Mathematics FP1

Examiner's use only

Team Leader's use only

Question

1

2

3

4

5

6

7

8

Leave

Past Paper

This resource was created and owned by Pearson Edexcel

Centre No.				Paper Reference		Surname	Initial(s)				
Candidate No.			6	6	6	7	/	0	1	Signature	

Paper Reference(s)

6667/01

Edexcel GCE

Further Pure Mathematics FP1 Advanced/Advanced Subsidiary

Thursday 14 May 2015 – Morning

Time: 1 hour 30 minutes

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

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 28 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. ©2015 Pearson Education Ltd





Total

PEARSON

Mathematics FP1

■ Past Paper

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

6667

Leave

	$f(x) = 9x^3 - 33x^2 - 55x - 25$
	Given that $x = 5$ is a solution of the equation $f(x) = 0$, use an algebraic method to solve $f(x) = 0$ completely.
	(5)
—	
_	
_	

Sum	mor	201	F
Sum	mer	ZU	

ast Paper	This resource was created and owned by Pearson Edexcei	6667
		Leave
		blank
Question 1 con	tinued	
		Q1
	(Total 5 ma	arks)
	(10 0000 0 0000	

Mathematics FP1

■ Past Paper

This resource was created and owned by Pearson Edexcel

6667

Leave blank

2. In the interval 13 < x < 14, the equation

$$3 + x \sin\left(\frac{x}{4}\right) = 0$$
, where x is measured in radians,

has exactly one root, α .

(a) Starting with the interval [13, 14], use interval bisection twice to find an interval of width 0.25 which contains α .

(3)

(b) Use linear interpolation once on the interval [13, 14] to find an approximate value for α . Give your answer to 3 decimal places.

(4)

Sum	mer	201	ı
Sun	ımer	ZUI	

st Paper	This resource was created and owned by Pearson Edexcel	6667
		Leave
Question 2 continu	har	blank
Question 2 continu	icu	
		Q2
	(T), 4, 3, 7	wka)
	(Total 7 ma	arks)

■ Past Paper

This resource was created and owned by Pearson Edexcel

0007

blank

3. (a) Using the formulae for $\sum_{r=1}^{n} r$ and $\sum_{r=1}^{n} r^2$, show that

$$\sum_{r=1}^{n} (r+1)(r+4) = \frac{n}{3} (n+4)(n+5)$$

for all positive integers n.

(5)

(b) Hence show that

$$\sum_{r=n+1}^{2n} (r+1)(r+4) = \frac{n}{3} (n+1)(an+b)$$

where a and b are integers to be found.

(3)

Summer 2015

Mathematics FP1

www.mystudybro.comThis resource was created and owned by Pearson Edexcel Past Paper Leave blank Question 3 continued

nmer 2015 Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F
		Lea
Question 3 contin	nued	bla

Past Paper	This resource was created and owned by Pearson Edexcel	6667
	·	Leave
		blank
Question 3 continu	ued	
		Q3
	(Total 8 ma	arks)



Mathematics FP1

■ Past Paper

This resource was created and owned by Pearson Edexcel

6667

Leave blank

4. $z_1 = 3i$ and $z_2 = 3i$

$$z_1 = 3i \text{ and } z_2 = \frac{6}{1 + i\sqrt{3}}$$

(a) Express z_2 in the form a + ib, where a and b are real numbers.

(2)

- (b) Find the modulus and the argument of z_2 , giving the argument in radians in terms of π .
- (c) Show the three points representing z_1 , z_2 and $(z_1 + z_2)$ respectively, on a single Argand diagram.

(2)

Sum	mer	201	ı
Sun	ımer	ZUI	

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

ast Paper	This resource was created and owned by Pearson Edexcel	6667
		Leave blank
Question 4 cont	tinued	Dialik
		Q4
	(Total 8 m	arks)
	(Total o III	u1 133)

Mathematics FP1

■ Past Paper

This resource was created and owned by Pearson Edexcel

6667

	Leav
	blank
The rectangular hyperbola H has equation $xy = 9$	

5. The rectangular hyperbola *H* has equation xy = 9

The point A on H has coordinates $\left(6, \frac{3}{2}\right)$.

(a) Show that the normal to H at the point A has equation

$$2y - 8x + 45 = 0$$

(5)

The normal at A meets H again at the point B.

(b) Find the coordinates of B.

(4)

Summer 2015 www.mystudybro.comThis resource was created and owned by Pearson Edexcel **Mathematics FP1** Past Paper Leave blank **Question 5 continued**

nmer 2015 Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathemati	CS FF 66
•	,		Leav
			blar
Question 5 contin	nued		

Sum	mer	201	ı
Sun	ımer	ZUI	

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

st Paper	This resource was created and owned by Pearson Edexcel	666
		Leave blank
Question 5 continue	ed	biank
Anomaia 6 00110111111		
		Q5
	(Total 9 ma	arks)

Mathematics FP1

■ Past Paper

This resource was created and owned by Pearson Edexcel

0007

Leave blank

6. (i) Prove by induction that, for $n \in \mathbb{Z}^+$,

$$\begin{pmatrix} 1 & 0 \\ -1 & 5 \end{pmatrix}^n = \begin{pmatrix} 1 & 0 \\ -\frac{1}{4}(5^n - 1) & 5^n \end{pmatrix}$$

(6)

(ii) Prove by induction that, for $n \in \mathbb{Z}^+$,

$$\sum_{r=1}^{n} (2r-1)^{2} = \frac{1}{3} n (4n^{2} - 1)$$

(6)

S Pa

ummer 2015 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP1
	,	Leave
Overtion 6 centi	nuod	blank
Question 6 conti	nuea	

bummer 2015	www.mystudybro.com	watnematic	SFF
Past Paper	This resource was created and owned by Pearson Edexcel		666
			_

Question 6 continued	b

Sum	mer	201	ı
Sun	ımer	ZUI	

st Paper	This resource was created and owned by Pearson Edexcei	6667
		Leave
Question 6 continue	d	blank
Question o continue	ou .	
		—
		Q6
	(Total 12 ma	rks)

■ Past Paper

This resource was created and owned by Pearson Edexcel

Leave blank

7. (i) $\mathbf{A} = \begin{pmatrix} 5k & 3k-1 \\ -3 & k+1 \end{pmatrix}$, where k is a real constant.

Given that A is a singular matrix, find the possible values of k.

(4)

(ii)
$$\mathbf{B} = \begin{pmatrix} 10 & 5 \\ -3 & 3 \end{pmatrix}$$

A triangle T is transformed onto a triangle T' by the transformation represented by the matrix \mathbf{B} .

The vertices of triangle T' have coordinates (0, 0), (-20, 6) and (10c, 6c), where c is a positive constant.

The area of triangle T' is 135 square units.

(a) Find the matrix \mathbf{B}^{-1}

(2)

(b) Find the coordinates of the vertices of the triangle T, in terms of c where necessary.

(3)

(c) Find the value of c.

(3)

mmer 2015 st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP
·	•	Leave
0 " 7 "		blank
Question 7 continu	ued	



Summer 2015	www.mystudybro.com	Mathematic	s FP1
Past Paper	This resource was created and owned by Pearson Edexcel		6667
			Leave

	blank
Question 7 continued	Olalik
Question / continued	

Sum	mor	201	F
Sum	mer	ZU	

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

		L
		b
Question 7 continued		
		(
	(Total 12 marks)	1

Leave

blank

The point $P(3p^2, 6p)$ lies on the parabola with equation $y^2 = 12x$ and the point S is the focus of this parabola.

(a) Prove that $SP = 3(1 + p^2)$

(3)

The point $Q(3q^2, 6q)$, $p \neq q$, also lies on this parabola.

The tangent to the parabola at the point P and the tangent to the parabola at the point Qmeet at the point R.

(b) Find the equations of these two tangents and hence find the coordinates of the point R, giving the coordinates in their simplest form.

(8)

(c) Prove that $SR^2 = SP. SQ$

(3)



S Pa

ummer 2015 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP 666
		Leave blank
Question 8 continued		

n mer 2015 Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F
		Le
Question 8 continu	ied	bla
C		

S Pa

Summer 2015 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics FP1
		Leave
Question 8 contin	nued	blank

Sı				20	4	1
-51	ım	m	er	Z U) [-

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

apei	This resource was created and owned by Fearson Edexcer	
		L
		b
Question 8 continued		
		-
		.
		.
		-
		-
		.
		.
		-
		.
		-
		-
		.
		-
		-
		.
		.
		-
		·
		.
		-
		-
		.
		-
		-
		-
		. -
	(Total 14 marks)	,
	(Total 14 marks)	
	(Total 14 marks) TOTAL FOR PAPER: 75 MARKS END	