

Edexcel GCE
Core Mathematics C3
Silver Level S3
(Question Paper)

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Paper Reference(s)

6665/01

**Edexcel GCE
Core Mathematics C3
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 C3), the paper reference (6665), 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
70	63	56	48	42	38

1. (a) Find the value of $\frac{dy}{dx}$ at the point where $x = 2$ on the curve with equation

$$y = x^2 \sqrt{5x - 1}. \quad (6)$$

- (b) Differentiate $\frac{\sin 2x}{x^2}$ with respect to x .

(4)

January 2009

2. $f(x) = x^3 + 2x^2 - 3x - 11$

- (a) Show that $f(x) = 0$ can be rearranged as

(2)

$$x = \sqrt{\left(\frac{3x + 11}{x + 2}\right)}, \quad x \neq -2.$$

The equation $f(x) = 0$ has one positive root α .

The iterative formula $x_{n+1} = \sqrt{\left(\frac{3x_n + 11}{x_n + 2}\right)}$ is used to find an approximation to α .

- (b) Taking $x_1 = 0$, find, to 3 decimal places, the values of x_2 , x_3 and x_4 .

(3)

- (c) Show that $\alpha = 2.057$ correct to 3 decimal places.

(3)

January 2010

3. (a) Express

$$\frac{4x-1}{2(x-1)} - \frac{3}{2(x-1)(2x-1)}$$

as a single fraction in its simplest form.

(4)

Given that

$$f(x) = \frac{4x-1}{2(x-1)} - \frac{3}{2(x-1)(2x-1)} - 2, \quad x > 1,$$

(b) show that

$$f(x) = \frac{3}{2x-1}.$$

(2)

(c) Hence differentiate $f(x)$ and find $f'(2)$.

(3)

January 2011

4.

$$f(x) = 7\cos x + \sin x$$

Given that $f(x) = R\cos(x - a)$, where $R > 0$ and $0 < a < 90^\circ$,

(a) find the exact value of R and the value of a to one decimal place.

(3)

(b) Hence solve the equation

$$7\cos x + \sin x = 5$$

for $0 \leq x < 360^\circ$, giving your answers to one decimal place.

(5)

(c) State the values of k for which the equation

$$7\cos x + \sin x = k$$

has only one solution in the interval $0 \leq x < 360^\circ$.

(2)

June 2013 (R)

5. The function f is defined by

$$f: x \mapsto 4 - \ln(x + 2), \quad x \in \mathbb{R}, \quad x \geq -1.$$

(a) Find $f^{-1}(x)$. **(3)**

(b) Find the domain of f^{-1} . **(1)**

The function g is defined by

$$g: x \mapsto e^{x^2} - 2, \quad x \in \mathbb{R}.$$

(c) Find $fg(x)$, giving your answer in its simplest form. **(3)**

(d) Find the range of fg . **(1)**

June 2011

6.

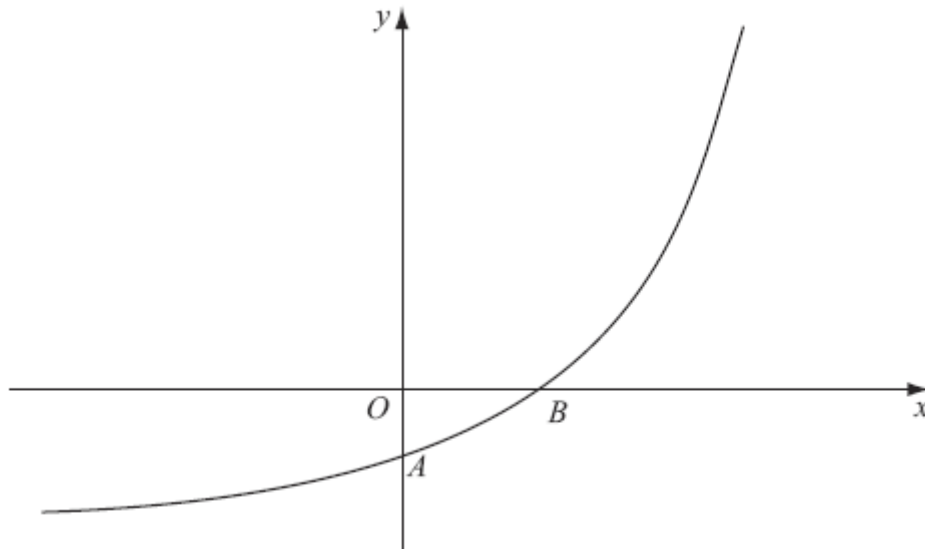


Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = f(x)$, $x \in \mathbb{R}$.

The curve meets the coordinate axes at the points $A(0, 1 - k)$ and $B(\frac{1}{2} \ln k, 0)$, where k is a constant and $k > 1$, as shown in Figure 2.

On separate diagrams, sketch the curve with equation

(a) $y = |f(x)|$, (3)

(b) $y = f^{-1}(x)$. (2)

Show on each sketch the coordinates, in terms of k , of each point at which the curve meets or cuts the axes.

Given that $f(x) = e^{2x} - k$,

(c) state the range of f , (1)

(d) find $f^{-1}(x)$, (3)

(e) write down the domain of f^{-1} . (1)

June 2009

7. $f(x) = x^2 - 3x + 2 \cos\left(\frac{1}{2}x\right), \quad 0 \leq x \leq \pi.$

(a) Show that the equation $f(x) = 0$ has a solution in the interval $0.8 < x < 0.9$. (2)

The curve with equation $y = f(x)$ has a minimum point P .

(b) Show that the x -coordinate of P is the solution of the equation

$$x = \frac{3 + \sin\left(\frac{1}{2}x\right)}{2}. \quad (4)$$

(c) Using the iteration formula

$$x_{n+1} = \frac{3 + \sin\left(\frac{1}{2}x_n\right)}{2}, \quad x_0 = 2,$$

find the values of x_1, x_2 and x_3 , giving your answers to 3 decimal places. (3)

(d) By choosing a suitable interval, show that the x -coordinate of P is 1.9078 correct to 4 decimal places. (3)

January 2012

8. The curve C has equation

$$y = \frac{3 + \sin 2x}{2 + \cos 2x}.$$

(a) Show that

$$\frac{dy}{dx} = \frac{6 \sin 2x + 4 \cos 2x + 2}{(2 + \cos 2x)^2} \quad (4)$$

(b) Find an equation of the tangent to C at the point on C where $x = \frac{\pi}{2}$.

Write your answer in the form $y = ax + b$, where a and b are exact constants. (4)

January 2011

TOTAL FOR PAPER: 75 MARKS

END