Centre No.					
Candidate No.					

Paper Reference: 6 6 6 4 / 0 1R

Surname | Initial(s)

Signature

Paper Reference(s)

6664/01R

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Thursday 22 May 2014 – Morning

Time: 1 hour 30 minutes

Materials required for examination	Items included with question papers
Mathematical Formulae (Pink)	Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation or symbolic differentiation/integration, or have retrievable mathematical formulae stored in them.

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

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.
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 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 3 5 A 0 1 3 2

Turn over

PEARSON

1. Find the first 4 terms, in ascending powers of x, of the binomial expansion of

$$\left(1 + \frac{3x}{2}\right)^8$$

giving each term in its simplest form.

(4)

Question 1 continued

Q1

(Total 4 marks)

Turn over

2. A geometric series has first term a, where $a \neq 0$, and common ratio r.
The sum to infinity of this series is 6 times the first term of the series.

(a) Show that $r = \frac{5}{6}$

(2)

Given that the fourth term of this series is 62.5

(b) find the value of a,

(2)

(c) find the difference between the sum to infinity and the sum of the first 30 terms, giving your answer to 3 significant figures.

(4)

Question 2 continued

Question 2 continued

Question 2 continued

(Total 8 marks)

Q2

3.

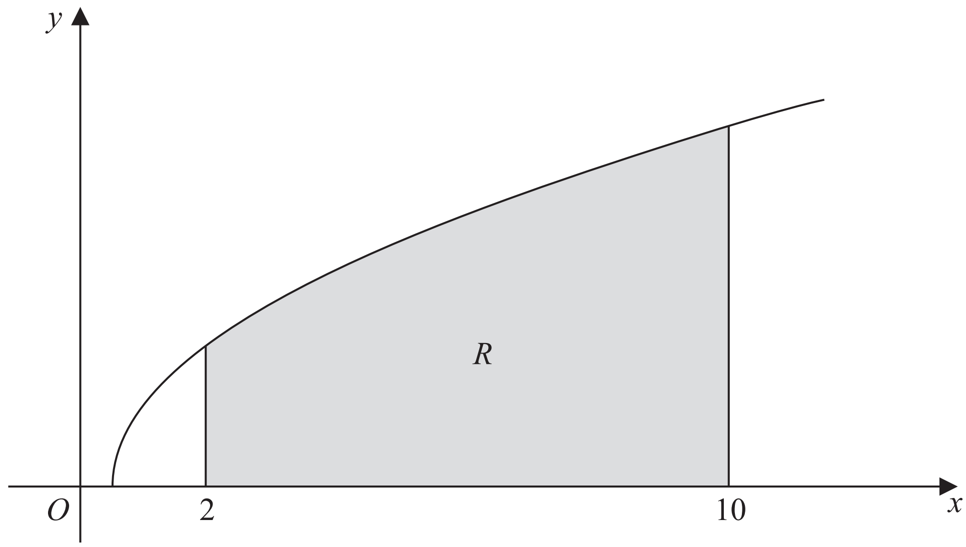

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \sqrt{(2x - 1)}$, $x \geqslant 0.5$

The finite region R, shown shaded in Figure 1, is bounded by the curve, the x-axis and the lines with equations $x = 2$ and $x = 10$.

The table below shows corresponding values of x and y for $y = \sqrt{(2x - 1)}$.

x	2	4	6	8	10
y	$\sqrt{3}$		$\sqrt{11}$		$\sqrt{19}$

(a) Complete the table with the values of y corresponding to $x = 4$ and $x = 8$.
(1)

(b) Use the trapezium rule, with all the values of y in the completed table, to find an approximate value for the area of R, giving your answer to 2 decimal places.
(3)

(c) State whether your approximate value in part (b) is an overestimate or an underestimate for the area of R.
(1)

Question 3 continued

(Total 5 marks)

Q3

4. $f(x) = -4x^3 + ax^2 + 9x - 18$, where a is a constant.

Given that $(x - 2)$ is a factor of $f(x)$,

(a) find the value of a,

(2)

(b) factorise $f(x)$ completely,

(3)

(c) find the remainder when $f(x)$ is divided by $(2x - 1)$.

(2)

Question 4 continued

Question 4 continued

Question 4 continued

Q4

(Total 7 marks)

5.

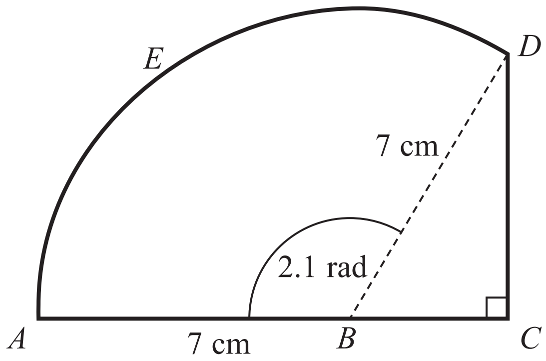

Figure 2

Figure 2 shows the shape *ABCDEA* which consists of a right-angled triangle *BCD* joined to a sector *ABDEA* of a circle with radius 7 cm and centre *B*.

A, *B* and *C* lie on a straight line with *AB* = 7 cm.

Given that the size of angle *ABD* is exactly 2.1 radians,

(a) find, in cm, the length of the arc *DEA*,

(2)

(b) find, in cm, the perimeter of the shape *ABCDEA*, giving your answer to 1 decimal place.

(4)

Question 5 continued

(Total 6 marks)

Q5

6.

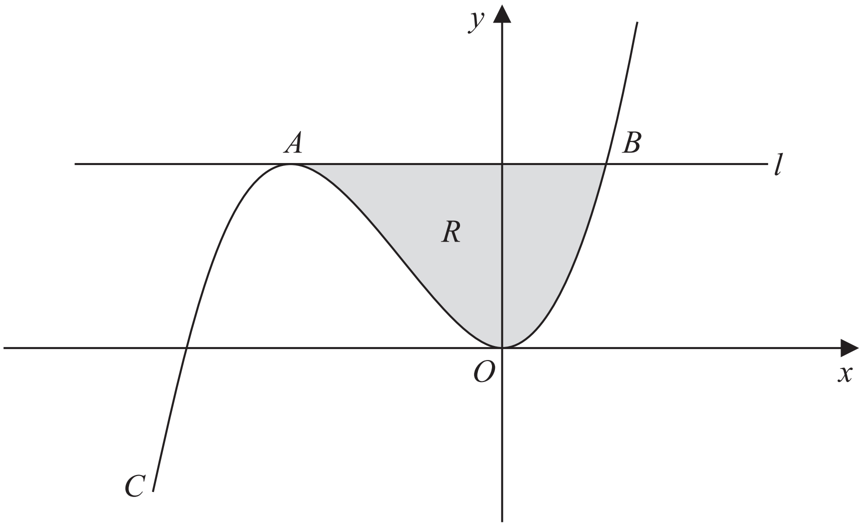

Figure 3

Figure 3 shows a sketch of part of the curve C with equation

$$y = \frac{1}{8}x^3 + \frac{3}{4}x^2, \quad x \in \mathbb{R}$$

The curve C has a maximum turning point at the point A and a minimum turning point at the origin O.

The line l touches the curve C at the point A and cuts the curve C at the point B.

The x coordinate of A is -4 and the x coordinate of B is 2.

The finite region R, shown shaded in Figure 3, is bounded by the curve C and the line l.

Use integration to find the area of the finite region R.

(7)

Question 6 continued

Question 6 continued

Question 6 continued

(Total 7 marks)

Q6

P 4 3 1 3 5 A 0 1 9 3 2

Turn over

7. (i) Solve, for $0 \leqslant \theta < 180°$, the equation

$$\frac{\sin 2\theta}{(4\sin 2\theta - 1)} = 1$$

giving your answers to 1 decimal place.

(3)

(ii) Solve, for $0 \leqslant x < 2\pi$, the equation

$$5\sin^2 x - 2\cos x - 5 = 0$$

giving your answers to 2 decimal places.
(*Solutions based entirely on graphical or numerical methods are not acceptable.*)

(5)

Question 7 continued

Question 7 continued

Question 7 continued

(Total 8 marks)

Q7

8. (i) Solve

$$5^y = 8$$

giving your answer to 3 significant figures.

(2)

(ii) Use algebra to find the values of x for which

$$\log_2(x + 15) - 4 = \frac{1}{2}\log_2 x$$

(6)

Question 8 continued

Q8

(Total 8 marks)

9.

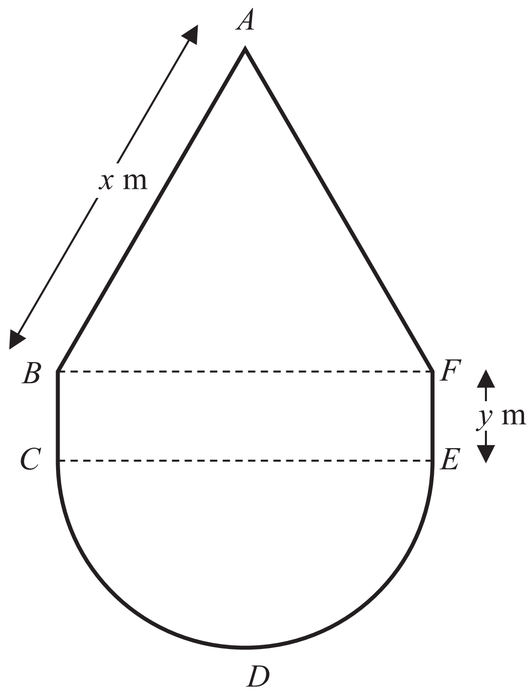

Figure 4

Figure 4 shows the plan of a pool.

The shape of the pool *ABCDEFA* consists of a rectangle *BCEF* joined to an equilateral triangle *BFA* and a semi-circle *CDE*, as shown in Figure 4.

Given that $AB = x$ metres, $EF = y$ metres, and the area of the pool is 50 m^2,

(a) show that

$$y = \frac{50}{x} - \frac{x}{8}(\pi + 2\sqrt{3})$$

(3)

(b) Hence show that the perimeter, P metres, of the pool is given by

$$P = \frac{100}{x} + \frac{x}{4}(\pi + 8 - 2\sqrt{3})$$

(3)

(c) Use calculus to find the minimum value of P, giving your answer to 3 significant figures.

(5)

(d) Justify, by further differentiation, that the value of P that you have found is a minimum.

(2)

P 4 3 1 3 5 A 0 2 6 3 2

Question 9 continued

Question 9 continued

Question 9 continued

Q9

(Total 13 marks)

P 4 3 1 3 5 A 0 2 9 3 2

10. The circle C, with centre A, passes through the point P with coordinates $(-9, 8)$ and the point Q with coordinates $(15, -10)$.

Given that PQ is a diameter of the circle C,

(a) find the coordinates of A,
(2)

(b) find an equation for C.
(3)

A point R also lies on the circle C.
Given that the length of the chord PR is 20 units,

(c) find the length of the shortest distance from A to the chord PR.
Give your answer as a surd in its simplest form.
(2)

(d) Find the size of the angle ARQ, giving your answer to the nearest 0.1 of a degree.
(2)

Question 10 continued

Question 10 continued

Q10

(Total 9 marks)

TOTAL FOR PAPER: 75 MARKS

END