Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	6	6	3	/	0	1R	Signature	

Paper Reference(s)

6663/01R

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 32 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 1 4 6 A 0 1 3 2

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PEARSON

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1. Factorise fully $25x - 9x^3$

(3)

Q1

(Total 3 marks)

P 4 3 1 4 6 A 0 2 3 2

Leave blank

2. (a) Evaluate $81^{\frac{3}{2}}$

(2)

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

(2)

Q2

(Total 4 marks)

Leave blank

3. A sequence $a_1, a_2, a_3, \ldots$ is defined by

$$a_{n+1} = 4a_n - 3, \qquad n \geqslant 1$$

$$a_1 = k, \qquad \text{where } k \text{ is a positive integer.}$$

(a) Write down an expression for a_2 in terms of k.

(1)

Given that $\sum_{r=1}^{3} a_r = 66$

(b) find the value of k.

(4)

P 4 3 1 4 6 A 0 4 3 2

Leave blank

Question 3 continued

Q3

(Total 5 marks)

P 4 3 1 4 6 A 0 5 3 2

Turn over

Leave blank

4. Given that $y = 2x^5 + \frac{6}{\sqrt{x}}$, $x > 0$, find in their simplest form

(a) $\frac{dy}{dx}$

(3)

(b) $\int y \, dx$

(3)

P 4 3 1 4 6 A 0 6 3 2

Leave blank

Question 4 continued

Q4

(Total 6 marks)

Leave blank

5. Solve the equation

$$10 + x\sqrt{8} = \frac{6x}{\sqrt{2}}$$

Give your answer in the form $a\sqrt{b}$ where a and b are integers.

(4)

P 4 3 1 4 6 A 0 8 3 2

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Question 5 continued

Q5

(Total 4 marks)

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6.

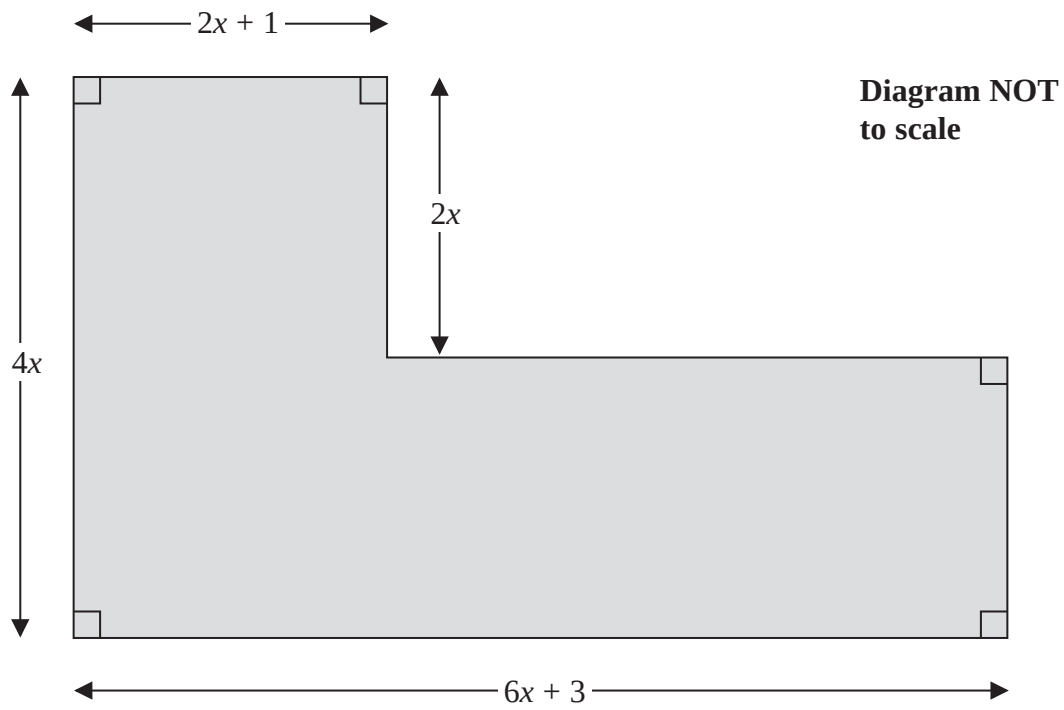

Figure 1

Figure 1 shows the plan of a garden. The marked angles are right angles.

The six edges are straight lines.

The lengths shown in the diagram are given in metres.

Given that the perimeter of the garden is greater than 40 m,

(a) show that $x > 1.7$

(3)

Given that the area of the garden is less than 120 m^2,

(b) form and solve a quadratic inequality in x.

(5)

(c) Hence state the range of the possible values of x.

(1)

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

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Question 6 continued

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Question 6 continued

Leave blank

Question 6 continued

Q6

(Total 9 marks)

Leave blank

7.

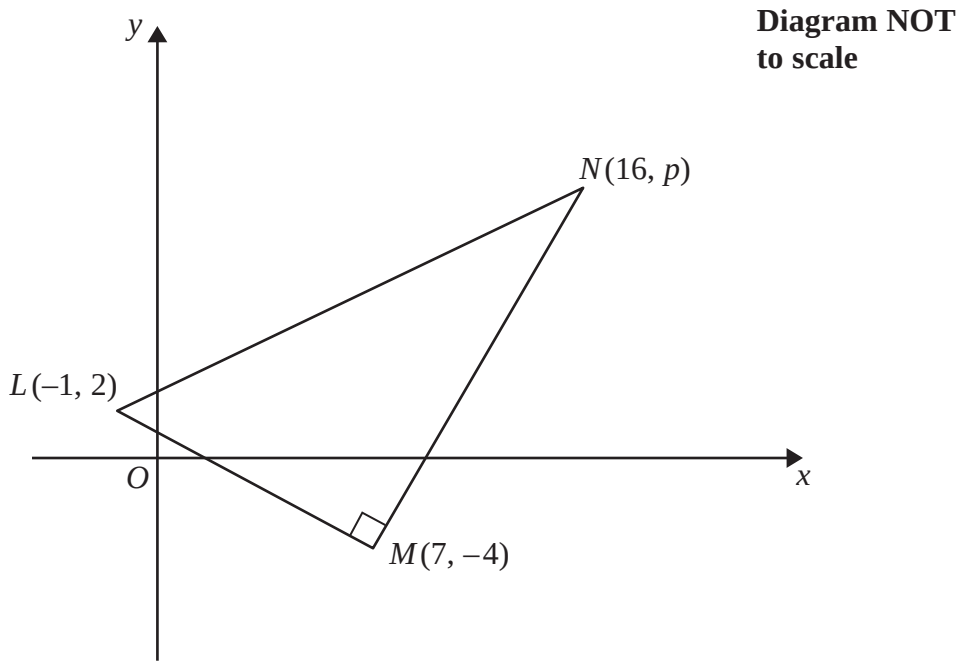

Figure 2

Figure 2 shows a right angled triangle *LMN*.

The points *L* and *M* have coordinates (–1, 2) and (7, –4) respectively.

(a) Find an equation for the straight line passing through the points *L* and *M*.

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

(4)

Given that the coordinates of point *N* are (16, *p*), where *p* is a constant, and angle $LMN = 90°$,

(b) find the value of *p*.

(3)

Given that there is a point *K* such that the points *L*, *M*, *N*, and *K* form a rectangle,

(c) find the *y* coordinate of *K*.

(2)

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

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Q7

(Total 9 marks)

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8. $$\frac{dy}{dx} = 6x^{-\frac{1}{2}} + x\sqrt{x}, \quad x > 0$$

Given that $y = 37$ at $x = 4$, find y in terms of x, giving each term in its simplest form.

(7)

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

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Question 8 continued

Q8

(Total 7 marks)

Leave blank

9. The curve C has equation $y = \frac{1}{3}x^2 + 8$

The line L has equation $y = 3x + k$, where k is a positive constant.

(a) Sketch C and L on separate diagrams, showing the coordinates of the points at which C and L cut the axes.

(4)

Given that line L is a tangent to C,

(b) find the value of k.

(5)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 9 marks)

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10. Xin has been given a 14 day training schedule by her coach.

Xin will run for A minutes on day 1, where A is a constant.

She will then increase her running time by $(d + 1)$ minutes each day, where d is a constant.

(a) Show that on day 14, Xin will run for

$$(A + 13d + 13) \text{ minutes.}$$

(2)

Yi has also been given a 14 day training schedule by her coach.

Yi will run for $(A - 13)$ minutes on day 1.

She will then increase her running time by $(2d - 1)$ minutes each day.

Given that Yi and Xin will run for the same length of time on day 14,

(b) find the value of d.

(3)

Given that Xin runs for a total time of 784 minutes over the 14 days,

(c) find the value of A.

(3)

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Question 10 continued

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Question 10 continued

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Question 10 continued

Q10

(Total 8 marks)

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11.

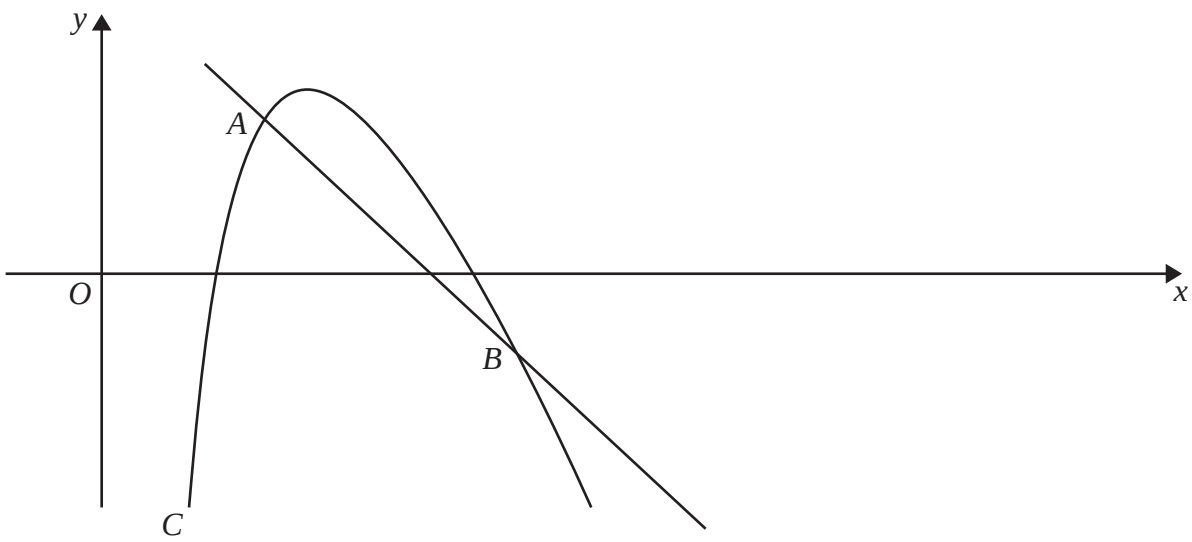

Figure 3

A sketch of part of the curve C with equation

$$y = 20 - 4x - \frac{18}{x}, \quad x > 0$$

is shown in Figure 3.

Point A lies on C and has an x coordinate equal to 2

(a) Show that the equation of the normal to C at A is $y = -2x + 7$

(6)

The normal to C at A meets C again at the point B, as shown in Figure 3.

(b) Use algebra to find the coordinates of B.

(5)

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

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Question 11 continued

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Question 11 continued

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Question 11 continued

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Question 11 continued

Q11

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

END

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