

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	
<b>TOTAL</b>	



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ANSWER IN THE SPACES PROVIDED**



Answer **all** questions in the spaces provided.

- 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]

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Answer \_\_\_\_\_

- 1 (b)** Find the value of  $b$  and the value of  $c$

[3 marks]

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$b =$  \_\_\_\_\_  $c =$  \_\_\_\_\_

4

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- 4 The numbers  $\alpha$  and  $\beta$  are roots of the quadratic equation

$$3x^2 - 7x + c = 0$$

where  $c$  is a constant.

- 4 (a) (i) Write down the value of  $\alpha + \beta$

[1 mark]

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Answer \_\_\_\_\_

- 4 (a) (ii) Write down  $\alpha\beta$  in terms of  $c$

[1 mark]

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Answer \_\_\_\_\_

- 4 (b) (i) Express  $\left(\alpha + \frac{5}{\beta}\right)\left(\beta + \frac{5}{\alpha}\right)$  in terms of  $c$

[2 marks]

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Answer \_\_\_\_\_



4 (b) (ii) Express  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$  in terms of  $c$

[2 marks]

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Answer \_\_\_\_\_

4 (b) (iii) Express  $\alpha^3 + \beta^3$  in terms of  $c$

[2 marks]

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Answer \_\_\_\_\_

8

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- 5 (a) Find the general solution of the equation

$$\tan\left(x + \frac{\pi}{3}\right) = 1$$

[3 marks]

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Answer \_\_\_\_\_

- 5 (b) Calculate the sum of the solutions of the equation

$$\tan\left(x + \frac{\pi}{3}\right) = 1$$

which lie in the interval  $-2\pi < x \leq 2\pi$

[2 marks]

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Answer \_\_\_\_\_

- 5 (c) The sum of the solutions of the equation

$$\tan\left(x + \frac{\pi}{3}\right) = 1$$

which lie in the interval  $-m\pi < x \leq m\pi$  is  $5\pi$

Determine the value of the positive integer  $m$

**[2 marks]**

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Answer \_\_\_\_\_

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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]

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6 (b) It is given that

$$x^2 - y^2 = k$$

where  $k$  is a real constant.

Find the value of  $k$

[1 mark]

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Answer \_\_\_\_\_











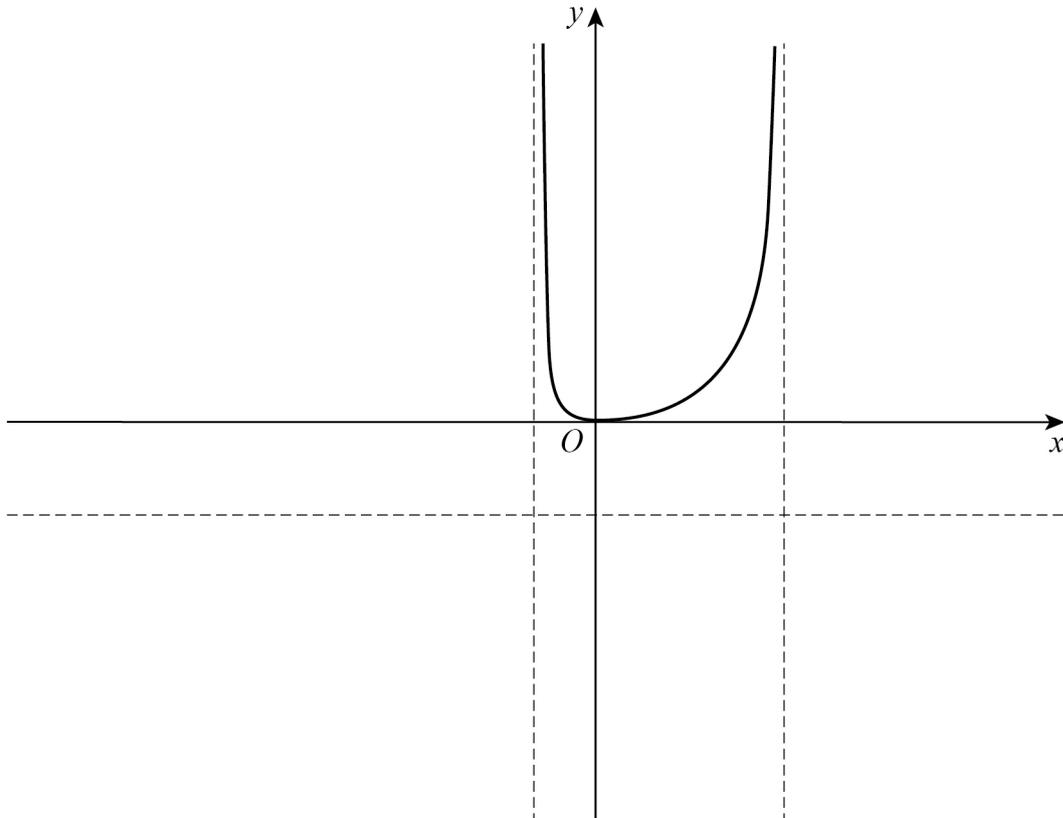


**8 (d)** One section of the curve  $C$  and its asymptotes are shown on the axes below.

Complete the sketch of the graph of  $C$

You are not required to include the coordinates of any points.

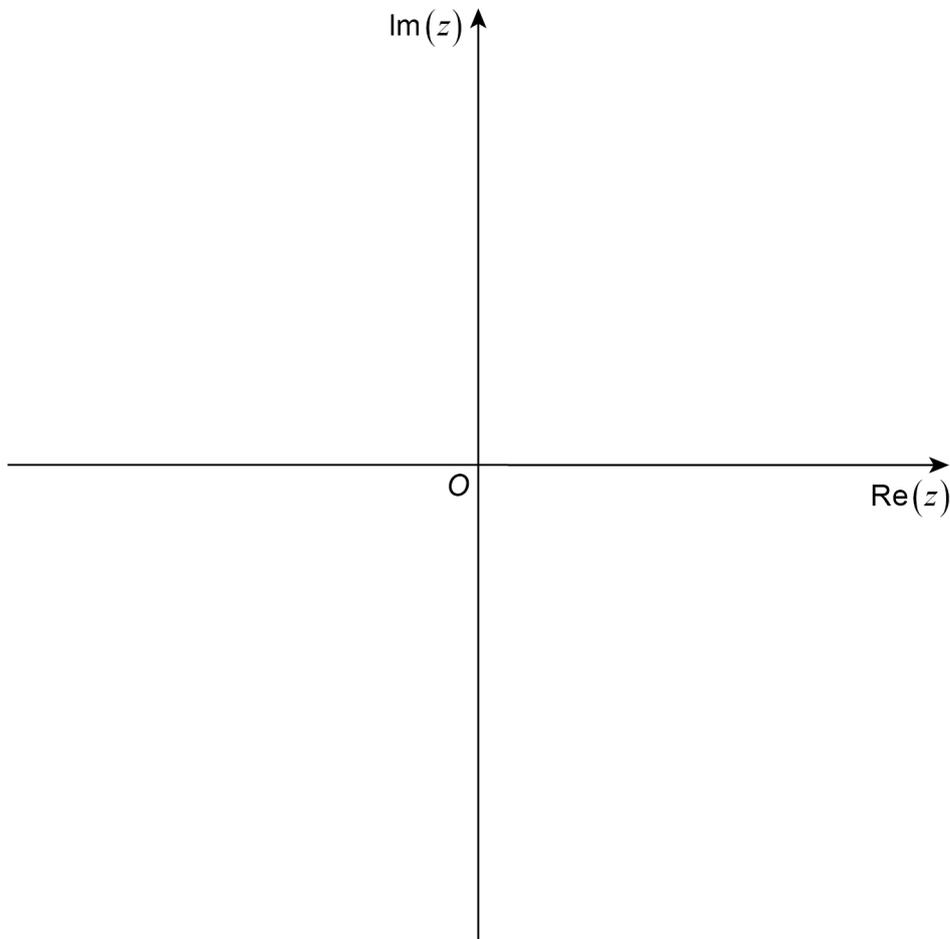
**[3 marks]**



- 9 (a) (i) On the Argand diagram below, sketch the locus of points which satisfies the equation

$$\arg(z) = \frac{\pi}{3}$$

[2 marks]



- 9 (a) (ii) On the same Argand diagram, sketch the locus of points which satisfies the equation

$$\arg(z - 8i) = \frac{\pi}{6}$$

[2 marks]

Question 9 continues on the next page

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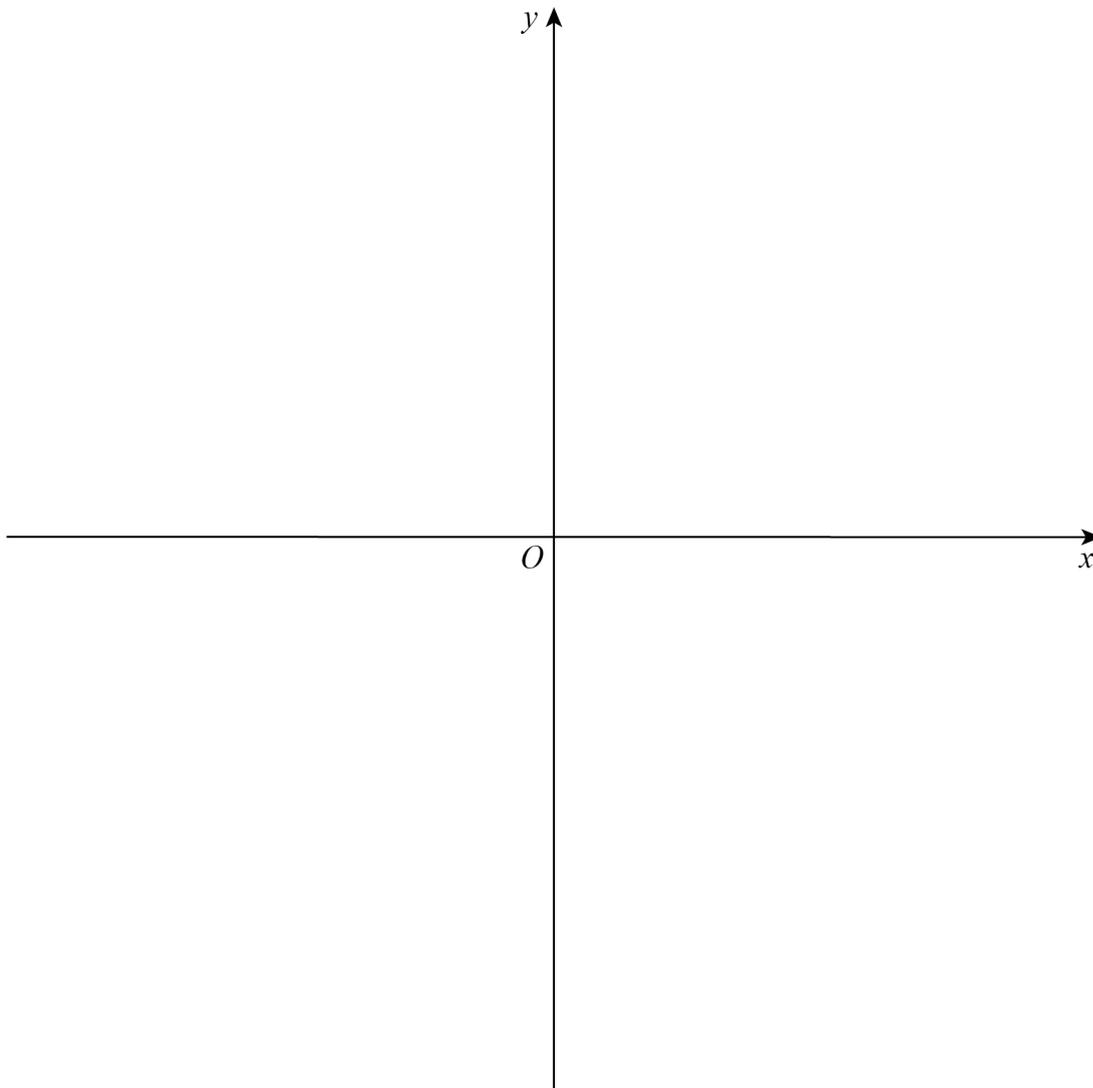




10 (b)(iv) Sketch the graph of  $H_2$

Show the asymptotes and the coordinates of any axis intercepts.

[3 marks]



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END OF QUESTIONS



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