

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** **WFM03/01**

Mathematics

International Advanced Subsidiary/Advanced Level

Further Pure Mathematics F3

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 8 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. The curve C has equation

$$y = \frac{1}{2} \operatorname{arcosh}(2x) \quad \frac{7}{2} \leq x \leq 13$$

Using calculus, determine the exact length of the curve C .

Give your answer in the form $p\sqrt{q}$, where p and q are constants to be found.

(6)

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Question 1 continued

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2. Given that

$$\cosh y = x \quad \text{and} \quad y < 0$$

use the definition of $\cosh y$ in terms of exponential functions to prove that

$$y = \ln(x - \sqrt{x^2 - 1})$$

(6)

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Q2

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Question 4 continued

Q4

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Question 5 continued

Q5

(Total 10 marks)



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6.

$$I_n = \int_0^{\sqrt{\frac{\pi}{2}}} x^n \cos(x^2) dx \quad n \geq 1$$

(a) Prove that, for $n \geq 5$

$$I_n = \frac{1}{2} \left(\frac{\pi}{2} \right)^{\frac{n-1}{2}} - \frac{1}{4} (n-1)(n-3) I_{n-4} \quad (6)$$

(b) Hence, determine the exact value of I_5 , giving your answer in its simplest form.

(3)

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Question 6 continued

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Question 6 continued

Q6

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Question 7 continued

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Question 7 continued

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Q7

(Total 11 marks)



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$$y = \arccos(2\sqrt{x})$$

(a) Determine $\frac{dy}{dx}$

(3)

(b) Show that

$$\int y \, dx = x \arccos(2\sqrt{x}) + \int \frac{\sqrt{x}}{\sqrt{1-4x}} \, dx$$

(2)

(c) Use the substitution $\sqrt{x} = \frac{1}{2} \cos \theta$ to show that

$$\int_0^{\frac{1}{8}} \frac{\sqrt{x}}{\sqrt{1-4x}} dx = \frac{1}{4} \int_a^b \cos^2 \theta d\theta$$

where a and b are limits to be determined.

(4)

(d) Hence, determine the exact value of

$$\int_0^{\frac{1}{8}} \arccos(2\sqrt{x}) \, dx$$

(4)

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Q8

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TOTAL FOR PAPER: 75 MARKS**END**