Centre No.					Pape	er Refer	ence			Surname	Initial(s)
Candidate No.			6	6	6	5	/	0	1	Signature	

Paper Reference(s)

6665/01

Edexcel GCE

Core Mathematics C3 Advanced

Monday 23 January 2012 - Morning

Time: 1 hour 30 minutes

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

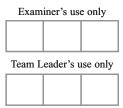
Advice to Candidates

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

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Question Number	Leave Blank
1	
2	
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8	

Turn over

Total

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. Differentiate with respect to x , giving your answer in its simplest for	m,
(a) $x^2 \ln(3x)$	(4)
(b) $\frac{\sin 4x}{x^3}$	(5)

	Leave
Question 1 continued	blank
	Q1
(Total 9 marks)	



2.

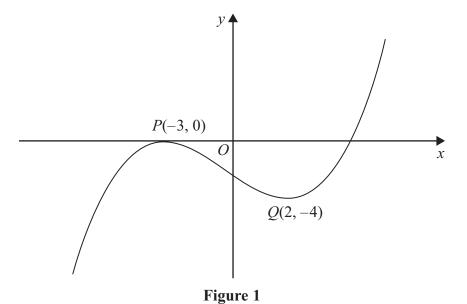


Figure 1 shows the graph of equation y = f(x).

The points P(-3, 0) and Q(2, -4) are stationary points on the graph.

Sketch, on separate diagrams, the graphs of

(a)
$$y = 3f(x+2)$$

(b)
$$y = |f(x)|$$

On each diagram, show the coordinates of any stationary points.

Question 2 continued	Leave blank
Question 2 continued	
	Q2
(Total 6 marks)	

	www.yesterdaysmathsexam.com				
3.	The area, $A \text{ mm}^2$, of a bacterial culture growing in milk, t hours after midday, is given by				
	$A = 20 e^{1.5t}, t \geqslant 0$				
	(a) Write down the area of the culture at midday. (1)				
	(b) Find the time at which the area of the culture is twice its area at midday. Give your answer to the nearest minute.				
	(5)				

estion 3 continued	

	d an equation of the normal to the curve at D	
ГШ	d an equation of the normal to the curve at <i>P</i> .	(7)

stion 4 continued	

$2\cot^2 3\theta = 7\csc 3\theta - 5$	
Give your answers in degrees to 1 decimal place.	
21.2 Jour and word in degrees to 1 decimal place.	(10)

Question 5 continued	blank
	Q5
(Total 10 marks)	

6. $f(x) = x^2 - 3x + 2\cos(\frac{1}{2}x), \quad 0 \le x \le \pi$

The curve with equation y = f(x) has a minimum point P.

(a) Show that the equation f(x)=0 has a solution in the interval 0.8 < x < 0.9 (2)

(b) Show that the x-coordinate of P is the solution of the equation

$$x = \frac{3 + \sin\left(\frac{1}{2}x\right)}{2} \tag{4}$$

(c) Using the iteration formula

$$x_{n+1} = \frac{3 + \sin\left(\frac{1}{2}x_n\right)}{2}, \quad x_0 = 2$$

find the values of x_1 , x_2 and x_3 , giving your answers to 3 decimal places.

(3)

(d) By choosing a suitable interval, show that the *x*-coordinate of *P* is 1.9078 correct to 4 decimal places.

(3)

Question 6 continued		blai



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Question 6 continued	

Question 6 continued	blank
	Q6
(Total 12 mar	

7. The function f is defined by

$$f: x \mapsto \frac{3(x+1)}{2x^2+7x-4} - \frac{1}{x+4}, \quad x \in \mathbb{R}, x > \frac{1}{2}$$

(a) Show that $f(x) = \frac{1}{2x-1}$

(4)

(b) Find $f^{-1}(x)$

(3)

(c) Find the domain of f^{-1}

(1)

$$g(x) = \ln(x+1)$$

(d) Find the solution of $fg(x) = \frac{1}{7}$, giving your answer in terms of e.

(4)

Question 7 continued	blank

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Question 7 continued	

Question 7 continued		blan
		Q
	(Total 12 marks)	

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(a) Starting from the formulae for sin(A+B) and cos(A+B), prove that

$$\tan\left(A+B\right) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \tag{4}$$

(b) Deduce that

$$\tan\left(\theta + \frac{\pi}{6}\right) = \frac{1 + \sqrt{3}\tan\theta}{\sqrt{3 - \tan\theta}}$$
(3)

(c) Hence, or otherwise, solve, for $0 \le \theta \le \pi$,

$$1 + \sqrt{3} \tan \theta = (\sqrt{3} - \tan \theta) \tan (\pi - \theta)$$

Give your answers as multiples of π .

(6)

Question 8 continued	blar
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	Q8
(Total 13 marks)	
TOTAL FOR PAPER: 75 MARKS	
END	