Paper Reference(s)

6663

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Set B: Practice Question Paper 8

Time: 1 hour 30 minutes

Materials required for examination	**Items included with question papers**
Mathematical Formulae	Nil

Instructions to Candidates

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
This paper has 8 questions.

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.

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1. (*a*) Show that $(x + 2)$ is a factor of $f(x) = x^3 - 19x - 30$. **(2)**

(*b*) Factorise $f(x)$ completely. **(4)**

[P1 January 2004 Question 1]

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2. For the binomial expansion, in descending powers of x, of $\left(x^3 - \frac{1}{2x}\right)^{12}$,

(*a*) find the first 4 terms, simplifying each term. **(5)**

(*b*) Find, in its simplest form, the term independent of x in this expansion. **(3)**

[P2 June 2004 Question 3]

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3. The curve C has equation $y = \cos\left(x + \frac{\pi}{4}\right)$, $0 \le x \le 2\pi$.

(*a*) Sketch C. **(2)**

(*b*) Write down the exact coordinates of the points at which C meets the coordinate axes. **(3)**

(*c*) Solve, for x in the interval $0 \le x \le 2\pi$, $\cos\left(x + \frac{\pi}{4}\right) = 0.5$, giving your answers in terms of π. **(4)**

[P1 November 2003 Question 5]

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4. Given that $\log_2 x = a$, find, in terms of a, the simplest form of

(*a*) $\log_2 (16x)$, **(2)**

(*b*) $\log_2\left(\frac{x^4}{2}\right)$. **(3)**

(*c*) Hence, or otherwise, solve $\log_2 (16x) - \log_2\left(\frac{x^4}{2}\right) = \frac{1}{2}$, giving your answer in its simplest surd form. **(4)**

[P2 January 2004 Question 3]

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5. (*a*) Given that $3 \sin x = 8 \cos x$, find the value of $\tan x$. **(1)**

(*b*) Find, to 1 decimal place, all the solutions of $3 \sin x - 8 \cos x = 0$ in the interval $0 \le x < 360°$. **(3)**

(*c*) Find, to 1 decimal place, all the solutions of $3 \sin^2 y - 8 \cos y = 0$ in the interval $0 \le y < 360°$. **(6)**

[P1 June 2004 Question 5]

6.

$$f(x) = \frac{(x^2-3)^2}{x^3}, x \neq 0.$$

(a) Show that $f(x) \equiv x - 6x^{-1} + 9x^{-3}$. **(2)**

(b) Hence, or otherwise, differentiate $f(x)$ with respect to x. **(3)**

(c) Verify that the graph of $y = f(x)$ has stationary points at $x = \pm\sqrt{3}$. **(2)**

(d) Determine whether the stationary value at $x = \sqrt{3}$ is a maximum or a minimum. **(3)**

[P1 June 2004 Question 6]

7.

Figure 1

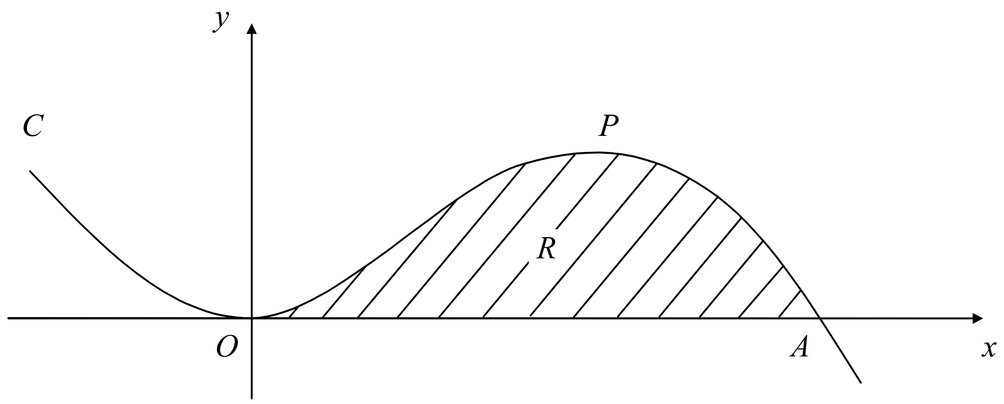

Fig. 1 shows part of the curve C with equation $y = \frac{3}{2}x^2 - \frac{1}{4}x^3$.

The curve C touches the x-axis at the origin and passes through the point $A(p, 0)$.

(a) Show that $p = 6$. **(1)**

(b) Find an equation of the tangent to C at A. **(4)**

The curve C has a maximum at the point P.

(c) Find the x-coordinate of P. **(2)**

The shaded region R, in Fig. 1, is bounded by C and the x-axis.

(d) Find the area of R. **(4)**

[P1 January 2004 Question 7]

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8. A geometric series is $a + ar + ar^2 + \ldots$

(a) Prove that the sum of the first n terms of this series is $S_n = \dfrac{a(1-r^n)}{1-r}$. **(4)**

The first and second terms of a geometric series G are 10 and 9 respectively.

(b) Find, to 3 significant figures, the sum of the first twenty terms of G. **(3)**

(c) Find the sum to infinity of G. **(2)**

Another geometric series has its first term equal to its common ratio. The sum to infinity of this series is 10.

(d) Find the exact value of the common ratio of this series. **(3)**

[P1 June 2004 Question 7]
