



Cambridge International AS & A Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 9709/23

Paper 2 Pure Mathematics 2

October/November 2024

1 hour 15 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 50.
- The number of marks for each question or part question is shown in brackets [].

This document has 16 pages. Any blank pages are indicated.

(a)	Use logarithms to show that the gradient of the straight line is $\frac{3}{2 \ln a}$.
(b)	Given that the straight line passes through the points $(0.4, 0.95)$ and $(3.3, 3.80)$, find the values a and k .

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Solve the inequality $ x-i > 4x+3$.	[4]
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(a) Find the exact value of $f'(\frac{2}{3}\pi)$.

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[3]

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(b)

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Find the exact value of	$\int_0^{\frac{1}{2}\pi} \left(f(x) + \sin x \right) dx.$	[4]
		•••••

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4 The polynomial p(x) is defined by

$$p(x) = ax^3 - ax^2 - 15x + 18,$$

where a is a constant. It is given that (x+2) is a factor of p(x).

(a)	Find the value of a.	[2]
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(b)	Hence factorise $p(x)$ completely.	[3]
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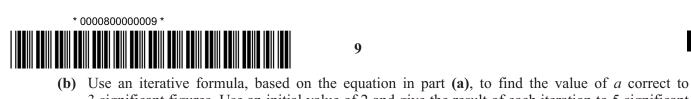
(c)	Solve the equation $p(\csc^2 \theta) = 0$ for $-90^{\circ} < \theta < 90^{\circ}$.	[3]
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It is given that $\int_{a}^{a^{3}} \frac{10}{2x+1} dx = 7$, where *a* is a constant greater than 1.

(a)	Show that $a = \sqrt[3]{0.5}e^{1.4}(2a+1) - 0.5$.	[5]		



figures.	[3

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A curve has parametric equations

	_	$e^{2t} - 2$	$y = e^{3t} + 1.$
Х	_	$\frac{e^{2t}+1}{e^{2t}+1}$,	y = e + 1.

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Find an expression for $\frac{dy}{dx}$ in terms of t.	

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(b)	Find the exact gradient of the curv

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Find the exact gradient of the curve at the point where the curve crosses the <i>y</i> -axis.	[3]
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(a)	Prove that $\cos(\theta + 30^{\circ})\cos(\theta + 60^{\circ}) \equiv \frac{1}{4}\sqrt{3} - \frac{1}{2}\sin 2\theta$.	
		••••••
(b)	Solve the equation $5\cos(2\alpha + 30^\circ)\cos(2\alpha + 60^\circ) = 1$ for $0^\circ < \alpha < 90^\circ$.	
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(c)	Show that the exact value of $\cos 20^{\circ} \cos 50^{\circ} + \cos 40^{\circ} \cos 70^{\circ}$ is $\frac{1}{2}\sqrt{3}$.

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Additional page

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

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