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

Wednesday 16 May 2012 – 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 (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 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 should show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.

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PEARSON

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1. Find

$$\int \left(6x^2 + \frac{2}{x^2} + 5\right) \mathrm{d}x$$

giving each term in its simplest form.

(4)

Q1

(Total 4 marks)

P 4 0 6 8 4 A 0 2 2 4

Leave blank

2. (a) Evaluate $(32)^{\frac{3}{5}}$, giving your answer as an integer.

(2)

(b) Simplify fully $\left(\dfrac{25x^4}{4}\right)^{-\frac{1}{2}}$

(2)

Q2

(Total 4 marks)

Leave blank

3. Show that $\dfrac{2}{\sqrt{(12)}-\sqrt{(8)}}$ can be written in the form $\sqrt{a}+\sqrt{b}$, where a and b are integers.

(5)

P 4 0 6 8 4 A 0 4 2 4

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Question 3 continued

Q3

(Total 5 marks)

P 4 0 6 8 4 A 0 5 2 4

Turn over

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4.

$$y = 5x^3 - 6x^{\frac{4}{3}} + 2x - 3$$

(a) Find $\frac{dy}{dx}$ giving each term in its simplest form.

(4)

(b) Find $\frac{d^2y}{dx^2}$

(2)

P 4 0 6 8 4 A 0 6 2 4

Leave blank

Question 4 continued

Q4

(Total 6 marks)

Leave blank

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

$$a_1 = 3$$

$$a_{n+1} = 2a_n - c \qquad (n \geqslant 1)$$

where c is a constant.

(a) Write down an expression, in terms of c, for a_2

(1)

(b) Show that $a_3 = 12 - 3c$

(2)

Given that $\sum_{i=1}^{4} a_i \geqslant 23$

(c) find the range of values of c.

(4)

P 4 0 6 8 4 A 0 8 2 4

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Question 5 continued

Q5

(Total 7 marks)

P 4 0 6 8 4 A 0 9 2 4

Turn over

Leave blank

6. A boy saves some money over a period of 60 weeks. He saves 10p in week 1, 15p in week 2, 20p in week 3 and so on until week 60. His weekly savings form an arithmetic sequence.

(a) Find how much he saves in week 15

(2)

(b) Calculate the total amount he saves over the 60 week period.

(3)

The boy's sister also saves some money each week over a period of m weeks. She saves 10p in week 1, 20p in week 2, 30p in week 3 and so on so that her weekly savings form an arithmetic sequence. She saves a total of £63 in the m weeks.

(c) Show that

$$m(m + 1) = 35 \times 36$$

(4)

(d) Hence write down the value of m.

(1)

Leave blank

Question 6 continued

Leave blank

Question 6 continued

Leave blank

Question 6 continued

(Total 10 marks)

Q6

Leave blank

7. The point P (4, –1) lies on the curve C with equation $y = \mathrm{f}(x)$, $x > 0$, and

$$\mathrm{f}'(x) = \frac{1}{2}x - \frac{6}{\sqrt{x}} + 3$$

(a) Find the equation of the tangent to C at the point P, giving your answer in the form $y = mx + c$, where m and c are integers.

(4)

(b) Find $\mathrm{f}(x)$.

(4)

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

Leave blank

Question 7 continued

Q7

(Total 8 marks)

P 4 0 6 8 4 A 0 1 5 2 4

Turn over

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8.

$$4x - 5 - x^2 = q - (x + p)^2$$

where p and q are integers.

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

(3)

(b) Calculate the discriminant of $4x - 5 - x^2$

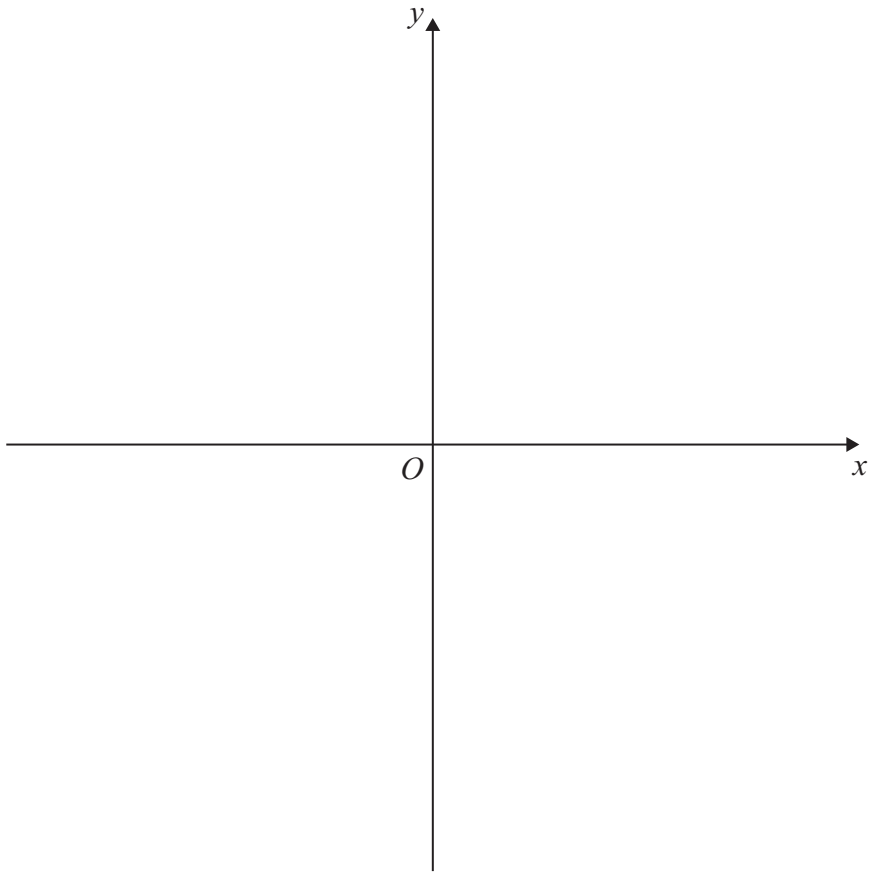
(2)

(c) On the axes on page 17, sketch the curve with equation $y = 4x - 5 - x^2$ showing clearly the coordinates of any points where the curve crosses the coordinate axes.

(3)

Leave blank

Question 8 continued



Q8

(Total 8 marks)

P 4 0 6 8 4 A 0 1 7 2 4

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9. The line L_1 has equation $4y + 3 = 2x$

The point A $(p, 4)$ lies on L_1

(a) Find the value of the constant p.

(1)

The line L_2 passes through the point C (2, 4) and is perpendicular to L_1

(b) Find an equation for L_2 giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

The line L_1 and the line L_2 intersect at the point D.

(c) Find the coordinates of the point D.

(3)

(d) Show that the length of CD is $\frac{3}{2}\sqrt{5}$

(3)

A point B lies on L_1 and the length of $AB = \sqrt{(80)}$

The point E lies on L_2 such that the length of the line $CDE = 3$ times the length of CD.

(e) Find the area of the quadrilateral $ACBE$.

(3)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 15 marks)

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10.

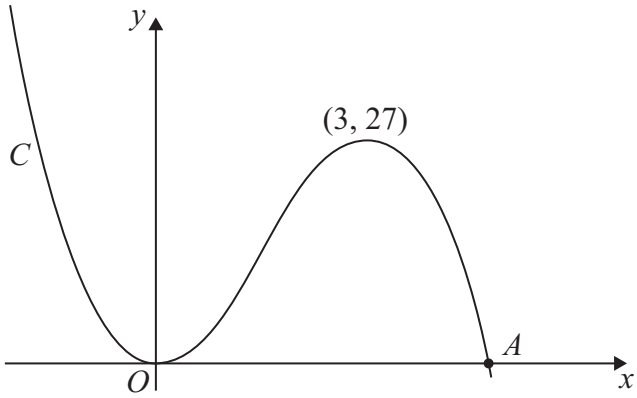

Figure 1

Figure 1 shows a sketch of the curve C with equation $y = \mathrm{f}(x)$ where

$$\mathrm{f}(x) = x^2(9 - 2x)$$

There is a minimum at the origin, a maximum at the point (3, 27) and C cuts the x-axis at the point A.

(a) Write down the coordinates of the point A.

(1)

(b) On separate diagrams sketch the curve with equation

(i) $y = \mathrm{f}(x + 3)$

(ii) $y = \mathrm{f}(3x)$

On each sketch you should indicate clearly the coordinates of the maximum point and any points where the curves cross or meet the coordinate axes.

(6)

The curve with equation $y = \mathrm{f}(x) + k$, where k is a constant, has a maximum point at (3, 10).

(c) Write down the value of k.

(1)

P 4 0 6 8 4 A 0 2 2 2 4

Leave blank

Question 10 continued

Leave blank

Question 10 continued

Q10

(Total 8 marks)

TOTAL FOR PAPER: 75 MARKS

END