| 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

Monday 10 January 2011 – Morning

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 | |
| 9 | |
| 10 | |
| 11 | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Total | |

**Materials required for examination**
Mathematical Formulae (Pink)

**Items included with question papers**
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 to 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 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.

This publication may be reproduced only in accordance with Edexcel Limited copyright policy.
©2011 Edexcel Limited.

Printer's Log. No.
H35402A
W850/R6663/57570 5/5/3/2/

H 3 5 4 0 2 A 0 1 2 4

***Turn over***

edexcel
advancing learning, changing lives

Leave blank

**1.** (a) Find the value of $16^{-\frac{1}{4}}$

**(2)**

(b) Simplify $x\left(2x^{-\frac{1}{4}}\right)^4$

**(2)**

**Q1**

**(Total 4 marks)**



H 3 5 4 0 2 A 0 2 2 4

Leave blank

**2.** Find

$$\int (12x^5 - 3x^2 + 4x^{\frac{1}{3}})\ \mathrm{d}x$$

giving each term in its simplest form.

**(5)**

**Q2**

**(Total 5 marks)**



H 3 5 4 0 2 A 0 3 2 4

**Turn over**

Leave blank

**3.** Simplify

$$\frac{5-2\sqrt{3}}{\sqrt{3}-1}$$

giving your answer in the form $p+q\sqrt{3}$, where $p$ and $q$ are rational numbers.

**(4)**

Leave blank

**Question 3 continued**

**Q3**

**(Total 4 marks)**

Leave blank

**4.** A sequence $a_1, a_2, a_3, \ldots$ is defined by

$$a_1 = 2$$
$$a_{n+1} = 3a_n - c$$

where $c$ is a constant.

(a) Find an expression for $a_2$ in terms of $c$.

**(1)**

Given that $\sum_{i=1}^{3} a_i = 0$

(b) find the value of $c$.

**(4)**



H 3 5 4 0 2 A 0 6 2 4

Leave blank

**Question 4 continued**

**Q4**

**(Total 5 marks)**

Leave blank

**5.**

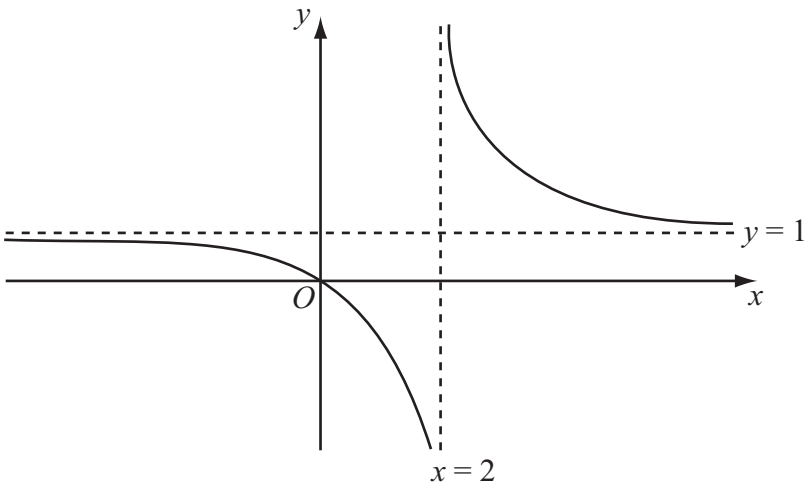



**Figure 1**

Figure 1 shows a sketch of the curve with equation $y = \mathrm{f}(x)$ where

$$\mathrm{f}(x) = \frac{x}{x-2}, \qquad x \neq 2$$

The curve passes through the origin and has two asymptotes, with equations $y = 1$ and $x = 2$, as shown in Figure 1.

(a) In the space below, sketch the curve with equation $y = \mathrm{f}(x-1)$ and state the equations of the asymptotes of this curve.

**(3)**

(b) Find the coordinates of the points where the curve with equation $y = \mathrm{f}(x-1)$ crosses the coordinate axes.

**(4)**

Leave blank

**Question 5 continued**

**Q5**

**(Total 7 marks)**

Leave blank

**6.** An arithmetic sequence has first term $a$ and common difference $d$. The sum of the first 10 terms of the sequence is 162.

(a) Show that $10a + 45d = 162$

**(2)**

Given also that the sixth term of the sequence is 17,

(b) write down a second equation in $a$ and $d$,

**(1)**

(c) find the value of $a$ and the value of $d$.

**(4)**

Leave blank

**Question 6 continued**

**Q6**

**(Total 7 marks)**

Leave blank

**7.** The curve with equation $y = \mathrm{f}(x)$ passes through the point $(-1, 0)$.

Given that

$$\mathrm{f}'(x) = 12x^2 - 8x + 1$$

find $\mathrm{f}(x)$.

**(5)**

Leave blank

**Question 7 continued**

**Q7**

**(Total 5 marks)**

Leave blank

**8.** The equation $x^2 + (k-3)x + (3-2k) = 0$, where $k$ is a constant, has two distinct real roots.

(a) Show that $k$ satisfies

$$k^2 + 2k - 3 > 0$$

**(3)**

(b) Find the set of possible values of $k$.

**(4)**

Leave blank

**Question 8 continued**

**Q8**

**(Total 7 marks)**

Leave blank

**9.** The line $L_1$ has equation $2y - 3x - k = 0$, where $k$ is a constant.

Given that the point $A$ $(1, 4)$ lies on $L_1$, find

(a) the value of $k$,

**(1)**

(b) the gradient of $L_1$.

**(2)**

The line $L_2$ passes through $A$ and is perpendicular to $L_1$.

(c) Find an equation of $L_2$ giving your answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.

**(4)**

The line $L_2$ crosses the $x$-axis at the point $B$.

(d) Find the coordinates of $B$.

**(2)**

(e) Find the exact length of $AB$.

**(2)**

Leave blank

**Question 9 continued**

Leave blank

**Question 9 continued**

Leave blank

**Question 9 continued**

**Q9**

**(Total 11 marks)**

Leave blank

**10.** (a) On the axes below, sketch the graphs of

(i) $y = x(x+2)(3-x)$

(ii) $y = -\dfrac{2}{x}$

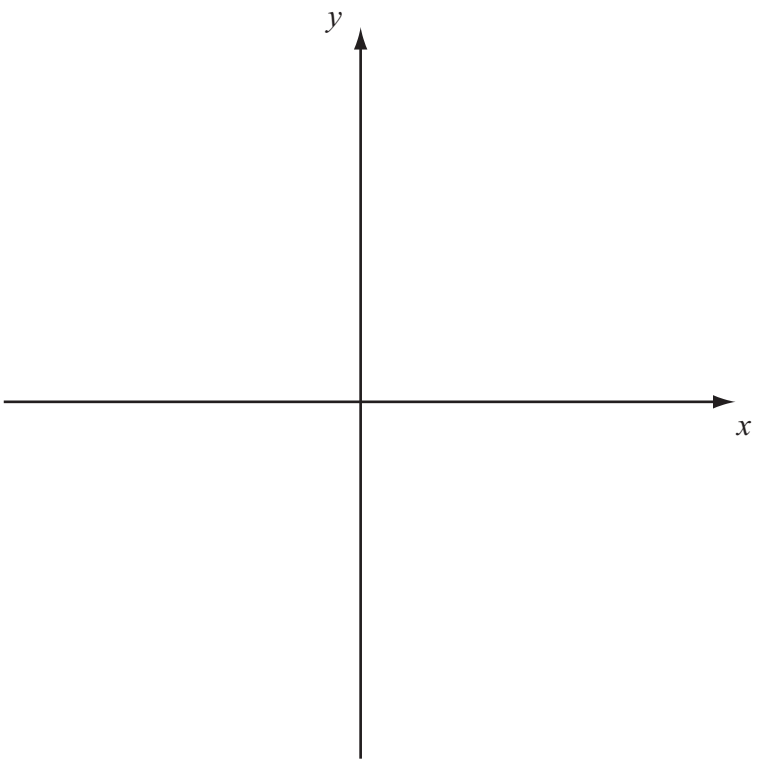
showing clearly the coordinates of all the points where the curves cross the coordinate axes.

**(6)**

(b) Using your sketch state, giving a reason, the number of real solutions to the equation

$$x(x+2)(3-x) + \frac{2}{x} = 0$$

**(2)**






H 3 5 4 0 2 A 0 2 0 2 4

Leave blank

**Question 10 continued**

**Q10**

**(Total 8 marks)**

Leave blank

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

$$y = \frac{1}{2}x^3 - 9x^{\frac{3}{2}} + \frac{8}{x} + 30, \qquad x > 0$$

(a) Find $\frac{dy}{dx}$.

**(4)**

(b) Show that the point $P(4, -8)$ lies on $C$.

**(2)**

(c) Find an equation of the normal to $C$ at the point $P$, giving your answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.

**(6)**

Leave blank

**Question 11 continued**

Leave blank

**Question 11 continued**

Q11

**(Total 12 marks)**

**TOTAL FOR PAPER: 75 MARKS**

**END**