Write your name here Surname	Other na	mes
Pearson Edexcel GCE	Centre Number	Candidate Number
Further F Mathema Advanced/Advance	atics FP2	
Wednesday 7 June 2017 Time: 1 hour 30 minute	•	Paper Reference 6668/01
You must have: Mathematical Formulae and	Statistical Tables (Pink)	Total Marks

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. 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). Coloured pencils and highlighter pens must not be used.
- 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.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information

- 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 guestion.

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.

Turn over ▶



(3)

1. (a) Show that, for r > 0

$$\frac{1}{r^2} - \frac{1}{(r+1)^2} \equiv \frac{2r+1}{r^2(r+1)^2}$$
 (1)

(b) Hence prove that, for $n \in \mathbb{N}$

$$\sum_{r=1}^{n} \frac{2r+1}{r^2(r+1)^2} = \frac{n(n+2)}{(n+1)^2}$$
 (3)

(c) Show that, for $n \in \mathbb{N}$, n > 1

$$\sum_{r=n}^{3n} \frac{6r+3}{r^2(r+1)^2} = \frac{an^2 + bn + c}{n^2(3n+1)^2}$$

where a, b and c are constants to be found.

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Question 1 continued	

Question 1 continued	Leave blank
	Q1
(Total 7 marks)	



2.	Use algebra to find the set of value	es of x for which	
	3	$\frac{x-2}{(x+2)} \leqslant \frac{12}{x(x+2)}$	
	$\overline{2}$	$\frac{1}{(x+2)} \leqslant \frac{1}{x(x+2)}$	
	2((x + 2) $(x + 2)$	(9)
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	Q2
(Total 9 marks)	



3	C 1	.1		. •
3.	Solve	the	ea	uation

$z^3 + 32 + 3$	$32i\sqrt{3} = 0$
giving your answers in the form $re^{i\theta}$ where	$e r > 0$ and $-\pi < \theta \leqslant \pi$

Question 3 continued	Leave blank
Question 5 continued	
	Q3
(Total 6 marks)	
(Total o marks)	



4.

$$y = \ln\left(\frac{1}{1 - 2x}\right), \quad |x| < \frac{1}{2}$$

(a) Find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ and $\frac{d^3y}{dx^3}$

(4)

(b) Hence, or otherwise, find the series expansion of $\ln\left(\frac{1}{1-2x}\right)$ about x=0, in ascending powers of x, up to and including the term in x^3 . Give each coefficient in its simplest form.

(3)

(c) Use your expansion to find an approximate value for $\ln\left(\frac{3}{2}\right)$, giving your answer to 3 decimal places.

(3)

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Question 4 continued	

Question 4 continued	Leave blank
	Q4
(Total 10 marks)	



5. (a) Find the general solution of the differential equation

$$\frac{\mathrm{d}^2 y}{\mathrm{d}x^2} - 2\frac{\mathrm{d}y}{\mathrm{d}x} = 26\sin 3x$$

(8)

(b) Find the particular solution of this differential equation for which y = 0 and $\frac{dy}{dx} = 0$ when x = 0

(5)

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Question 5 continued	
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		Q5
	(Total 13 marks)	



(8)

6.

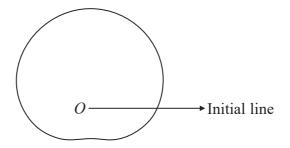


Figure 1

Figure 1 shows a sketch of a curve with polar equation

$$r = 6 + a\sin\theta$$

where $0 \le a \le 6$ and $0 \le \theta \le 2\pi$

The area enclosed by the curve is $\frac{97\pi}{2}$

Find the value of the constant *a*.

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Question 6 continued	blank
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	Q6
(Total 8 marks)	
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7. (a) Find, in the form y = f(x), the general solution of the equation

$$\cos x \frac{\mathrm{d}y}{\mathrm{d}x} + y \sin x = 2\cos^3 x \sin x + 1, \quad 0 < x < \frac{\pi}{2}$$

(8)

Given that $y = 5\sqrt{2}$ when $x = \frac{\pi}{4}$

(b) find the value of y when $x = \frac{\pi}{6}$, giving your answer in the form $a + b\sqrt{3}$, where a and b are rational numbers to be found.

(3)

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Question 7 continued	
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Question 7 continued	
	Q7
(Total 11 marks)	



8. The transformation T from the z-plane to the w-plane is given by

$$w = \frac{z + 3i}{1 + iz}, \quad z \neq i$$

The transformation T maps the circle |z| = 1 in the z-plane onto the line l in the w-plane.

(a) Find a cartesian equation of the line l.

(5)

The circle |z - a - bi| = c in the z-plane is mapped by T onto the circle |w| = 5 in the w-plane.

(b) Find the exact values of the real constants a, b and c.

(6)

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Question 8 continued	Olalik



Question 8 continued	

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Question 8 continued	



		Q8
	(Total 11 marks)	
	TOTAL FOR PAPER: 75 MARKS	
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Question 8 continued