FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper C

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. Find the coefficient of x^2 in the expansion of

$$(1 + x)(1 - x)^6.$$ **(4)**

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2. A geometric series has common ratio $\frac{1}{3}$.

Given that the sum of the first four terms of the series is 200,

(a) find the first term of the series, **(3)**
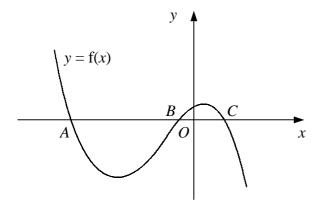
(b) find the sum to infinity of the series. **(2)**

3.

Figure 1

Figure 1 shows the curve $y = f(x)$ where

$$f(x) = 4 + 5x + kx^2 - 2x^3,$$

and k is a constant.

The curve crosses the x-axis at the points A, B and C.

Given that A has coordinates $(-4, 0)$,

(a) show that $k = -7$, **(2)**

(b) find the coordinates of B and C. **(5)**

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4. *(a)* *(i)* Sketch the curve $y = \sin(x - 30)°$ for x in the interval $-180 \leq x \leq 180$.

       (ii) Write down the coordinates of the turning points of the curve in
            this interval. **(4)**

    (b) Find all values of x in the interval $-180 \leq x \leq 180$ for which

$$\sin(x - 30)° = 0.35,$$

        giving your answers to 1 decimal place. **(4)**

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5. *(a)* Evaluate

$$\log_3 27 - \log_8 4. \qquad \textbf{(4)}$$

    (b) Solve the equation

$$4^x - 3(2^{x+1}) = 0. \qquad \textbf{(5)}$$

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6. $$f(x) = 2 - x + 3x^{\frac{2}{3}}, \quad x > 0.$$

    (a) Find $f'(x)$ and $f''(x)$. **(3)**

    (b) Find the coordinates of the turning point of the curve $y = f(x)$. **(4)**

    (c) Determine whether the turning point is a maximum or minimum point. **(2)**

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7. The points P, Q and R have coordinates $(-5, 2)$, $(-3, 8)$ and $(9, 4)$ respectively.

    (a) Show that $\angle PQR = 90°$. **(4)**

Given that P, Q and R all lie on circle C,

    (b) find the coordinates of the centre of C, **(3)**

    (c) show that the equation of C can be written in the form

$$x^2 + y^2 - 4x - 6y = k,$$

        where k is an integer to be found. **(3)**

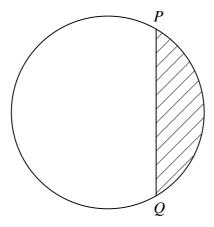***Turn over***

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8.

Figure 2

Figure 2 shows a circle of radius 12 cm which passes through the points P and Q.
The chord PQ subtends an angle of $120°$ at the centre of the circle.

(a) Find the exact length of the major arc PQ. **(2)**

(b) Show that the perimeter of the shaded minor segment is given by
$k(2\pi + 3\sqrt{3})$ cm, where k is an integer to be found. **(4)**

(c) Find, to 1 decimal place, the area of the shaded minor segment as a percentage
of the area of the circle. **(4)**

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9. The finite region R is bounded by the curve $y = 1 + 3\sqrt{x}$, the x-axis and the
lines $x = 2$ and $x = 8$.

(a) Use the trapezium rule with three intervals of equal width to estimate to
3 significant figures the area of R. **(6)**

(b) Use integration to find the exact area of R in the form $a + b\sqrt{2}$. **(5)**

(c) Find the percentage error in the estimate made in part *(a)*. **(2)**

END

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