

Please check the examination details below before entering your candidate information	
Candidate surname	Other names
Centre Number	Candidate Number
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<h2 style="margin: 0;">Pearson Edexcel International Advanced Level</h2>	
<h3 style="margin: 0;">考前模拟卷 - A Level Clouds出品</h3>	
Morning (Time: 1 hour 30 minutes)	<div style="display: inline-block; border: 1px solid black; padding: 2px 5px;">Paper reference</div> <div style="display: inline-block; border: 1px solid black; padding: 5px 10px; font-weight: bold; font-size: 1.2em;">WFM02/01</div>
<div style="border: 1px solid black; padding: 10px;"> <h2 style="margin: 0;">Mathematics</h2> <p style="margin: 5px 0 0 0;"><b>International Advanced Subsidiary/ Advanced Level</b></p> <p style="margin: 0 0 0 0;"><b>Further Pure Mathematics F2</b></p> </div>	
<b>You must have:</b> Mathematical Formulae and Statistics Tables (Yellow), calculator	<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Total Marks</div>

**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 ►

1. Given that

$$y \frac{d^2 y}{dx^2} + 2 \left( \frac{dy}{dx} \right)^2 - 2y = 0 \quad y > 0$$

- (a) determine  $\frac{d^3 y}{dx^3}$  in terms of  $\frac{d^2 y}{dx^2}$ ,  $\frac{dy}{dx}$  and  $y$  (4)

Given that  $y = 2$  and  $\frac{dy}{dx} = 1$  at  $x = 0$

- (b) determine a series solution for  $y$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , giving each coefficient in its simplest form. (4)

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Question 1 continued

Lined area for writing the answer to Question 1.

**Question 1 continued**

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2. Using the method of differences, find

$$\sum_{r=1}^n \frac{2r+3}{3^r \cdot r(r+1)}$$

(5)

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3. (a) Show that the substitution  $v = y^{-2}$  transforms the differential equation

$$\frac{dy}{dx} + 6xy = 3xe^{x^2}y^3 \quad x > 0 \quad (\text{I})$$

into the differential equation

$$\frac{dv}{dx} - 12vx = -6xe^{x^2} \quad x > 0 \quad (\text{II}) \quad (4)$$

- (b) Hence find the general solution of the differential equation (I), giving your answer in the form  $y^2 = f(x)$ . (6)



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Question 3 continued

Lined area for writing the answer to Question 3 continued.

**Question 3 continued**

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[illegible]

4. Use algebra to obtain the set of values of  $x$  for which

$$\left| \frac{x^2 + 3x + 10}{x + 2} \right| < 7 - x$$

(8)

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Question 4 continued

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(Total for Question 4 is 8 marks)



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Question 5 continued

Lined area for writing the answer to Question 5.

**Question 5 continued**

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6. (a) Use de Moivre's theorem to show that

$$\cos^5 \theta \equiv p \cos 5\theta + q \cos 3\theta + r \cos \theta$$

where  $p$ ,  $q$  and  $r$  are rational numbers to be found.

(6)

- (b) Hence, showing all your working, find the exact value of

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos^5 \theta \, d\theta$$

(4)

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Question 6 continued

Lined area for writing the answer to Question 6.

**Question 6 continued**

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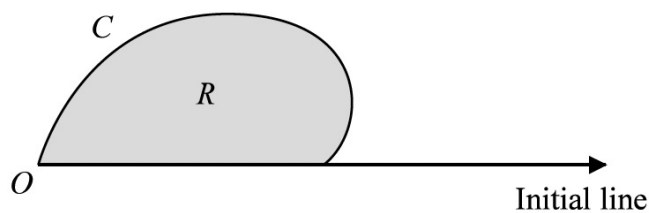
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Question 6 continued

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(Total for Question 6 is 10 marks)

7.

**Figure 1**

The curve  $C$  shown in Figure 1 has polar equation

$$r = \sin \theta + \cos 2\theta \quad 0 \leq \theta \leq \frac{\pi}{2}$$

At the point  $P$  on  $C$  the tangent to  $C$  is parallel to the initial line.

Given that  $O$  is the pole,

- (a) find the length of the line of  $OP$ , giving your answer to 3 significant figures.

(6)

The region  $R$ , shown shaded in Figure 1, is bounded by the curve  $C$  and the initial line.

- (b) Use calculus to find the exact area of  $R$ .

(6)

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Question 7 continued

Lined area for writing the answer to Question 7.

**Question 7 continued**

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[illegible]

8. (a) Show that the substitution  $x = e^t$  transforms the differential equation

$$x^2 \frac{d^2 y}{dx^2} + 5x \frac{dy}{dx} + 13y = 0, \quad x > 0 \quad (\text{I})$$

into the differential equation

$$\frac{d^2 y}{dt^2} + 4 \frac{dy}{dt} + 13y = 0 \quad (7)$$

- (b) Hence find the general solution of the differential equation (I).

(5)

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Question 8 continued

Lined area for writing the answer to Question 8.

**Question 8 continued**

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**(Total for Question 8 is 12 marks)**

**TOTAL FOR PAPER IS 75 MARKS**