

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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Monday 18 January 2021

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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Question 1 continued

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Question 1 continued

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Question 1 continued

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(Total 6 marks)

Q1



$$y = x^3 - x^2 - 16x + 2$$

- (a) Using calculus, find the x coordinates of the stationary points of the curve. (4)
- (b) Justify, by further calculus, the nature of all of the stationary points of the curve. (3)

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Question 2 continued

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(Total 7 marks)

Q2



3. (i) Solve

$$7^{x+2} = 3$$

giving your answer in the form $x = \log_7 a$ where a is a rational number in its simplest form.

(3)

(ii) Using the laws of logarithms, solve

$$1 + \log_2 y + \log_2 (y + 4) = \log_2 (5 - y)$$

(5)

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Question 3 continued

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(Total 8 marks)

Q3



- (4)

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Question 4 continued

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Question 4 continued

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(Total 8 marks)

Q4



5. (i) Use algebra to prove that for all $x \geq 0$

$$3x + 1 \geq 2\sqrt{3x}$$

$$9x^2 + 1 + 6x - 12x \geq 0$$

$$9x^2 - 6x + 1 \geq 0 \quad (3)$$

$$(3x - 1)^2 \geq 0$$

- (ii) Show that the following statement is not true.

“The sum of three consecutive prime numbers is always a multiple of 5”

(1)

2 3 5

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Question 5 continued

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(Total 4 marks)

Q5



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Question 6 continued

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Question 6 continued

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Question 6 continued

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(Total 8 marks)

Q6



7.

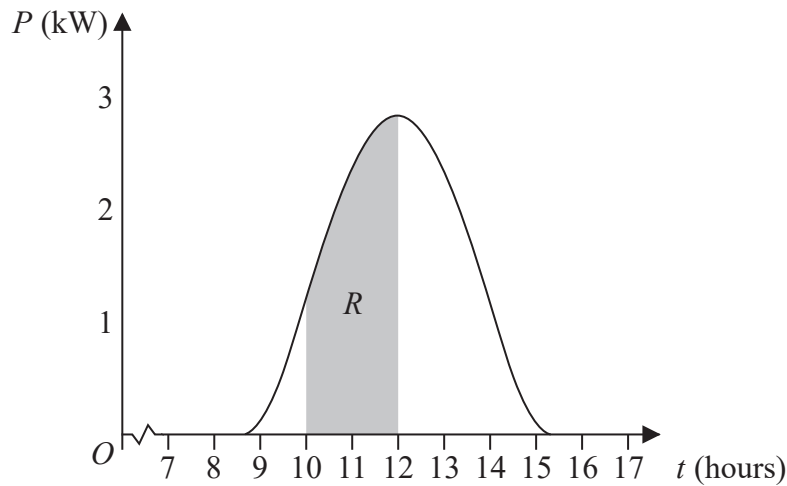


Figure 1

Solar panels are installed on the roof of a building.

The power, P , produced on a particular day, in kW, can be modelled by the equation

$$P = 0.95 + 2^{t-12} + 2^{12-t} - (t-12)^2 \quad 8.5 \leq t \leq 15.2$$

where t is the time in hours after midnight. The graph of P against t is shown in Figure 1.

A table of values of t and P is shown below, with the values of P given to 4 significant figures where appropriate.

Time, t (hours)	10	10.5	11	11.5	12
Power, P (kW)		1.882	2.45		2.95

- (a) Use the given equation to complete the table, giving the values of P to 4 significant figures where appropriate.

(2)

The amount of energy, in kWh, produced between 10:00 and 12:00 can be found by calculating the area of region R , shown shaded in Figure 1.

- (b) Use the trapezium rule, with all the values of P in the completed table, to find an estimate for the amount of energy produced between 10:00 and 12:00. Give your answer to 2 decimal places.

(4)



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Question 7 continued

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(Total 6 marks)

Q7



$$\begin{aligned} a_{n+1} &= 2(a_n + 3)^2 - 7 \\ a_1 &= p - 3 \end{aligned}$$

(a) Find an expression for a_2 in terms of p , giving your answer in simplest form. (1)

(b) find the possible values of a_2 (6)

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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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Question 9 continued

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Question 9 continued

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Question 9 continued

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(Total 10 marks)

Q9





Question 10 continued

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Q10

Question 10 continued

Handwriting practice lines for Question 10 continued.

(Total 11 marks)

TOTAL FOR PAPER IS 75 MARKS

END

