Mathematics F1

Past Paper

This resource was created and owned by Pearson Edexcel

WFM01

Write your name here		
Surname	Other nar	mes
Pearson Edexcel International Advanced Level	Centre Number	Candidate Number
Further Pu Mathemated/Advance	tics F1	
Monday 23 June 2014 – Mo Time: 1 hour 30 minutes	orning	Paper Reference WFM01/01

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 quide 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.

P 4 4 9 6 5 A 0 1 3 2

Turn over ▶



■ Pas

mmer 2014 t Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Matnematics i WFM	
1. Find the value	e of $\sum_{r=1}^{200} (r+1)(r-1)$	Leave blank	
	/	(4)	

2

_					
Su	ım	m	er	201	14

aper	This resource was created and owned by Pearson Edexcel	
Question 1 continu	ed	
		——
		——

**Mathematics F1** 

■ Past Paper

This resource was created and owned by Pearson Edexcel

WFM01

Leave	1
blank	

$$z^2 + pz + q = 0$$

where p and q are real constants,

(a) write down the other root of the equation.

(1)

(b) Find the value of p and the value of q.

**(3)** 

_					
Su	ım	m	er	201	14

ast Paper	This resource was created and owned by Pearson Edexcel	WFM0
		Leave blank
Question 2 contin	ued	
		Q2
	(Total 4 m	arks)



**Mathematics F1** 

This resource was created and owned by Pearson Edexcel

WFM01

blank

3.

■ Past Paper

$$\mathbf{A} = \begin{pmatrix} 4 & -2 \\ a & -3 \end{pmatrix}$$

where a is a real constant and  $a \neq 6$ 

(a) Find  $A^{-1}$  in terms of a.

(3)

Given that  $\mathbf{A} + 2\mathbf{A}^{-1} = \mathbf{I}$ , where  $\mathbf{I}$  is the 2 × 2 identity matrix,

(b) find the value of *a*.

**(3)** 

Ç,	ım	m	۵r	20	<b>Ո</b> 1	1
Jι	1111	ш	ei.	~	U	4

Past Paper	This resource was created and owned by Pearson Edexcel	WFM01
		Leave
		blank
Question 3 continued		
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		Q3
		— Y
	(Total 6 mark	(s)
-	( Total V main	.51

This resource was created and owned by Pearson Edexcel

WFM01

Leave

blank

4.

■ Past Paper

$$f(x) = x^{\frac{3}{2}} - 3x^{\frac{1}{2}} - 3, \quad x > 0$$

Given that  $\alpha$  is the only real root of the equation f(x) = 0,

(a) show that  $4 < \alpha < 5$ 

**(2)** 

(b) Taking 4.5 as a first approximation to  $\alpha$ , apply the Newton-Raphson procedure once to f(x) to find a second approximation to  $\alpha$ , giving your answer to 3 decimal places.

**(5)** 

(c) Use linear interpolation once on the interval [4, 5] to find another approximation to  $\alpha$ , giving your answer to 3 decimal places.

(3)

<b>Summer</b>	201	4
Past Paper		

nmer 2014 Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics WF
		Le
Question 4 continued	I	

Summe	r 201/
Summe	1 ZU 14

st Paper	This resource was created and owned by Pearson Edexcel	WFM0
Question 4 continu	ad.	Leave blank
Question 4 continue	eu	

Sum		204	4
Sum	mer	<b>Z</b> U1	4

apei	This resource was created and owned by Fearson Edexcei	VVFI
		Lea
		bla
Question 4 continued		
		C
	(Total 10 marks)	1

■ Past Paper

**www.mystudybro.com**This resource was created and owned by Pearson Edexcel

WFM01

	Given that $z_1 = -3 - 4i$ and $z_2 = 4 - 3i$	
	(a) show, on an Argand diagram, the point $P$ representing $z_1$ and the point $Q$ representing	$\log z_2$
		(2)
	(b) Given that <i>O</i> is the origin, show that <i>OP</i> is perpendicular to <i>OQ</i> .	
	(b) Given that O is the origin, show that O is perpendicular to OQ.	(2)
	(c) Show the point $R$ on your diagram, where $R$ represents $z_1 + z_2$	(1)
	(I) Post of Copper	` '
	(d) Prove that <i>OPRQ</i> is a square.	(2)
		(-)
-		

Sum	mar	201	1
Juli	IIIEI	<b>Z</b> U I	4

st Paper	This resource was created and owned by Pearson Edexcel	WFM0 <sup>2</sup>
		Leave
Question 5 conti	nued	blank
<b>Z</b>		

Summe	r 201/
Summe	1 ZU 14

ummer 2014 st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F <sup>2</sup> WFM0
straper	This resource was created and owned by I carson Edexect	Leave
Question 5 continue	d	blank

Sum	mar	201	1
Juli	IIIEI	<b>Z</b> U I	4

Past Paper	This resource was created and owned by Pearson Edexcel	WFM01
		Leave blank
Question 5 continue	d	biank
		Q5
	(T-4-17	amba)
	(Total 7 m	arks)

■ Past Paper

**www.mystudybro.com**This resource was created and owned by Pearson Edexcel

WFM01

	(a)	Find the exact value of $\alpha^3 + \beta^3$	
			(3)
	(b)	Find a quadratic equation which has roots $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$ , giving your answer in the	e
		form $ax^2 + bx + c = 0$ , where a, b and c are integers.	<b>(=</b> )
			(5)
_			

0		004	4
Sum	mer	<b>Z</b> U1	4

ast Paper	This resource was created and owned by Pearson Edexcel	WFM0
		Leave blank
Question 6 continued	I	biank

Sum	mar	2014
Juli	IIIEI	<b>ZUI</b> 4

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

ast Paper	This resource was created and owned by Pearson Edexcel	WFM
		Leav
Question 6 continued		blan
Z. 100001011 0 001101111100		
		-

Sι	ım	m	۸r	20	14	1
Эι.	ım	m	er	Ζl	ľ	4

Past Paper	This resource was created and owned by Pearson Edexcel	WFM01
		Leave
Question 6 continued	1	blank
Question o continued		
		Q6
	(Total 8 ma	rks)
	(Total o mai	1113)

**Mathematics F1** 

This resource was created and owned by Pearson Edexcel

WFM01

Leave blank

7.

Past Paper

$$\mathbf{P} = \begin{pmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix}$$

(a) Describe fully the single geometrical transformation U represented by the matrix  $\mathbf{P}$ .

(3)

The transformation V, represented by the  $2 \times 2$  matrix  $\mathbf{Q}$ , is a reflection in the x-axis.

(b) Write down the matrix  $\mathbf{Q}$ .

**(1)** 

Given that V followed by U is the transformation T, which is represented by the matrix  $\mathbf{R}$ ,

(c) find the matrix  $\mathbf{R}$ .

**(2)** 

(d) Show that there is a real number k for which the transformation T maps the point (1, k) onto itself. Give the exact value of k in its simplest form.

**(5)** 

_			_
Sum	mer	201	4

mmer 2014 t Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F <sup>2</sup> WFM0
τι αρει	This resource was created and owned by I carson Edexeer	Leave
Overtion 7 conti	in and	blank
Question 7 conti	inued	

Sum	mar	2014
Juli	IIIEI	<b>ZUI</b> 4

Summer 2014 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F <sup>2</sup>
чит прог	This resource was created and owned by I earson Eucklei	Leave
Question 7 continu	ned	

Sur	~ ~	<b>^</b>	20	4 4	
Sur	nm	er	ZU	14	

apei	This resource was created and owned by Fearson Edexcer	
		Le
		bla
Question 7 continued		
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
	(Total 11 mark	

**Mathematics F1** 

■ Past Paper

**www.mystudybro.com**This resource was created and owned by Pearson Edexcel

WFM01

		Lea
8.	The hyperbola $H$ has cartesian equation $xy = 16$	Dia
	The parabola P has parametric equations $x = 8t^2$ , $y = 16t$ .	
	(a) Find, using algebra, the coordinates of the point A where H meets P.	
		(3)
	Another point $B(8, 2)$ lies on the hyperbola $H$ .	
	(b) Find the equation of the normal to $H$ at the point $(8, 2)$ , giving your answer in the form	orm
	y = mx + c, where m and c are constants.	(5)
		(5)
	(c) Find the coordinates of the points where this normal at $B$ meets the parabola $P$ .	
		(6)
_		
		_
		_

0		004	4
Sum	mer	<b>Z</b> U1	4

: Paper	This resource was created and owned by Pearson Edexcel	WFM
		Leav blan
Question 8 continued		

Summe	r 201/
Summe	1 ZU 14

st Paper	This resource was created and owned by Pearson Edexcel	WFM0
		Leave blank
Question 8 continued		

Sum		204	4
Sum	mer	<b>Z</b> U1	4

Past Paper	This resource was created and owned by Pearson Edexcel	WFM01
		Leave
	1	blank
Question 8 continue	d	
		—
		Q8
	(Total 14 mar)	ke)
	(10131 14 11131)	N3)

**Mathematics F1** 

■ Past Paper This resource was created and owned by Pearson Edexcel

WFM01

Leave blank

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

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

**(5)** 

(ii) Prove by induction that,

 $4^n + 6n + 8$  is divisible by 18

for all positive integers n.

**(6)** 

0		004	4
Sum	mer	<b>Z</b> U1	4

mmer 2014 t Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics F
	,	Leave blank
Question 9 continu	ed	Ulalik

Sum	mar	2014
Juli	IIIEI	<b>ZUI</b> 4

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

ast Paper	This resource was created and owned by Pearson Edexcel	WFN
		Lea blar
Question 9 continued	d	

Ç,	ım	m	۵r	20	1	1
Jι	1111	ш	ei.	Z	J I	4

t Paper	This resource was created and owned by Pearson Edexcel	WFM0 <sup>2</sup>
		Leave
Question 9 continu	ied	blank
&monor > 00110111		

Q.	ım	m	٥r	20	1	,
.51	ım	m	er	<b>Z</b> U	1	4

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

Question 9 continued	apei	This resource was created and owned by Fearson Edexcer	VVFIVIO
Question 9 continued  (Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			Leave
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS	0 4: 0 4:	1	blank
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS	Question 9 continue	a a constant of the constant o	
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			-
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			-
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			-
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			-
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_
(Total 11 marks)  TOTAL FOR PAPER: 75 MARKS			_ Q9
TOTAL FOR PAPER: 75 MARKS		(T) 4 144 1	
END			.8
!		END	