

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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## Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper

reference

**WMA13/01**

### Mathematics

#### International Advanced Level

#### Pure Mathematics P3

**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 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 ►

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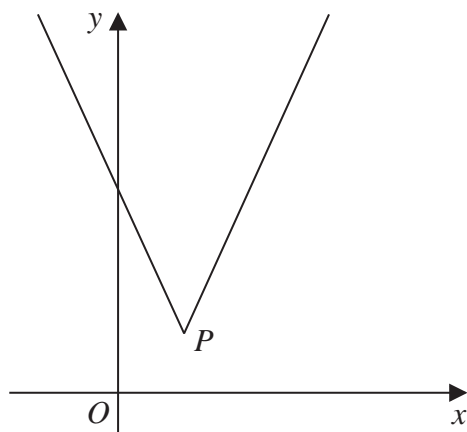


Figure 1

Figure 1 shows a sketch of part of the graph with equation  $y = f(x)$ , where

$$f(x) = |3x - 13| + 5 \quad x \in \mathbb{R}$$

The vertex of the graph is at point  $P$ , as shown in Figure 1.

(a) State the coordinates of  $P$ . (2)

(b) (i) State the range of  $f$ .  
 (ii) Find the value of  $ff(4)$  (2)

(c) Solve, using algebra and showing your working,  
 $16 - 2x > |3x - 13| + 5$  (4)

The graph with equation  $y = f(x)$  is transformed onto the graph with equation  $y = af(x + b)$

The vertex of the graph with equation  $y = af(x + b)$  is  $(4, 20)$

Given that  $a$  and  $b$  are constants,

(d) find the value of  $a$  and the value of  $b$ . (2)

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8. A curve  $C$  has equation  $y = f(x)$ , where

$$f(x) = \arcsin\left(\frac{1}{2}x\right) \quad -2 \leq x \leq 2 \quad -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

(a) Sketch  $C$ .

(1)

(b) Given  $x = 2 \sin y$ , show that

$$\frac{dy}{dx} = \frac{1}{\sqrt{A - x^2}}$$

where  $A$  is a constant to be found.

(3)

The point  $P$  lies on  $C$  and has  $y$  coordinate  $\frac{\pi}{4}$

(c) Find the equation of the tangent to  $C$  at  $P$ . Write your answer in the form  $y = mx + c$ , where  $m$  and  $c$  are constants to be found.

(3)

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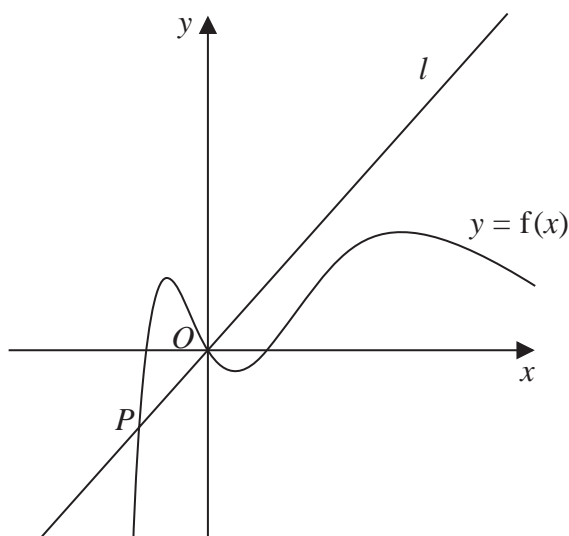


Figure 3

Figure 3 shows a sketch of part of the curve with equation  $y = f(x)$ , where

$$f(x) = x(x^2 - 4)e^{-\frac{1}{2}x}$$

- (a) Find  $f'(x)$ . (2)

The line  $l$  is the normal to the curve at  $O$  and meets the curve again at the point  $P$ .

The point  $P$  lies in the 3rd quadrant, as shown in Figure 3.

- (b) Show that the  $x$  coordinate of  $P$  is a solution of the equation

$$x = -\frac{1}{2}\sqrt{16 + e^{\frac{1}{2}x}} \quad (4)$$

- (c) Using the iterative formula

$$x_{n+1} = -\frac{1}{2}\sqrt{16 + e^{\frac{1}{2}x_n}} \quad \text{with } x_1 = -2$$

find, to 4 decimal places,

- (i) the value of  $x_2$   
 (ii) the  $x$  coordinate of  $P$ . (3)

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