

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes **Paper reference** **WFM01/01**

Mathematics

International Advanced Subsidiary/Advanced Level

Further Pure Mathematics F1

You must have:
Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

Candidates may use any calculator permitted by Pearson regulations. 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).
- **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.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 9 questions in this question paper. 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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1.
$$\mathbf{M} = \begin{pmatrix} 3x & 7 \\ 4x + 1 & 2 - x \end{pmatrix}$$

Find the range of values of x for which the determinant of the matrix $\mathbf{M}$ is positive. (5)

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Question 1 continued

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Q1

(Total 5 marks)



Question 2 continued

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Question 2 continued

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Question 2 continued

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Q2

(Total 8 marks)



(4)

Question 3 continued

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Question 3 continued

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Question 3 continued

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Q3

(Total 5 marks)



$$x^4 + Ax^3 + Bx^2 + Cx + 225 = 0$$

- a complex root $4 + 3i$
- a repeated positive real root

- (a) Write down the other complex root of this equation. (1)
- (b) Hence determine a quadratic factor of $x^4 + Ax^3 + Bx^2 + Cx + 225$ (2)
- (c) Deduce the real root of the equation. (2)
- (d) Hence determine the value of each of the constants A , B and C (3)

Question 4 continued

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Question 4 continued

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Question 4 continued

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Q4

(Total 8 marks)



$$\mathbf{P} = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$$

(d) Determine the matrix that represents W'

Question 5 continued

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Question 5 continued

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Q5

(Total 8 marks)



(2)

(3)

(3)

[illegible]

(3)

(3)

[illegible]

(3)

(3)

[illegible]

(3)

Question 6 continued

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Question 6 continued

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Question 6 continued

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Q6

(Total 8 marks)



Solutions relying entirely on calculator technology are not acceptable.

The point $P(4, 9)$ lies on H

- $$4x - 9y + 65 = 0 \quad (4)$$

(b) Determine an equation for the tangent to H at Q , giving your answer in the form $y = mx + c$ where m and c are rational constants.

(5)

Question 7 continued

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Question 7 continued

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Question 7 continued

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Q7

(Total 9 marks)



Question 8 continued

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Question 8 continued

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Q8

(Total 10 marks)



$$\sum_{r=1}^n r^3 = \frac{1}{4} n^2 (n+1)^2 \quad (5)$$
$$\sum_{r=1}^n r(r+1)(r-1) = \frac{1}{4} n(n+A)(n+B)(n+C)$$

(c) Determine the value of n for which

$$3 \sum_{r=1}^n r(r+1)(r-1) = 17 \sum_{r=n}^{2n} r^2 \quad (5)$$

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Question 9 continued

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Question 9 continued

Lined area for writing the answer to Question 9.



Question 9 continued

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Question 9 continued

Lined area for writing the answer to Question 9.

Q9

Grading box for Question 9.

(Total 14 marks)

TOTAL FOR PAPER: 75 MARKS

END

