

Cambridge International AS & A Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 9709/21

Paper 2 Pure Mathematics 2

October/November 2020

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 [].

4	\sim	.1 .
	+137An	that
1	Given	mai

ln(2x +	1) $-\ln(x-3) = 2$,	
find x in terms of e.		[4]

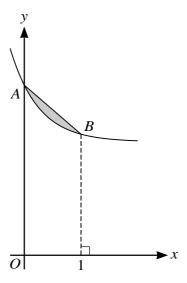
2	The polynomial $p(x)$ is defined by	
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n	(\mathbf{r})	_	r^3	+	ax^2	+	hr	+	16
יע	A I	_	л	_	ил	\pm	$U\lambda$	\pm	10.

where a and b are constants. It is given that (x + 2) is a factor of p(x) and that the remainder is 72 when p(x) is divided by (x - 2).

Find the values of a and b .	[5]

3



The diagram shows the curve $y = 2 + e^{-2x}$. The curve crosses the y-axis at the point A, and the point B on the curve has x-coordinate 1. The shaded region is bounded by the curve and the line segment AB.

Find the exact area of the shaded region.	[5]

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4	(a)	Solve the equation $ 2x - 5 = x + 6 $.	[3]
	(b)	Hence find the value of y such that $ 2^{1-y} - 5 = 2^{-y} + 6 $. Give your answer correct figures.	to 3 significant [2]

The to α	sequence of values given by the iterative formula $x_{n+1} = \frac{6 + 8x_n}{8 + x_n^2}$ with initial value $x_1 = 2$ converges
(a)	Use the iterative formula to find the value of α correct to 4 significant figures. Give the result of each iteration to 6 significant figures. [3]
(b)	State an equation satisfied by α and hence determine the exact value of α . [2]

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(a)	Find the exact value of $\sin \theta$.	
(b)	Find the exact value of $\sec \theta$.	
(c)	Find the exact value of $\cos 2\theta$.	

	7	Αd	curve	is	defined	by	the	parametric	equation	s
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r	= 3t -	$2 \sin t$	1	, =	5t +	4 cos	t
л	- Ji -	\angle SIII ι ,		<i>-</i>	$J\iota \top$	+ 003	ι,

where $0 \le t \le 2\pi$. At each of the points *P* and *Q* on the curve, the gradient of the curve is $\frac{5}{2}$.

	$tion 10\cos t - 8\sin t = 5.$	\mathbf{u}	ie values of t at P	mow mat the Va
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Give the	where $R > 0$ and $0 < \alpha < \frac{1}{2}\pi$. figures.	e form $R\cos(t + \cos t)$ orrect to 3 signif	$\cos t - 8 \sin t$ in thand the value of α	Express 10 cos <i>t</i> value of <i>R</i> and t

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)	Hence find the values of t at the points P and Q .	[4
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(a)	Find an expression for $\frac{dy}{dx}$ and hence find the coordinates of each of the stationary points	S (
(4)	curve $y = f(x)$.	,
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	Divide $4x^3 + 8x - 4$ by $(2x - 1)$, and hence find $\int f(x) dx$.	
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