

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

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.

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- $$\frac{2}{\sqrt{9-2x}} \quad |x| < \frac{9}{2}$$

(5)

(2)



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Question 1 continued

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Q1

(Total 7 marks)



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2. The curve C has parametric equations

$$x = \frac{t^4}{2t+1} \quad y = \frac{t^3}{2t+1} \quad t > 0$$

(a) Write down $\frac{x}{y}$ in terms of t , giving your answer in simplest form.

(1)

(b) Hence show that all points on C satisfy the equation

$$x^3 - 2xy^3 - y^4 = 0$$

(3)

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DO NOT WRITE IN THIS AREA



$$3y^2 - 11x^2 + 11xy = 20y - 36x + 28$$

- (5)

Given that $k < 0$

- (5)



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6. Use integration by parts to show that

$$\int e^{2x} \cos 3x \, dx = pe^{2x} \sin 3x + qe^{2x} \cos 3x + k$$

where p and q are rational numbers to be found and k is an arbitrary constant.

(6)

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8. Use proof by contradiction to prove that, for all positive real numbers x and y ,

$$\frac{9x}{y} + \frac{y}{x} \geq 6$$

(4)

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9.

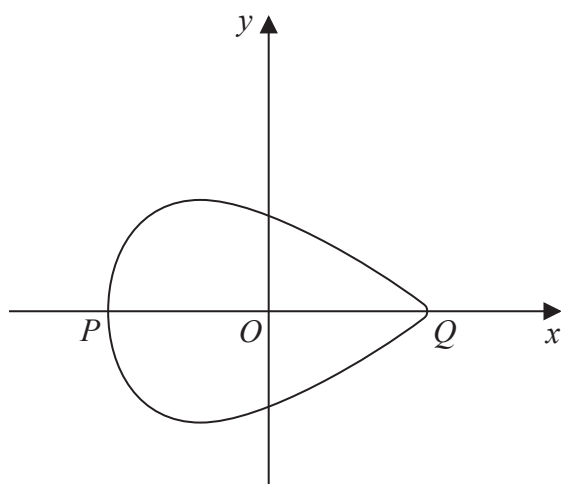


Figure 1

Figure 1 shows a sketch of a closed curve with parametric equations

$$x = 5 \cos \theta \quad y = 3 \sin \theta - \sin 2\theta \quad 0 \leq \theta < 2\pi$$

The region enclosed by the curve is rotated through π radians about the x -axis to form a solid of revolution.

- (a) Show that the volume, V , of the solid of revolution is given by

$$V = 5\pi \int_{\alpha}^{\beta} \sin^3 \theta (3 - 2 \cos \theta)^2 \, d\theta$$

where α and β are constants to be found.

(4)

- (b) Use the substitution $u = \cos \theta$ and algebraic integration to show that $V = k\pi$ where k is a rational number to be found.

(7)



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