

**Edexcel GCE
Core Mathematics C3
Gold Level G3
(Question Paper)**

**All exam papers are issued free to students for education purpose only.
Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com**

Paper Reference(s)

6665/01

**Edexcel GCE
Core Mathematics C3
Gold Level (Harder) G3**

Time: 1 hour 30 minutes

Materials required for examination

Mathematical Formulae (Green)

Items included with question papers

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
62	54	46	37	30	22

1. Given that

$$\frac{2x^4 - 3x^2 + x + 1}{(x^2 - 1)} \equiv (ax^2 + bx + c) + \frac{dx + e}{(x^2 - 1)},$$

find the values of the constants a , b , c , d and e .

(4)

January 2008

2.

$$f(x) = 5 \cos x + 12 \sin x.$$

Given that $f(x) = R \cos(x - \alpha)$, where $R > 0$ and $0 < \alpha < \frac{\pi}{2}$,

(a) find the value of R and the value of α to 3 decimal places.

(4)

(b) Hence solve the equation

$$5 \cos x + 12 \sin x = 6$$

for $0 \leq x < 2\pi$.

(5)

(c) (i) Write down the maximum value of $5 \cos x + 12 \sin x$.

(1)

(ii) Find the smallest positive value of x for which this maximum value occurs.

(2)

June 2008

3. Find all the solutions of

$$2 \cos 2\theta = 1 - 2 \sin \theta$$

in the interval $0 \leq \theta < 360^\circ$.

(6)

January 2011

4. (a) Express $6 \cos \theta + 8 \sin \theta$ in the form $R \cos (\theta - \alpha)$, where $R > 0$ and $0 < \alpha < \frac{\pi}{2}$.
Give the value of α to 3 decimal places. (4)

(b)
$$p(\theta) = \frac{4}{12 + 6 \cos \theta + 8 \sin \theta}, \quad 0 \leq \theta \leq 2\pi.$$

Calculate

- (i) the maximum value of $p(\theta)$,
(ii) the value of θ at which the maximum occurs. (4)

January 2013

5. The functions f and g are defined by

$$f : x \mapsto 3x + \ln x, \quad x > 0, \quad x \in \mathbb{R},$$

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

- (a) Write down the range of g . (1)
- (b) Show that the composite function fg is defined by

$$fg : x \mapsto x^2 + 3e^{x^2}, \quad x \in \mathbb{R}. \quad (2)$$

- (c) Write down the range of fg . (1)

- (d) Solve the equation $\frac{d}{dx}[fg(x)] = x(xe^{x^2} + 2)$. (6)

January 2009

6. The function f is defined by

$$f: x \mapsto \frac{3-2x}{x-5}, \quad x \in \mathbb{R}, \quad x \neq 5.$$

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

(3)

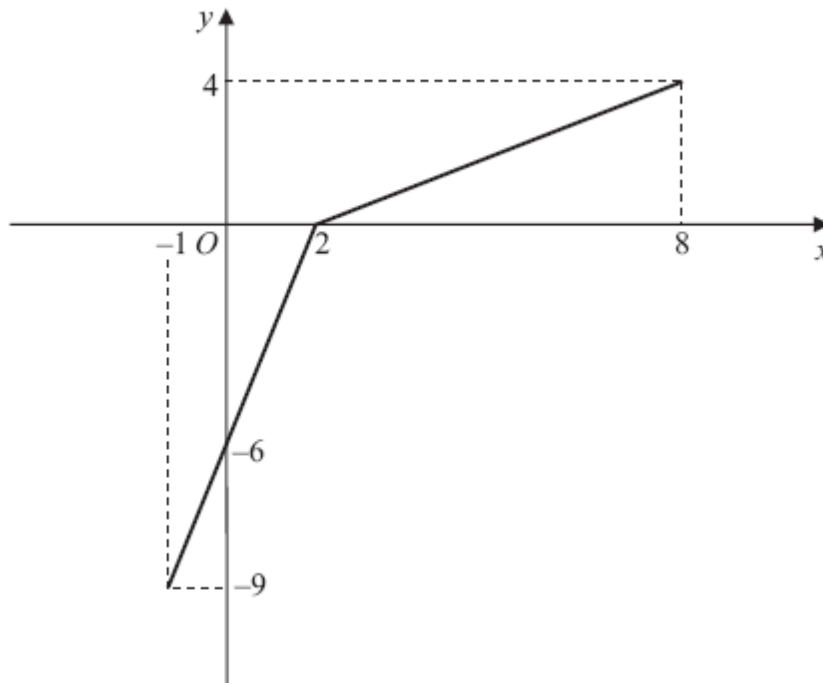


Figure 2

The function g has domain $-1 \leq x \leq 8$, and is linear from $(-1, -9)$ to $(2, 0)$ and from $(2, 0)$ to $(8, 4)$. Figure 2 shows a sketch of the graph of $y = g(x)$.

(b) Write down the range of g .

(1)

(c) Find $gg(2)$.

(2)

(d) Find $fg(8)$.

(2)

(e) On separate diagrams, sketch the graph with equation

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

(ii) $y = g^{-1}(x)$.

Show on each sketch the coordinates of each point at which the graph meets or cuts the axes.

(4)

(f) State the domain of the inverse function g^{-1} .

(1)

January 2011

7. A curve C has equation

$$y = 3 \sin 2x + 4 \cos 2x, \quad -\pi \leq x \leq \pi.$$

The point $A(0, 4)$ lies on C .

- (a) Find an equation of the normal to the curve C at A . (5)

- (b) Express y in the form $R \sin(2x + \alpha)$, where $R > 0$ and $0 < \alpha < \frac{\pi}{2}$.

Give the value of α to 3 significant figures. (4)

- (c) Find the coordinates of the points of intersection of the curve C with the x -axis.
Give your answers to 2 decimal places. (4)

January 2008

8. The value of Bob's car can be calculated from the formula

$$V = 17000e^{-0.25t} + 2000e^{-0.5t} + 500.$$

where V is the value of the car in pounds (£) and t is the age in years.

- (a) Find the value of the car when $t = 0$. (1)

- (b) Calculate the exact value of t when $V = 9500$. (4)

- (c) Find the rate at which the value of the car is decreasing at the instant when $t = 8$.
Give your answer in pounds per year to the nearest pound. (4)

January 2013

TOTAL FOR PAPER: 75 MARKS

END