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

Wednesday 10 January 2007 – 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	
9	
10	
Total	

Materials required for examination	Items included with question papers
Mathematical Formulae (Green)	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, 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.
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 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.

Printer's Log. No.
N24322A
W850/R6664/57570 4/4/3/3/3/3/21,400

N 2 4 3 2 2 A 0 1 2 4

Turn over

edexcel
advancing learning, changing lives

Leave blank

1. $$f(x) = x^3 + 3x^2 + 5.$$

Find

(a) $f''(x)$,

(3)

(b) $\int_1^2 f(x)\,dx$.

(4)

Leave blank

Question 1 continued

Q1

(Total 7 marks)

Leave blank

2. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $(1-2x)^5$. Give each term in its simplest form.

(4)

(b) If x is small, so that x^2 and higher powers can be ignored, show that

$$(1+x)(1-2x)^5 \approx 1-9x\,.$$

(2)

Leave blank

Question 2 continued

Q2

(Total 6 marks)

N24322A0524

Leave blank

3. The line joining the points (–1, 4) and (3, 6) is a diameter of the circle C.

Find an equation for C.

(6)

Q3

(Total 6 marks)

Leave blank

4. Solve the equation

$$5^x = 17,$$

giving your answer to 3 significant figures.

(3)

Q4

(Total 3 marks)

Leave blank

5. $$f(x) = x^3 + 4x^2 + x - 6.$$

(a) Use the factor theorem to show that $(x + 2)$ is a factor of $f(x)$.

(2)

(b) Factorise $f(x)$ completely.

(4)

(c) Write down all the solutions to the equation

$$x^3 + 4x^2 + x - 6 = 0.$$

(1)

Leave blank

Question 5 continued

Q5

(Total 7 marks)

Leave blank

6. Find all the solutions, in the interval $0 \leqslant x < 2\pi$, of the equation

$$2\cos^2 x + 1 = 5\sin x,$$

giving each solution in terms of π.

(6)

Leave blank

Question 6 continued

Q6

(Total 6 marks)

Leave blank

7.

Figure 1

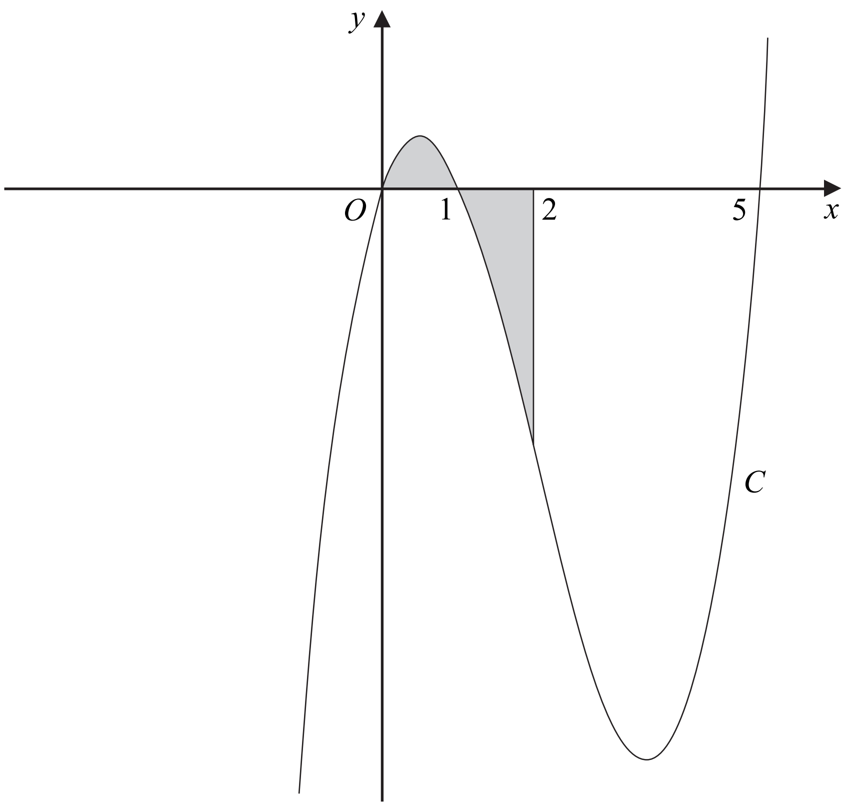

Figure 1 shows a sketch of part of the curve C with equation

$$y = x(x-1)(x-5).$$

Use calculus to find the total area of the finite region, shown shaded in Figure 1, that is between $x = 0$ and $x = 2$ and is bounded by C, the x-axis and the line $x = 2$.

(9)

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Q7

(Total 9 marks)

Leave blank

8. A diesel lorry is driven from Birmingham to Bury at a steady speed of v kilometres per hour. The total cost of the journey, £C, is given by

$$C = \frac{1400}{v} + \frac{2v}{7}.$$

(a) Find the value of v for which C is a minimum.

(5)

(b) Find $\frac{d^2C}{dv^2}$ and hence verify that C is a minimum for this value of v.

(2)

(c) Calculate the minimum total cost of the journey.

(2)

Leave blank

Question 8 continued

Q8

(Total 9 marks)

Leave blank

9.

Figure 2

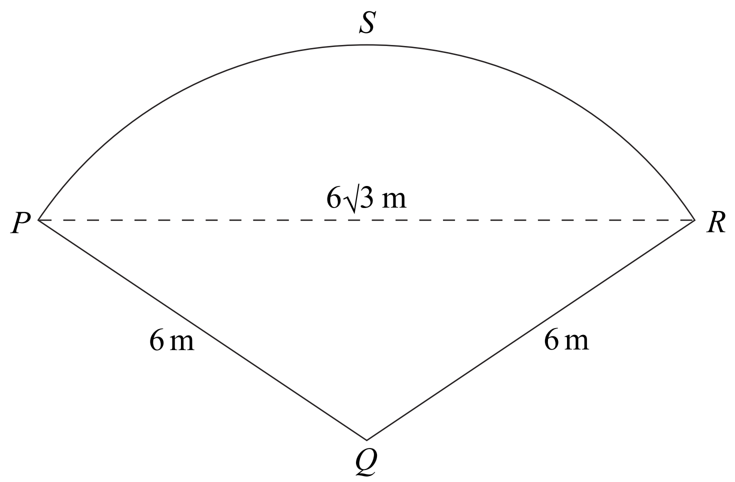

Figure 2 shows a plan of a patio. The patio *PQRS* is in the shape of a sector of a circle with centre *Q* and radius 6 m.

Given that the length of the straight line *PR* is $6\sqrt{3}$ m,

(a) find the exact size of angle *PQR* in radians. **(3)**

(b) Show that the area of the patio *PQRS* is 12π m^2. **(2)**

(c) Find the exact area of the triangle *PQR*. **(2)**

(d) Find, in m^2 to 1 decimal place, the area of the segment *PRS*. **(2)**

(e) Find, in m to 1 decimal place, the perimeter of the patio *PQRS*. **(2)**

Leave blank

Question 9 continued

N 2 4 3 2 2 A 0 1 9 2 4

Turn over

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 11 marks)

N 2 4 3 2 2 A 0 2 1 2 4

Leave blank

10. A geometric series is $a + ar + ar^2 + ...$

(a) Prove that the sum of the first n terms of this series is given by

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

(4)

(b) Find

$$\sum_{k=1}^{10} 100(2^k).$$

(3)

(c) Find the sum to infinity of the geometric series

$$\frac{5}{6} + \frac{5}{18} + \frac{5}{54} + ...$$

(3)

(d) State the condition for an infinite geometric series with common ratio r to be convergent.

(1)

Leave blank

Question 10 continued

Leave blank

Question 10 continued

Q10

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

END