

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

Tuesday 14 May 2024

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 (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.
- 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. (a) Find the first four terms, in ascending powers of x , of the binomial expansion of

$$\left(1 - \frac{1}{6}x\right)^9$$

giving each term in simplest form.

(3)

(b) Hence find the coefficient of x^3 in the expansion of

$$(10x + 3)\left(1 - \frac{1}{6}x\right)^9$$

giving the answer in simplest form.

(2)



Question 1 continued

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Lined writing area for the answer to Question 1.

(Total for Question 1 is 5 marks)



Question 2 continued

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Lined writing area for the answer to Question 2.

(Total for Question 2 is 7 marks)



6. (a) Sketch the curve with equation

$$y = a^x + 4$$

where a is a positive constant greater than 1

On your sketch, show

- the coordinates of the point of intersection of the curve with the y -axis
- the equation of the asymptote of the curve

(3)

x	2	2.3	2.6	2.9	3.2	3.5
y	0	0.3246	0.8629	1.6643	2.7896	4.3137

The table shows corresponding values of x and y for

$$y = 2^x - 2x$$

with the values of y given to 4 decimal places as appropriate.

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

(b) obtain an estimate for $\int_2^{3.5} (2^x - 2x) dx$, giving your answer to 2 decimal places.

(3)

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

(i) $\int_2^{3.5} (2^x + 2x) dx$

(ii) $\int_2^{3.5} (2^{x+1} - 4x) dx$

(3)



Question 6 continued

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Lined writing area for the answer to Question 6.

(Total for Question 6 is 9 marks)



Question 7 continued

Lined writing area for the answer to Question 7.

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9.

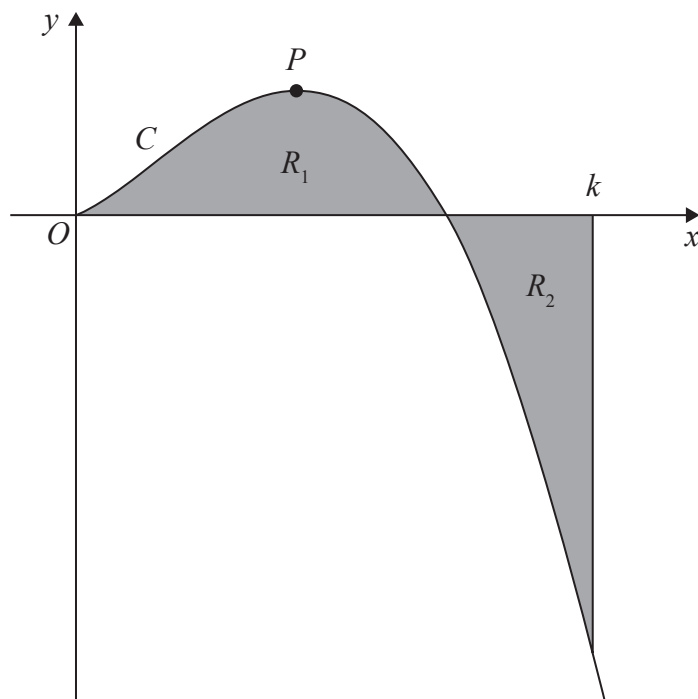


Figure 1

Figure 1 is a sketch of the curve C with equation

$$y = 2x^{\frac{3}{2}}(4 - x) \quad x \geq 0$$

The point P is the stationary point of C .

(a) Find, using calculus, the x coordinate of P .

(4)

The region R_1 , shown shaded in Figure 1, is bounded by C and the x -axis.

The region R_2 , also shown shaded in Figure 1, is bounded by C , the x -axis and the line with equation $x = k$, where k is a constant.

Given that the area of R_1 is equal to the area of R_2

(b) find, using calculus, the exact value of k .

(4)



10.

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

The number of dormice and the number of voles on an island are being monitored.

Initially there are 2000 dormice on the island.

A model predicts that the number of dormice will increase by 3% each year, so that the numbers of dormice on the island at the end of each year form a geometric sequence.

- (a) Find, according to the model, the number of dormice on the island 6 years after monitoring began. Give your answer to 3 significant figures. (2)

The number of voles on the island is being monitored over the same period of time.

Given that

- 4 years after monitoring began there were 3690 voles on the island
 - 7 years after monitoring began there were 3470 voles on the island
 - the number of voles on the island at the end of each year is modelled as a geometric sequence
- (b) find the equation of this model in the form

$$N = ab^t$$

where N is the number of voles, t years after monitoring began and a and b are constants. Give the value of a and the value of b to 2 significant figures. (3)

When $t = T$, the number of dormice on the island is equal to the number of voles on the island.

- (c) Find, according to the models, the value of T , giving your answer to one decimal place. (3)



