

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number

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Candidate Number

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# Core Mathematics C34

## Advanced

Monday 27 January 2014 – Morning  
**Time: 2 hours 30 minutes**

Paper Reference  
**WMA02/01**

**You must have:**  
Mathematical Formulae and Statistical Tables (Blue)

Total Marks

**Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. 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). Coloured pencils and highlighter pens must not be used.
- **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.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

### Information

- The total mark for this paper is 125.
- 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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4.

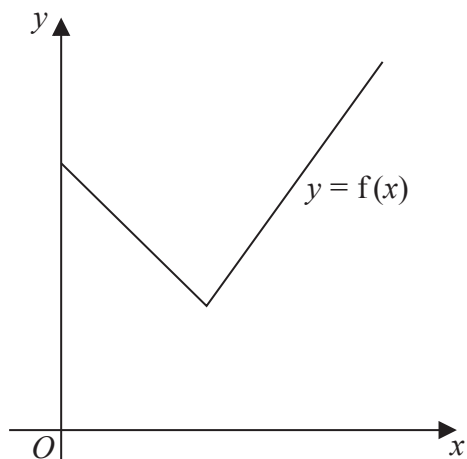


Figure 1

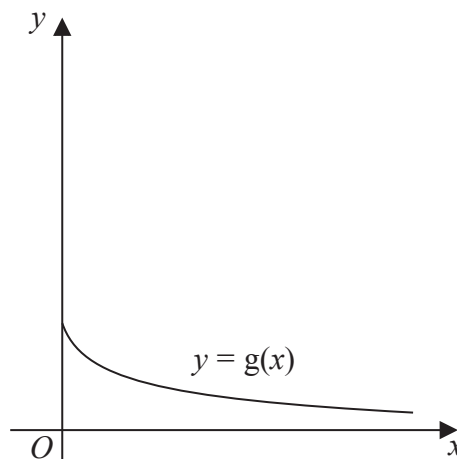


Figure 2

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

$$f(x) = 2|3 - x| + 5, \quad x \geq 0$$

Figure 2 shows a sketch of part of the graph  $y = g(x)$ , where

$$g(x) = \frac{x + 9}{2x + 3}, \quad x \geq 0$$

(a) Find the value of  $fg(1)$  (2)

(b) State the range of  $g$  (2)

(c) Find  $g^{-1}(x)$  and state its domain. (4)

Given that the equation  $f(x) = k$ , where  $k$  is a constant, has exactly two roots,

(d) state the range of possible values of  $k$ . (3)

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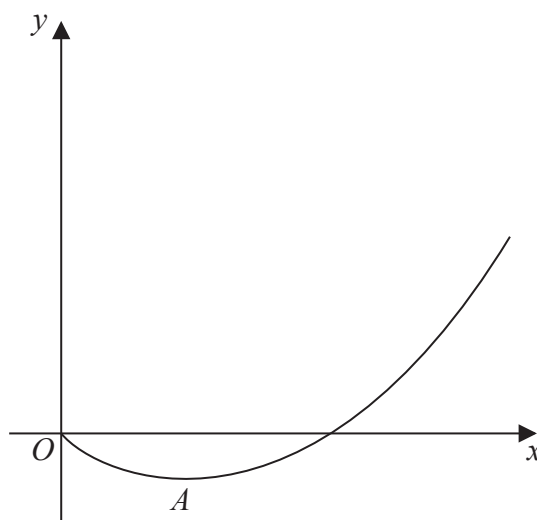








7.



**Figure 3**

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

$$f(x) = 2x(1 + x) \ln x, \quad x > 0$$

The curve has a minimum turning point at  $A$ .

(a) Find  $f'(x)$  (3)

(b) Hence show that the  $x$  coordinate of  $A$  is the solution of the equation

$$x = e^{-\frac{1+x}{1+2x}} \quad (3)$$

(c) Use the iteration formula

$$x_{n+1} = e^{-\frac{1+x_n}{1+2x_n}}, \quad x_0 = 0.46$$

to find the values of  $x_1$ ,  $x_2$  and  $x_3$  to 4 decimal places. (3)

(d) Use your answer to part (c) to estimate the coordinates of  $A$  to 2 decimal places. (2)

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12.

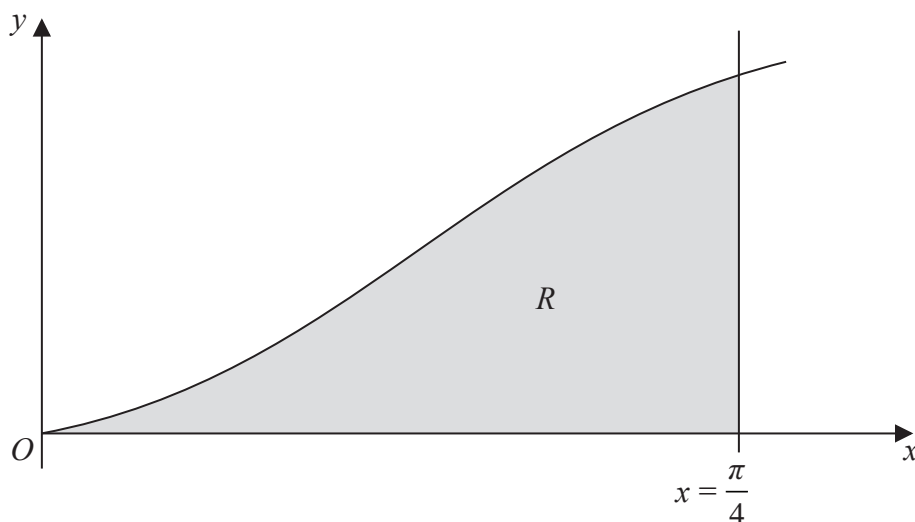


Figure 4

Figure 4 shows a sketch of part of the curve with equation

$$y = x(\sin x + \cos x), \quad 0 \leq x \leq \frac{\pi}{4}$$

The finite region  $R$ , shown shaded in Figure 4, is bounded by the curve, the  $x$ -axis and the line  $x = \frac{\pi}{4}$ . This shaded region is rotated through  $2\pi$  radians about the  $x$ -axis to form a solid of revolution, with volume  $V$ .

(a) Assuming the formula for volume of revolution show that  $V = \int_0^{\frac{\pi}{4}} \pi x^2 (1 + \sin 2x) dx$  (3)

(b) Hence using calculus find the exact value of  $V$ .

You must show your working.

*(Solutions based entirely on graphical or numerical methods are not acceptable.)* (9)

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