

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						<b>6</b>	<b>6</b>	<b>6</b>	<b>5</b>	/	<b>0</b>	<b>1</b>	Signature	

Paper Reference(s)

**6665/01**

# Edexcel GCE

## Core Mathematics C3

### Advanced Level

Monday 12 June 2006 – Afternoon  
Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Question Number	Leave Blank
1	
2	
3	
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6	
7	
8	
Total	

Materials required for examination  
Mathematical Formulae (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**

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.  
If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

A booklet 'Mathematical Formulae and Statistical Tables' is provided.  
The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).  
Full marks may be obtained for answers to ALL questions.  
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.

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**Turn over**





3.

Figure 1

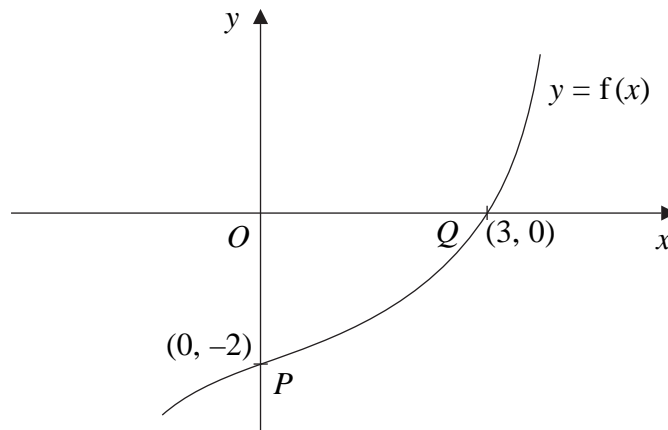


Figure 1 shows part of the curve with equation  $y = f(x)$ ,  $x \in \mathbb{R}$ , where  $f$  is an increasing function of  $x$ . The curve passes through the points  $P(0, -2)$  and  $Q(3, 0)$  as shown.

In separate diagrams, sketch the curve with equation

(a)  $y = |f(x)|$ , (3)

(b)  $y = f^{-1}(x)$ , (3)

(c)  $y = \frac{1}{2} f(3x)$ . (3)

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.



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**Question 3 continued**





5.

**Figure 2**

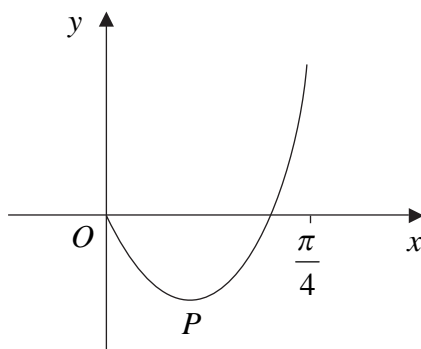


Figure 2 shows part of the curve with equation

$$y = (2x - 1) \tan 2x, \quad 0 \leq x < \frac{\pi}{4}.$$

The curve has a minimum at the point  $P$ . The  $x$ -coordinate of  $P$  is  $k$ .

(a) Show that  $k$  satisfies the equation

$$4k + \sin 4k - 2 = 0. \tag{6}$$

The iterative formula

$$x_{n+1} = \frac{1}{4}(2 - \sin 4x_n), \quad x_0 = 0.3,$$

is used to find an approximate value for  $k$ .

(b) Calculate the values of  $x_1, x_2, x_3$  and  $x_4$ , giving your answers to 4 decimal places. (3)

(c) Show that  $k = 0.277$ , correct to 3 significant figures. (2)

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**Question 5 continued**

Ruled area for writing answers.





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**6. (a)** Using  $\sin^2\theta + \cos^2\theta \equiv 1$ , show that  $\text{cosec}^2\theta - \cot^2\theta \equiv 1$ . (2)

(b) Hence, or otherwise, prove that

$$\text{cosec}^4\theta - \cot^4\theta \equiv \text{cosec}^2\theta + \cot^2\theta. \tag{2}$$

(c) Solve, for  $90^\circ < \theta < 180^\circ$ ,

$$\text{cosec}^4\theta - \cot^4\theta = 2 - \cot \theta. \tag{6}$$

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7. For the constant  $k$ , where  $k > 1$ , the functions  $f$  and  $g$  are defined by

$$\begin{aligned} f: x &\mapsto \ln(x+k), & x > -k, \\ g: x &\mapsto |2x-k|, & x \in \mathbb{R}. \end{aligned}$$

(a) On separate axes, sketch the graph of  $f$  and the graph of  $g$ .

On each sketch state, in terms of  $k$ , the coordinates of points where the graph meets the coordinate axes.

(5)

(b) Write down the range of  $f$ .

(1)

(c) Find  $fg\left(\frac{k}{4}\right)$  in terms of  $k$ , giving your answer in its simplest form.

(2)

The curve  $C$  has equation  $y = f(x)$ . The tangent to  $C$  at the point with  $x$ -coordinate 3 is parallel to the line with equation  $9y = 2x + 1$ .

(d) Find the value of  $k$ .

(4)







