Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel GCE

Centre Number | Candidate Number

Wednesday 22 May 2019

Morning (Time: 1 hour 30 minutes) | Paper Reference **6664/01**

Core Mathematics C2

Advanced Subsidiary

You must have:
Mathematical Formulae and Statistical Tables (Pink)

Total Marks

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

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information

- The total mark for this paper is 75.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

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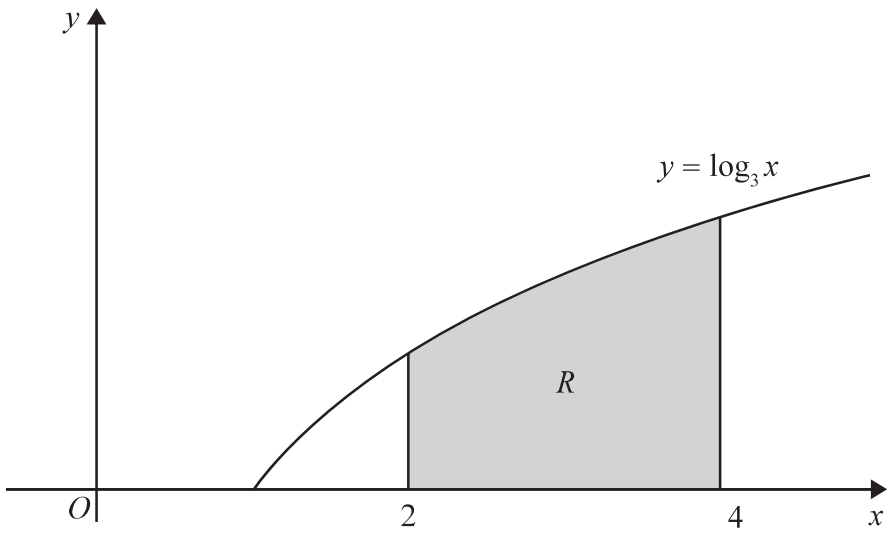

Figure 1

Figure 1 shows a sketch of part of the curve with equation

$$y = \log_3 x, \qquad x \geqslant 1$$

The finite region R, shown shaded in Figure 1, is bounded by the curve, the line with equation $x = 2$, the x-axis and the line with equation $x = 4$

(a) Complete the table below with the value of y corresponding to $x = 3.5$
Give your answer to 3 decimal places.

x	2	2.5	3	3.5	4
y	0.631	0.834	1		1.262

(1)

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

(4)

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Question 1 continued

Q1

(Total 5 marks)

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2.

$$f(x) = 3x^3 - 25x^2 + ax - 15, \text{ where } a \text{ is a constant}$$

Given that $(x - 3)$ is a factor of $f(x)$,

(a) find the value of a,

(2)

(b) factorise $f(x)$ completely, using algebra.

(4)

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Question 2 continued

Q2

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3. (a) Find the first 4 terms, in ascending powers of x, in the binomial expansion of

$$(1 + kx)^{10}$$

where k is a positive constant. Give each term in its simplest form.

(3)

Given that, in this expansion, the coefficients of x and x^3 are equal,

(b) find the exact value of k,

(3)

(c) find the coefficient of x^2

(1)

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Question 3 continued

Q3

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4. A business plan predicts a yearly profit of £250 000 for the year 2019.
The business plan also predicts that the yearly profit will increase by 10% each year forming a geometric sequence.

(a) Find the first year in which the business plan predicts that the yearly profit will exceed £1 000 000

(4)

(b) Find the total predicted profits for the years 2019 to 2030 inclusive, giving your answer to the nearest pound.

(3)

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Question 4 continued

Q4

(Total 7 marks)

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5. The circle C has equation

$$x^2 + y^2 - 3x + 6y = 1$$

Find

(a) the coordinates of the centre of C,

(2)

(b) the value of the radius of C.

(2)

The point P (5, −3) lies on the circle C.

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

(2)

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Question 5 continued

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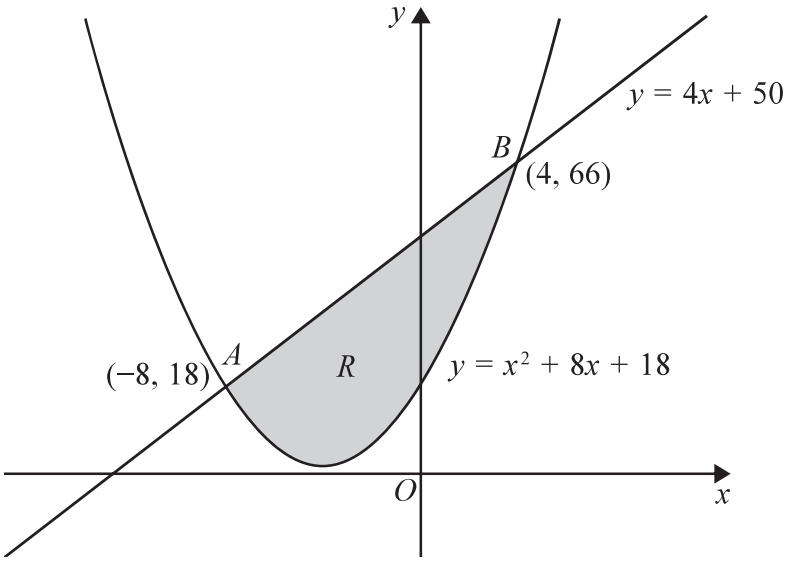

Figure 2

Figure 2 shows the line with equation $y = 4x + 50$ and the curve with equation $y = x^2 + 8x + 18$. The line cuts the curve at the points A $(-8, 18)$ and B $(4, 66)$.

The shaded region R is bounded by the line and the curve, as shown in Figure 2.

Using calculus, find the area of R.

(6)

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Question 6 continued

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Question 6 continued

Q6

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7. (a) Show that the equation

$$6\cos^2 x - \sin x - 4 = 0$$

may be written as

$$6\sin^2 x + \sin x - 2 = 0$$

(2)

(b) Hence solve, for $-90° \leqslant y < 90°$, the equation

$$6\cos^2(2y) - \sin(2y) - 4 = 0$$

giving your answers to one decimal place where appropriate.

(5)

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Question 7 continued

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Question 7 continued

Q7

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8. (i) Find the real value of x such that

$$\log_x 600 = 3$$

Give your answer to 2 decimal places.

(2)

(ii) Solve the equation

$$\log_9(3x) + \log_9\left(\frac{x^4}{81}\right) = 2$$

giving the exact answer in the form $x = 3^k$, where k is a rational number.

(5)

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Question 8 continued

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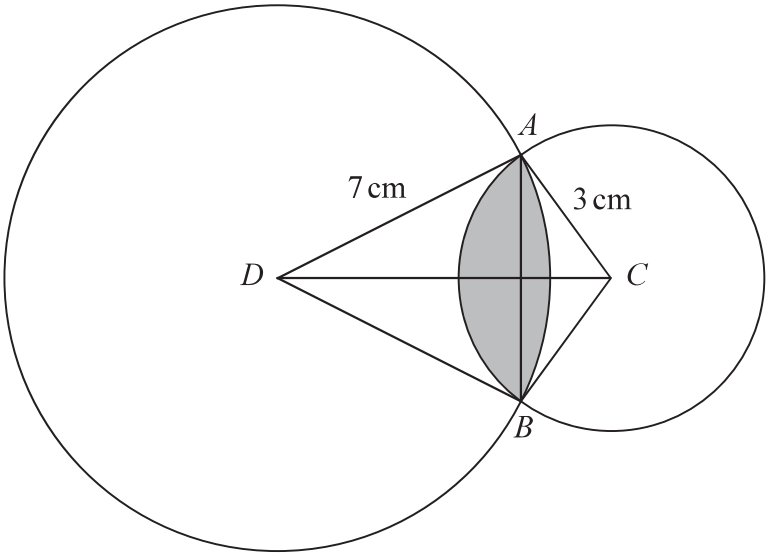

Figure 3

Figure 3 shows two intersecting circles.

The larger circle has its centre at the point D and has radius 7 cm.

The smaller circle has its centre at the point C and has radius 3 cm.

AB is the common chord of the two circles, and the distance CD is 9 cm.

(a) Find, to 3 significant figures, the size of

(i) the angle ADC in radians,

(ii) the angle ACD in radians.

(4)

The region common to both circles is shown shaded in Figure 3.

(b) Find the perimeter of the shaded region.

(3)

(c) Find the area of the shaded region.

(4)

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Question 9 continued

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Question 9 continued

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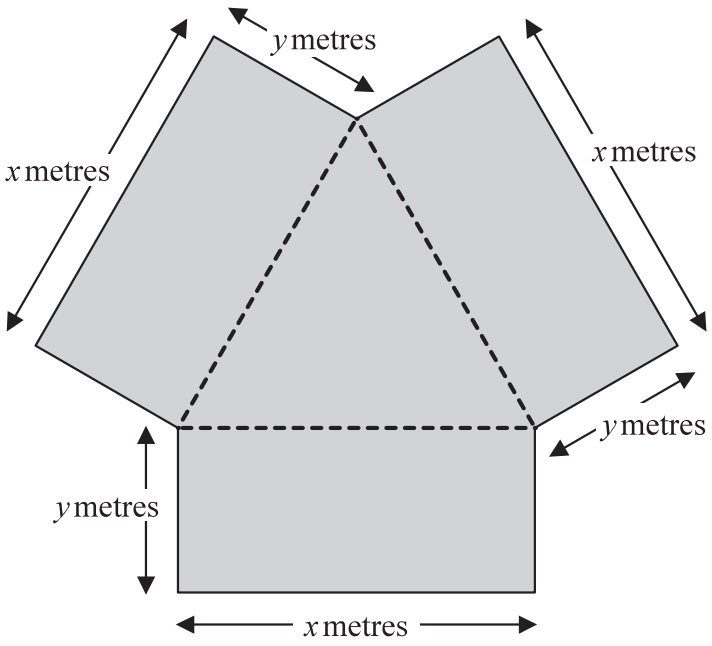

Figure 4

Figure 4 shows a plan view for a flower bed. Its shape is an equilateral triangle of side x metres with three congruent rectangles attached to the triangle along its sides. Each rectangle has length x metres and width y metres, as shown in Figure 4.

Given that the total area of the flower bed is $3\,\text{m}^2$ and that $0 < x < 2.632$ (3d.p.),

(a) show that the perimeter P metres, around the outside of the flower bed, is given by the equation

$$P = 3x + \frac{6}{x} - \frac{\sqrt{3}}{2}x$$

(6)

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

(5)

(c) Justify, using calculus, that the value you have found in part (b) is a minimum value.

(2)

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Q10

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TOTAL FOR PAPER: 75 MARKS

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