OXFORDAQA

INTERNATIONAL QUALIFICATIONS

Please write clearly in	block capitals.
Centre number	Candidate number
Surname	
Forename(s)	
Candidate signature	
	I declare this is my own work.

INTERNATIONAL AS FURTHER MATHEMATICS

(9665/FM01) Unit FP1 Pure Mathematics

Tuesday 7 January 2025 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

- For this paper you must have the OxfordAQA Booklet of Formulae and Statistical Tables (enclosed).
- You may use a graphical 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 around 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		
10		
TOTAL		







			-
		Answer all questions in the spaces provided.	Do not write outside the box
1		The complex number $8-5i$ is a root of the quadratic equation	
		$z^2 + bz + c = 0$	
		where b and c are real constants.	
1 ((a)	Write down the other root of the quadratic equation. [1 mark]	
		Answer	
	(L .)		
1 ((D)	Find the value of <i>b</i> and the value of <i>c</i> [3 marks]	
		<i>b</i> = <i>c</i> =	4
		Turn ovor N	



2		A curve has the equation	Do not write outside the box
		- 2 .	
		$y = 5x^2 - 4x$	
2	(a)	A line passes through two points on the curve, one where $x = a$ and the other where $x = a + h$ and a is a constant.	
		Find the gradient of this line in terms of a and h	
		Fully simplify your answer.	
		[3 marks]	
		Answer	



			Do not write
2	(b)	Show how your answer to part (a) can be used to find the gradient of the curve at the point where $x = 3$	outside the box
		Write down the value of this gradient.	
		[2 marks]	
		·	
		Answer	5
		Turn over for the next question	







		Do not write
3	Show that	outside the box
	5+i	
	7-3i	
	can be written in the form	
	a+bi	
	$\frac{1}{29}$	
	where a and b are integers	
	[3 marks]	
		3



			Do n
4	The numbers $ lpha $ and $ eta $ are roots of the quadratic equation		out
	$3x^2 - 7x + c = 0$		
	where c is a constant.		
4 (a) (i)	Write down the value of $\alpha + \beta$	[1 mark]	
	Answer		
4 (a) (ii)	Write down $\alpha\beta$ in terms of <i>c</i>	[1 mark]	
	Answer		
4 (b) (i)	Express $\left(\alpha + \frac{5}{\beta}\right) \left(\beta + \frac{5}{\alpha}\right)$ in terms of c		
		[2 marks]	
	Answer		



4	(b) (ii)	Express	$\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$	in terms of c			Do not write outside the box
			ρα			[2 marks]	
				Answer	 		
4	(b) (iii)	Evoross	$\alpha^3 + \beta^3$	in terms of c			
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of c		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	α ³ + β ³	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	
4	(b) (iii)	Express	$\alpha^3 + \beta^3$	in terms of <i>c</i>		[2 marks]	8







		Do not write outside the
		box
	Answer	
5 (c)	The sum of the solutions of the equation	
	(π)	
	$\tan\left(x+\frac{\pi}{3}\right)=1$	
	which lie in the interval $-m\pi < x \le m\pi$ is 5π	
	Determine the value of the positive integer m	
	[2 marks]	
	Answer	7



6 The real numbers x and y are such that

$$(x+iy)^2 = 45-28i$$

6 (a) Show that
 $y = -\frac{14}{x}$ [2 marks]
[2 marks]
[3 marks]
[4 mark]
[4 mark]
[4 mark]
[4 mark]
[4 mark]
[4 mark]



6	(c)	Hence solve the equation	Do not write outside the box
		$z^2 = 45 - 28i$	
		[4 marks]	
		Answer	7



Do not write outside the 7 (a) Show that $\log\left(1+\frac{2}{r}\right) = \log(Ar+B) - \log(r)$ where A and B are integers. [1 mark] 7 (b) Use the method of differences to show that $\sum_{r=1}^{2n} \log\left(1 + \frac{2}{r}\right) = \log(Cn + D) + \log(En + F)$ where C, D, E and F are integers. [4 marks]



box

7 (c)	Hence find the value of
	$\sum_{r=1}^{1200} \log\left(1 + \frac{2}{r}\right)$ Give your answer in the form $\log(G)$ where G is an integer.
	[3 marks]
	Answer



Turn over ►

8	The curve C has the equation	0	Do not w outside t box
	$y = \frac{x^2}{4+3x-x^2}$		
8 (a)	Find the equations of the three asymptotes of <i>C</i>	[3 marks]	
	Asymptote 1		
	Asymptote 3		
8 (b)	The line $y = k$ intersects the curve <i>C</i>		
	Find the range of possible values of k	[5 marks]	



		Answer	
8 (c)	Find the coordinates of the point at which C intersects one of its asymptotes.	
- (-,	· · · · · · · · · · · · · · · · · · ·	[2 marks]
		A	
		Answer	
		Question 8 continues on the next page	









9 (b)	The point P represents the complex number which satisfies both equations	
	$\arg(z) = \frac{\pi}{3}$ and $\arg(z-8i) = \frac{\pi}{6}$	
	Find the complex number represented by the point <i>P</i>	
	Give your answer in the form $a+ib$ where a and b are real.	[3 marks]
	Answer	
9 (c)	The point Q represents the complex number 8i	
	The point R is such that the quadrilateral $OPQR$ is a parallelogram.	
9 (c) (i)	Find the complex number represented by the point R	
	Give your answer in the form $c+id$ where c and d are real.	[2 marks]



		Answer
9	(c) (ii)	Find the area of parallelogram OPQR [2 marks]
		[]
		Answer



Turn over ►

Do not write outside the 10 The locus of a point *P* is such that the distance from *P* to the point (0,5) is **three** times the distance from *P* to the line with equation y = -5The locus of P is the hyperbola H_1 10 (a) Show that the equation of H_1 is $x^2 = 8y^2 + 100y + a$ where a is a constant. [4 marks]



box

			Do not wri
10	(b)	The hyperbola H_2 is a translation of H_1	outside the
		The equation of H_2 is	
		$x^2 = 8y^2 + b$	
		where b is a constant	
10	(b) (i)	Find the translation vector which maps <i>H</i> ₁ onto <i>H</i> ₂ [3 marks]	
		Answer	
		Question 10 continues on the next page	



IB/G/Jan25/FM01

10 (b) (ii)	Calculate the value of b	[1 mark]	Do not outside box
	Answer		
10 (b) (iii	Find the equations of the asymptotes of H_2 in the form $y = f(x)$	[3 marke]	
	Answer		



IB/G/Jan25/FM01









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



Question number	Additional page, if required. Write the question numbers in the left-hand margin.	
	Copyright information	
	For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.oxfordaqa.com	
	Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and OxfordAQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.	
	Copyright © 2025 OxfordAQA International Examinations and its licensors. All rights reserved.	



