

Edexcel GCE
Core Mathematics C3
Silver Level S2
(Question Paper)

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Paper Reference(s)

6665/01

**Edexcel GCE
Core Mathematics C3
Silver Level S2**

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
69	62	55	46	43	39

1.

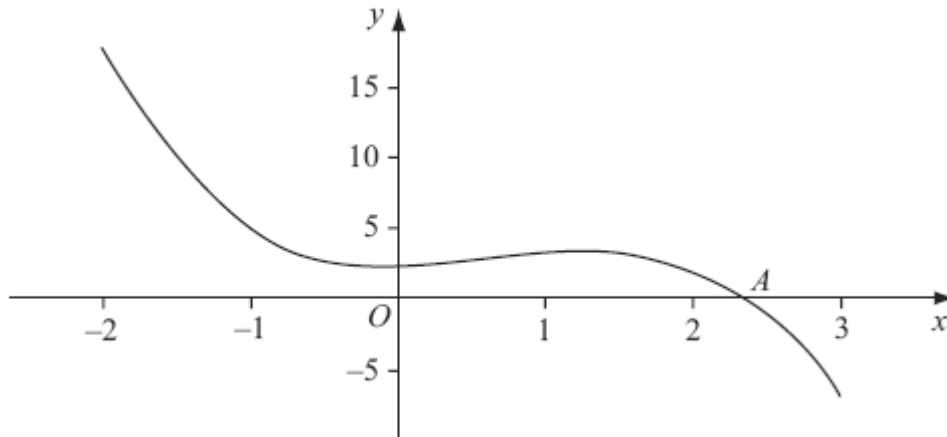


Figure 1

Figure 1 shows part of the curve with equation $y = -x^3 + 2x^2 + 2$, which intersects the x -axis at the point A where $x = \alpha$.

To find an approximation to α , the iterative formula

$$x_{n+1} = \frac{2}{(x_n)^2} + 2$$

is used.

(a) Taking $x_0 = 2.5$, find the values of x_1, x_2, x_3 and x_4 .
Give your answers to 3 decimal places where appropriate.

(3)

(b) Show that $\alpha = 2.359$ correct to 3 decimal places.

(3)

June 2009

2.

$$f(x) = x^3 + 3x^2 + 4x - 12$$

(a) Show that the equation $f(x) = 0$ can be written as

$$x = \sqrt{\left(\frac{4(3-x)}{3+x}\right)}, \quad x \neq -3. \quad (3)$$

The equation $x^3 + 3x^2 + 4x - 12 = 0$ has a single root which is between 1 and 2.

(b) Use the iteration formula

$$x_{n+1} = \sqrt{\left(\frac{4(3-x_n)}{3+x_n}\right)}, \quad n \geq 0,$$

with $x_0 = 1$ to find, to 2 decimal places, the value of x_1 , x_2 and x_3 . (3)

The root of $f(x) = 0$ is α .

(c) By choosing a suitable interval, prove that $\alpha = 1.272$ to 3 decimal places. (3)

June 2012

3.

$$f(x) = 2 \sin(x^2) + x - 2, \quad 0 \leq x < 2\pi.$$

(a) Show that $f(x) = 0$ has a root α between $x = 0.75$ and $x = 0.85$. (2)

The equation $f(x) = 0$ can be written as $x = [\arcsin(1 - 0.5x)]^{\frac{1}{2}}$.

(b) Use the iterative formula

$$x_{n+1} = [\arcsin(1 - 0.5x_n)]^{\frac{1}{2}}, \quad x_0 = 0.8,$$

to find the values of x_1 , x_2 and x_3 , giving your answers to 5 decimal places. (3)

(c) Show that $\alpha = 0.80157$ is correct to 5 decimal places. (3)

June 2011

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

(a) Show that there is a root of $f(x) = 0$ in the interval $2 < x < 3$. (2)

(b) Use the iterative formula

$$x_{n+1} = \ln(x_n + 2) + 1, \quad x_0 = 2.5,$$

to calculate the values of x_1, x_2 and x_3 , giving your answers to 5 decimal places. (3)

(c) Show that $x = 2.505$ is a root of $f(x) = 0$ correct to 3 decimal places. (2)

January 2008

5. The function f is defined by

$$f: x \mapsto \frac{2(x-1)}{x^2 - 2x - 3} - \frac{1}{x-3}, \quad x > 3.$$

(a) Show that $f(x) = \frac{1}{x+1}, \quad x > 3$. (4)

(b) Find the range of f . (2)

(c) Find $f^{-1}(x)$. State the domain of this inverse function. (3)

The function g is defined by

$$g: x \mapsto 2x^2 - 3, \quad x \in \mathbb{R}.$$

(d) Solve $fg(x) = \frac{1}{8}$. (3)

June 2008

6. The functions f and g are defined by

$$f: x \mapsto \ln(2x - 1), \quad x \in \mathbb{R}, \quad x > \frac{1}{2},$$

$$g: x \mapsto \frac{2}{x-3}, \quad x \in \mathbb{R}, \quad x \neq 3.$$

(a) Find the exact value of $fg(4)$. (2)

(b) Find the inverse function $f^{-1}(x)$, stating its domain. (4)

(c) Sketch the graph of $y = |g(x)|$. Indicate clearly the equation of the vertical asymptote and the coordinates of the point at which the graph crosses the y -axis. (3)

(d) Find the exact values of x for which $\left| \frac{2}{x-3} \right| = 3$. (3)

June 2007

7.

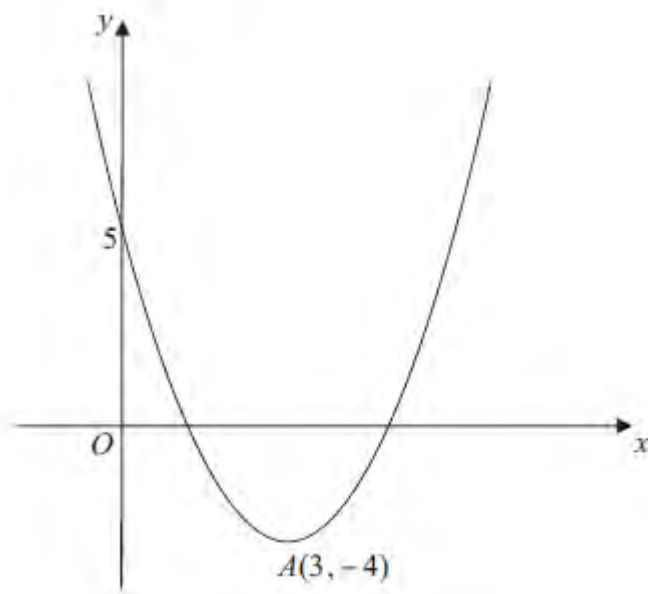


Figure 2

Figure 2 shows a sketch of the curve with the equation $y = f(x)$, $x \in \mathbb{R}$.

The curve has a turning point at $A(3, -4)$ and also passes through the point $(0, 5)$.

(a) Write down the coordinates of the point to which A is transformed on the curve with equation

(i) $y = |f(x)|$,

(ii) $y = 2f(\frac{1}{2}x)$.

(4)

(b) Sketch the curve with equation $y = f(|x|)$.

On your sketch show the coordinates of all turning points and the coordinates of the point at which the curve cuts the y -axis.

(3)

The curve with equation $y = f(x)$ is a translation of the curve with equation $y = x^2$.

(c) Find $f(x)$.

(2)

(d) Explain why the function f does not have an inverse.

(1)

June 2010

8. (a) Differentiate with respect to x ,

(i) $x^{\frac{1}{2}} \ln(3x)$,

(ii) $\frac{1-10x}{(2x-1)^5}$, giving your answer in its simplest form.

(6)

(b) Given that $x = 3 \tan 2y$ find $\frac{dy}{dx}$ in terms of x .

(5)

June 2012

TOTAL FOR PAPER: 75 MARKS

END