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Pearson
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Centre Number

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Candidate Number

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Core Mathematics C2

Advanced Subsidiary

Wednesday 25 May 2016 – Morning
Time: 1 hour 30 minutes

Paper Reference

6664/01

You must have:

Mathematical Formulae and Statistical Tables (Pink)

Total Marks

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, 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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- (3)

2. The curve C has equation

$$y = 8 - 2^{x-1}, \quad 0 \leq x \leq 4$$

(a) Complete the table below with the value of y corresponding to $x = 1$

x	0	1	2	3	4
y	7.5		6	4	0

(1)

(b) Use the trapezium rule, with all the values of y in the completed table, to find an approximate value for $\int_0^4 (8 - 2^{x-1}) dx$

(3)

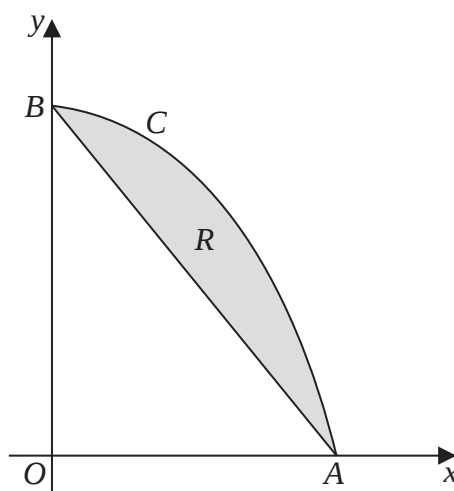


Figure 1

Figure 1 shows a sketch of the curve C with equation $y = 8 - 2^{x-1}$, $0 \leq x \leq 4$

The curve C meets the x -axis at the point A and meets the y -axis at the point B .

The region R , shown shaded in Figure 1, is bounded by the curve C and the straight line through A and B .

(c) Use your answer to part (b) to find an approximate value for the area of R .

(2)

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Question 2 continued

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3.

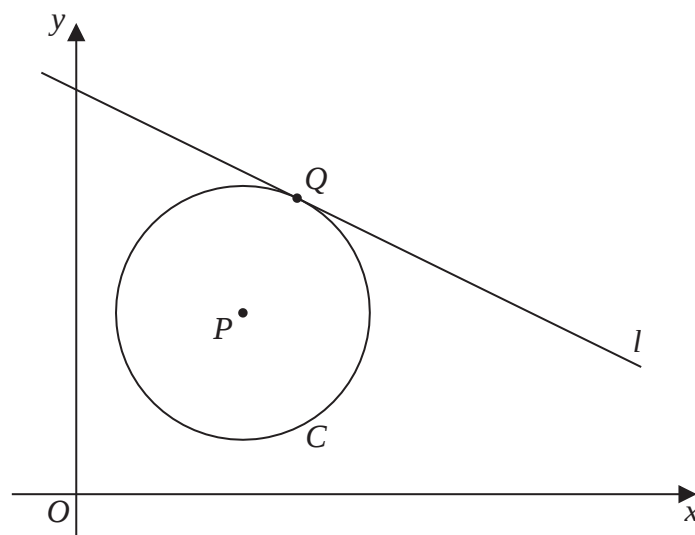


Figure 2

The circle C has centre $P(7, 8)$ and passes through the point $Q(10, 13)$, as shown in Figure 2.

- (a) Find the length PQ , giving your answer as an exact value. (2)

- (b) Hence write down an equation for C . (2)

The line l is a tangent to C at the point Q , as shown in Figure 2.

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



Question 3 continued

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4.

$$f(x) = 6x^3 + 13x^2 - 4$$

- Use the remainder theorem to find the remainder when $f(x)$ is divided by $(2x + 3)$.
(2)
- Use the factor theorem to show that $(x + 2)$ is a factor of $f(x)$.
(2)
- Factorise $f(x)$ completely.
(4)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (2)



Question 5 continued

Handwriting practice area with 25 horizontal lines.

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$$1 - 2\cos\left(\theta - \frac{\pi}{5}\right) = 0$$

(3)

$$4\cos^2 x + 7\sin x - 2 = 0$$

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(6)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 6 continued

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This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a template for writing or drawing. The margins are consistent on all sides.

Question 7 continued

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9.

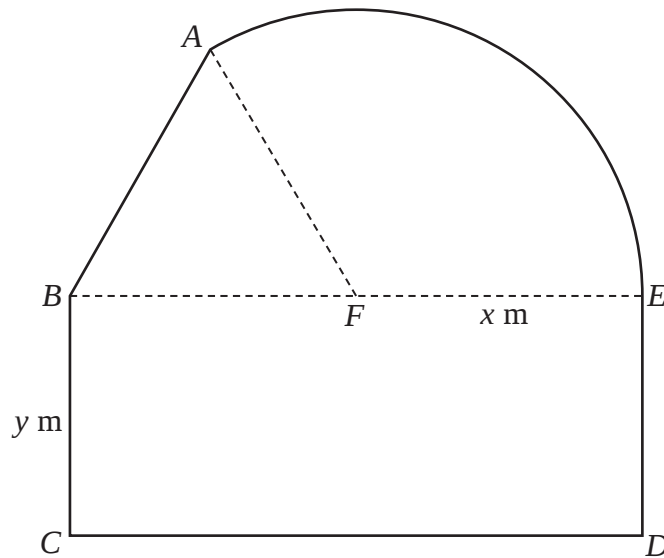


Diagram not
drawn to scale

Figure 4

Figure 4 shows a plan view of a sheep enclosure.

The enclosure $ABCDEA$, as shown in Figure 4, consists of a rectangle $BCDE$ joined to an equilateral triangle BFA and a sector FEA of a circle with radius x metres and centre F .

The points B , F and E lie on a straight line with $FE = x$ metres and $10 \leq x \leq 25$

- (a) Find, in m^2 , the exact area of the sector FEA , giving your answer in terms of x , in its simplest form.

(2)

Given that $BC = y$ metres, where $y > 0$, and the area of the enclosure is 1000 m^2 ,

- (b) show that

$$y = \frac{500}{x} - \frac{x}{24}(4\pi + 3\sqrt{3})$$

(3)

- (c) Hence show that the perimeter P metres of the enclosure is given by

$$P = \frac{1000}{x} + \frac{x}{12}(4\pi + 36 - 3\sqrt{3})$$

(3)

- (d) Use calculus to find the minimum value of P , giving your answer to the nearest metre.

(5)

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

(2)



Question 9 continued

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