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Edexcel GCE
Core Mathematics C2
Advanced Subsidiary
Set B: Practice Question Paper 5

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 9 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) Using the factor theorem, show that $(x + 3)$ is a factor of $x^3 - 3x^2 - 10x + 24$. (2)
(b) Factorise $x^3 - 3x^2 - 10x + 24$ completely. (4)

[P1 November 2002 Question 2]

2. (a) Expand $(2\sqrt{x} + 3)^2$. (2)
(b) Hence evaluate $\int_1^2 (2\sqrt{x} + 3)^2 dx$, giving your answer in the form $a + b\sqrt{2}$, where a and b are integers. (5)

[P1 November 2003 Question 4]

3. The first three terms in the expansion, in ascending powers of x , of $(1 + px)^n$, are $1 - 18x + 36p^2x^2$. Given that n is a positive integer, find the value of n and the value of p . (7)

[P2 January 2003 Question 2]

4. A circle C has equation $x^2 + y^2 - 6x + 8y - 75 = 0$.
(a) Write down the coordinates of the centre of C , and calculate the radius of C . (3)
A second circle has centre at the point $(15, 12)$ and radius 10.
(b) Sketch both circles on a single diagram and find the coordinates of the point where they touch. (4)

[P3 June 2003 Question 3]

5. (i) Differentiate $2x^3 + \sqrt{x} + \frac{x^2 + 2x}{x^2}$ with respect to x (5)
(ii) Evaluate $\int_1^4 \left(\frac{x}{2} + \frac{1}{x^2} \right) dx$. (5)

[P1 November 2002 Question 3]

6. A geometric series has first term 1200. Its sum to infinity is 960.
(a) Show that the common ratio of the series is $-\frac{1}{4}$. (3)
(b) Find, to 3 decimal places, the difference between the ninth and tenth terms of the series. (3)
(c) Write down an expression for the sum of the first n terms of the series. (2)
Given that n is odd,
(d) prove that the sum of the first n terms of the series is $960(1 + 0.25^n)$. (2)

[P1 January 2003 Question 4]

7. On a journey, the average speed of a car is $v \text{ m s}^{-1}$. For $v \geq 5$, the cost per kilometre, C pence, of the journey is modelled by $C = \frac{160}{v} + \frac{v^2}{100}$.

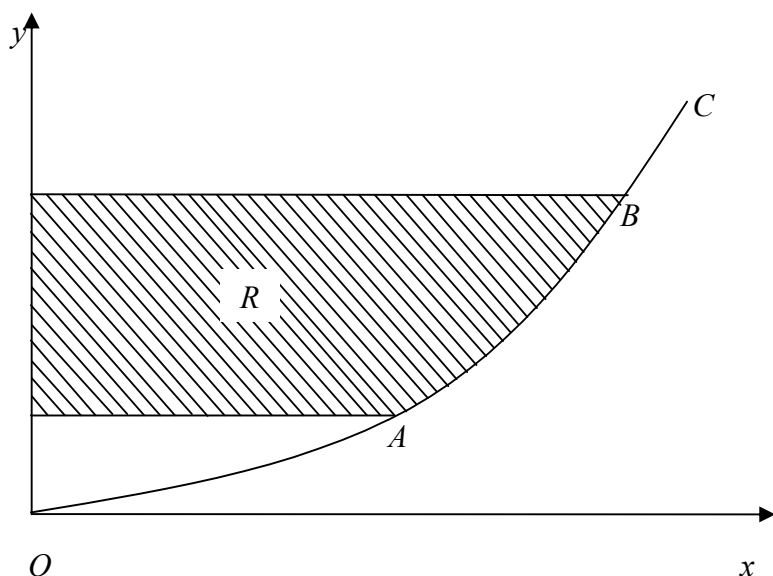
Using this model,

- (a) show, by calculus, that there is a value of v for which C has a stationary value, and find this value of v . (5)
- (b) Justify that this value of v gives a minimum value of C . (2)
- (c) Find the minimum value of C and hence find the minimum cost of a 250 km car journey. (3)

[P1 January 2003 Question 5]

8.

Figure 1



The curve C , shown in Fig. 1, represents the graph of $y = \frac{x^2}{25}$, $x \geq 0$.

The points A and B on the curve C have x -coordinates 5 and 10 respectively.

- (a) Write down the y -coordinates of A and B . (1)
- (b) Find an equation of the tangent to C at A . (4)
- The finite region R is enclosed by C , the y -axis and the lines through A and B parallel to the x -axis.
- (c) For points (x, y) on C , express x in terms of y . (2)
- (d) Use integration to find the area of R . (5)

[P1 January 2003 Question 8]

9. (i) Solve, for $0^\circ < x < 180^\circ$, the equation $\sin(2x + 50^\circ) = 0.6$, giving your answers to 1 d. p.
- (ii) In the triangle ABC , $AC = 18 \text{ cm}$, $\angle ABC = 60^\circ$ and $\sin A = \frac{1}{3}$.
- (a) Use the sine rule to show that $BC = 4\sqrt{3}$. (4)
- (b) Find the exact value of $\cos A$. (2)

[P1 November 2002 Question 5]