

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 6 November 2019

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

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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 2 continued

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Q2

(Total 6 marks)



3. (a) Find the first 4 terms, in ascending powers of x , in the binomial expansion of

$$\left(1 + \frac{x}{4}\right)^{12}$$

giving each coefficient in its simplest form.

(3)

(b) Find the term independent of x in the expansion of

$$\left(\frac{x^2 + 8}{x^5}\right)\left(1 + \frac{x}{4}\right)^{12}$$

(3)

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Question 4 continued

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Question 4 continued

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Lined writing area for Question 4.

(Total 8 marks)

Q4



5. (a) Given $0 < a < 1$, sketch the curve with equation

$$y = a^x$$

showing the coordinates of the point at which the curve crosses the y-axis.

(2)

x	2	2.5	3	3.5	4
y	4.25	6.427	9.125	12.34	16.06

The table above shows corresponding values of x and y for $y = x^2 + \left(\frac{1}{2}\right)^x$

The values of y are given to 4 significant figures as appropriate.

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

- (b) obtain an estimate for $\int_2^4 \left(x^2 + \left(\frac{1}{2}\right)^x \right) dx$

(3)

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

- (c) $\int_2^4 \left(x(x-3) + \left(\frac{1}{2}\right)^x \right) dx$

(2)



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Question 5 continued

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Q5

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(Total 7 marks)



6.

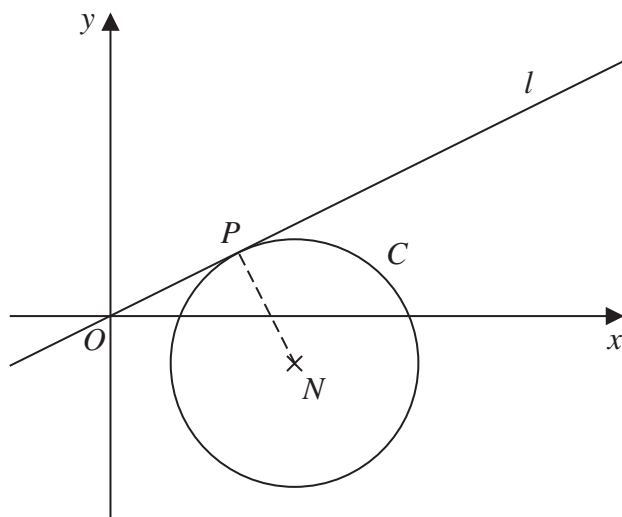


Figure 1

Figure 1 shows a sketch of a circle C with centre $N(4, -1)$.

The line l with equation $y = \frac{1}{2}x$ is a tangent to C at the point P .

Find

(a) the equation of line PN in the form $y = mx + c$, where m and c are constants, (2)

(b) the equation of C . (5)

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7. Given $\log_a b = k$, find, in simplest form in terms of k ,

(i) $\log_a \left(\frac{\sqrt{a}}{b} \right)$ (2)

(ii) $\frac{\log_a a^2 b}{\log_a b^3}$ (2)

(iii) $\sum_{n=1}^{50} (k + \log_a b^n)$ (3)

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8. Solutions relying on calculator technology are not acceptable in this question.

(i)

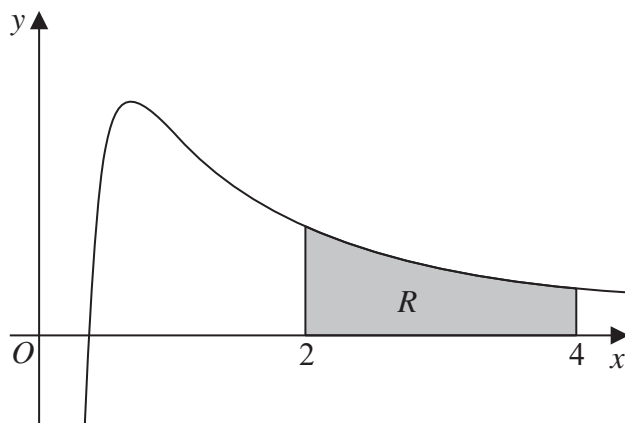


Figure 2

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

$$y = \frac{8\sqrt{x} - 5}{2x^2} \quad x > 0$$

The region R , shown shaded in Figure 2, is bounded by the curve, the line with equation $x = 2$, the x -axis and the line with equation $x = 4$

Find the exact area of R .

(5)

(ii) Find the value of the constant k such that

$$\int_{-3}^6 \left(\frac{1}{2}x^2 + k \right) dx = 55$$

(4)



Question 8 continued

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9. Solutions based entirely on graphical or numerical methods are not acceptable in this question.

(i) Solve, for $0 \leq \theta < 180^\circ$, the equation

$$3 \sin(2\theta - 10^\circ) = 1$$

giving your answers to one decimal place.

(4)

(ii) The first three terms of an arithmetic sequence are

$$\sin \alpha, \frac{1}{\tan \alpha} \text{ and } 2 \sin \alpha$$

where α is a constant.

(a) Show that $2 \cos \alpha = 3 \sin^2 \alpha$

(3)

Given that $\pi < \alpha < 2\pi$,

(b) find, showing all working, the value of α to 3 decimal places.

(5)

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Question 9 continued

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Q9

(Total 12 marks)



