

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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Sample Assessment Materials for first teaching September 2018

(Time: 1 hour 30 minutes)

Paper Reference **WFM01/01**

Mathematics

International Advanced Subsidiary/Advanced Level
Further Pure Mathematics FP1

You must have:

Mathematical Formulae and Statistical Tables, 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 10 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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Answer ALL questions. Write your answers in the spaces provided.

1. Use the standard results for $\sum_{r=1}^n r$ and for $\sum_{r=1}^n r^3$ to show that, for all positive integers n ,

$$\sum_{r=1}^n r(r^2 - 3) = \frac{n}{4}(n+a)(n+b)(n+c)$$

where a , b and c are integers to be found.

(4)

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Question 1 continued

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Q1

(Total for Question 1 is 4 marks)

- Points A and B lie on the parabola P . The line AB is parallel to the directrix of P and cuts the x -axis at the midpoint of OS , where O is the origin.

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Question 2 continued

Lined area for writing the answer to Question 2.

(Total for Question 2 is 5 marks)

Q2

$$f(x) = x^2 + \frac{3}{x} - 1, \quad x < 0$$

(a) Taking -1.5 as a first approximation to α , apply the Newton-Raphson procedure once to $f(x)$ to find a second approximation to α , giving your answer to 2 decimal places.

(5)

(2)

(Total for Question 3 is 7 marks)

$$\mathbf{A} = \begin{pmatrix} k & 3 \\ -1 & k+2 \end{pmatrix}, \text{ where } k \text{ is a constant}$$

- (a) show that $\det(\mathbf{A}) > 0$ for all real values of k ,

- (b) find $\mathbf{A}^{-1}$ in terms of k . (2)

Question 4 continued

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Q4

(Total for Question 4 is 5 marks)

5.

$$2z + z^* = \frac{3 + 4i}{7 + i}$$

Find z , giving your answer in the form $a + bi$, where a and b are real constants. You must show all your working.

(5)

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(Total for Question 5 is 5 marks)

- (a) Verify that, for $t \neq 0$, the point $P\left(5t, \frac{5}{t}\right)$ is a general point on H . (1)

(b) Show that the normal to H at the point A has equation

$$8y - 2x - 75 = 0 \tag{5}$$

This normal at A meets H again at the point B .

- (c) Find the coordinates of B . (4)

Question 6 continued

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(Total for Question 6 is 10 marks)

Question 7 continued

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(Total for Question 7 is 10 marks)

Question 8 continued

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Question 8 continued

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(Total for Question 8 is 9 marks)

Q8

$$2x^2 + 4x - 3 = 0$$

Without solving the quadratic equation,

- (a) find the exact value of

(i) $\alpha^2 + \beta^2$

$$\text{(ii)} \quad \alpha^3 + \beta^3$$

(5)

- (b) Find a quadratic equation which has roots $(\alpha^2 + \beta)$ and $(\beta^2 + \alpha)$, giving your answer in the form $ax^2 + bx + c = 0$, where a , b and c are integers.

(4)

Question 9 continued

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[illegible]

Question 9 continued

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(Total for Question 9 is 9 marks)

Q9

$$\begin{aligned} u_1 &= 5 \\ u_{n+1} &= 3u_n + 2, \quad n \geq 1 \end{aligned}$$

$$\begin{aligned} u_1 &= 5 \\ u_{n+1} &= 3u_n + 2, \quad n \geq 1 \end{aligned}$$

$$u_n = 2 \times (3)^n - 1 \quad (5)$$
$$\sum_{r=1}^n \frac{4r}{3^r} = 3 - \frac{(3+2n)}{3^n} \quad (6)$$

$$\sum_{r=1}^n \frac{4r}{3^r} = 3 - \frac{(3+2n)}{3^n} \quad (6)$$

Question 10 continued

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Question 10 continued

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TOTAL FOR PAPER IS 75 MARKS