

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

WMA12/01

Mathematics

**International Advanced Subsidiary/Advanced Level
Pure Mathematics P2**

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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- (3)

Question 1 continued

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Q1

(Total 6 marks)





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Question 2 continued

Lined area for writing the answer to Question 2.

(Total 5 marks)

Q2

Mark box for Question 2.



3.

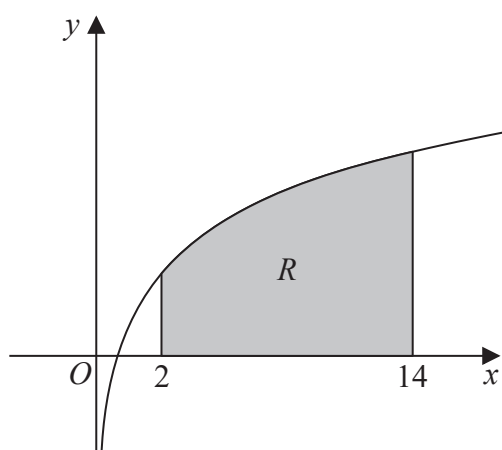


Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \log_{10} x$

The region R , shown shaded in Figure 1, is bounded by the curve, the line with equation $x = 2$, the x -axis and the line with equation $x = 14$

Using the trapezium rule with four strips of equal width,

(a) show that the area of R is approximately 10.10 (3)

(b) Explain how the trapezium rule could be used to obtain a more accurate estimate for the area of R . (1)

(c) Using the answer to part (a) and making your method clear, estimate the value of

(i) $\int_2^{14} \log_{10} \sqrt{x} \, dx$

(ii) $\int_2^{14} \log_{10} 100x^3 \, dx$

(4)



Question 3 continued

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Question 3 continued

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Question 3 continued

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Q3

(Total 8 marks)



(5)

Question 4 continued

Lined area for writing the answer to Question 4.

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Question 4 continued

Lined area for writing the answer to Question 4.



Question 4 continued

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Q4

(Total 8 marks)



- extracted 480 tonnes of silver from the mine in year 1
- extracted 465 tonnes of silver from the mine in year 2
- extracted 450 tonnes of silver from the mine in year 3

(a) Find the mass of silver extracted in year 14

Given that this occurred at the end of year N ,

(b) show that

$$N^2 - 65N + 1036 = 0$$

(c) Hence, state the value of N .

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Question 5 continued

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Q5

(Total 6 marks)





Question 6 continued

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Question 6 continued

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Q6

(Total 8 marks)



- (d) find the sum of the first 4 terms of the series. (2)

Question 7 continued

Handwriting practice area with 25 horizontal lines.

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Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

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Lined area for writing the answer to Question 7.

(Total 10 marks)

Q7



8. In this question you must show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

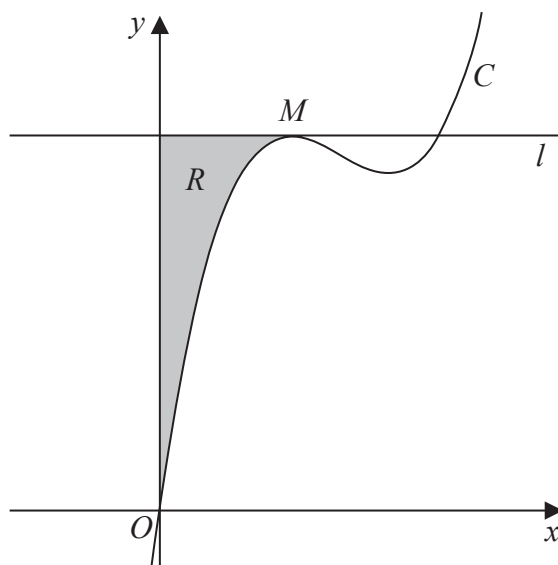


Figure 2

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

$$y = \frac{4}{3}x^3 - 11x^2 + kx \quad \text{where } k \text{ is a constant}$$

The point M is the maximum turning point of C and is shown in Figure 2.

Given that the x coordinate of M is 2

(a) show that $k = 28$ (3)

(b) Determine the range of values of x for which y is increasing. (2)

The line l passes through M and is parallel to the x -axis.

The region R , shown shaded in Figure 2, is bounded by the curve C , the line l and the y -axis.

(c) Find, by algebraic integration, the exact area of R . (5)



Question 8 continued

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Question 8 continued

Lined area for writing the answer to Question 8.



Question 8 continued

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Lined area for writing the answer to Question 8.

(Total 10 marks)

Q8



9. (a) Prove that for all positive values of x and y ,

$$\frac{x+y}{2} \geq \sqrt{xy} \quad (3)$$

- (b) Prove by counter-example that this inequality does not hold when x and y are both negative. (1)

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Question 9 continued

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Q9

(Total 4 marks)





Question 10 continued

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END

TOTAL FOR PAPER IS 75 MARKS