

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel		Centre Number	Candidate Number
International			
Advanced Level			
Time 1 hour 30 minutes	Paper reference	WMA14/01	
Mathematics International Advanced Level Pure Mathematics P4			
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 ►





Question 1 continued

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Question 1 continued

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Q1

(Total 7 marks)



Question 2 continued

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Q2

(Total 7 marks)



A diagram of a bowl with a height of 20 cm. Inside the bowl, there is a smaller shaded bowl with a height of h cm.

Figure 2

The bowl is initially empty and water starts flowing into the bowl.

When the depth of water is h cm, the volume of water in the bowl, V cm³, is modelled by the equation

$$V = \frac{1}{3} h^2 (h + 4) \quad 0 \leq h \leq 20$$

Given that the water flows into the bowl at a constant rate of $160 \text{ cm}^3 \text{ s}^{-1}$, find, according to the model,

- (a) the time taken to fill the bowl, (2)
- (b) the rate of change of the depth of the water, in cm s^{-1} , when $h = 5$ (5)

Question 3 continued

Handwriting practice area with 25 horizontal lines.

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Question 3 continued

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Question 3 continued

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(Total 7 marks)

Q3



4. Use algebraic integration and the substitution $u = \sqrt{x}$ to find the exact value of

$$\int_1^4 \frac{10}{5x + 2x\sqrt{x}} dx$$

Write your answer in the form $4\ln\left(\frac{a}{b}\right)$, where a and b are integers to be found.

(Solutions relying entirely on calculator technology are not acceptable.)

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Question 4 continued

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Question 4 continued

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Q4

(Total 8 marks)



Question 5 continued

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Q5

(Total 9 marks)



6.

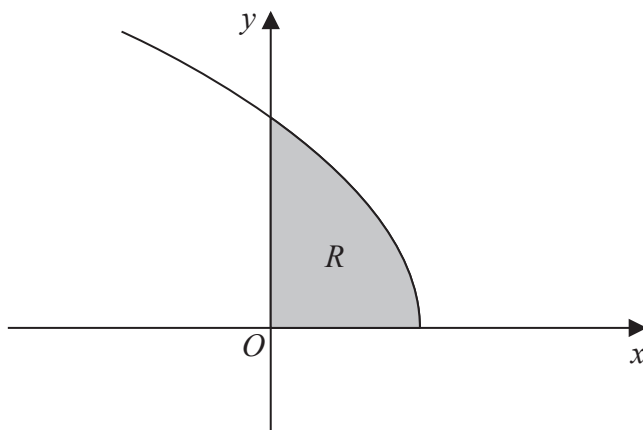


Figure 3

Figure 3 shows a sketch of the curve C with parametric equations

$$x = 2 \cos 2t \quad y = 4 \sin t \quad 0 \leq t \leq \frac{\pi}{2}$$

The region R , shown shaded in Figure 3, is bounded by the curve, the x -axis and the y -axis.

- (a) (i) Show, making your working clear, that the area of $R = \int_0^{\frac{\pi}{4}} 32 \sin^2 t \cos t \, dt$
- (ii) Hence find, by algebraic integration, the exact value of the area of R . (6)
- (b) Show that all points on C satisfy $y = \sqrt{ax + b}$, where a and b are constants to be found. (3)

The curve C has equation $y = f(x)$ where f is the function

$$f(x) = \sqrt{ax + b} \quad -2 \leq x \leq 2$$

and a and b are the constants found in part (b).

- (c) State the range of f . (1)



Question 6 continued

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Question 6 continued

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Question 6 continued

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Lined area for writing the answer to Question 6.

Q6

Grading boxes for Question 6.

(Total 10 marks)





Question 7 continued

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Question 7 continued

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Lined area for writing the answer to Question 7.

(Total 10 marks)

Q7



8. (a) Given that $y = 1$ at $x = 0$, solve the differential equation

$$\frac{dy}{dx} = \frac{6xy^{\frac{1}{3}}}{e^{2x}} \quad y \geq 0$$

giving your answer in the form $y^2 = g(x)$.

(7)

- (b) Hence find the equation of the horizontal asymptote to the curve with equation $y^2 = g(x)$.

(2)

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Question 8 continued

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Question 8 continued

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(Total 9 marks)

Q8



- Given $AB:AC = 1:3$ show that

(ii) Given that $n \in \mathbb{N}$, prove by contradiction that if n^2 is a multiple of 3 then n is a multiple of 3

(5)

[illegible]

Question 9 continued

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Question 9 continued

Handwriting practice lines for Question 9.

Q9

Mark box for Q9

(Total 8 marks)

TOTAL FOR PAPER IS 75 MARKS

END

