Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	6	6	4	/	0	1	Signature	

Paper Reference(s)

6664/01

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Monday 20 June 2005 – 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	
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, initials and signature.
Check that you have the correct question paper.
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 10 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 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 the coordinates of the stationary point on the curve with equation $y = 2x^2 - 12x$.

(4)

Q1

(Total 4 marks)

Leave blank

2. Solve

(a) $5^x = 8$, giving your answer to 3 significant figures,

(3)

(b) $\log_2(x + 1) - \log_2 x = \log_2 7$.

(3)

Leave blank

3. (a) Use the factor theorem to show that $(x + 4)$ is a factor of $2x^3 + x^2 - 25x + 12$.

(2)

(b) Factorise $2x^3 + x^2 - 25x + 12$ completely.

(4)

N 2 3 4 9 2 B 0 6 2 8

Leave blank

4. (a) Write down the first three terms, in ascending powers of x, of the binomial expansion of $(1 + px)^{12}$, where p is a non-zero constant.

(2)

Given that, in the expansion of $(1 + px)^{12}$, the coefficient of x is $(-q)$ and the coefficient of x^2 is $11q$,

(b) find the value of p and the value of q.

(4)

N 2 3 4 9 2 B 0 8 2 8

Leave blank

5. Solve, for $0 \leqslant x \leqslant 180°$, the equation

(a) $\sin(x + 10°) = \frac{\sqrt{3}}{2}$,

(4)

(b) $\cos 2x = -0.9$, giving your answers to 1 decimal place.

(4)

Leave blank

6. A river, running between parallel banks, is 20 m wide. The depth, y metres, of the river measured at a point x metres from one bank is given by the formula

$$y = \frac{1}{10}x\sqrt{(20-x)}, \quad 0 \leqslant x \leqslant 20.$$

(a) Complete the table below, giving values of y to 3 decimal places.

x	0	4	8	12	16	20
y	0		2.771			0

(2)

(b) Use the trapezium rule with all the values in the table to estimate the cross-sectional area of the river.

(4)

Given that the cross-sectional area is constant and that the river is flowing uniformly at $2\ \text{ms}^{-1}$,

(c) estimate, in m^3, the volume of water flowing per minute, giving your answer to 3 significant figures.

(2)

N 2 3 4 9 2 B 0 1 2 2 8

Leave blank

7. In the triangle ABC, $AB = 8$ cm, $AC = 7$ cm, $\angle ABC = 0.5$ radians and $\angle ACB = x$ radians.

(a) Use the sine rule to find the value of $\sin x$, giving your answer to 3 decimal places.

(3)

Given that there are two possible values of x,

(b) find these values of x, giving your answers to 2 decimal places.

(3)

N 2 3 4 9 2 B 0 1 4 2 8

Leave blank

8. The circle C, with centre at the point A, has equation $x^2 + y^2 - 10x + 9 = 0$.

Find

(a) the coordinates of A,

(2)

(b) the radius of C,

(2)

(c) the coordinates of the points at which C crosses the x-axis.

(2)

Given that the line l with gradient $\frac{7}{2}$ is a tangent to C, and that l touches C at the point T,

(d) find an equation of the line which passes through A and T.

(3)

N 2 3 4 9 2 B 0 1 6 2 8

Leave blank

Question 8 continued

Leave blank

9. (a) A geometric series has first term a and common ratio r. Prove that the sum of the first n terms of the series is

$$\frac{a(1-r^n)}{1-r}.$$

(4)

Mr. King will be paid a salary of £35 000 in the year 2005. Mr. King's contract promises a 4% increase in salary every year, the first increase being given in 2006, so that his annual salaries form a geometric sequence.

(b) Find, to the nearest £100, Mr. King's salary in the year 2008.

(2)

Mr. King will receive a salary each year from 2005 until he retires at the end of 2024.

(c) Find, to the nearest £1000, the total amount of salary he will receive in the period from 2005 until he retires at the end of 2024.

(4)

Leave blank

Question 9 continued

Leave blank

10. **Figure 1**

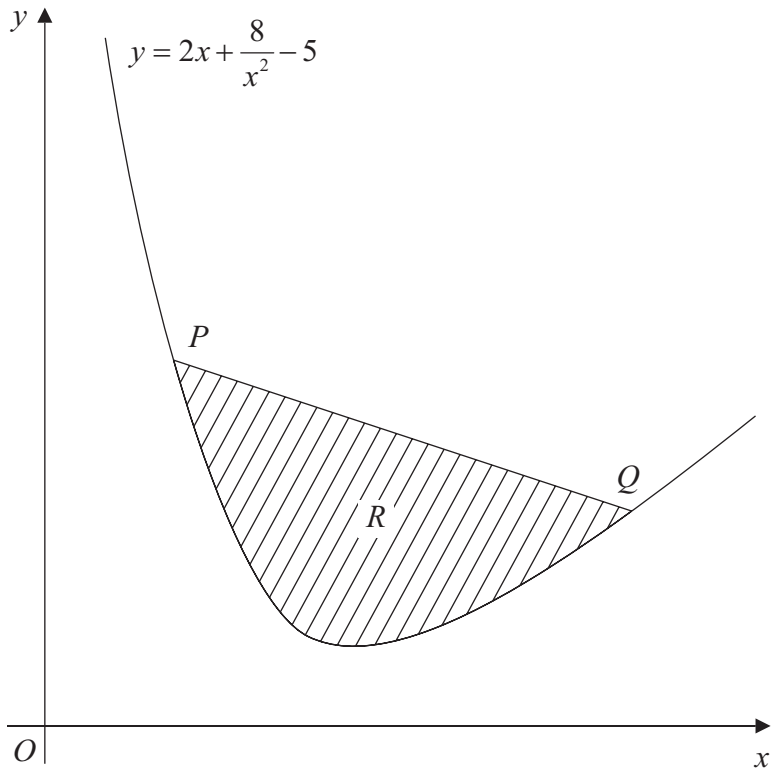

Figure 1 shows part of the curve C with equation $y = 2x + \frac{8}{x^2} - 5, \ x > 0$.

The points P and Q lie on C and have x-coordinates 1 and 4 respectively. The region R, shaded in Figure 1, is bounded by C and the straight line joining P and Q.

(a) Find the exact area of R.

(8)

(b) Use calculus to show that y is increasing for $x > 2$.

(4)

N 2 3 4 9 2 B 0 2 4 2 8

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Question 10 continued

Q10

(Total 12 marks)

TOTAL FOR PAPER: 75 MARKS

END

N 2 3 4 9 2 B 0 2 7 2 8