Paper Reference(s)

6663

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Set B: Practice Question Paper 2

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.

Edexcel
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1. Given that $p = \log_q 16$, express in terms of p,

(a) $\log_q 2$, **(2)**

(b) $\log_q (8q)$. **(4)**

[P2 January 2002 Question 2]

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2. $$\mathrm{f}(x) = x^3 - x^2 - 7x + c, \text{ where } c \text{ is a constant.}$$

Given that $\mathrm{f}(4) = 0$,

(a) find the value of c, **(2)**

(b) factorise $\mathrm{f}(x)$ as the product of a linear factor and a quadratic factor. **(3)**

(c) Hence show that, apart from $x = 4$, there are no real values of x for which $\mathrm{f}(x) = 0$. **(2)**

[P1 January 2002 Question 2]

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3. Find the values of θ, to 1 decimal place, in the interval $-180 \le \theta < 180$ for which

$$2 \sin^2 \theta° - 2 \sin \theta° = \cos^2 \theta°.$$ **(8)**

[P1 January 2002 Question 3]

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4. A population of deer is introduced into a park. The population P at t years after the deer have been introduced is modelled by $P = \dfrac{2000a^t}{4 + a^t}$, where a is a constant. Given that there are 800 deer in the park after 6 years,

(a) calculate, to 4 decimal places, the value of a, **(4)**

(b) use the model to predict the number of years needed for the population of deer to increase from 800 to 1800. **(4)**

(c) With reference to this model, give a reason why the population of deer cannot exceed 2000. **(1)**

[P2 June 2001 Question 6]

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5. (a) Given that $(2 + x)^5 + (2 - x)^5 = A + Bx^2 + Cx^4$, find the values of the constants A, B and C. **(6)**

(b) Using the substitution $y = x^2$ and your answers to part (a), solve,

$$(2 + x)^5 + (2 - x)^5 = 349.$$ **(5)**

[P2 June 2001 Question 8]

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6. **Figure 1**

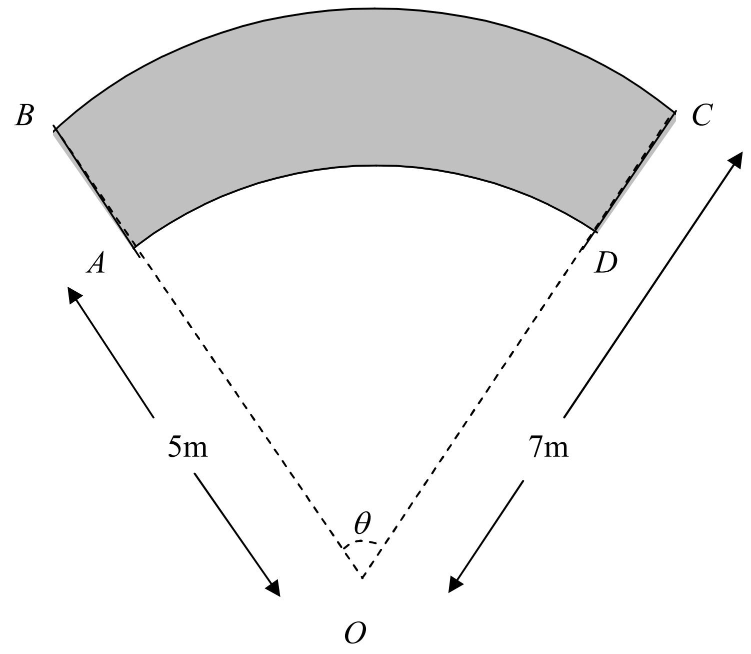

Fig. 1 shows a gardener's design for the shape of a flower bed with perimeter *ABCD*. *AD* is an arc of a circle with centre *O* and radius 5 m. *BC* is an arc of a circle with centre *O* and radius 7 m. *OAB* and *ODC* are straight lines and the size of $\angle AOD$ is θ radians.

(*a*) Find, in terms of θ, an expression for the area of the flower bed. **(3)**

Given that the area of the flower bed is 15 m^2,

(*b*) show that $\theta = 1.25$, **(2)**

(*c*) calculate, in m, the perimeter of the flower bed. **(3)**

The gardener now decides to replace arc *AD* with the straight line *AD*.

(*d*) Find, to the nearest cm, the reduction in the perimeter of the flower bed. **(2)**

[P1 January 2002 Question 6]

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

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

The second and fourth terms of the series are 3 and 1.08 respectively.

Given that all terms in the series are positive, find

(*b*) the value of *r* and the value of *a*, **(5)**

(*c*) the sum to infinity of the series. **(3)**

[P1 January 2002 Question 7]

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8. **Figure 2**

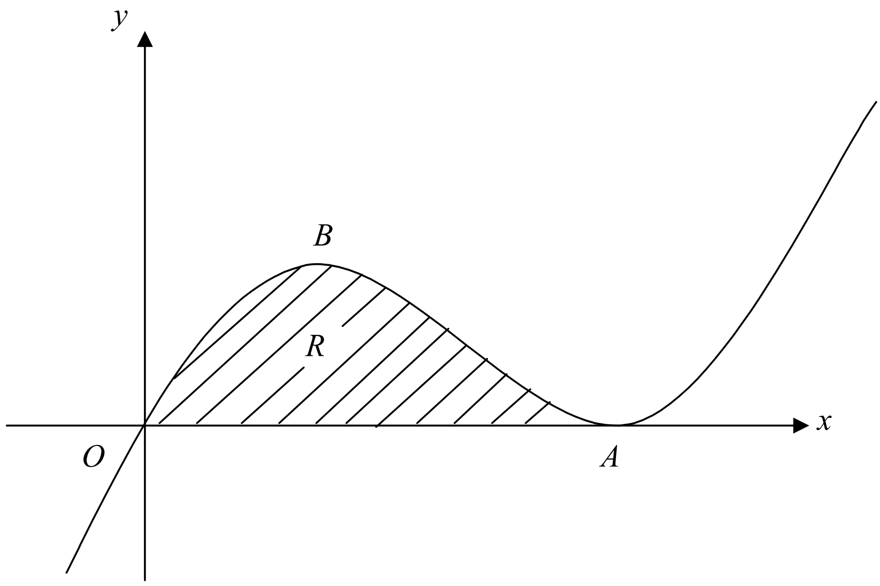

Fig. 2 shows part of the curve with equation $y = x^3 - 6x^2 + 9x$. The curve touches the x-axis at A and has a maximum turning point at B.

(a) Show that the equation of the curve may be written as $y = x(x-3)^2$, and hence write down the coordinates of A. **(2)**

(b) Find the coordinates of B. **(5)**

The shaded region R is bounded by the curve and the x-axis.

(c) Find the area of R. **(5)**

[P1 June 2001 Question 7]