

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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9	
TOTAL	



General Certificate of Education
Advanced Subsidiary Examination
June 2014

Mathematics

MFP1

Unit Further Pure 1

Tuesday 10 June 2014 9.00 am to 10.30 am

For this paper you must have:

- the blue AQA booklet of formulae and statistical tables.

You may use a graphics calculator.

Time allowed

- 1 hour 30 minutes

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.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.



J U N 1 4 M F P 1 0 1

Answer **all** questions.

Answer each question in the space provided for that question.

1 A curve passes through the point (9, 6) and satisfies the differential equation

$$\frac{dy}{dx} = \frac{1}{2 + \sqrt{x}}$$

Use a step-by-step method with a step length of 0.25 to estimate the value of y at $x = 9.5$. Give your answer to four decimal places.

[5 marks]

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2 The quadratic equation

$$2x^2 + 8x + 1 = 0$$

has roots α and β .

(a) Write down the value of $\alpha + \beta$ and the value of $\alpha\beta$.

[2 marks]

(b) (i) Find the value of $\alpha^2 + \beta^2$.

[2 marks]

(ii) Hence, or otherwise, show that $\alpha^4 + \beta^4 = \frac{449}{2}$.

[2 marks]

(c) Find a quadratic equation, with integer coefficients, which has roots

$$2\alpha^4 + \frac{1}{\beta^2} \text{ and } 2\beta^4 + \frac{1}{\alpha^2}$$

[5 marks]

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4 Find the complex number z such that

$$5iz + 3z^* + 16 = 8i$$

Give your answer in the form $a + bi$, where a and b are real.

[6 marks]

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6 A curve C has equation $y = \frac{1}{x(x+2)}$.

(a) Write down the equations of all the asymptotes of C .

[2 marks]

(b) The curve C has exactly one stationary point. The x -coordinate of the stationary point is -1 .

(i) Find the y -coordinate of the stationary point.

[1 mark]

(ii) Sketch the curve C .

[2 marks]

(c) Solve the inequality

$$\frac{1}{x(x+2)} \leq \frac{1}{8}$$

[5 marks]

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END OF QUESTIONS



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ANSWER IN THE SPACES PROVIDED**

