

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

Paper Reference(s)

**6665/01**

Edexcel GCE

Core Mathematics C3

Advanced

Friday 25 January 2013 – Afternoon

Time: 1 hour 30 minutes

Examiner's use only

--	--	--

Team Leader's use only

--	--	--

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
Total	

<b>Materials required for examination</b>	<b>Items included with question papers</b>
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 28 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.

This publication may be reproduced only in accordance with Pearson Education Ltd copyright policy. ©2013 Pearson Education Ltd.

Printer's Log. No.  
**P41486A**



*Turn over*



2.

$$g(x) = e^{x-1} + x - 6$$

(a) Show that the equation  $g(x) = 0$  can be written as

$$x = \ln(6 - x) + 1, \quad x < 6$$

**(2)**

The root of  $g(x) = 0$  is  $\alpha$ .

The iterative formula

$$x_{n+1} = \ln(6 - x_n) + 1, \quad x_0 = 2$$

is used to find an approximate value for  $\alpha$ .

(b) Calculate the values of  $x_1$ ,  $x_2$  and  $x_3$  to 4 decimal places.

**(3)**

(c) By choosing a suitable interval, show that  $\alpha = 2.307$  correct to 3 decimal places.

**(3)**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



3.

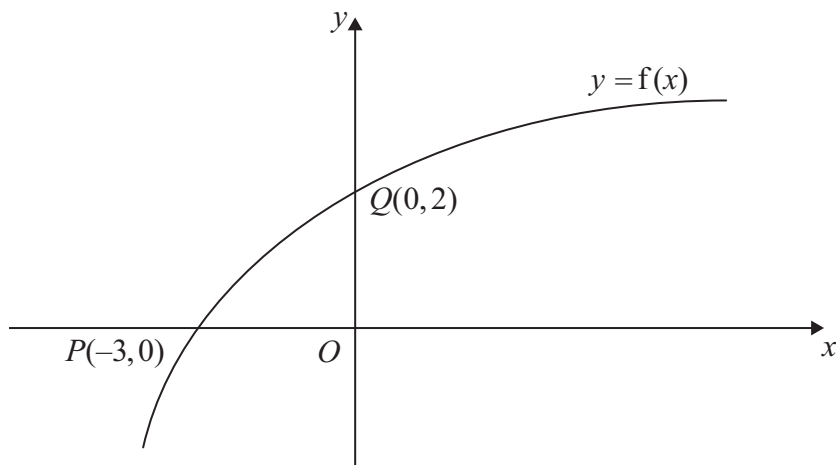


Figure 1

Figure 1 shows part of the curve with equation  $y = f(x)$ ,  $x \in \mathbb{R}$ .

The curve passes through the points  $Q(0,2)$  and  $P(-3,0)$  as shown.

- (a) Find the value of  $ff(-3)$ . (2)

On separate diagrams, sketch the curve with equation

- (b)  $y = f^{-1}(x)$ , (2)

- (c)  $y = f(|x|) - 2$ , (2)

- (d)  $y = 2f\left(\frac{1}{2}x\right)$ . (3)

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

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Leave  
blank

**Question 3 continued**



Leave  
blank

4. (a) Express  $6 \cos \theta + 8 \sin \theta$  in the form  $R \cos(\theta - \alpha)$ , where  $R > 0$  and  $0 < \alpha < \frac{\pi}{2}$ .

Give the value of  $\alpha$  to 3 decimal places.

(4)

(b) 
$$p(\theta) = \frac{4}{12 + 6 \cos \theta + 8 \sin \theta}, \quad 0 \leq \theta \leq 2\pi$$

Calculate

- (i) the maximum value of  $p(\theta)$ ,
- (ii) the value of  $\theta$  at which the maximum occurs.

(4)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



**5.** (i) Differentiate with respect to  $x$

(a)  $y = x^3 \ln 2x$

(b)  $y = (x + \sin 2x)^3$

**(6)**

Given that  $x = \cot y$ ,

(ii) show that  $\frac{dy}{dx} = \frac{-1}{1+x^2}$

**(5)**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



6. (i) Without using a calculator, find the exact value of

$$(\sin 22.5^\circ + \cos 22.5^\circ)^2$$

You must show each stage of your working.

(5)

(ii) (a) Show that  $\cos 2\theta + \sin \theta = 1$  may be written in the form

$$k \sin^2 \theta - \sin \theta = 0, \text{ stating the value of } k.$$

(2)

(b) Hence solve, for  $0 \leq \theta < 360^\circ$ , the equation

$$\cos 2\theta + \sin \theta = 1$$

(4)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---







7. 
$$h(x) = \frac{2}{x+2} + \frac{4}{x^2+5} - \frac{18}{(x^2+5)(x+2)}, \quad x \geq 0$$

(a) Show that  $h(x) = \frac{2x}{x^2+5}$  (4)

(b) Hence, or otherwise, find  $h'(x)$  in its simplest form. (3)

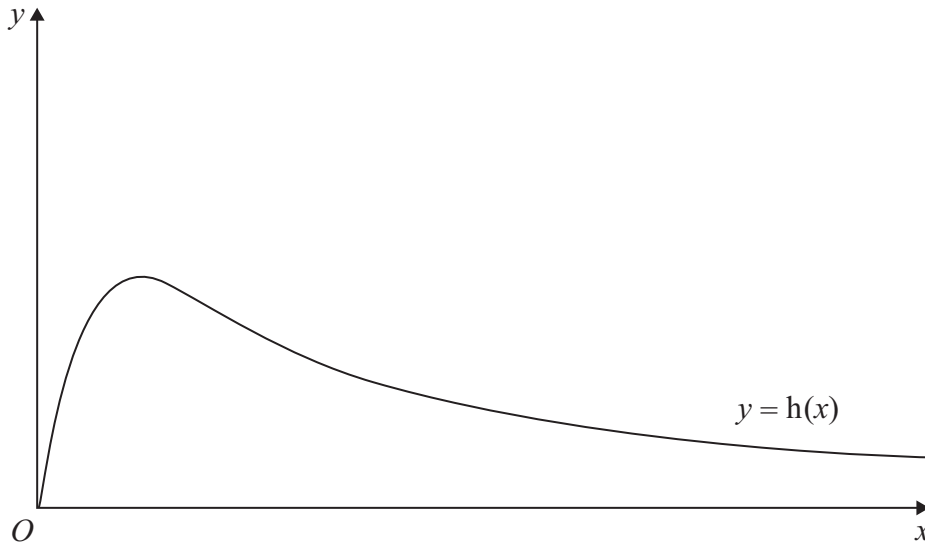


Figure 2

Figure 2 shows a graph of the curve with equation  $y = h(x)$ .

(c) Calculate the range of  $h(x)$ . (5)

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---







