

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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Wednesday 15 January 2020

Morning (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 (Lilac), 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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1. The table below shows corresponding values of x and y for $y = \log_2(2x)$

The values of y are given to 2 decimal places as appropriate.

x	2	5	8	11	14
y	2	3.32	4	4.46	4.81

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

- (a) obtain an estimate for $\int_2^{14} \log_2(2x) dx$, giving your answer to one decimal place. (3)

Using your answer to part (a) and making your method clear, estimate

- (b) (i) $\int_2^{14} \frac{\log_2(4x^2)}{5} dx$
(ii) $\int_2^{14} \log_2\left(\frac{2}{x}\right) dx$ (4)

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Q1

(Total 7 marks)



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2. One of the terms in the binomial expansion of $(3 + ax)^6$, where a is a constant, is $540x^4$

(a) Find the possible values of a .

(4)

(b) Hence find the term independent of x in the expansion of

$$\left(\frac{1}{81} + \frac{1}{x^6}\right)(3 + ax)^6$$

(3)

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3.

$$f(x) = 6x^3 + 17x^2 + 4x - 12$$

- (a) Use the factor theorem to show that $(2x + 3)$ is a factor of $f(x)$.

(2)

- (b) Hence, using algebra, write $f(x)$ as a product of three linear factors.

(4)

- (c) Solve, for $\frac{\pi}{2} < \theta < \pi$, the equation

$$6 \tan^3 \theta + 17 \tan^2 \theta + 4 \tan \theta - 12 = 0$$

giving your answers to 3 significant figures.

(2)

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Question 3 continued

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Q3



4.

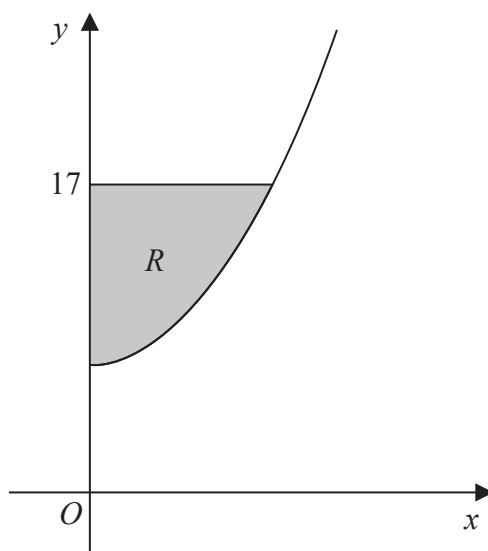
**Figure 1**

Figure 1 shows a sketch of the curve with equation

$$y = 2x^2 + 7 \quad x \geq 0$$

The finite region R , shown shaded in Figure 1, is bounded by the curve, the y -axis and the line with equation $y = 17$

Find the exact area of R .

(6)

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Q4

(Total 6 marks)



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(Total 8 marks)**Q5**

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Question 6 continued

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Question 6 continued

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7. (a) Show that the equation

$$8 \tan \theta = 3 \cos \theta$$

may be rewritten in the form

$$3 \sin^2 \theta + 8 \sin \theta - 3 = 0$$

(3)

- (b) Hence solve, for $0 \leq x \leq 90^\circ$, the equation

$$8 \tan 2x = 3 \cos 2x$$

giving your answers to 2 decimal places.

(4)

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(Total 7 marks)**Q7**

8. (i) An arithmetic series has first term a and common difference d .

Prove that the sum to n terms of this series is

$$\frac{n}{2}\{2a + (n-1)d\} \quad (3)$$

- (ii) A sequence $u_1, u_2, u_3, \dots$ is given by

$$u_n = 5n + 3(-1)^n$$

Find the value of

(a) u_5 (1)

(b) $\sum_{n=1}^{59} u_n$ (3)

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Question 8 continued

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Question 8 continued

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(Total 7 marks)

Q8



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9. (a) Sketch the curve with equation

$$y = 3 \times 4^x$$

showing the coordinates of any points of intersection with the coordinate axes.

(2)

The curve with equation $y = 6^{1-x}$ meets the curve with equation $y = 3 \times 4^x$ at the point P .

- (b) Show that the x coordinate of P is $\frac{\log_{10} 2}{\log_{10} 24}$

(5)

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Question 9 continued

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(Total 7 marks)**Q9**

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Question 10 continued

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Q10

(Total 10 marks)

END

TOTAL FOR PAPER IS 75 MARKS