

Please write clearly in	block capitals.		
Centre number		Candidate number	
Surname			
Forename(s)			
Candidate signature			

INTERNATIONAL AS FURTHER MATHEMATICS

(9665/FM01) Pure Maths Unit FP1

Tuesday 22 January 2019 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

- For this paper you must have the Oxford International AQA booklet of formulae and statistical tables.
- You may use a graphics calculator.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box on each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- Show all necessary working; otherwise marks may be lost.



For Examiner's Use		
Question	Mark	
1		
2		
3		
4		
5		
6		
7		
8		
9		
TOTAL		



	Answer all questions in the spaces provided.	Do not v outside box
1	A curve has equation $y = x^3 - 12x$	
1 (a)	A line passes through two points on the curve. At one point $x = -2$ and at the other point $x = -2 + h$	
	Find the gradient of the line in the form $ph + qh^2$, where p and q are integers. [4 marks]	
	Answer	
1 (b)	Use your answer to part (a) to explain why the point on the curve where $x = -2$ is a stationary point. [2 marks]	
		6



[5 marks]
[2 marks]
-



7

One of the roots of the quadratic equation	
$x^2 + 3x + c = 0$	
is $p + 2i$, where p and c are real numbers.	
Find the value of p and the value of c .	5 marks]
<i>p</i> =	
<i>c</i> =	



not write tside the box

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4	For each of the improper integrals below, either find its exact value or explain why it has no finite value.	outside the box
	Show all necessary working.	
4 (a)	$\int_{12}^{12} \frac{1}{1} dr$	
	$\int_0^{\infty} \sqrt{x} dx$ [3 marks]	
	Answer	
A (b)	۲ ¹² 1	
4 (D)	$\int_0^{\infty} \frac{1}{x^4} dx$ [3 marks]	
	Answer	
		6
	Turn over ►	





9

box

6	By considering the derivative of $y = x^{\frac{1}{3}}$ when $x = 8$, find an estimate for $\sqrt[3]{8.06}$	[6 marks]	Do not write outside the box
	Answer		
	Turn over for the post question		6
	rum over for the next question		
	T	urn over ►	



7	For the complex number $z_1 = x + iy$, where x and y are real numbers,		
	$2z_1^* + 3i = iz_1$		
7 (a)	Find the value of x and the value of y .	[6 marks]	
	<i>x</i> =		
	y =		



Do not write outside the box

7 (b)	Find the modulus and argument of z	Do not write outside the box
. ()	[3 marks]	
	$ z_1 =$	
	$\operatorname{org}(z) =$	
	$arg(z_1) - $	
7 (c)	Find the shortest distance on an Argand diagram from the point representing z_1 to the half-line $\arg z = \frac{\pi}{4}$	
	[4 marks]	
	Answer	



8	The curve <i>C</i> has equation $y = \frac{x-2}{x-3}$	Do not write outside the box
8 (a)	State the equations of the asymptotes of <i>C</i> .	-
	Answer	
8 (b)	The line L has equation	
	$y = \frac{1}{2}x$	
	Find the coordinates of the points of intersection of L and C . [4 marks]	
		-
		-
		-
		-
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		-
		-
		-
		-
	Answer	-







		Do not write
9	The ellipse E_{\star} has equation	box
	• 1 •	
	$\frac{x^2}{x^2} + \frac{y^2}{x^2} = 1$	
	16 12	
	The locus of a point P is such that the distance from P to the point (6, 0) is half the	
	distance from P to the y-axis.	
9 (a)	The locus of P is the curve E_2	
	2	
	Show that E_2 is an ellipse which is a translation of E_1	
	Write down the vector for this translation.	
	[7 marks]	
	Answer	



Do not write outside the Find the coordinates of the points where $E_{\rm 2}$ meets the x-axis. 9 (b) [1 mark] Answer Show that, if the line y = mx + c meets the ellipse E_2 , then 9 (c) $(3 + 4m^2)x^2 + (8mc - 48)x + (4c^2 + 144) = 0$ [3 marks] Question 9 continues on the next page Turn over ►



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box

				Do not write
9	(d)	Hence find the equations of the tangents to the ellipse E_2 which pass through the point (0, 8).		box
		No credit will be given for solutions based on differentiation.		
			[5 marks]	
				16
		Answer		
		END OF QUESTIONS		







Question number	Additional page, if required. Write the question numbers in the left-hand margin.



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Do not write outside the box

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