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 19 May 2014 – 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 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 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 should show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.

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P 4 3 0 1 4 A 0 1 2 8

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PEARSON

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1. Find

$$\int (8x^3 + 4)\,dx$$

giving each term in its simplest form.

(3)

Q1

(Total 3 marks)

P 4 3 0 1 4 A 0 2 2 8

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2. (a) Write down the value of $32^{\frac{1}{5}}$

(1)

(b) Simplify fully $(32x^5)^{-\frac{2}{5}}$

(3)

Q2

(Total 4 marks)

Leave blank

3. Find the set of values of x for which

(a) $3x - 7 > 3 - x$

(2)

(b) $x^2 - 9x \leqslant 36$

(4)

(c) **both** $3x - 7 > 3 - x$ **and** $x^2 - 9x \leqslant 36$

(1)

Leave blank

Question 3 continued

Q3

(Total 7 marks)

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4.

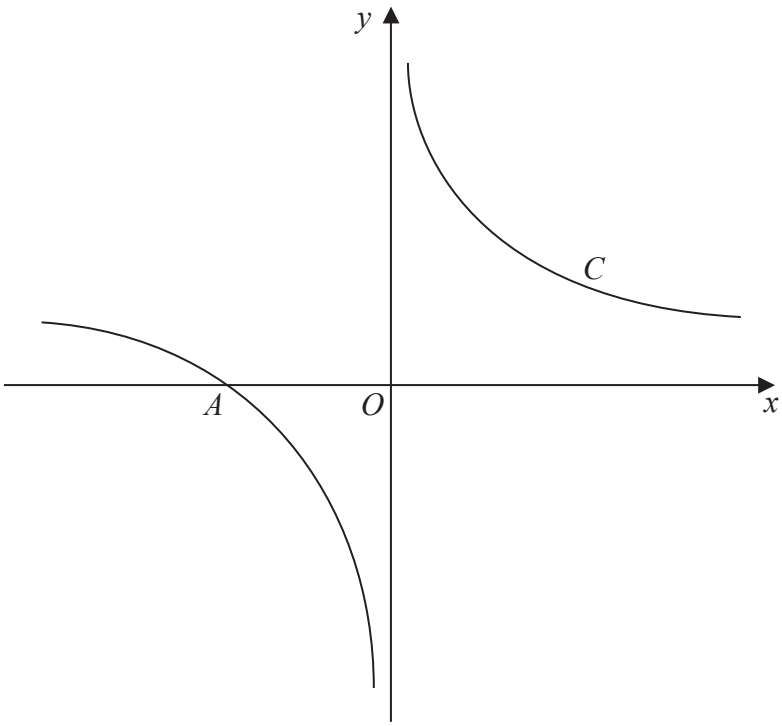

Figure 1

Figure 1 shows a sketch of the curve C with equation

$$y = \frac{1}{x} + 1, \qquad x \neq 0$$

The curve C crosses the x-axis at the point A.

(a) State the x coordinate of the point A.

(1)

The curve D has equation $y = x^2(x - 2)$, for all real values of x.

(b) A copy of Figure 1 is shown on page 7.
On this copy, sketch a graph of curve D.
Show on the sketch the coordinates of each point where the curve D crosses the coordinate axes.

(3)

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

$$x^2(x - 2) = \frac{1}{x} + 1$$

(1)

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Question 4 continued

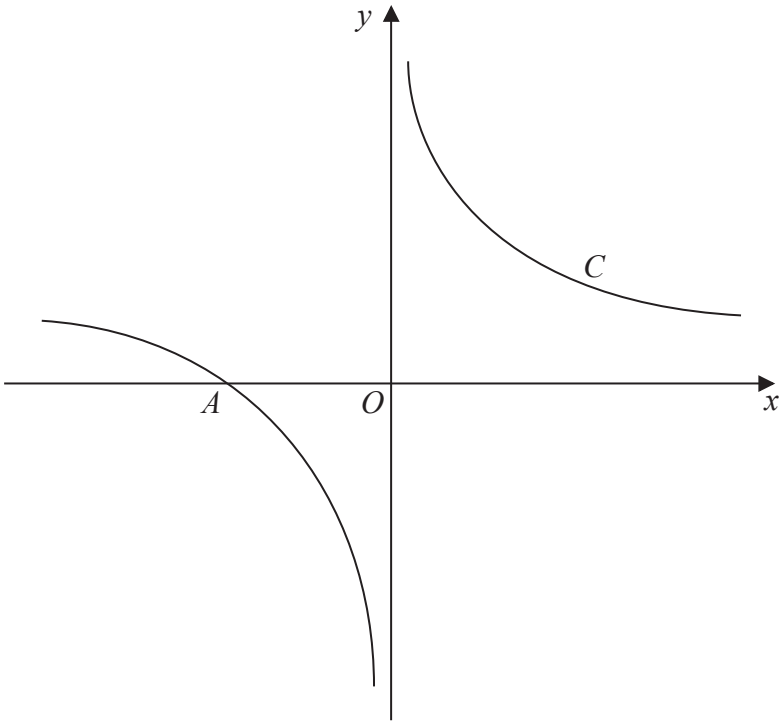

Figure 1

Q4

(Total 5 marks)

P 4 3 0 1 4 A 0 7 2 8

Turn over

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5. A sequence of numbers $a_1, a_2, a_3 \ldots$ is defined by

$$a_{n+1} = 5a_n - 3, \qquad n \geqslant 1$$

Given that $a_2 = 7$,

(a) find the value of a_1

(2)

(b) Find the value of $\sum_{r=1}^{4} a_r$

(3)

P 4 3 0 1 4 A 0 8 2 8

Leave blank

Question 5 continued

Q5

(Total 5 marks)

Leave blank

6 (a) Write $\sqrt{80}$ in the form $c\sqrt{5}$, where c is a positive constant.

(1)

A rectangle R has a length of $(1 + \sqrt{5})$ cm and an area of $\sqrt{80}$ cm^2.

(b) Calculate the width of R in cm. Express your answer in the form $p + q\sqrt{5}$, where p and q are integers to be found.

(4)

Leave blank

Question 6 continued

Q6

(Total 5 marks)

Leave blank

7. Differentiate with respect to x, giving each answer in its simplest form.

(a) $(1 - 2x)^2$

(3)

(b) $\dfrac{x^5 + 6\sqrt{x}}{2x^2}$

(4)

P 4 3 0 1 4 A 0 1 2 2 8

Leave blank

Question 7 continued

Q7

(Total 7 marks)

Leave blank

8. In the year 2000 a shop sold 150 computers. Each year the shop sold 10 more computers than the year before, so that the shop sold 160 computers in 2001, 170 computers in 2002, and so on forming an arithmetic sequence.

(a) Show that the shop sold 220 computers in 2007.

(2)

(b) Calculate the total number of computers the shop sold from 2000 to 2013 inclusive.

(3)

In the year 2000, the selling price of each computer was £900. The selling price fell by £20 each year, so that in 2001 the selling price was £880, in 2002 the selling price was £860, and so on forming an arithmetic sequence.

(c) In a particular year, the selling price of each computer in £s was equal to three times the number of computers the shop sold in that year. By forming and solving an equation, find the year in which this occurred.

(4)

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Question 8 continued

Leave blank

Question 8 continued

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Question 8 continued

Q8

(Total 9 marks)

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9.

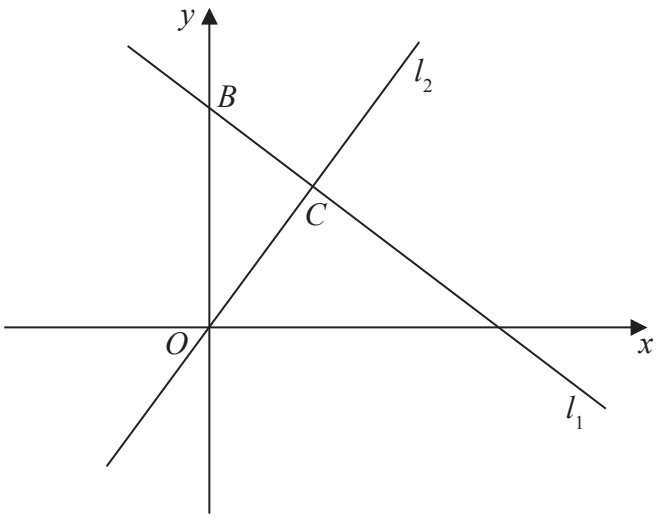

Figure 2

The line l_1, shown in Figure 2 has equation $2x + 3y = 26$

The line l_2 passes through the origin O and is perpendicular to l_1

(a) Find an equation for the line l_2

(4)

The line l_2 intersects the line l_1 at the point C.

Line l_1 crosses the y-axis at the point B as shown in Figure 2.

(b) Find the area of triangle OBC.

Give your answer in the form $\frac{a}{b}$, where a and b are integers to be determined.

(6)

P 4 3 0 1 4 A 0 1 8 2 8

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

(Total 10 marks)

Q9

Leave blank

10. A curve with equation $y = \mathrm{f}(x)$ passes through the point (4, 25).

Given that

$$\mathrm{f}'(x) = \frac{3}{8}x^2 - 10x^{-\frac{1}{2}} + 1, \qquad x > 0$$

(a) find $\mathrm{f}(x)$, simplifying each term.

(5)

(b) Find an equation of the normal to the curve at the point (4, 25).

Give your answer in the form $ax + by + c = 0$, where a, b and c are integers to be found.

(5)

Leave blank

Question 10 continued

Leave blank

Question 10 continued

Leave blank

Question 10 continued

Q10

(Total 10 marks)

Leave blank

11. Given that

$$f(x) = 2x^2 + 8x + 3$$

(a) find the value of the discriminant of $f(x)$.

(2)

(b) Express $f(x)$ in the form $p(x + q)^2 + r$ where p, q and r are integers to be found.

(3)

The line $y = 4x + c$, where c is a constant, is a tangent to the curve with equation $y = f(x)$.

(c) Calculate the value of c.

(5)

P 4 3 0 1 4 A 0 2 6 2 8

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Question 11 continued

Leave blank

Question 11 continued

Q11

(Total 10 marks)

TOTAL FOR PAPER: 75 MARKS

END

P 4 3 0 1 4 A 0 2 8 2 8