

Edexcel GCE
Core Mathematics C4
Silver Level S3
(Question Paper)

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Paper Reference(s)

6666/01

**Edexcel GCE
Core Mathematics C4
Silver Level S3**

Time: 1 hour 30 minutes

Materials required for examination papers

Mathematical Formulae (Green)

Items included with question

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, differentiation and integration, or have retrievable mathematical formulas stored in them.

Instructions to Candidates

Write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Core Mathematics C4), the paper reference (6666), your surname, initials and signature.

Information for Candidates

A booklet ‘Mathematical Formulae and Statistical Tables’ is provided.

Full marks may be obtained for answers to ALL questions.

There are 8 questions in this question paper. The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.

You must show sufficient working to make your methods clear to the Examiner. Answers without working may gain no credit.

Suggested grade boundaries for this paper:

A*	A	B	C	D	E
67	59	51	45	38	32

1. Express in partial fractions

$$\frac{5x+3}{(2x+1)(x+1)^2}$$

(4)

June 2013 (R)

2. (a) Use integration to find

$$\int \frac{1}{x^3} \ln x \, dx .$$

(5)

- (b) Hence calculate

$$\int_1^2 \frac{1}{x^3} \ln x \, dx .$$

(2)

January 2013

3. $f(x) = \frac{27x^2 + 32x + 16}{(3x + 2)^2(1 - x)}, \quad |x| < \frac{2}{3}.$

Given that $f(x)$ can be expressed in the form

$$f(x) = \frac{A}{(3x + 2)} + \frac{B}{(3x + 2)^2} + \frac{C}{(1 - x)},$$

- (a) find the values of B and C and show that $A = 0$. (4)
- (b) Hence, or otherwise, find the series expansion of $f(x)$, in ascending powers of x , up to and including the term in x^2 . Simplify each term. (6)
- (c) Find the percentage error made in using the series expansion in part (b) to estimate the value of $f(0.2)$. Give your answer to 2 significant figures. (4)

January 2009

4. A curve C has parametric equations

$$x = \sin^2 t, y = 2 \tan t, 0 \leq t < \frac{\pi}{2}.$$

- (a) Find $\frac{dy}{dx}$ in terms of t .

(4)

The tangent to C at the point where $t = \frac{\pi}{3}$ cuts the x -axis at the point P .

- (b) Find the x -coordinate of P .

(6)

June 2010

5. Find the gradient of the curve with equation

$$\ln y = 2x \ln x, \quad x > 0, \quad y > 0,$$

at the point on the curve where $x = 2$. Give your answer as an exact value.

(7)

June 2011

6. With respect to a fixed origin O , the lines l_1 and l_2 are given by the equations

$$l_1: \mathbf{r} = \begin{pmatrix} 6 \\ -3 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix}, \quad l_2: \mathbf{r} = \begin{pmatrix} -5 \\ 15 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix},$$

where μ and λ are scalar parameters.

- (a) Show that l_1 and l_2 meet and find the position vector of their point of intersection A .

(6)

- (b) Find, to the nearest 0.1° , the acute angle between l_1 and l_2 .

(3)

The point B has position vector $\begin{pmatrix} 5 \\ -1 \\ 1 \end{pmatrix}$.

- (c) Show that B lies on l_1 .

(1)

- (d) Find the shortest distance from B to the line l_2 , giving your answer to 3 significant figures.

(4)

June 2011

7.

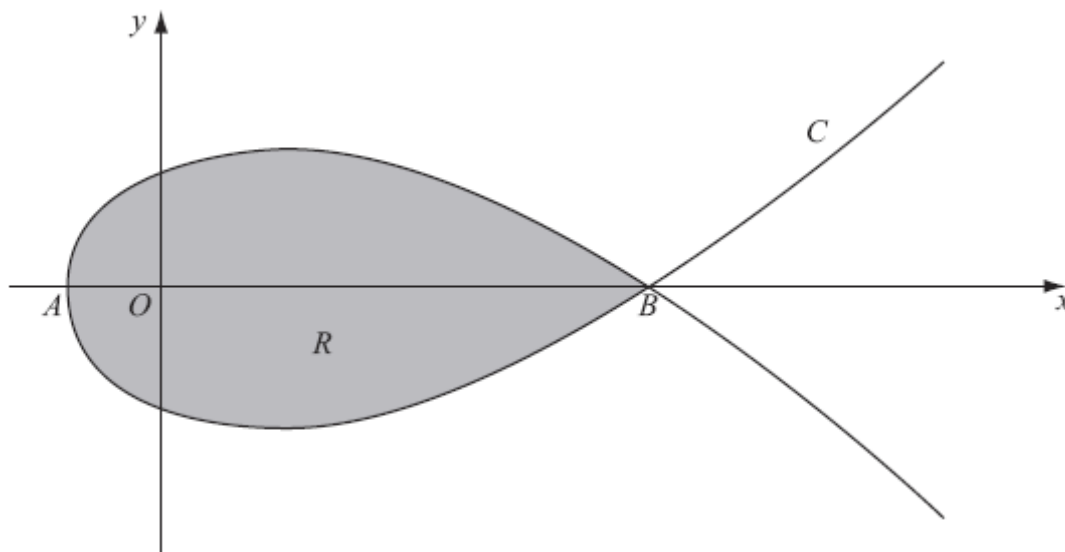


Figure 2

Figure 2 shows a sketch of the curve C with parametric equations

$$x = 5t^2 - 4, \quad y = t(9 - t^2)$$

The curve C cuts the x -axis at the points A and B .

(a) Find the x -coordinate at the point A and the x -coordinate at the point B . **(3)**

The region R , as shown shaded in Figure 2, is enclosed by the loop of the curve.

(b) Use integration to find the area of R . **(6)**

January 2010

8. (a) Using the substitution $x = 2 \cos u$, or otherwise, find the exact value of

$$\int_1^{\sqrt{2}} \frac{1}{x^2 \sqrt{4-x^2}} dx .$$

(7)

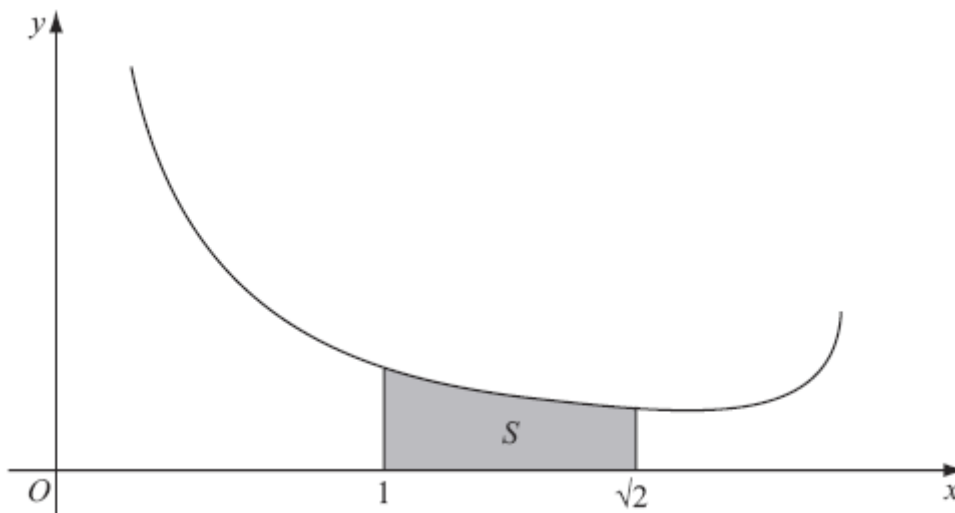


Figure 3

Figure 3 shows a sketch of part of the curve with equation $y = \frac{4}{x(4-x^2)^{\frac{1}{4}}}$, $0 < x < 2$.

The shaded region S , shown in Figure 3, is bounded by the curve, the x -axis and the lines with equations $x = 1$ and $x = \sqrt{2}$. The shaded region S is rotated through 2π radians about the x -axis to form a solid of revolution.

- (b) Using your answer to part (a), find the exact volume of the solid of revolution formed.

(3)

January 2010

TOTAL FOR PAPER: 75 MARKS

END