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Surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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Further Pure Mathematics F1

Advanced/Advanced Subsidiary

Monday 15 January 2018 – Afternoon

Time: 1 hour 30 minutes

Paper Reference

WFM01/01

You must have:

Mathematical Formulae and Statistical Tables (Blue)

Total Marks

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information

- The total mark for this paper is 75.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Question 1 continued

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(Total 7 marks)

Q1



2.

$$f(z) = z^4 - 6z^3 + 38z^2 - 94z + 221$$

- (a) Given that $z = 2 + 3i$ is a root of the equation $f(z) = 0$, use algebra to find the three other roots of $f(z) = 0$

(7)

- (b) Show the four roots of $f(z) = 0$ on a single Argand diagram.

(2)



Question 2 continued

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Question 2 continued

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(Total 9 marks)

Q2



- $$\sum_{r=1}^n r^2(r+1) = \frac{1}{12}n(n+1)(n+2)(an+b)$$

(4)

- $$\sum_{r=5}^{25} r^2(r+1) + \sum_{r=1}^k 3^r = 140543$$

(4)

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Question 3 continued

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Question 3 continued

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(Total 8 marks)

Q3



$$3x^2 + 2x + 5 = 0$$

Without solving the equation,

- (b) show that $\alpha^3 + \beta^3 = \frac{82}{27}$ (2)

- $$\left(\alpha + \frac{\alpha}{\beta^2}\right) \text{ and } \left(\beta + \frac{\beta}{\alpha^2}\right)$$

giving your answer in the form $px^2 + qx + r = 0$, where p , q and r are integers. **(4)**

Question 4 continued

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Question 4 continued

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Q4

(Total 8 marks)



(5)

(4)

find the possible values of λ .

Question 5 continued

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Question 5 continued

Lined area for writing the answer to Question 5.

(Total 9 marks)

Q5



- (a) Write down the coordinates of S . (1)

- (b) Find the length of PT . (1)

- $$y = 2x + 4 \quad (4)$$

(d) Find the exact coordinates of the points L and M , giving your answers in their simplest form.

Question 6 continued

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Question 6 continued

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Q6

(Total 12 marks)



P 5 1 5 1 1 A 0 2 3 3 2

$$\mathbf{A} = \begin{pmatrix} 6 & k \\ -3 & -4 \end{pmatrix}, \text{ where } k \text{ is a real constant, } k \neq 8$$
$$(a) \quad \mathbf{A}^{-1} \tag{3}$$
$$(b) \mathbf{A}^2 \tag{1}$$

(c) find the value of k . (3)

The matrix \mathbf{M} represents a one way stretch, parallel to the y -axis, scale factor p , where $p > 0$, followed by a rotation anticlockwise through an angle θ about $(0, 0)$.

(a) Find the value of p . (2)

(b) Find the value of θ . (2)



Question 7 continued

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Question 7 continued

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Lined area for writing the answer to Question 7.

Q7

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(Total 11 marks)





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Question 8 continued

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Question 8 continued

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TOTAL FOR PAPER 75 MARKS

END