shows a square $ABCD$ where each side has length 12 cm . Points E and F lie on the sides BC and CD respectively and are such that $BE = \frac{1}{3}BC$ and $DF = \frac{1}{3}DC$. The arc EF is part of a circle with centre A . The shaded region is bounded by the arc EF and the line segments EC and FC .

- (a) Show that the size of angle EAF is 0.9273 radians, correct to 4 significant figures. [2]

.....

.....

.....

.....

- (b) Find the perimeter of the shaded region. [3]

.....

.....

.....

.....

.....

.....

.....

- (c) Find the area of the shaded region. [3]

.....

.....

.....

.....

.....

.....

.....



DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

- (a)** Show that one of the possible values of k is 10, and find the other possible value. [4]

[illegible]



Find the equation of the tangent to the circle at R . Give your answer in the form $ax + by + c = 0$, where a , b and c are integers. [5]

[illegible]



10 A curve C has equation $y = \frac{9}{2x-5} + 2x - 5$.

(a) Find the coordinates of the two stationary points.

[4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Find $\frac{d^2y}{dx^2}$ and hence determine the nature of each stationary point.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





- (i) State the coordinates of the maximum point of C_1 . [1]

- (ii) Find the equation of C_1 in the form $y = \frac{a}{bx+c} + dx + e$, where a, b, c, d and e are integers. [3]

[illegible]

- The function g is such that $g^{-1}(x) = \sqrt[3]{2x-4}$ for $x \in \mathbb{R}$.

-
- 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 or typing. There are no margins, text, or other markings on the page.



[6]

[illegible]

[illegible]

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.



Cambridge International AS & A Level

CANDIDATE
NAME
CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

MATHEMATICS**9709/15**

Paper 1 Pure Mathematics 1

May/June 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 [].

This document has **20** pages. Any blank pages are indicated.

- DO NOT WRITE IN THIS MARGIN

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.



Find the possible values of the constant a .

[5]

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.



- 3 (a) Use completing the square to find the exact solutions of the equation $4x^2 - 4x - 1 = 0$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Hence solve the equation $4 \tan \theta = 4 + \frac{1}{\tan \theta}$ for $0^\circ < \theta < 180^\circ$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

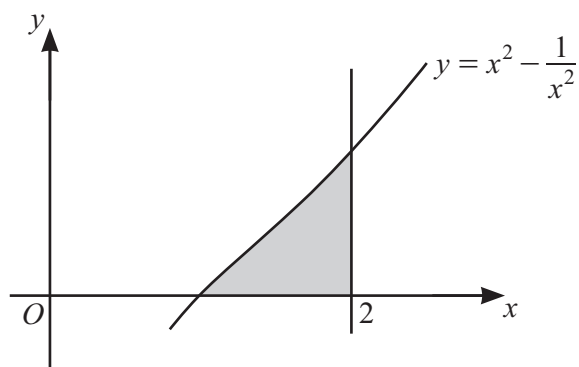
.....

.....

.....

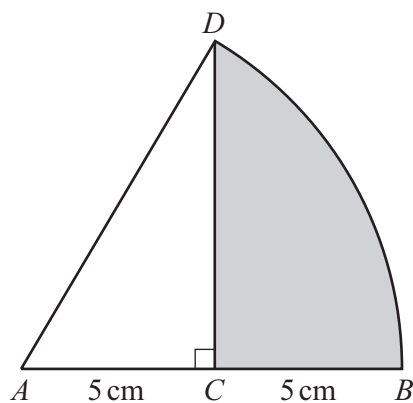
.....





Find the volume formed when the shaded region is rotated through 360° about the x -axis, giving your answer correct to 2 decimal places. [5]

[illegible]



The diagram shows a sector ABD of a circle with centre A and radius 10 cm. The perpendicular bisector of AB passes through D .

- (a) Find the perimeter of the shaded region BCD , giving your answer correct to 1 decimal place. [4]

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



[2]

[illegible]

- On Ananya's first birthday, her father gives her \$10. Every subsequent year, her father gives her \$5 more than he gave her the previous year.

On Ananya's first birthday, her mother also gives her \$10. Every subsequent year, her mother gives her 20% more than she gave her the previous year.

- (a) Show that on Ananya's eleventh birthday she receives more from her mother than from her father. [3]

[illegible]

[illegible]

- DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

[illegible]

DO NOT WRITE IN THIS MARGIN

[illegible]

[illegible]

- (a) Find the values of the constants a and b .

[5]

[illegible]



(b) Find the coordinates of the other stationary point.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) A point P is moving along part of the curve in such a way that the y -coordinate of P is increasing at a constant rate of 6 units per second.

Find the rate at which the x -coordinate of P is increasing when $x = 5$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....





9 Functions f and g are defined as follows.

$$f(x) = \cos x \text{ for } 0 \leq x \leq \pi$$

$$g(x) = 3 \cos(x - \pi) + 2 \text{ for } \pi \leq x \leq 2\pi$$

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

.....

.....

.....

.....

.....

.....

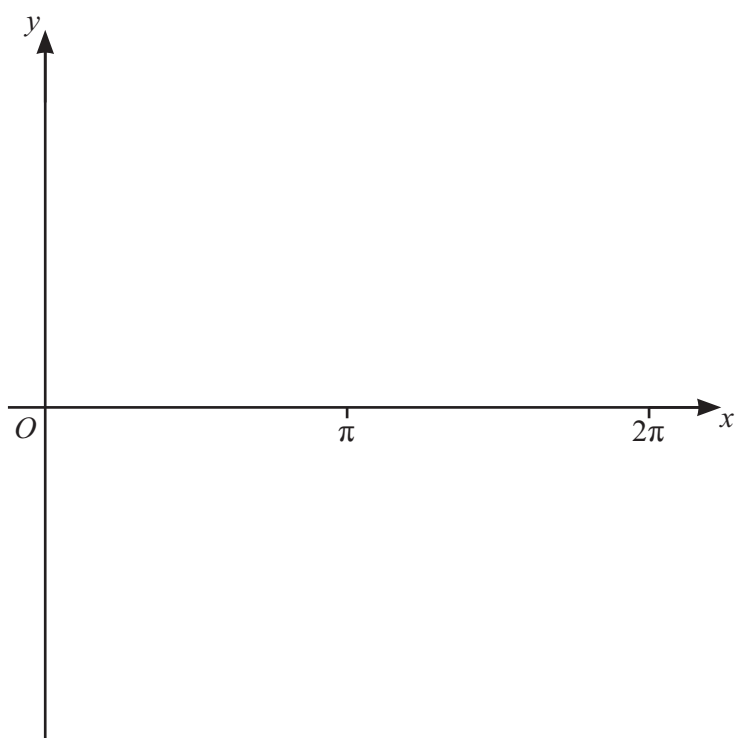
.....

.....

.....

.....

- (b) On the given axes, sketch the graphs of $y = f(x)$ and $y = g(x)$. [4]





[4]

[1]

(a) Find an equation of the tangent to the circle at the point $(2, 8)$, giving your answer in the form $ax + by + c = 0$. [4]

This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dotted lines, creating a series of uniform gaps for writing. The lines are evenly spaced across the entire page, providing a guide for letter height and placement. There is no text or other markings on the page.



(b) Given that the line $x + 3y = k$ does **not** intersect the circle, show that $k^2 - 20k - 220 > 0$. [5]

[illegible]

[illegible]





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.

