

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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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 9 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.
- Good luck with your examination.

Turn over ►

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- (4)

Question 1 continued

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Q1

(Total 7 marks)



2.

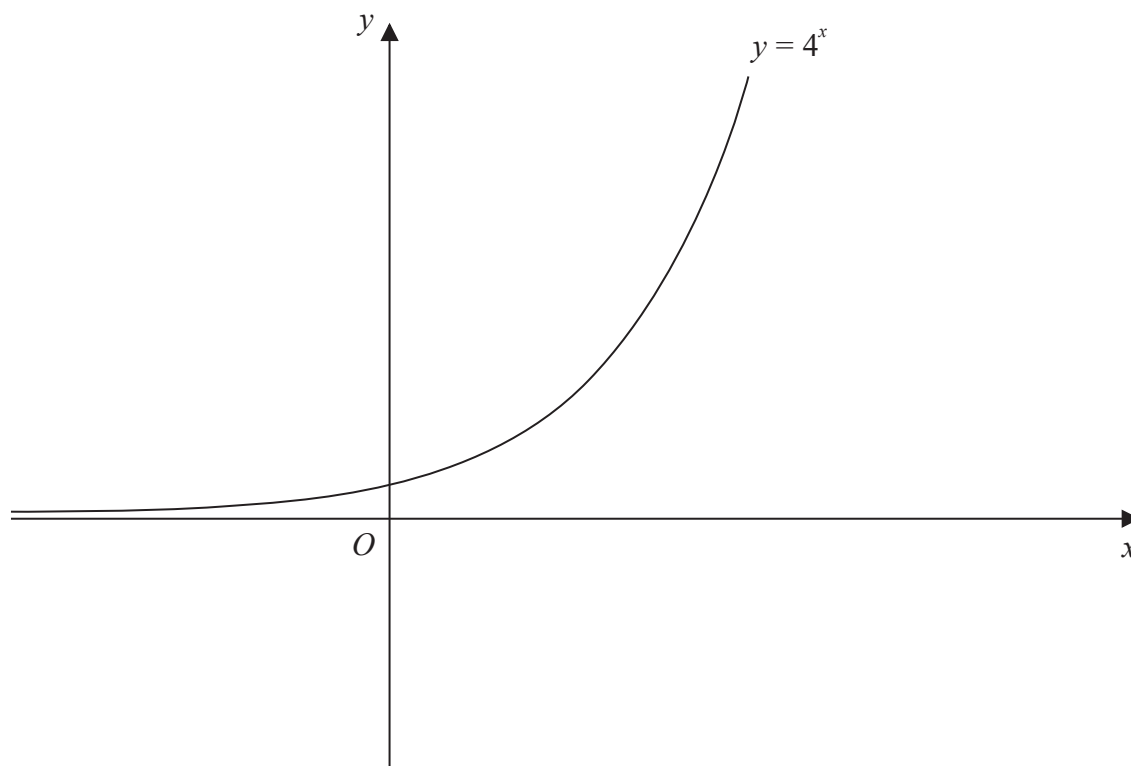


Figure 1

Figure 1 shows a sketch of the curve with equation $y = 4^x$

A copy of Figure 1, labelled Diagram 1, is shown on the next page.

(a) On Diagram 1, sketch the curve with equation

(i) $y = 2^x$

(ii) $y = 4^x - 6$

Label clearly the coordinates of any points of intersection with the coordinate axes. (4)

The curve with equation $y = 2^x$ meets the curve with equation $y = 4^x - 6$ at the point P .

(b) Using algebra, find the exact coordinates of P . (4)

Question 2 continued

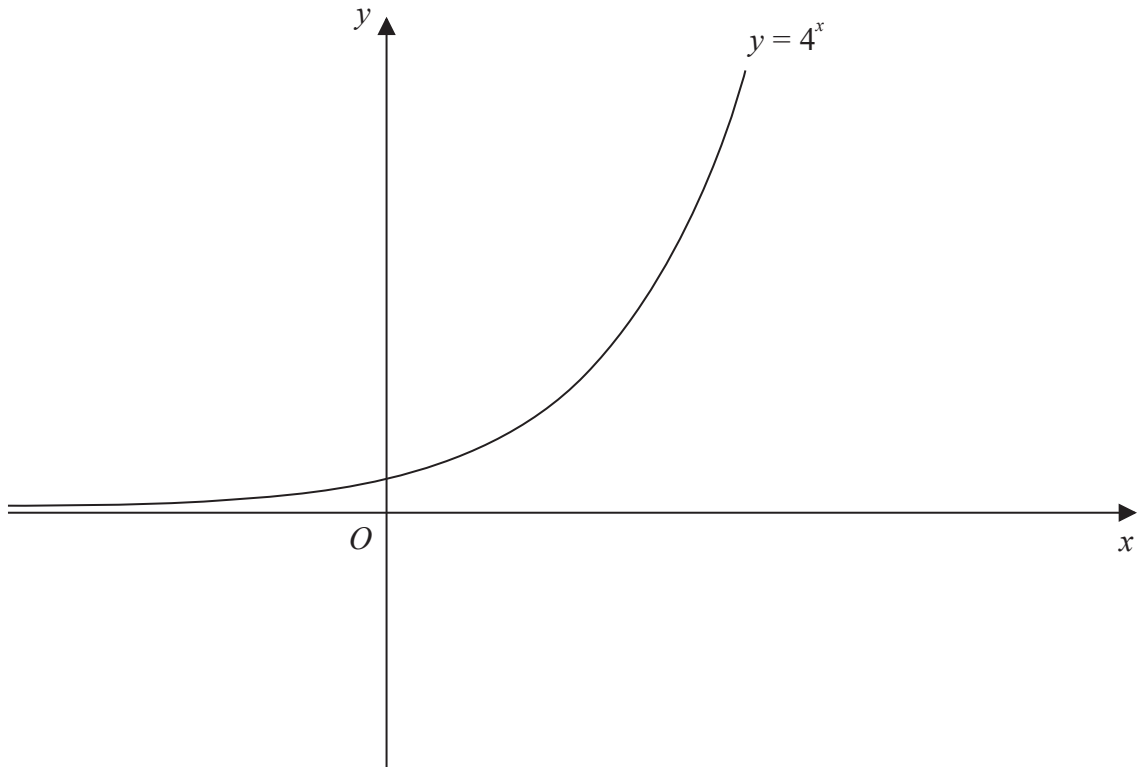


Diagram 1

Handwritten area with horizontal lines for student response.

(Total 8 marks)

Q2

3. (i) Prove that for all single digit prime numbers, p ,

$$p^3 + p \text{ is a multiple of } 10$$

(2)

- (ii) Show, using algebra, that for $n \in \mathbb{N}$

$$(n + 1)^3 - n^3 \text{ is not a multiple of } 3$$

(3)

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Question 3 continued

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Question 3 continued

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Question 3 continued

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Q3

(Total 5 marks)



- $$\left(2 + \frac{x}{8}\right)^{13}$$

(4)

- (3)

(1)

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Question 4 continued

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Question 4 continued

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Q4

(Total 8 marks)



5.

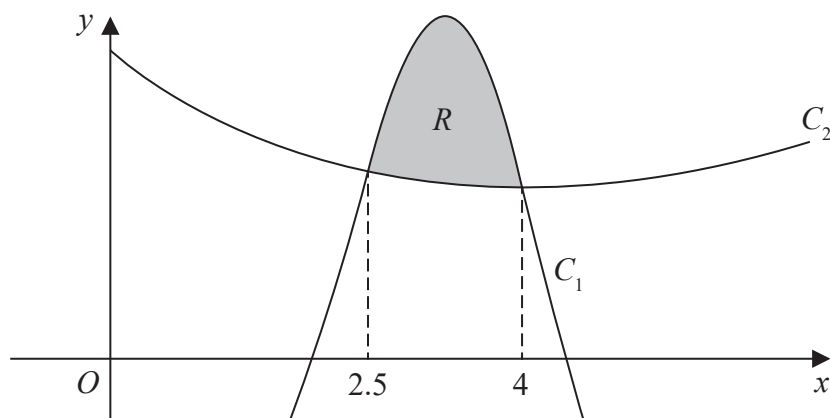


Figure 2

Figure 2 shows a sketch of part of the graph of the curves C_1 and C_2

The curves intersect when $x = 2.5$ and when $x = 4$

A table of values for some points on the curve C_1 is shown below, with y values given to 3 decimal places as appropriate.

x	2.5	2.75	3	3.25	3.5	3.75	4
y	5.453	7.764	9.375	9.964	9.367	7.626	5

Using the trapezium rule with all the values of y in the table,

- (a) find, to 2 decimal places, an estimate for the area bounded by the curve C_1 , the line with equation $x = 2.5$, the x -axis and the line with equation $x = 4$

(4)

The curve C_2 has equation

$$y = x^{\frac{3}{2}} - 3x + 9 \quad x > 0$$

- (b) Find $\int \left(x^{\frac{3}{2}} - 3x + 9 \right) dx$

(3)

The region R , shown shaded in Figure 2, is bounded by the curves C_1 and C_2

- (c) Use the answers to part (a) and part (b) to find, to one decimal place, an estimate for the area of the region R .

(3)



Question 5 continued

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Question 5 continued

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Q5

(Total 10 marks)



- (4)

Question 6 continued

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Question 6 continued

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Q6

(Total 7 marks)





Question 7 continued

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Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

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Q7

(Total 10 marks)



Solutions relying entirely on calculator technology are not acceptable.

- $$3 \sin(\theta + 30^\circ) = 7 \cos(\theta + 30^\circ)$$

giving your answers to one decimal place.

(ii) (a) Show that the equation

$$3 \sin^3 x = 5 \sin x - 7 \sin x \cos x$$

can be written in the form

$$\sin x (a \cos^2 x + b \cos x + c) = 0$$

where a , b and c are constants to be found.

- (b) Hence solve for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ the equation

$$3 \sin^3 x = 5 \sin x - 7 \sin x \cos x$$

(6)

Question 8 continued

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Question 8 continued

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Q8

(Total 10 marks)



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Question 9 continued

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Question 9 continued

Lined area for writing the answer to Question 9.

Q9

(Total 10 marks)

TOTAL FOR PAPER IS 75 MARKS

END

