Please check the examination details below before enter	ering your candidate information
Candidate surname	Other names
Centre Number Candidate Number	
Pearson Edexcel Internation	al Advanced Level
Time 1 hour 30 minutes Paper reference	WMA14/01
Mathematics	00
International Advanced Level	_
Pure Mathematics P4	
Pure Mathematics P4	
You must have: Mathematical Formulae and Statistical Tables (Ye	Total Marks
matternation Formation and Statistical Tables (Fe	

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.

Instruc**tions**

- 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.

Turn over ▶







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

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

giving each coefficient as a simplified fraction.

(5)

By substituting x = 1 into the answer to part (a),

(b) find an approximation for $\sqrt{7}$, giving your answer to 4 decimal places.

(2)





	Leave blank
Question 1 continued	
	Q1
(Total 7 marks)	





2. The curve C has parametric equations

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

(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)





3. The curve C has equation

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

(a) Find, in simplest form, $\frac{dy}{dx}$ in terms of x and y.

(5)

The point P(4, k), where k is a constant, lies on C.

Given that k < 0

(b) find the value of the gradient of C at P

(5)





4.

$$f(x) = \frac{4 - 4x}{x(x - 2)^2} \qquad x > 2$$

(a) Express f(x) in partial fractions.

(4)

(b) Hence find $\int f(x) dx$

(3)

(c) Find

$$\int_3^5 f(x) \, \mathrm{d}x$$

giving your answer in the form $a + \ln b$, where a and b are rational numbers to be found.

(2)





5. With respect to a fixed origin O, the lines l_1 and l_2 are given by the equations

$$l_1: \mathbf{r} = \begin{pmatrix} 4 \\ 4 \\ -5 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -3 \\ 6 \end{pmatrix} \qquad l_2: \mathbf{r} = \begin{pmatrix} 13 \\ -1 \\ 4 \end{pmatrix} + \mu \begin{pmatrix} 5 \\ 1 \\ -3 \end{pmatrix}$$

where λ and μ are scalar parameters.

- (a) Show that l_1 and l_2 meet and find the position vector of their point of intersection A.
- (b) Find the acute angle between l_1 and l_2 , giving your answer in degrees to one decimal place.

(3)

(4)

A circle with centre A and radius 35 cuts the line l_1 at the points P and Q.

Given that the x coordinate of P is greater than the x coordinate of Q,

(c) find the coordinates of P and the coordinates of Q.





6. Use integration by parts to show that

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

****		~ ~ ~	motion ol	4033400 10 0400	+- 1	formal		1- 10 000	arbitrary	a a sa a ta sa t
where	<i>n</i> and	<i>u</i> are	rationai	numbers	to be	Touna	and I	k is ai	arbitrary	constant
		7								

	-	`
- 1	6	. 1
٠,	v	,,





7. Water is flowing into a large container and is leaking from a hole at the base of the container.

At time t seconds after the water starts to flow, the volume, $V \, \text{cm}^3$, of water in the container is modelled by the differential equation

$$\frac{\mathrm{d}V}{\mathrm{d}t} = 300 - kV$$

where k is a constant.

(a) Solve the differential equation to show that, according to the model,

$$V = \frac{300}{k} + Ae^{-kt}$$

where A is a constant.

(5)

Given that the container is initially empty and that when t = 10, the volume of water is increasing at a rate of $200 \,\mathrm{cm}^3 \,\mathrm{s}^{-1}$

(b) find the exact value of k.

(4)

(c) Hence find, according to the model, the time taken for the volume of water in the container to reach 6 litres. Give your answer to the nearest second.

(2)





$\frac{9x}{y} + \frac{y}{x} \geqslant 6$	9x v			
		$\frac{-}{v} + \frac{c}{x} \geqslant 6$		
		, .,		



9.

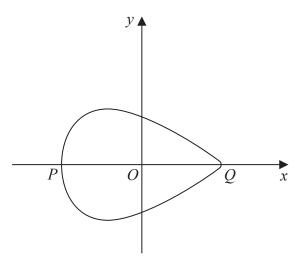


Figure 1

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

$$x = 5\cos\theta$$
 y

$$y = 3\sin\theta - \sin 2\theta$$

$$0 \leqslant \theta < 2\pi$$

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)



Please check the examination details below before entering your candidate information					
Candidate surname	Other names				
Centre Number Candidate Number					
Pearson Edexcel International Advanced Level					
Time 1 hour 30 minutes Paper reference	WMA14/01				
Mathematics					
International Advanced Level					
Pure Mathematics P4					
Pure Mathematics P4.					
You must have:					
You must have: Mathematical Formulae and Statistical Tables (Yellow), calculator Total Marks					
Mathematical Formulae and Statistical Tables (1e	illow), calculator				

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.

Turn over ▶



P66648A
©2022 Pearson Education Ltd.

