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Edexcel GCE
Core Mathematics C2
Advanced Subsidiary
Set B: Practice Question Paper 4

Time: 1 hour 30 minutes

Materials required for examination

Mathematical Formulae

Items included with question papers

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.

1. (a) Write down the first four terms of the binomial expansion, in ascending powers of x , of $(1 + 3x)^n$, where $n > 2$. (2)

Given that the coefficient of x^3 in this expansion is ten times the coefficient of x^2 ,

- (b) find the value of n , (2)
(c) find the coefficient of x^4 in the expansion. (2)

[P2 June 2002 Question 1]

2. $f(x) = x^3 + ax^2 + bx - 10$, where a and b are constants. When $f(x)$ is divided by $(x - 3)$, the remainder is 14. When $f(x)$ is divided by $(x + 1)$, the remainder is -18 .

- (a) Find the value of a and the value of b . (5)
(b) Show that $(x - 2)$ is a factor of $f(x)$. (2)

[P3 June 2002 Question 1]

3. Given that $f(x) = 15 - 7x - 2x^2$,

- (a) find the coordinates of all points at which the graph of $y = f(x)$ crosses the coordinate axes. (3)
(b) Sketch the graph of $y = f(x)$. (2)
(c) Calculate the coordinates of the stationary point of $f(x)$. (3)

[P1 June 2002 Question 3]

4. $f(x) = 5 \sin 3x^\circ$, $0 \leq x \leq 180$.

- (a) Sketch the graph of $f(x)$, indicating the value of x at each point where the graph intersects the x -axis. (3)
(b) Write down the coordinates of all the maximum and minimum points of $f(x)$. (3)
(c) Calculate the values of x for which $f(x) = 2.5$ (4)

[P1 June 2002 Question 5]

5. (a) Given that $3 + 2 \log_2 x = \log_2 y$, show that $y = 8x^2$. (3)

- (b) Hence, or otherwise, find the roots α and β , where $\alpha < \beta$, of the equation

$$3 + 2 \log_2 x = \log_2 (14x - 3). \quad (3)$$

- (c) Show that $\log_2 \alpha = -2$. (1)
(d) Calculate $\log_2 \beta$, giving your answer to 3 significant figures. (3)

[P2 June 2002 Question 5]

6. Given that $f(x) = (2x^{\frac{3}{2}} - 3x^{-\frac{3}{2}})^2 + 5$, $x > 0$,
- (a) find, to 3 significant figures, the value of x for which $f(x) = 5$. (3)
- (b) Show that $f(x)$ may be written in the form $Ax^3 + \frac{B}{x^3} + C$, where A , B and C are constants to be found. (3)
- (c) Hence evaluate $\int_1^2 f(x) \, dx$. (5)

[P1 June 2002 Question 6]

7.

Figure 1

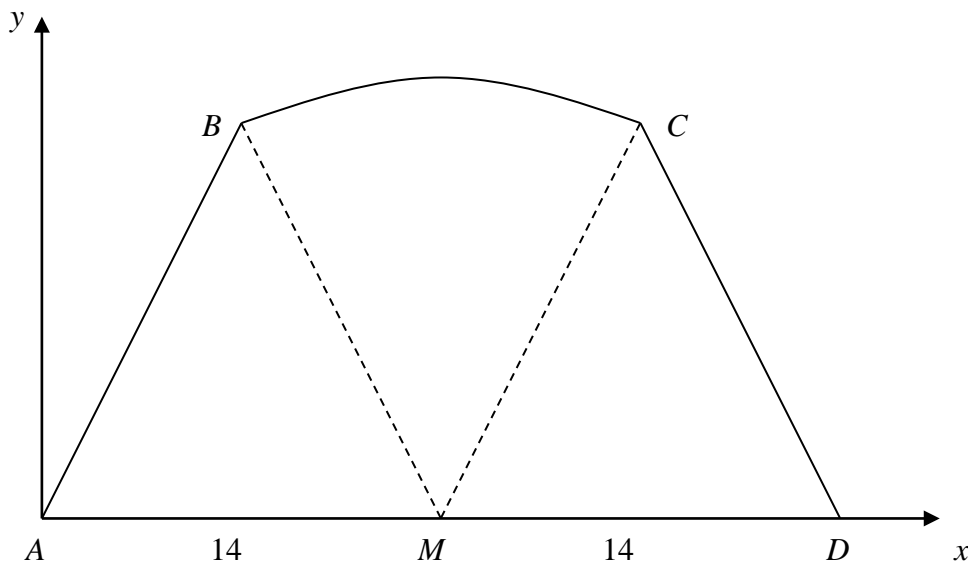


Fig. 1 shows the cross-section $ABCD$ of a chocolate bar, where AB , CD and AD are straight lines and M is the mid-point of AD . The length AD is 28 mm, and BC is an arc of a circle with centre M .

Taking A as the origin, B , C and D have coordinates $(7, 24)$, $(21, 24)$ and $(28, 0)$ respectively.

- (a) Show that the length of BM is 25 mm. (1)
- (b) Show that, to 3 significant figures, $\angle BMC = 0.568$ radians. (3)
- (c) Hence calculate, in mm^2 , the area of the cross-section of the chocolate bar. (5)

Given that this chocolate bar has length 85 mm,

- (d) calculate, to the nearest cm^3 , the volume of the bar. (2)

[P1 January 2003 Question 7]

8. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is $\frac{1}{2}n[2a + (n - 1)d]$. (4)

A company made a profit of £54 000 in the year 2001. A model for future performance assumes that yearly profits will increase in an arithmetic sequence with common difference £ d . This model predicts total profits of £619 200 for the 9 years 2001 to 2009 inclusive.

- (b) Find the value of d . (4)

Using your value of d ,

- (c) find the predicted profit for the year 2011. (2)

An alternative model assumes that the company's yearly profits will increase in a geometric sequence with common ratio 1.06. Using this alternative model and again taking the profit in 2001 to be £54 000,

- (d) find the predicted profit for the year 2011. (3)

[P1 November 2002 Question 4]
