

Edexcel GCE
Core Mathematics C3
Silver Level S4
(Question Paper)

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Paper Reference(s)

6665/01

**Edexcel GCE
Core Mathematics C3
Silver Level S4**

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	61	53	45	39	34

1. (a) Express $7 \cos x - 24 \sin x$ in the form $R \cos(x + \alpha)$ where $R > 0$ and $0 < \alpha < \frac{\pi}{2}$.

Give the value of α to 3 decimal places.

(3)

- (b) Hence write down the minimum value of $7 \cos x - 24 \sin x$.

(1)

- (c) Solve, for $0 \leq x < 2\pi$, the equation

$$7 \cos x - 24 \sin x = 10,$$

giving your answers to 2 decimal places.

(5)

January 2011

2. (a) Use the identity $\cos^2 \theta + \sin^2 \theta = 1$ to prove that $\tan^2 \theta = \sec^2 \theta - 1$.

(2)

- (b) Solve, for $0 \leq \theta < 360^\circ$, the equation

$$2 \tan^2 \theta + 4 \sec \theta + \sec^2 \theta = 2.$$

(6)

June 2009

3. (a) Express $5 \cos x - 3 \sin x$ in the form $R \cos(x + \alpha)$, where $R > 0$ and $0 < \alpha < \frac{1}{2} \pi$.

(4)

- (b) Hence, or otherwise, solve the equation

$$5 \cos x - 3 \sin x = 4$$

for $0 \leq x < 2\pi$, giving your answers to 2 decimal places.

(5)

January 2010

4.
$$f(x) = \frac{2x+2}{x^2-2x-3} - \frac{x+1}{x-3}.$$

- (a) Express $f(x)$ as a single fraction in its simplest form.

(4)

- (b) Hence show that $f'(x) = \frac{2}{(x-3)^2}$.

(3)

January 2009

5. The mass, m grams, of a leaf t days after it has been picked from a tree is given by

$$m = pe^{-kt},$$

where k and p are positive constants.

When the leaf is picked from the tree, its mass is 7.5 grams and 4 days later its mass is 2.5 grams.

- (a) Write down the value of p . (1)

- (b) Show that $k = \frac{1}{4} \ln 3$. (4)

- (c) Find the value of t when $\frac{dm}{dt} = -0.6 \ln 3$. (6)

June 2011

6. (a) Prove that

$$\frac{1}{\sin 2\theta} - \frac{\cos 2\theta}{\sin 2\theta} = \tan \theta, \quad \theta \neq 90n^\circ, \quad n \in \mathbb{Z}. \quad (4)$$

- (b) Hence, or otherwise,

- (i) show that $\tan 15^\circ = 2 - \sqrt{3}$, (3)

- (ii) solve, for $0 < x < 360^\circ$,

$$\operatorname{cosec} 4x - \cot 4x = 1. \quad (5)$$

June 2011

7.
$$h(x) = \frac{2}{x+2} + \frac{4}{x^2+5} - \frac{18}{(x^2+5)(x+2)}, \quad x \geq 0.$$

(a) Show that $h(x) = \frac{2x}{x^2+5}$.

(4)

(b) Hence, or otherwise, find $h'(x)$ in its simplest form.

(3)

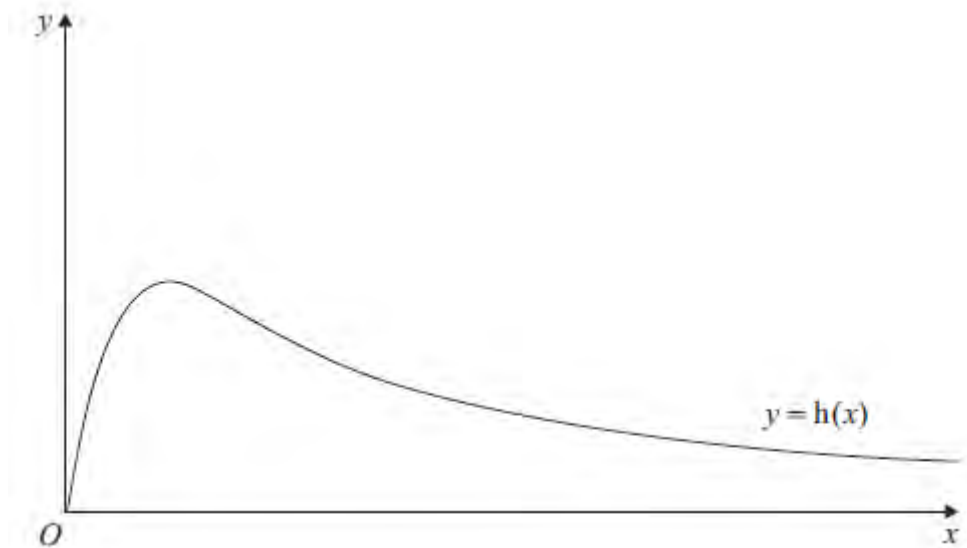


Figure 1

Figure 1 shows a graph of the curve with equation $y = h(x)$.

(c) Calculate the range of $h(x)$.

(5)

January 2013

8. The amount of a certain type of drug in the bloodstream t hours after it has been taken is given by the formula

$$x = De^{-\frac{1}{8}t},$$

where x is the amount of the drug in the bloodstream in milligrams and D is the dose given in milligrams.

A dose of 10 mg of the drug is given.

- (a) Find the amount of the drug in the bloodstream 5 hours after the dose is given.
Give your answer in mg to 3 decimal places.

(2)

A second dose of 10 mg is given after 5 hours.

- (b) Show that the amount of the drug in the bloodstream 1 hour after the second dose is 13.549 mg to 3 decimal places.

(2)

No more doses of the drug are given. At time T hours after the second dose is given, the amount of the drug in the bloodstream is 3 mg.

- (c) Find the value of T .

(3)

June 2007

TOTAL FOR PAPER: 75 MARKS

END