



## **Cambridge Assessment International Education**

Cambridge International Advanced Subsidiary Level

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			9709/21
Paper 2 Pure Mather	matics 2 (P2)		May/June 2019
			1 hour 15 minutes
Candidates answer o	n the Question Paper.		
Additional Materials:	List of Formulae (MF9)		

## **READ THESE INSTRUCTIONS FIRST**

Write your centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** the questions in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

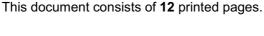
The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 50.





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(1)	Solve the inequality $ 3x - 5  <  x + 3 $ .	
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(ii)	Hence find the greatest integer <i>n</i> satisfying the inequality $ 3^{0.1n+1} - 5  <  3^{0.1n} + 3 $ .	
(11)	Trende and the greatest meger n statistying the inequality  5	
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4
Find the equation of the normal to the curve
$x^2 \ln y + 2x + 5y = 11$
at the point (3, 1).

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4 (8	a)	Find $\int \tan^2 3x  dx$ .	[3]
(1	b)	Find the exact value of $\int_0^1 \frac{e^{3x} + 4}{e^x} dx$ . Show all necessary working.	[4]

5 The polynomial $p(x)$ is defined b	y
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$$p(x) = 5x^3 + ax^2 + bx - 16,$$

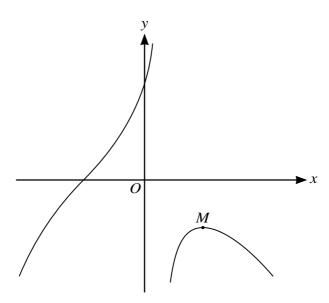
where a and b are constants. It is given that (x-2) is a factor of p(x) and that the remainder is 27 when p(x) is divided by (x+1).

Find the values of $a$ and $b$ .	[5

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Hence factorise $p(x)$ completely.	[3]

6



The diagram shows the curve with equation  $y = \frac{8 + x^3}{2 - 5x}$ . The maximum point is denoted by M.

(i)	Find an expression for $\frac{dy}{dx}$ and determine the gradient of the curve at the point where the curve crosses the x-axis.

	Show that the x-coordinate of the point M satisfies the equation $x = \sqrt{(0.6x + 4x^{-1})}$ .	
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1	Use an iterative formula, based on the equation in part (ii), to find the $x$ -coordinate of $M$ to 3 significant figures. Give the result of each iteration to 5 significant figures.	cor
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	Use an iterative formula, based on the equation in part (ii), to find the x-coordinate of M to 3 significant figures. Give the result of each iteration to 5 significant figures.	cor
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	Show that $2 \csc 2\theta \cot \theta \equiv \csc^2 \theta$ .	
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(ii)	Hence show that $\csc^2 15^\circ \tan 15^\circ = 4$ .	
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## **Additional Page**

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

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