Paper Reference(s)

6663

Edexcel GCE

Core Mathematics C2

Advanced Subsidiary

Set B: Practice Question Paper 3

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 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.

Edexcel
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1. Find the remainder when $f(x) = 4x^3 + 3x^2 - 2x - 6$ is divided by $(2x + 1)$. **(3)**

[P3 January 2002 Question 1]

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2. Given that $2 \sin 2\theta = \cos 2\theta$,

(a) show that $\tan 2\theta = 0.5$. **(1)**

(b) Hence find the values of θ, to one decimal place, in the interval $0 \leq \theta < 360$ for which $2 \sin 2\theta° = \cos 2\theta°$. **(5)**

[P1 June 2001 Question 2]

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3. (a) Using the substitution $u = 2^x$, show that the equation $4^x - 2^{(x+1)} - 15 = 0$ can be written in the form $u^2 - 2u - 15 = 0$. **(2)**

(b) Hence solve the equation $4^x - 2^{(x+1)} - 15 = 0$, giving your answers to 2 d. p. **(4)**

[P2 November 2002 Question 2]

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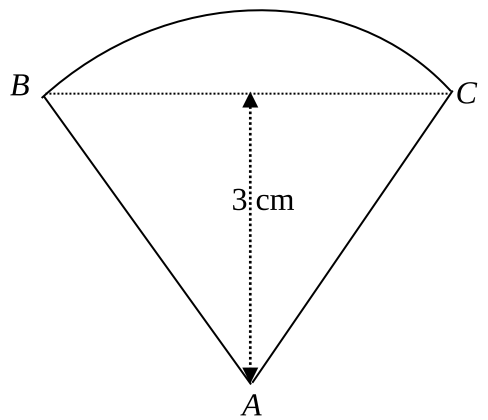
4. **Figure 1**



The shape of a badge is a sector ABC of a circle with centre A and radius AB, as shown in Fig 1. The triangle ABC is equilateral and has a perpendicular height 3 cm.

(a) Find, in surd form, the length AB. **(2)**

(b) Find, in terms of π, the area of the badge. **(2)**

(c) Prove that the perimeter of the badge is $\frac{2\sqrt{3}}{3}(\pi + 6)$ cm. **(3)**

[P1 June 2002 Question 2]

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5. A circle C has centre (3, 4) and radius $3\sqrt{2}$. A straight line l has equation $y = x + 3$.

(a) Write down an equation of the circle C. **(2)**

(b) Calculate the exact coordinates of the two points where the line l intersects C, giving your answers in surds. **(5)**

(c) Find the distance between these two points. **(2)**

[P3 January 2002 Question 4]

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6. The sequence $u_1, u_2, u_3, \ldots, u_n$ is defined by the recurrence relation

$$u_{n+1} = pu_n + 5, \; u_1 = 2, \text{ where } p \text{ is a constant.}$$

Given that $u_3 = 8$,

(a) show that one possible value of p is $\frac{1}{2}$ and find the other value of p. **(5)**

Using $p = \frac{1}{2}$,

(b) write down the value of $\log_2 p$. **(1)**

Given also that $\log_2 q = t$,

(c) express $\log_2 \left(\dfrac{p^3}{\sqrt{q}} \right)$ in terms of t. **(3)**

[P2 November 2002 Question 4]

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7. **Figure 2**

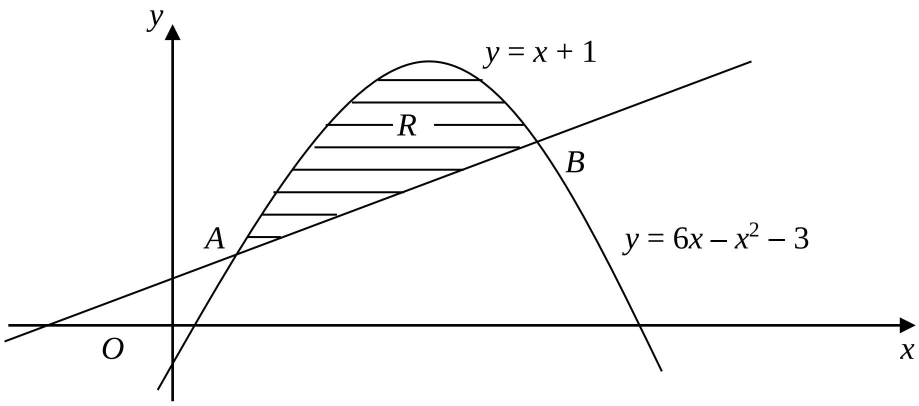

Fig. 2 shows the line with equation $y = x + 1$ and the curve with equation $y = 6x - x^2 - 3$.

The line and the curve intersect at the points A and B, and O is the origin.

(a) Calculate the coordinates of A and the coordinates of B. **(5)**

The shaded region R is bounded by the line and the curve.

(b) Calculate the area of R. **(7)**

[P1 January 2002 Question 8]

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8. $$\mathrm{f}(x) = \left(1 + \frac{x}{k}\right)^n, \qquad k, n \in \mathbb{N}, \qquad n > 2.$$

Given that the coefficient of x^3 is twice the coefficient of x^2 in the binomial expansion of $\mathrm{f}(x)$,

(a) prove that $n = 6k + 2$. **(3)**

Given also that the coefficients of x^4 and x^5 are equal and non-zero,

(b) form another equation in n and k and hence show that $k = 2$ and $n = 14$. **(4)**

Using these values of k and n,

(c) expand $\mathrm{f}(x)$ in ascending powers of x, up to and including the term in x^5. Give each coefficient as an exact fraction in its lowest terms **(4)**

[P2 January 2002 Question 9]

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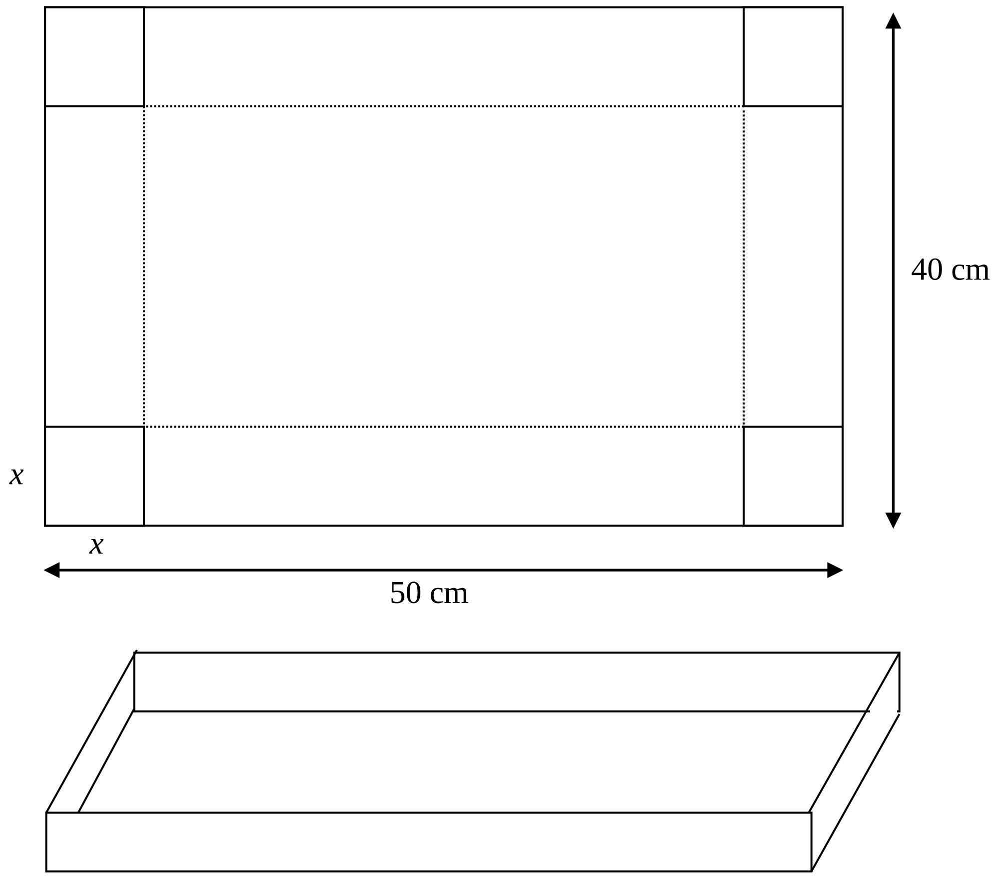
9. **Figure 3**



A rectangular sheet of metal measures 50 cm by 40 cm. Squares of side x cm are cut from each corner of the sheet and the remainder is folded along the dotted lines to make an open tray, as shown in Fig. 3.

(*a*) Show that the volume, V cm^3, of the tray is given by $V = 4x(x^2 - 45x + 500)$. **(3)**

(*b*) State the range of possible values of x. **(1)**

(*c*) Find the value of x for which V is a maximum. **(4)**

(*d*) Hence find the maximum value of V. **(2)**

(*e*) Justify that the value of V you found in part (*d*) is a maximum. **(2)**

[P1 June 2002 Question 7]