| Centre No. | | | | | | Paper Reference | | | | | | | Surname | Initial(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Candidate No. | | | | | | 6 | 6 | 6 | 3 | / | 0 | 1 | Signature | |

Paper Reference(s)

**6663/01**

# Edexcel GCE

## Core Mathematics C1

## Advanced Subsidiary

Friday 9 January 2009 – Morning

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 |
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| 1 | |
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| Materials required for examination | Items included with question papers |
|---|---|
| Mathematical Formulae (Green) | Nil |

**Calculators may NOT be used in this examination.**

### 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.

### 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 11 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.

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**1.** (a) Write down the value of $125^{\frac{1}{3}}$.

**(1)**

(b) Find the value of $125^{-\frac{2}{3}}$.

**(2)**

**Q1**

**(Total 3 marks)**



N 3 0 0 8 1 A 0 3 2 8

**Turn over**

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**2.** Find $\int (12x^5 - 8x^3 + 3)\,dx$, giving each term in its simplest form.

**(4)**

Q2

**(Total 4 marks)**



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**3.** Expand and simplify $(\sqrt{7} + 2)(\sqrt{7} - 2)$.

**(2)**

**(Total 2 marks)**

Q3



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**4.** A curve has equation $y = \mathrm{f}(x)$ and passes through the point (4, 22).

Given that

$$\mathrm{f}'(x) = 3x^2 - 3x^{\frac{1}{2}} - 7,$$

use integration to find $\mathrm{f}(x)$, giving each term in its simplest form.

**(5)**



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**Question 4 continued**

**(Total 5 marks)**

Q4



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**5.**

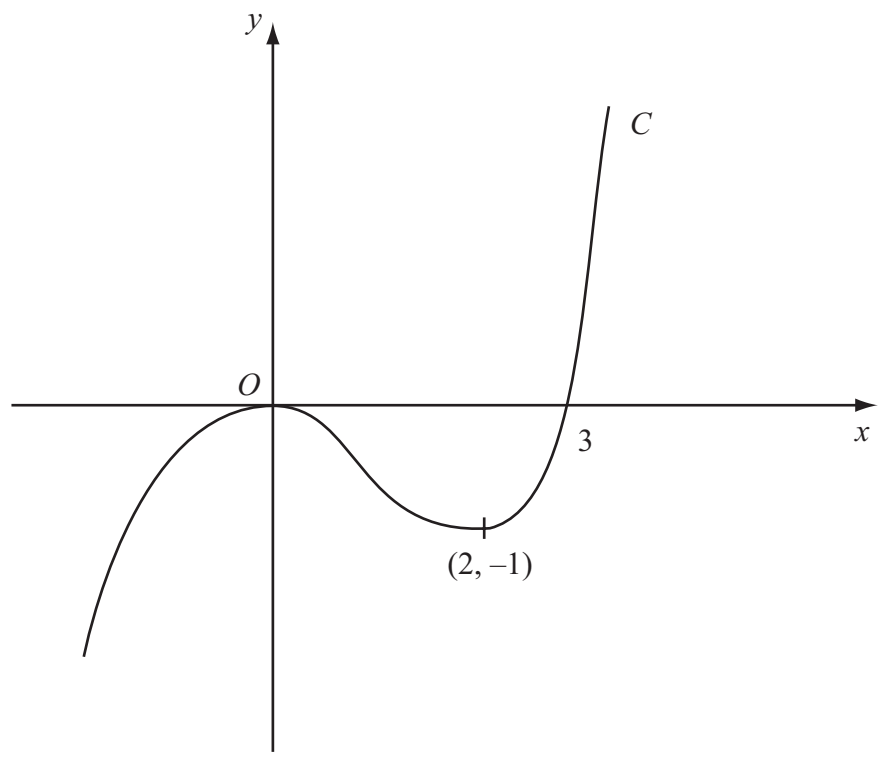


**Figure 1**

Figure 1 shows a sketch of the curve $C$ with equation $y = \mathrm{f}(x)$. There is a maximum at (0, 0), a minimum at (2, –1) and $C$ passes through (3, 0).

On separate diagrams sketch the curve with equation

(a) $y = \mathrm{f}(x + 3)$,

**(3)**

(b) $y = \mathrm{f}(-x)$.

**(3)**

On each diagram show clearly the coordinates of the maximum point, the minimum point and any points of intersection with the $x$-axis.



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**Question 5 continued**

Q5

**(Total 6 marks)**

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**6.** Given that $\dfrac{2x^2 - x^{\frac{3}{2}}}{\sqrt{x}}$ can be written in the form $2x^p - x^q$,

(a) write down the value of $p$ and the value of $q$.

**(2)**

Given that $y = 5x^4 - 3 + \dfrac{2x^2 - x^{\frac{3}{2}}}{\sqrt{x}}$ ,

(b) find $\dfrac{dy}{dx}$, simplifying the coefficient of each term.

**(4)**



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**Question 6 continued**

**Q6**

**(Total 6 marks)**



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**7.** The equation $kx^2 + 4x + (5 - k) = 0$, where $k$ is a constant, has 2 different real solutions for $x$.

(a) Show that $k$ satisfies

$$k^2 - 5k + 4 > 0.$$

**(3)**

(b) Hence find the set of possible values of $k$.

**(4)**



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**Question 7 continued**

Q7

**(Total 7 marks)**



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**8.** The point $P$ (1, $a$) lies on the curve with equation $y = (x + 1)^2(2 - x)$.

(a) Find the value of $a$.

**(1)**

(b) On the axes below sketch the curves with the following equations:

(i) $y = (x + 1)^2(2 - x)$,

(ii) $y = \frac{2}{x}$ .

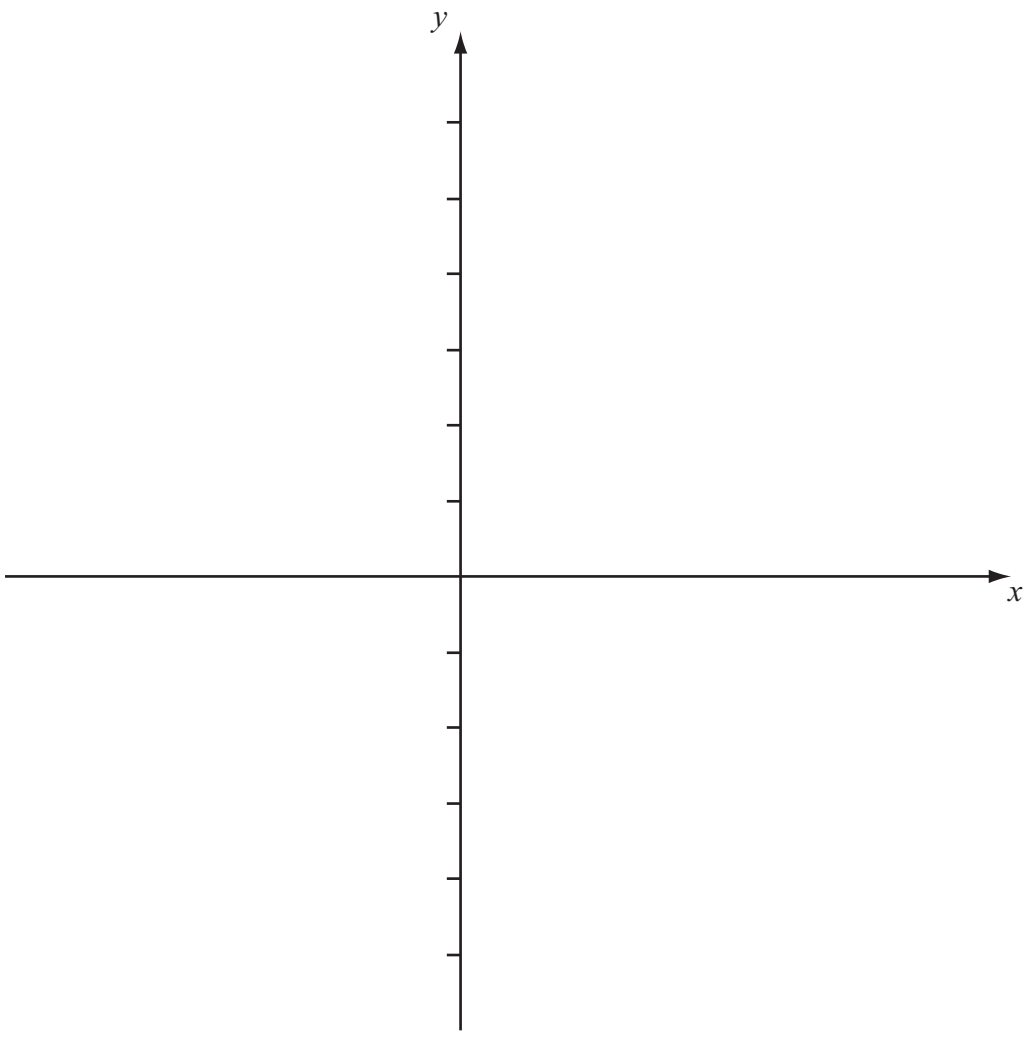
On your diagram show clearly the coordinates of any points at which the curves meet the axes.

**(5)**

(c) With reference to your diagram in part (b) state the number of real solutions to the equation

$$(x+1)^2(2-x) = \frac{2}{x}.$$

**(1)**



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**Question 8 continued**

**Q8**

**(Total 7 marks)**

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**9.** The first term of an arithmetic series is $a$ and the common difference is $d$.

The 18th term of the series is 25 and the 21st term of the series is $32\frac{1}{2}$.

(a) Use this information to write down two equations for $a$ and $d$.

**(2)**

(b) Show that $a = -17.5$ and find the value of $d$.

**(2)**

The sum of the first $n$ terms of the series is 2750.

(c) Show that $n$ is given by

$$n^2 - 15n = 55 \times 40.$$

**(4)**

(d) Hence find the value of $n$.

**(3)**



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**Question 9 continued**

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**Question 9 continued**

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**Question 9 continued**

**(Total 11 marks)**

Q9



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**10.** The line $l_1$ passes through the point $A$ (2, 5) and has gradient $-\frac{1}{2}$.

(a) Find an equation of $l_1$, giving your answer in the form $y = mx + c$.

**(3)**

The point $B$ has coordinates (–2, 7).

(b) Show that $B$ lies on $l_1$.

**(1)**

(c) Find the length of $AB$, giving your answer in the form $k\sqrt{5}$, where $k$ is an integer.

**(3)**

The point $C$ lies on $l_1$ and has $x$-coordinate equal to $p$.

The length of $AC$ is 5 units.

(d) Show that $p$ satisfies

$$p^2 - 4p - 16 = 0.$$

**(4)**



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**Question 10 continued**

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**Question 10 continued**



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**Question 10 continued**

Q10

**(Total 11 marks)**

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**11.** The curve $C$ has equation

$$y = 9 - 4x - \frac{8}{x}, \qquad x > 0 .$$

The point $P$ on $C$ has $x$-coordinate equal to 2.

(a) Show that the equation of the tangent to $C$ at the point $P$ is $y = 1 - 2x$.

**(6)**

(b) Find an equation of the normal to $C$ at the point $P$.

**(3)**

The tangent at $P$ meets the $x$-axis at $A$ and the normal at $P$ meets the $x$-axis at $B$.

(c) Find the area of triangle $APB$.

**(4)**



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**Question 11 continued**

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**Question 11 continued**



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**Question 11 continued**

Q11

**(Total 13 marks)**

**TOTAL FOR PAPER: 75 MARKS**

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