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 22 May 2006 – 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 (Green)

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, initial(s) and signature.
Check that you have the correct question paper.
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 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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1. Find $\int \left(6x^2 + 2 + x^{-\frac{1}{2}}\right) \mathrm{d}x$, giving each term in its simplest form.

(4)

Q1

(Total 4 marks)

N 2 3 5 5 7 A 0 2 2 4

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2. Find the set of values of x for which

$$x^2 - 7x - 18 > 0.$$

(4)

Q2

(Total 4 marks)

N 2 3 5 5 7 A 0 3 2 4

Leave blank

3. On separate diagrams, sketch the graphs of

(a) $y = (x + 3)^2$,

(3)

(b) $y = (x + 3)^2 + k$, where k is a positive constant.

(2)

Show on each sketch the coordinates of each point at which the graph meets the axes.

N 2 3 5 5 7 A 0 4 2 4

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Question 3 continued

Q3

(Total 5 marks)

N 2 3 5 5 7 A 0 5 2 4

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

$$a_1 = 3,$$
$$a_{n+1} = 3a_n - 5, \quad n \geqslant 1.$$

(a) Find the value of a_2 and the value of a_3.

(2)

(b) Calculate the value of $\sum_{r=1}^{5} a_r$.

(3)

N 2 3 5 5 7 A 0 6 2 4

Leave blank

Question 4 continued

Q4

(Total 5 marks)

Leave blank

5. Differentiate with respect to x

(a) $x^4 + 6\sqrt{x}$,

(3)

(b) $\dfrac{(x+4)^2}{x}$.

(4)

N 2 3 5 5 7 A 0 8 2 4

Leave blank

Question 5 continued

Q5

(Total 7 marks)

Leave blank

6. (a) Expand and simplify $(4 + \sqrt{3})(4 - \sqrt{3})$.

(2)

(b) Express $\dfrac{26}{4+\sqrt{3}}$ in the form $a + b\sqrt{3}$, where a and b are integers.

(2)

N 2 3 5 5 7 A 0 1 0 2 4

Leave blank

Question 6 continued

Q6

(Total 4 marks)

Leave blank

7. An athlete prepares for a race by completing a practice run on each of 11 consecutive days. On each day after the first day, he runs further than he ran on the previous day. The lengths of his 11 practice runs form an arithmetic sequence with first term a km and common difference d km.

He runs 9 km on the 11th day, and he runs a total of 77 km over the 11 day period.

Find the value of a and the value of d.

(7)

N 2 3 5 5 7 A 0 1 2 2 4

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Question 7 continued

Q7

(Total 7 marks)

Leave blank

8. The equation $x^2 + 2px + (3p + 4) = 0$, where p is a positive constant, has equal roots.

(a) Find the value of p.

(4)

(b) For this value of p, solve the equation $x^2 + 2px + (3p + 4) = 0$.

(2)

N 2 3 5 5 7 A 0 1 4 2 4

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Question 8 continued

Q8

(Total 6 marks)

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9. Given that $f(x) = (x^2 - 6x)(x - 2) + 3x$,

(a) express $f(x)$ in the form $x(ax^2 + bx + c)$, where a, b and c are constants.

(3)

(b) Hence factorise $f(x)$ completely.

(2)

(c) Sketch the graph of $y = f(x)$, showing the coordinates of each point at which the graph meets the axes.

(3)

N 2 3 5 5 7 A 0 1 6 2 4

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Question 9 continued

Q9

(Total 8 marks)

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10. The curve C with equation $y = \mathrm{f}(x)$, $x \neq 0$, passes through the point $(3, 7\frac{1}{2})$.

Given that $\mathrm{f}'(x) = 2x + \dfrac{3}{x^2}$,

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

(5)

(b) Verify that $\mathrm{f}(-2) = 5$.

(1)

(c) Find an equation for the tangent to C at the point $(-2, 5)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

N 2 3 5 5 7 A 0 1 8 2 4

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Question 10 continued

Q10

(Total 10 marks)

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11. The line l_1 passes through the points $P(-1, 2)$ and $Q(11, 8)$.

(a) Find an equation for l_1 in the form $y = mx + c$, where m and c are constants.

(4)

The line l_2 passes through the point $R(10, 0)$ and is perpendicular to l_1. The lines l_1 and l_2 intersect at the point S.

(b) Calculate the coordinates of S.

(5)

(c) Show that the length of RS is $3\sqrt{5}$.

(2)

(d) Hence, or otherwise, find the exact area of triangle PQR.

(4)

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Question 11 continued

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Question 11 continued

N 2 3 5 5 7 A 0 2 2 2 4

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Question 11 continued

Q11

(Total 15 marks)

TOTAL FOR PAPER: 75 MARKS

END

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