FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper B

Time: 1 hour 30 minutes

Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and / or integration.

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has nine questions.

Advice to Candidates

You must show sufficient working to make your methods clear to an examiner. Answers without working may gain no credit.



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1. Solve the equation

$$\log_5 (4x + 3) - \log_5 (x - 1) = 2. \quad \textbf{(4)}$$

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2. Given that

$$\int_1^3 (x^2 - 2x + k)\ \mathrm{d}x = 8\tfrac{2}{3},$$

find the value of the constant k. **(6)**

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3. For the binomial expansion in ascending powers of x of $(1 + \frac{1}{4}x)^n$, where n is an integer and $n \geq 2$,

(a) find and simplify the first three terms, **(3)**

(b) find the value of n for which the coefficient of x is equal to the coefficient of x^2. **(3)**

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4. Solve, for $0 \leq x < 360$, the equation

$$3\cos^2 x° + \sin^2 x° + 5\sin x° = 0. \quad \textbf{(7)}$$

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5. The circle C has centre $(-1, 6)$ and radius $2\sqrt{5}$.

(a) Find an equation for C. **(2)**

The line $y = 3x - 1$ intersects C at the points A and B.

(b) Find the x-coordinates of A and B. **(4)**

(c) Show that $AB = 2\sqrt{10}$. **(3)**

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6.

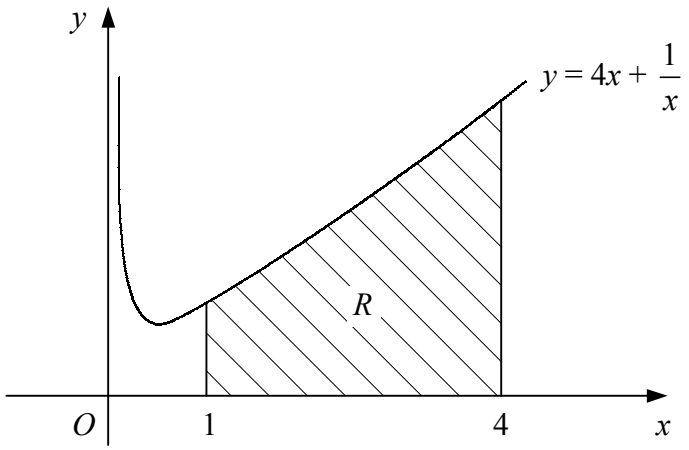


Figure 1

Figure 1 shows the curve with equation $y = 4x + \frac{1}{x}$, $x > 0$.

(a) Find the coordinates of the minimum point of the curve. **(5)**

The shaded region R is bounded by the curve, the x-axis and the lines $x = 1$ and $x = 4$.

(b) Use the trapezium rule with three intervals of equal width to estimate the area of R. **(5)**

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7. A student completes a mathematics course and begins to work through past exam papers. He completes the first paper in 2 hours and the second in 1 hour 54 minutes.

Assuming that the times he takes to complete successive papers form a geometric sequence,

(a) find, to the nearest minute, how long he will take to complete the fifth paper, **(3)**

(b) show that the total time he takes to complete the first eight papers is approximately 13 hours 28 minutes, **(3)**

(c) find the least number of papers he must work through if he is to complete a paper in less than one hour. **(4)**

Turn over

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8.

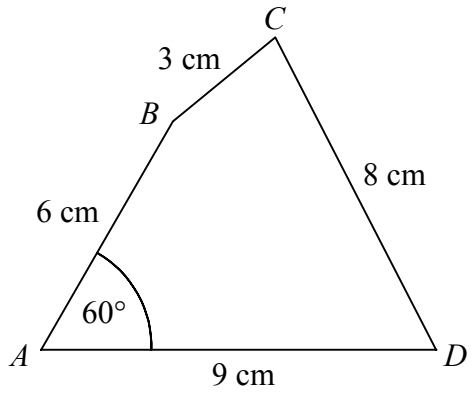


Figure 2

Figure 2 shows the quadrilateral $ABCD$ in which $AB = 6$ cm, $BC = 3$ cm, $CD = 8$ cm, $AD = 9$ cm and $\angle BAD = 60°$.

(a) Using the cosine rule, show that $BD = 3\sqrt{7}$ cm. **(4)**

(b) Find the size of $\angle BCD$ in degrees. **(3)**

(c) Find the area of quadrilateral $ABCD$. **(3)**

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9. $\mathrm{f}(x) = x^3 - 9x^2 + 24x - 16.$

(a) Evaluate f(1) and hence state a linear factor of f(x). **(2)**

(b) Show that f(x) can be expressed in the form

$$\mathrm{f}(x) = (x + p)(x + q)^2,$$

where p and q are integers to be found. **(4)**

(c) Sketch the curve $y = \mathrm{f}(x)$. **(2)**

(d) Using integration, find the area of the region enclosed by the curve $y = \mathrm{f}(x)$ and the x-axis. **(5)**

END

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