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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; background-color: #333; color: white; padding: 5px 10px; font-weight: bold; font-size: 1.2em;">WMA13/01</div>
<div style="border: 1px solid black; padding: 10px;"> <h2 style="margin: 0;">Mathematics</h2> <h3 style="margin: 0;">International Advanced Level</h3> <h3 style="margin: 0;">Pure Mathematics P3</h3> </div>	
<b>You must have:</b> 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 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.

Turn over ►

1.

$$y = \log_{10}(2x + 1)$$

(a) Express  $x$  in terms of  $y$ .

(2)

(b) Hence, giving your answer in terms of  $x$ , find  $\frac{dy}{dx}$

(3)

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Question 1 continued

Handwriting practice area with 30 horizontal lines.

(Total for Question 1 is 5 marks)

2. Solve, for  $0 \leq x \leq 270^\circ$ , the equation

$$\frac{\tan 2x + \tan 50^\circ}{1 - \tan 2x \tan 50^\circ} = 2$$

Give your answers in degrees to 2 decimal places.

(6)

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[illegible]

3. Given that

$$f(x) = \frac{4}{3x+5}, \quad x > 0$$

$$g(x) = \frac{1}{x}, \quad x > 0$$

- (a) state the range of  $f$ , (2)
- (b) find  $f^{-1}(x)$ , (3)
- (c) find  $fg(x)$ . (1)
- (d) Show that the equation  $fg(x) = gf(x)$  has no real solutions. (4)

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Question 3 continued

Lined area for writing the answer to Question 3 continued.

**Question 3 continued**

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Question 4 continued

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(Total for Question 4 is 6 marks)

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5.

$$f(x) = x \cos\left(\frac{x}{3}\right) \quad x > 0$$

- (a) Find  $f'(x)$

- (b) Show that the equation  $f'(x) = 0$  can be written as

$$x = k \arctan\left(\frac{k}{x}\right)$$

where  $k$  is an integer to be found. (2)

- (c) Starting with  $x_1 = 2.5$  use the iteration formula

$$x_{n+1} = k \arctan\left(\frac{k}{x_n}\right)$$

with the value of  $k$  found in part (b), to calculate the values of  $x_2$  and  $x_6$  giving your answers to 3 decimal places.

**(2)**

- (d) Using a suitable interval and a suitable function that should be stated, show that a root of  $f'(x) = 0$  is 2.581 correct to 3 decimal places. (2)

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Question 5 continued

Lined area for writing the answer to Question 5.

**Question 5 continued**

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Question 5 continued

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(Total for Question 5 is 8 marks)

6.

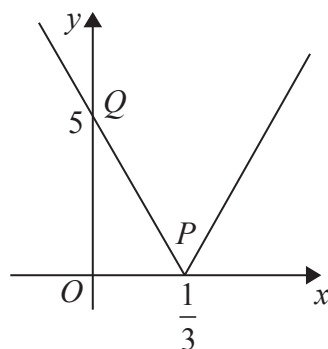


Figure 1

Figure 1 shows a sketch of the graph of  $y = f(x)$ ,  $x \in \mathbb{R}$ .

The point  $P\left(\frac{1}{3}, 0\right)$  is the vertex of the graph.

The point  $Q(0, 5)$  is the intercept with the  $y$ -axis.

Given that  $f(x) = |ax + b|$ , where  $a$  and  $b$  are constants,

(a) (i) find all possible values for  $a$  and  $b$ ,

(ii) hence find an equation for the graph.

(4)

(b) Sketch the graph with equation

$$y = f\left(\frac{1}{2}x\right) + 3$$

showing the coordinates of its vertex and its intercept with the  $y$ -axis.

(3)



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Question 6 continued

Lined area for writing the answer to Question 6.

**Question 6 continued**

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Question 6 continued

Handwriting practice area with horizontal lines.

(Total for Question 6 is 7 marks)



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Question 7 continued

Lined area for writing the answer to Question 7.

**Question 7 continued**

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8. (a) Express  $3 \sin 2x + 5 \cos 2x$  in the form  $R \sin(2x + \alpha)$ , where  $R > 0$  and  $0 < \alpha < \frac{\pi}{2}$

Give the exact value of  $R$  and give the value of  $\alpha$  to 3 significant figures.

(3)

- (b) Solve, for  $0 < x < \pi$ ,

$$3 \sin 2x + 5 \cos 2x = 4$$

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(5)

$$g(x) = 4(3 \sin 2x + 5 \cos 2x)^2 + 3$$

- (c) Using your answer to part (a) and showing your working,

(i) find the greatest value of  $g(x)$ ,

(ii) find the least value of  $g(x)$ .

(4)



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Question 8 continued

Lined area for writing the answer to Question 8.

**Question 8 continued**

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Question 8 continued

Handwriting practice area with horizontal lines.

(Total for Question 8 is 12 marks)

9. (i) Find

$$\int \frac{4}{(5y-7)^4} dy \quad (2)$$

(ii) Find, in simplest form,

$$\int (1 - 4 \tan 3x)^2 dx \quad (3)$$

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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

Handwriting practice area with 30 horizontal lines.

(Total for Question 9 is 5 marks)

10. Ellen bungee jumps from a high platform.

Ellen's distance above the ground,  $H$  metres, is modelled by the equation

$$H = 60 + \frac{50 \cos(0.5t)}{e^{0.2t}} \quad t \in \mathbb{R}, t \geq 0$$

where  $t$  is the time measured in seconds from when she jumps from the platform.

- (a) (i) Find, in simplest form,  $\frac{dH}{dt}$

- (ii) Hence show that when  $\frac{dH}{dt} = 0$ , the values of  $t$  satisfy the equation

$$\tan(0.5t) = -0.4 \quad (5)$$

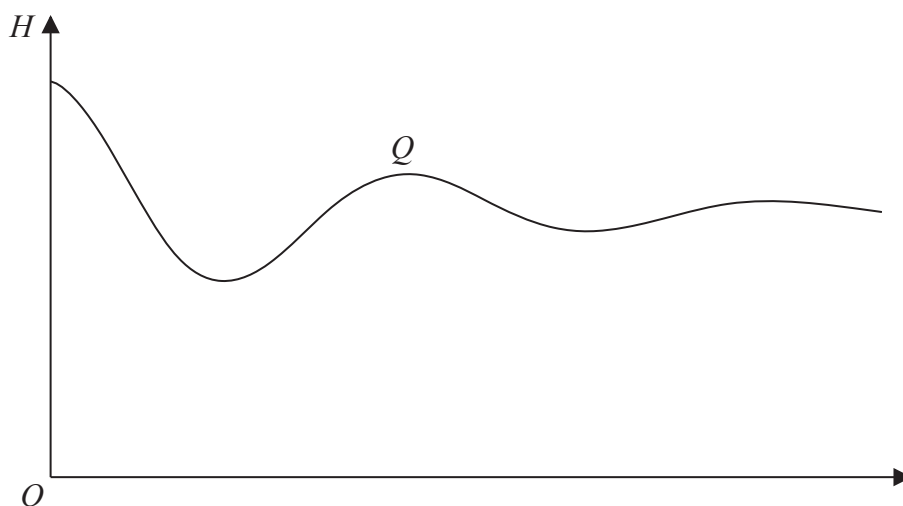


Figure 2

Figure 2 shows a sketch of  $H$  against  $t$ . The point  $Q$ , shown in Figure 2, represents the greatest distance above the ground to which Ellen bounces after jumping from the platform.

Using the answer to (a)(ii),

- (b) find the value of  $t$  and the value of  $H$  at the point  $Q$ , giving your answers to 3 significant figures.

(3)

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Question 10 continued

Lined area for writing the answer to Question 10.

**Question 10 continued**

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Question 10 continued

Lined area for writing the answer to Question 10.

**Question 10 continued**

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**(Total for Question 10 is 8 marks)**

**TOTAL FOR PAPER IS 75 MARKS**