

Edexcel GCE
Core Mathematics C4
Silver Level S1
(Question Paper)

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Paper Reference(s)

6666/01

**Edexcel GCE
Core Mathematics C4
Silver Level S1**

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	53	47	40	34

1.
$$f(x) = \frac{1}{\sqrt{4+x}}, \quad |x| < 4.$$

Find the binomial expansion of $f(x)$ in ascending powers of x , up to and including the term in x^3 . Give each coefficient as a simplified fraction.

(6)

June 2009

2. (a) Use the binomial theorem to expand

$$(8-3x)^{\frac{1}{3}}, \quad |x| < \frac{8}{3},$$

in ascending powers of x , up to and including the term in x^3 , giving each term as a simplified fraction.

(5)

(b) Use your expansion, with a suitable value of x , to obtain an approximation to $\sqrt[3]{7.7}$. Give your answer to 7 decimal places.

(2)

January 2008

3.
$$f(x) = \frac{6}{\sqrt{9-4x}}, \quad |x| < \frac{9}{4}.$$

(a) Find the binomial expansion of $f(x)$ in ascending powers of x , up to and including the term in x^3 . Give each coefficient in its simplest form.

(6)

Use your answer to part (a) to find the binomial expansion in ascending powers of x , up to and including the term in x^3 , of

(b)
$$g(x) = \frac{6}{\sqrt{9+4x}}, \quad |x| < \frac{9}{4},$$

(1)

(c)
$$h(x) = \frac{6}{\sqrt{9-8x}}, \quad |x| < \frac{9}{8}.$$

(2)

June 2012

4. (a) Find the binomial expansion of

$$\sqrt[3]{(8-9x)}, \quad |x| < \frac{8}{9}$$

in ascending powers of x , up to and including the term in x^3 . Give each coefficient as a simplified fraction.

(6)

- (b) Use your expansion to estimate an approximate value for $\sqrt[3]{7100}$, giving your answer to 4 decimal places. State the value of x , which you use in your expansion, and show all your working.

(3)

June 2013 (R)

5. The curve C has equation

$$16y^3 + 9x^2y - 54x = 0.$$

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

(5)

- (b) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$.

(7)

June 2012

6. Water is being heated in a kettle. At time t seconds, the temperature of the water is θ °C.

The rate of increase of the temperature of the water at any time t is modelled by the differential equation

$$\frac{d\theta}{dt} = \lambda(120 - \theta), \quad \theta \leq 100$$

where λ is a positive constant.

Given that $\theta = 20$ when $t = 0$,

- (a) solve this differential equation to show that

$$\theta = 120 - 100e^{-\lambda t} \quad (8)$$

When the temperature of the water reaches 100 °C, the kettle switches off.

- (b) Given that $\lambda = 0.01$, find the time, to the nearest second, when the kettle switches off.

(3)

June 2013

7.

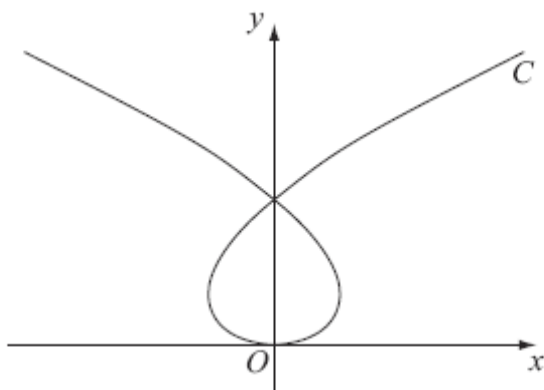


Figure 3

The curve C shown in Figure 3 has parametric equations

$$x = t^3 - 8t, \quad y = t^2$$

where t is a parameter. Given that the point A has parameter $t = -1$,

(a) find the coordinates of A .

(1)

The line l is the tangent to C at A .

(b) Show that an equation for l is $2x - 5y - 9 = 0$.

(5)

The line l also intersects the curve at the point B .

(c) Find the coordinates of B .

(6)

January 2009

8. With respect to a fixed origin O , the line l has equation

$$\mathbf{r} = \begin{pmatrix} 13 \\ 8 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 2 \\ -1 \end{pmatrix}, \text{ where } \lambda \text{ is a scalar parameter.}$$

The point A lies on l and has coordinates $(3, -2, 6)$.

The point P has position vector $(-p\mathbf{i} + 2p\mathbf{k})$ relative to O , where p is a constant.

Given that vector \overline{PA} is perpendicular to l ,

(a) find the value of p .

(4)

Given also that B is a point on l such that $\angle BPA = 45^\circ$,

(b) find the coordinates of the two possible positions of B .

(5)

June 2013

TOTAL FOR PAPER: 75 MARKS

END