Mathematics FP2

Examiner's use only

Team Leader's use only

1

2

3

4

5

6

7

8

Leave

Past Paper

This resource was created and owned by Pearson Edexcel

0000

Centre No.			Paper Reference			Surname	Initial(s)				
Candidate No.			6	6	6	8		0	1 R	Signature	

Paper Reference(s)

6668/01R

Edexcel GCE

Further Pure Mathematics FP2 Advanced/Advanced Subsidiary

Friday 21 June 2013 – Morning

Time: 1 hour 30 minutes

Materials required for examination
Mathematical Formulae (Pink)Items included with question papers
Nil

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 or symbolic differentiation/integration, or have retrievable mathematical formulae stored in them.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions.

You must write your answer to each question in the space following the question.

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 8 questions in this question paper. The total mark for this paper is 75.

There are 32 pages in this question paper. Any blank pages are indicated.

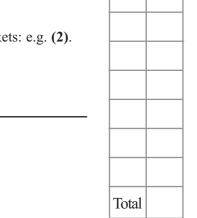
Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled. You should show sufficient working to make your methods clear to the Examiner. Answers without working may not gain full credit.

This publication may be reproduced only in accordance with Pearson Education Ltd copyright policy. ©2013 Pearson Education Ltd.

Printer's Log. No. P42955A





Turn over

PEARSON

Mathematics FP2

Past Paper

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

6668

Leave

	A transformation T from the z-plane to the w-plane is given by
	$w = \frac{z + 2i}{iz} \qquad z \neq 0$
	The transformation maps points on the real axis in the <i>z</i> -plane onto a line in the <i>w</i> -plane.
	Find an equation of this line. (4)
_	
_	

www.mystudybro.com was created and owned by Pearson Edexcel

usstian 1 continued	
uestion 1 continued	
	—

Mathematics FP2

Past Paper

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

6668

Leave	1
blank	

$\frac{6x}{3-x} > \frac{1}{x+1}$	
	(7)

Summer 2013R	www.mystudybro.com	Mathematics FI	2
Past Paper	This resource was created and owned by Pearson Edexcel	66	68
		Leav	- 1

uestion 2 continued	

nmer 2013R Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics
		Lo
Question 2 continued		bi
Question 2 continued		

www.mystudybro.com

Paper	This resource was created and owned by Pearson Edexcel	
		L
Question 2 continue	ed	
		Q2

Mathematics FP2

Past Paper

This resource was created and owned by Pearson Edexcel

Leave blank

3. (a) Express $\frac{2}{(r+1)(r+3)}$ in partial fractions.

(2)

(b) Hence show that

$$\sum_{r=1}^{n} \frac{2}{(r+1)(r+3)} = \frac{n(5n+13)}{6(n+2)(n+3)}$$

(4)

(c) Evaluate $\sum_{r=10}^{100} \frac{2}{(r+1)(r+3)}$, giving your answer to 3 significant figures.

(2)

S Pa

ummer 2013R ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP2
act apoi		Leave
Question 3 continu	ied	orank

ast Paper	This resource was created and owned by Pearson Edexcel	

	blank
Question 3 continued	
<i>Q </i>	

www.mystudybro.com

t Paper	This resource was created and owned by Pearson Edexcel	6668
		Leave
Question 3 continued		blank
Question 5 continued		
		Q3
	(TD + 3.0	
	(Total 8 ma	arks)

■ Past Paper

This resource was created and owned by Pearson Edexcel

6668

Leave blank

4. Given that

$$y\frac{\mathrm{d}^2 y}{\mathrm{d}x^2} + \left(\frac{\mathrm{d}y}{\mathrm{d}x}\right)^2 + 5y = 0$$

(a) find $\frac{d^3y}{dx^3}$ in terms of $\frac{d^2y}{dx^2}$, $\frac{dy}{dx}$ and y.

(4)

Given that y = 2 and $\frac{dy}{dx} = 2$ at x = 0

(b) find a series solution for y in ascending powers of x, up to and including the term in x^3 .

(5)

S Pa

ummer 2013R	www.mystudybro.com	Mathematics FP2
ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	6668
,		Leave
		blank
Question 4 continu	ued	

nmer 2013R Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics	66 66
Тарсі	This resource was created and owned by I carson Edexeer		Leav
			blan
Question 4 continu	ued		

www.mystudybro.com was created and owned by Pearson Edexcel

uestion 4 continued	

■ Past Paper

This resource was created and owned by Pearson Edexcel

6668

Leave blank

5. (a) Find, in the form y = f(x), the general solution of the equation

$$\frac{\mathrm{d}y}{\mathrm{d}x} + 2y \tan x = \sin 2x, \qquad 0 < x < \frac{\pi}{2}$$

(6)

Given that y = 2 at $x = \frac{\pi}{3}$

(b) find the value of y at $x = \frac{\pi}{6}$, giving your answer in the form $a + k \ln b$, where a and b are integers and k is rational.

(4)

S

nmer 2013R Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F
		Lea
Question 5 continu	ied	bla

Summer 2013R	www.mystudybro.com	Mathematic	s FP2
Past Paper	This resource was created and owned by Pearson Edexcel		6668
			Leave

	blan
Question 5 continued	

www.mystudybro.com

st Paper	This resource was created and owned by Pearson Edexcei	666
		Leave
0		blank
Question 5 contin	lued	
		Q5
	/TD / 3.40	
	(Total 10 ma	arks)

■ Past Paper

This resource was created and owned by Pearson Edexcel

Leave blank

- **6.** The complex number $z = e^{i\theta}$, where θ is real.
 - (a) Use de Moivre's theorem to show that

$$z^n + \frac{1}{z^n} = 2\cos n\theta$$

where n is a positive integer.

(2)

(5)

(b) Show that

$$\cos^5\theta = \frac{1}{16}(\cos 5\theta + 5\cos 3\theta + 10\cos \theta)$$

(c) Hence find all the solutions of

$$\cos 5\theta + 5\cos 3\theta + 12\cos \theta = 0$$

in the interval $0 \leqslant \theta < 2\pi$

(4)

S Pa

ummer 2013R ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP2
	The received had allowed and emiled by I balloon Edokool	Leave
Question 6 continue	d	blank

ummer 2013R st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP2
		Leave blank
Question 6 contin	ued	

_					_		_
Sı	ım	m	Δr	20	1	3 F	2

Question 6 continued	Le bl
Question 6 continued	
	_ _ _
	.
	(

■ Past Paper

This resource was created and owned by Pearson Edexcel

Leave

blank

7. (a) Find the value of λ for which $\lambda t^2 e^{3t}$ is a particular integral of the differential equation

 $\frac{d^2 y}{dt^2} - 6\frac{dy}{dt} + 9y = 6e^{3t}, t \ge 0$ (5)

(b) Hence find the general solution of this differential equation.

(3)

Given that when t = 0, y = 5 and $\frac{dy}{dt} = 4$

(c) find the particular solution of this differential equation, giving your solution in the form y = f(t).

(5)

nmer 2013R Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathemati	CS FP 660
црог	This resource was dicated and owned by Fearson Edexoer		Leav
			blan
Question 7 continue	ed		

ummer 2013R ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP2
	·	Leave blank
Question 7 contin	ued	bialik

www.mystudybro.com

aper	This resource was created and owned by Pearson Edexcel	
		Le bl
Question 7 continued		



Past Paper

This resource was created and owned by Pearson Edexcel

6668 Leave

blank

8.

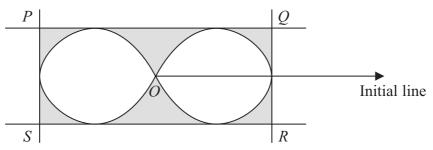


Figure 1

Figure 1 shows a closed curve C with equation

$$r = 3(\cos 2\theta)^{\frac{1}{2}}$$
, where $-\frac{\pi}{4} < \theta \leqslant \frac{\pi}{4}$, $\frac{3\pi}{4} < \theta \leqslant \frac{5\pi}{4}$

The lines PQ, SR, PS and QR are tangents to C, where PQ and SR are parallel to the initial line and PS and QR are perpendicular to the initial line. The point O is the pole.

(a) Find the total area enclosed by the curve C, shown unshaded inside the rectangle in Figure 1.

(4)

(b) Find the total area of the region bounded by the curve *C* and the four tangents, shown shaded in Figure 1.

(9)

S Pa

ummer 2013R	www.mystuaypro.com	Mathematics FP
ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	666
		Leave
		blank
Question 8 continu	red	
Question o continu	icu	

tics FP2

Summer 2013R	www.mystuaybro.com	watnematic
Past Paper	This resource was created and owned by Pearson Edexcel	

	blank
Question 8 continued	

S

nmer 2013R Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics	6668
			Leave olank
Question 8 continu	ed		June

_			
Sum	mer	201	3R

Paper	This resource was created and owned by Pearson Edexcei	6
		Lea
0	1	bla
Question 8 continued	1	
	(Total 13 ma	rks)
	TOTAL FOR PAPER: 75 MA	RKS
	END	
	DAID	