

Please check the examination details below before entering your candidate information

Candidate surname	Other names
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**Pearson Edexcel**  
International  
Advanced Level

Centre Number

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Candidate Number

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**Wednesday 6 November 2019**

Morning (Time: 2 hours 30 minutes) Paper Reference **WMA02/01**

**Mathematics**  
International Advanced Level  
Core Mathematics C34

**You must have:**  
Mathematical Formulae and Statistical Tables (Blue), 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 14 questions in this question paper. 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►























**Question 3 continued**

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**(Total 10 marks)**

**Q3**



4. The curve  $C$  has equation

$$y = x \cos 2x \quad 0 \leq x \leq \frac{\pi}{4}$$

The curve has a turning point at the point  $P$ .

(a) Show, using calculus, that the  $x$  coordinate of  $P$  is a solution of the equation

$$x = \frac{1}{2} \arctan\left(\frac{1}{2x}\right) \tag{4}$$

(b) Starting with  $x_0 = 0.5$  use

$$x_{n+1} = \frac{1}{2} \arctan\left(\frac{1}{2x_n}\right)$$

to calculate the value of  $x_1$  and the value of  $x_2$ , giving your answers to 4 decimal places.

(3)

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Question 5 continued

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Question 5 continued

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(Total 9 marks)

Q5





















8. With respect to a fixed origin  $O$ , the lines  $l_1$  and  $l_2$  are given by the equations

$$l_1: \mathbf{r} = \begin{pmatrix} -1 \\ 1 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} 4 \\ 2 \\ -3 \end{pmatrix} \qquad l_2: \mathbf{r} = \begin{pmatrix} 9 \\ -7 \\ 4 \end{pmatrix} + \mu \begin{pmatrix} 3 \\ -5 \\ 2 \end{pmatrix}$$

where  $\lambda$  and  $\mu$  are scalar parameters.

(a) Show that  $l_1$  and  $l_2$  meet, and find the position vector of their point of intersection. (6)

The point  $P$  with position vector  $\begin{pmatrix} 11 \\ p \\ -6 \end{pmatrix}$ , where  $p$  is a constant, lies on  $l_1$

(b) Find the value of  $p$ . (1)

Given that point  $Q$  lies on  $l_2$  such that  $PQ$  is perpendicular to  $l_2$

(c) find the exact coordinates of the point  $Q$ . (4)

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Question 8 continued

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Question 8 continued

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Q8

(Total 11 marks)



9. Given that  $a$  is a positive constant,

(a) on separate diagrams, sketch the graph with equation

(i)  $y = a - |x|$

(ii)  $y = |3x - 2a|$

Show on each sketch the coordinates, in terms of  $a$ , of each point at which the graph crosses or meets the axes.

(4)

(b) Find, in terms of  $a$ , the values of  $x$  for which

$$a - |x| = |3x - 2a|$$

(4)

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Question 9 continued

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10. (a) Using the substitution  $u = 2x - 1$ , show that

$$\int_2^5 \frac{(3x + 2)^2}{2x - 1} dx = 72 + \frac{49}{8} \ln 3 \tag{6}$$

The curve  $C$  has equation

$$y = \frac{3x + 2}{2\sqrt{2x - 1}} \quad x > 1$$

The finite region  $R$  is bounded by  $C$ , the  $x$ -axis and the lines with equations  $x = 2$  and  $x = 5$

The region  $R$  is rotated through  $2\pi$  radians about the  $x$ -axis to form a solid of revolution.

(b) Using the result from part (a), find the exact value of the volume of the solid generated. (2)

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Question 10 continued

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Q10

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(Total 8 marks)



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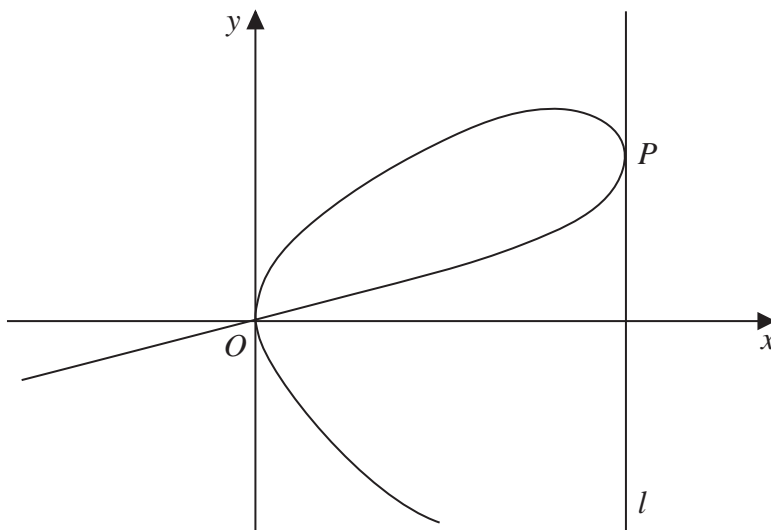


Figure 1

Figure 1 shows a sketch of part of the curve with equation

$$2x^2 + y^3 = kxy$$

where  $k$  is a positive constant.

- (a) Find  $\frac{dy}{dx}$  in terms of  $x$ ,  $y$  and  $k$ . (4)

The line  $l$  is parallel to the  $y$ -axis and touches the curve at the point  $P$ , as shown in Figure 1.

- (b) Find, in terms of  $k$ , the coordinates of the point  $P$ . (5)

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Question 11 continued

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Question 12 continued

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Q12

(Total 10 marks)



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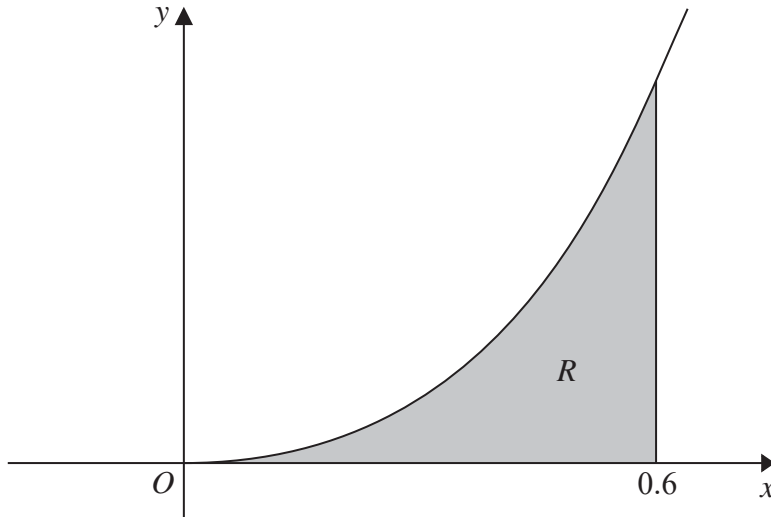


Figure 2

Figure 2 shows a sketch of part of the curve  $C$  with equation

$$y = x^2 4^x$$

The finite region  $R$ , shown shaded in Figure 2, is bounded by the curve  $C$ , the  $x$ -axis and the line with equation  $x = 0.6$

The table below shows corresponding values of  $x$  and  $y$  for  $y = x^2 4^x$

$x$	0	0.1	0.2	0.3	0.4	0.5	0.6
$y$	0	0.0115	0.0528		0.2786	0.5	0.8271

(a) Complete the table above giving the missing value of  $y$  to 4 decimal places. (1)

(b) Use the trapezium rule, with all the values of  $y$  in the completed table, to obtain an estimate for the area of  $R$ , giving your answer to 3 decimal places. (3)

(c) Find

$$\int x^2 4^x dx$$
(5)

(d) Using your answer from part (c), find the area of region  $R$ , giving your answer to 3 significant figures. (2)









**Question 13 continued**

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**Q13**

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(Total 11 marks)





Question 14 continued

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**Question 14 continued**

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**Q14**

**(Total 10 marks)**

**END**

**TOTAL FOR PAPER: 125 MARKS**

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