Mathematics C4

Past Paper

This resource was created and owned by Pearson Edexcel

6666

Centre No.					Pape	er Refer	ence			Surname	Initial(s)
Candidate No.			6	6	6	6	/	0	1	Signature	

Paper Reference(s)

6666/01

Edexcel GCE

Core Mathematics C4 Advanced Level

Tuesday 28 June 2005 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination

Items included with question papers

Mathematical Formulae (Green)

Nil

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration. Thus candidates may NOT use calculators such as the Texas Instruments TI 89, TI 92, Casio CFX 9970G, Hewlett Packard HP 48G.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

Check that you have the correct question paper.

You must write your answer for 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 24 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 must show sufficient working to make your methods clear to the Examiner. Answers without working may gain no credit.

This publication may be reproduced only in accordance with Edexcel Limited copyright policy.

©2005 Edexcel Limited.

 $\begin{array}{c} \text{Printer's Log. No.} \\ N20232B \\ \text{W850/R66666/57570} & 7/3/3/3/3 \end{array}$



Turn over

Total



Examiner's use only

Team Leader's use only

Question

Leave

■ Past Paper

This resource was created and owned by Pearson Edexcel

6666

Leave blank

1. Use the binomial theorem to expand

$$\sqrt{(4-9x)}, \qquad |x| < \frac{4}{9},$$

in ascending powers of x, up to and including the term in x^3 , simplifying each term.

(5)

Q1

(Total 5 marks)

Past Paper

This resource was created and owned by Pearson Edexcel

Leave

blank

2.	A curve l	has equation
----	-----------	--------------

$$x^2 + 2xy - 3y^2 + 16 = 0.$$

Find the coordinates of the points on the curve where $\frac{dy}{dx} = 0$.

(7)

Q2

(Total 7 marks)

■ Past Paper

This resource was created and owned by Pearson Edexcel

6666

Leave blank

3.	(a)	Express	$\frac{5x+3}{(2x+3)(2x+3)}$	in partial fractions.	
			(2x-3)(x+2)	(3	3)

(b) Hence find the exact value of $\int_{2}^{6} \frac{5x+3}{(2-3)(x+2)} dx$, giving your answer as a single

	$J_2(2x-3)(x+2)$	2
logarithm.		
logaritimi.		(-
		(5)

Ç,	ım	mei	· 20	ns
. 31.		mei	ZU	US

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

aper	This resource was created and owned by Pearson Edexcel	
Question 3 continu	ed	
Question e commu		

■ Past Paper

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

\sim	^	^	-
n	n	n	n

Leave)
olank	ı

Use the substitution $x = \sin \theta$ to find the exact $\int_0^{\frac{1}{2}} \frac{1}{(1-x^2)^{\frac{3}{2}}}$	
	(7)

6

Summer	2005
Past Paper	

ummer 2005 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics C4
st Paper	This resource was created and owned by Fearson Edexcer	Leave
Question 4 continu	hau	blank
Question 4 continu	acu -	
		04

(Total 7 marks)

Leave blank

5.

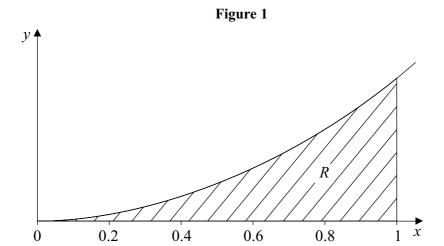


Figure 1 shows the graph of the curve with equation

$$y = xe^{2x}, \qquad x \geqslant 0.$$

The finite region R bounded by the lines x = 1, the x-axis and the curve is shown shaded in Figure 1.

(a) Use integration to find the exact value for the area of R.

(5)

(b) Complete the table with the values of y corresponding to x = 0.4 and 0.8.

X	0	0.2	0.4	0.6	0.8	1
$y = xe^{2x}$	0	0.29836		1.99207		7.38906

(1)

(c) Use the trapezium rule with all the values in the table to find an approximate value for this area, giving your answer to 4 significant figures.

(4)

Summer 2005

www.mystudybro.con

Julillier 2003	www.mystudybro.com	Mathematics 64
Past Paper	This resource was created and owned by Pearson Edexcel	6666

Juiiiioi 2000	······································
Past Paper	This resource was created and owned by Pearson Edexce

Paper	This resource was created and owned by Pearson Edexcel	666
		Leave
		blank
Question 5 cor	ntinued	

Q.	ım	mer	20	ΛF
ઝ ા	m	mer	ZU	Uə

ipei	This resource was created and owned by Fearson Edexcer	
Question 5 continu	ed	

Past Paper

This resource was created and owned by Pearson Edexcel

6666

Leave blank

6. A curve has parametric equations

$$x = 2 \cot t$$
, $y = 2 \sin^2 t$, $0 < t \le \frac{\pi}{2}$.

(a) Find an expression for $\frac{dy}{dx}$ in terms of the parameter t.

(4)

(b) Find an equation of the tangent to the curve at the point where $t = \frac{\pi}{4}$.

(4)

(c) Find a cartesian equation of the curve in the form y = f(x). State the domain on which the curve is defined.

(4)

^				_	^^	_
.51	ım	m	er	7	w	

Sulliller 2005	www.iiiystuuybio.com	Maniemancs C4
Past Paper	This resource was created and owned by Pearson Edexcel	6666

	Leav blan	ve ık
Question 6 continued		

www.mvstudvbro.com

Mathematics C4

Jan 2000	
Past Paper	This resource was created and owned by Pearson Edexcel

ıatı	CS	C 4
	6	6666

Leave

	blank
Question 6 continued	
	1
	1
	1
	1
	1
	1
	1
	1
	1
	1

Sι			~=	20	M
5 1.	ım	m	er	Zι	เบร

Paper	This resource was created and owned by Pearson Edexcel	6
		Lea bla
Question 6 continue	d	Dia
Question o continue	u	
		Q
	(Total 12 ma	arks)

Leave blank

The line l_1 has vector equation

$$\mathbf{r} = \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ -1 \\ 4 \end{pmatrix}$$

and the line l_2 has vector equation

$$\mathbf{r} = \begin{pmatrix} 0 \\ 4 \\ -2 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix},$$

where λ and μ are parameters.

The lines l_1 and l_2 intersect at the point B and the acute angle between l_1 and l_2 is θ .

(a) Find the coordinates of B.

(4)

(b) Find the value of $\cos \theta$, giving your answer as a simplified fraction.

(4)

The point A, which lies on l_1 , has position vector $\mathbf{a} = 3\mathbf{i} + \mathbf{j} + 2\mathbf{k}$.

The point C, which lies on l_2 , has position vector $\mathbf{c} = 5\mathbf{i} - \mathbf{j} - 2\mathbf{k}$.

The point D is such that ABCD is a parallelogram.

(c) Show that $|\overrightarrow{AB}| = |\overrightarrow{BC}|$.

(3)

(d) Find the position vector of the point D.

(2)

c.				21	20	E
ગ	ım	m	er	Ζl	JU	Э

Julillier 2003	www.iiiystuuybio.coiii	Mathematics C4
Past Paper	This resource was created and owned by Pearson Edexcel	6666
		Leave

	,,
Past Paper	This resource was created and owned by Pearson Edexce

i apci	This resource was created and owned by I carson Edexoci	000
		Leave
		blank
Question 7 continued		
		—

Sι			~=	20	M
5 1.	ım	m	er	Zι	เบร

Immer 2005 st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics C4
or rapor	This resource was oreated and owned by I earson Edexice	Leave
Question 7 continue	d	blank
		Q7

(Total 13 marks)

Leave blank

- Liquid is pouring into a container at a constant rate of $20\,\mathrm{cm^3\,s^{-1}}$ and is leaking out at a rate proportional to the volume of liquid already in the container.
 - (a) Explain why, at time t seconds, the volume, $V \text{ cm}^3$, of liquid in the container satisfies the differential equation

$$\frac{\mathrm{d}V}{\mathrm{d}t} = 20 - kV,$$

where k is a positive constant.

(2)

The container is initially empty.

(b) By solving the differential equation, show that

$$V = A + Be^{-kt},$$

giving the values of A and B in terms of k.

(6)

Given also that $\frac{dV}{dt} = 10$ when t = 5,

(c) find the volume of liquid in the container at 10 s after the start.

(5)

_				_		_
c.	ım	m	۸r	2	NΛ	5
-			T	~	w	

Mathematics C

Leave

Julillier 2003	www.iiiystuuybio.com	Mathematics C4
Past Paper	This resource was created and owned by Pearson Edexcel	6666

Question 8 continued	blan

Question 8 continued

www.mystudybro.com

Ma

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

athematics C4				
	Leave blank			

Si			~=	20	\\
-	ım	m	Δr	71	11 15

Paper	This resource was created and owned by Pearson Edexcel	6
		Lea bla
Question 8 continue	ed	
_		
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_ _
	(Total 13 marks	s)
	TOTAL FOR PAPER: 75 MARK	
	END	
	—= · =	