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 2005 – 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
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.
You must write your answer for each question in the space following the question.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
This paper has ten questions. Pages 2 and 20 are blank.
The total mark for this paper is 75.

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. (a) Write down the value of $16^{\frac{1}{2}}$.

(1)

(b) Find the value of $16^{-\frac{3}{2}}$.

(2)

Q1

(Total 3 marks)

Leave blank

2. (i) Given that $y = 5x^3 + 7x + 3$, find

(a) $\dfrac{dy}{dx}$,

(3)

(b) $\dfrac{d^2y}{dx^2}$.

(1)

(ii) Find $\int \left(1 + 3\sqrt{x} - \dfrac{1}{x^2}\right) dx$.

(4)

Leave blank

Question 2 continued

(Total 8 marks)

Q2

Leave blank

3. Given that the equation $kx^2 + 12x + k = 0$, where k is a positive constant, has equal roots, find the value of k.

(4)

Q3

(Total 4 marks)

Leave blank

4. Solve the simultaneous equations

$$x + y = 2$$

$$x^2 + 2y = 12.$$

(6)

Q4

(Total 6 marks)

Leave blank

5. The rth term of an arithmetic series is $(2r - 5)$.

(a) Write down the first three terms of this series.

(2)

(b) State the value of the common difference.

(1)

(c) Show that $\sum_{r=1}^{n}(2r-5) = n(n-4)$.

(3)

Leave blank

Question 5 continued

Q5

(Total 6 marks)

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6.

Figure 1

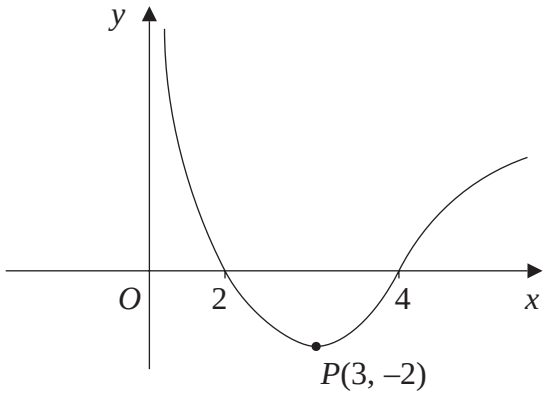


Figure 1 shows a sketch of the curve with equation $y = \mathrm{f}(x)$. The curve crosses the x-axis at the points (2, 0) and (4, 0). The minimum point on the curve is $P(3, -2)$.

In separate diagrams sketch the curve with equation

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

(3)

(b) $y = \mathrm{f}(2x)$.

(3)

On each diagram, give the coordinates of the points at which the curve crosses the x-axis, and the coordinates of the image of P under the given transformation.

Leave blank

Question 6 continued

Q6

(Total 6 marks)

Leave blank

7. The curve C has equation $y = 4x^2 + \frac{5-x}{x}$, $x \neq 0$. The point P on C has x-coordinate 1.

(a) Show that the value of $\frac{dy}{dx}$ at P is 3.

(5)

(b) Find an equation of the tangent to C at P.

(3)

This tangent meets the x-axis at the point $(k, 0)$.

(c) Find the value of k.

(2)

Leave blank

Question 7 continued

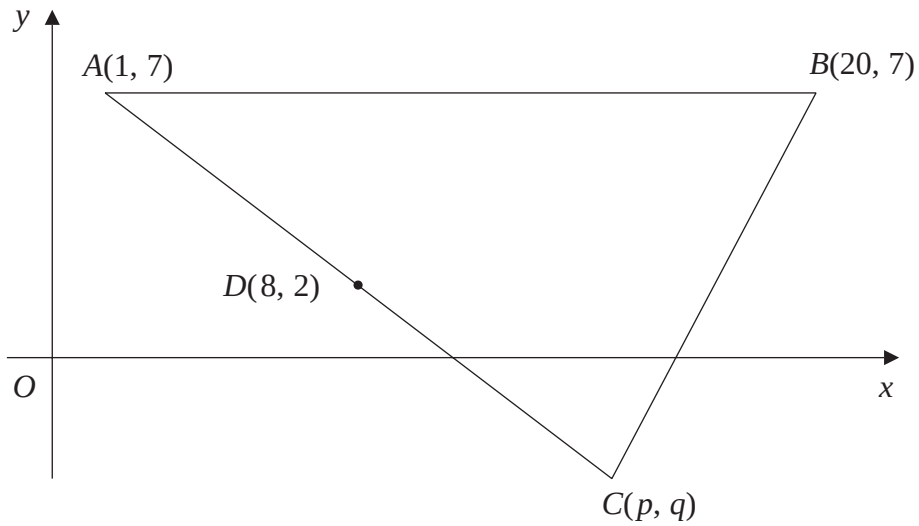
Q7

(Total 10 marks)

Leave blank

8.

Figure 2



The points $A(1, 7)$, $B(20, 7)$ and $C(p, q)$ form the vertices of a triangle ABC, as shown in Figure 2. The point $D(8, 2)$ is the mid-point of AC.

(a) Find the value of p and the value of q.

(2)

The line l, which passes through D and is perpendicular to AC, intersects AB at E.

(b) Find an equation for l, in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

(c) Find the exact x-coordinate of E.

(2)

Leave blank

Question 8 continued

Q8

(Total 9 marks)

Leave blank

9. The gradient of the curve C is given by

$$\frac{dy}{dx} = (3x-1)^2.$$

The point $P(1, 4)$ lies on C.

(a) Find an equation of the normal to C at P.

(4)

(b) Find an equation for the curve C in the form $y = f(x)$.

(5)

(c) Using $\frac{dy}{dx} = (3x-1)^2$, show that there is no point on C at which the tangent is parallel to the line $y = 1 - 2x$.

(2)

Leave blank

Question 9 continued

Q9

(Total 11 marks)

Leave blank

10. Given that

$$f(x) = x^2 - 6x + 18, \quad x \geqslant 0,$$

(a) express f(x) in the form $(x - a)^2 + b$, where a and b are integers.

(3)

The curve C with equation $y = f(x)$, $x \geqslant 0$, meets the y-axis at P and has a minimum point at Q.

(b) In the space provided on page 19, sketch the graph of C, showing the coordinates of P and Q.

(4)

The line $y = 41$ meets C at the point R.

(c) Find the x-coordinate of R, giving your answer in the form $p + q\sqrt{2}$, where p and q are integers.

(5)

Leave blank

Question 10 continued

Q10

(Total 12 marks)

TOTAL FOR PAPER: 75 MARKS

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