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Edexcel GCE
Core Mathematics C1
Advanced Subsidiary
Set B: Practice Question Paper 3

Time: 1 hour 30 minutes

Materials required for examination

Mathematical Formulae

Items included with question papers

Nil

Calculators may NOT be used in this examination.

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) Solve the equation $4x^2 + 12x = 0$. (3)

You are given that $f(x) = 4x^2 + 12x + c$, where c is a constant.

- (b) Given that $f(x) = 0$ has equal roots, find the value of c and hence solve $f(x) = 0$. (4)

[P1 November 2003 Question 2]

2. A sequence is defined by the recurrence relation $u_{n+1} = \sqrt{\left(\frac{u_n}{2} + \frac{a}{u_n}\right)}$, $n = 1, 2, 3, \dots$,

where a is a constant.

- (a) Given that $a = 20$ and $u_1 = 3$, find the values of u_2 , u_3 and u_4 , giving your answers to 2 decimal places. (3)

- (b) Given instead that $u_1 = u_2 = 3$,

(i) calculate the value of a , (3)

(ii) write down the value of u_5 . (1)

[P2 January 2004 Question 2]

3. For the curve C with equation $y = x^4 - 8x^2 + 3$,

- (a) find $\frac{dy}{dx}$, (2)

The point A , on the curve C , has x -coordinate 1.

- (b) Find an equation for the normal to C at A , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (5)

[P1 June 2003 Question 8*]

4. The width of a rectangular sports pitch is x metres, $x > 0$. The length of the pitch is 20 m more than its width. Given that the perimeter of the pitch must be less than 300 m,

- (a) form a linear inequality in x . (2)

Given that the area of the pitch must be greater than 4800 m^2 ,

- (b) form a quadratic inequality in x . (2)

- (c) by solving your inequalities, find the set of possible values of x . (4)

[P1 June 2004 Question 3]

5. The curve C with equation $y = f(x)$ is such that $\frac{dy}{dx} = 3\sqrt{x} + \frac{12}{\sqrt{x}}$, $x > 0$.

- (a) Show that, when $x = 8$, the exact value of $\frac{dy}{dx}$ is $9\sqrt{2}$. (3)

The curve C passes through the point $(4, 30)$.

- (b) Using integration, find $f(x)$. (6)

[P1 January 2004 Question 5]

6. (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)

[P1 November 2002 Question 4*]

7.

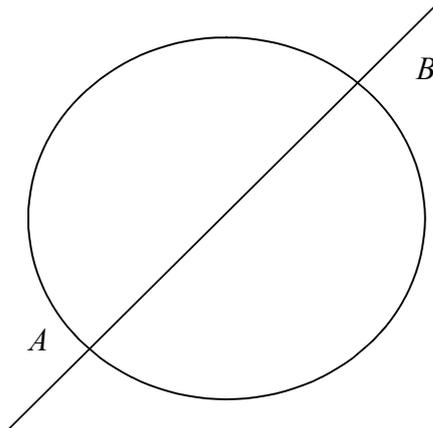


Figure 1

The points $A(-3, -2)$ and $B(8, 4)$ are at the ends of a diameter of the circle shown in Fig. 1.

- (a) Find the coordinates of the centre of the circle. (2)

- (b) Find an equation of the diameter AB , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (4)

- (c) Find an equation of tangent to the circle at B . (3)

The line l passes through A and the origin.

- (d) Find the coordinates of the point at which l intersects the tangent to the circle at B , giving your answer as exact fractions. (4)

[P1 June 2002 Question 8]

8.

$$f(x) = 9 - (x - 2)^2$$

- (a) Write down the maximum value of $f(x)$. (1)

- (b) Sketch the graph of $y = f(x)$, showing the coordinates of the points at which the graph meets the coordinate axes. (5)

The points A and B on the graph of $y = f(x)$ have coordinates $(-2, -7)$ and $(3, 8)$ respectively.

- (c) Find, in the form $y = mx + c$, an equation of the straight line through A and B . (4)

- (d) Find the coordinates of the point at which the line AB crosses the x -axis. (2)

The mid-point of AB lies on the line with equation $y = kx$, where k is a constant.

- (e) Find the value of k . (2)

[P1 November 2002 Question 6]