Centre No.				Paper Reference 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 23 January 2007 – Afternoon

Time: 1 hour 30 minutes

Materials required	for	examination
Mathematical Formu	ılae	(Green)

Items included with question papers

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
mon actions	w	Canulates

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

Check that you have the correct question paper.

When a calculator is used, the answer should be given to an appropriate degree of accuracy. You must write your answer for each question in the space following the question.

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 20 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.

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Turn over

Total

Examiner's use only

Team Leader's use only

Question Number

2

3

4

5

6

7

8



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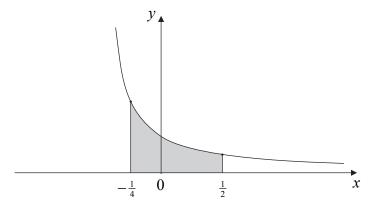
giving each coeffi	I expansion of $f(x)$, in ascending powers of x , as a ficient as a simplified fraction.	
		(5)

uestion 1 continued	

Leave blank

2.

Figure 1



The curve with equation $y = \frac{1}{3(1+2x)}$, $x > -\frac{1}{2}$, is shown in Figure 1.

The region bounded by the lines $x = -\frac{1}{4}$, $x = \frac{1}{2}$, the x-axis and the curve is shown shaded in Figure 1.

This region is rotated through 360 degrees about the *x*-axis.

(a) Use calculus to find the exact value of the volume of the solid generated.

(5)

Figure 2

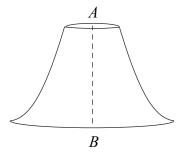


Figure 2 shows a paperweight with axis of symmetry AB where AB = 3 cm. A is a point on the top surface of the paperweight, and B is a point on the base of the paperweight. The paperweight is geometrically similar to the solid in part (a).

(b) Find the volume of this paperweight.

(2)

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3.	A curve	nas	parametric	equations

parametric equations
$$x = 7\cos t - \cos 7t, \ y = 7\sin t - \sin 7t, \qquad \frac{\pi}{8} < t < \frac{\pi}{3}.$$

(a) Find an expression for $\frac{dy}{dx}$ in terms of t. You need not simplify your answer.

(3)

(b) Find an equation of the normal to the curve at the point where $t = \frac{\pi}{6}$.

Give your answer in its simplest exact form.

(6)

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Question 3 continued	
	Q3
(Total 9 marks)	

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4. (a) Express $\frac{2x-1}{(x-1)(2x-3)}$ in partial fractions.

(3)

(b) Given that $x \ge 2$, find the general solution of the differential equation

$$(2x-3)(x-1)\frac{dy}{dx} = (2x-1)y$$
.

(5)

(c) Hence find the particular solution of this differential equation that satisfies y = 10 at x = 2, giving your answer in the form y = f(x).

(4)

estion 4 continued	

_					
5.	A set of curves	s is giver	i by the e	quation sin	$x + \cos v = 0.5$

(a)	Use implicit	differentiation	to find	an	expression	for	$\frac{\mathrm{d}y}{\mathrm{d}x}$
							$\mathbf{u}_{\mathcal{N}}$

(2)

For $-\pi < x < \pi$ and $-\pi < y < \pi$,

(b) find the coordinates of the points where $\frac{dy}{dx} = 0$.

(5)

		Lear blar
Question 5 continued		
	Q	Q 5
	(Total 7 marks)	

(2) Find the gradient of the curve with equation $y = 2^{(x^2)}$ at the point with coordinates
(2,16).
(4)

	Leav blanl
Question 6 continued	
	Q6
(Total 6 marks)	

	The point A has position vector $\mathbf{a} = 2\mathbf{i} + 2\mathbf{j} + \mathbf{k}$ and the point B has position vector $\mathbf{b} = \mathbf{i} + \mathbf{j} - 4\mathbf{k}$, relative to an origin O.
	(a) Find the position vector of the point C , with position vector \mathbf{c} , given by
	$\mathbf{c} = \mathbf{a} + \mathbf{b}$.
	(1)
	(b) Show that <i>OACB</i> is a rectangle, and find its exact area.
	(6)
	The diagonals of the rectangle, AB and OC , meet at the point D .
	(c) Write down the position vector of the point <i>D</i> .
	(1)
	(d) Find the size of the angle ADC.
	(6)
_	

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Question 7 continued	

uestion 7 continued		

Question 7 continued	L bi
Question / continued	
(Total 14 marks)	

8.

$$I = \int_0^5 e^{\sqrt{(3x+1)}} \, \mathrm{d}x.$$

(a) Given that $y = e^{\sqrt{3x+1}}$, complete the table with the values of y corresponding to x = 2, 3 and 4.

X	0	1	2	3	4	5
y	e^1	e^2				e^4

(2)

(b) Use the trapezium rule, with all the values of y in the completed table, to obtain an estimate for the original integral *I*, giving your answer to 4 significant figures.

(3)

(c) Use the substitution $t = \sqrt{(3x+1)}$ to show that I may be expressed as $\int_a^b kte^t dt$, giving the values of a, b and k.

(5)

(d) Use integration by parts to evaluate this integral, and hence find the value of I correct to 4 significant figures, showing all the steps in your working.

(5)

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Question 8 continued	

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Question 8 continued		
		Q8
	(Total 15 marks)	
	TOTAL FOR PAPER: 75 MARKS	
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