FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C1

Paper L

Time: 1 hour 30 minutes

Instructions and Information

Candidates may NOT use a calculator in this paper

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has ten questions.

Advice to Candidates

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



Written by Shaun Armstrong

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1. Evaluate $49^{\frac{1}{2}} + 8^{\frac{2}{3}}$. **(3)**

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2. A sequence is defined by the recurrence relation

$$u_{n+1} = \frac{u_n + 1}{3}, \quad n = 1, 2, 3, \ldots$$

Given that $u_3 = 5$,

(a) find the value of u_4, **(1)**

(b) find the value of u_1. **(3)**

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3. $\mathrm{f}(x) = 4x^2 + 12x + 9$.

(a) Determine the number of real roots that exist for the equation $\mathrm{f}(x) = 0$. **(2)**

(b) Solve the equation $\mathrm{f}(x) = 8$, giving your answers in the form $a + b\sqrt{2}$ where a and b are rational. **(4)**

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4. Find the set of values of x for which

(a) $6x - 11 > x + 4$, **(2)**

(b) $x^2 - 6x - 16 < 0$, **(3)**

(c) both $6x - 11 > x + 4$ and $x^2 - 6x - 16 < 0$. **(1)**

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5. $\mathrm{f}(x) = (2 - \sqrt{x})^2, \quad x > 0$.

(a) Solve the equation $\mathrm{f}(x) = 0$. **(2)**

(b) Find f(3), giving your answer in the form $a + b\sqrt{3}$, where a and b are integers. **(2)**

(c) Find

$$\int \mathrm{f}(x)\ \mathrm{d}x.$$ **(4)**

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6. The straight line l passes through the point P $(-3, 6)$ and the point Q $(1, -4)$.

(a) Find an equation for l in the form $ax + by + c = 0$, where a, b and c are integers. **(4)**

The straight line m has the equation $2x + ky + 7 = 0$, where k is a constant.

Given that l and m are perpendicular,

(b) find the value of k. **(4)**

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7. Given that

$$f'(x) = 5 + \frac{4}{x^2}, \quad x \neq 0,$$

(a) find an expression for $f(x)$. **(3)**

Given also that

$$f(2) = 2f(1),$$

(b) find $f(4)$. **(5)**

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8. $$f(x) = x^3 - 6x^2 + 5x + 12.$$

(a) Show that

$$(x + 1)(x - 3)(x - 4) \equiv x^3 - 6x^2 + 5x + 12.$$ **(3)**

(b) Sketch the curve $y = f(x)$, showing the coordinates of any points of intersection with the coordinate axes. **(3)**

(c) Showing the coordinates of any points of intersection with the coordinate axes, sketch on separate diagrams the curves

(i) $y = f(x + 3)$,

(ii) $y = f(-x)$. **(4)**

Turn over

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9. The first two terms of an arithmetic series are $(t - 1)$ and $(t^2 - 5)$ respectively, where t is a positive constant.

(a) Find and simplify expressions in terms of t for

(i) the common difference of the series,

(ii) the third term of the series. **(4)**

Given also that the third term of the series is 19,

(b) find the value of t, **(2)**

(c) show that the 10th term of the series is 75, **(3)**

(d) find the sum of the first 40 terms of the series. **(2)**

10.

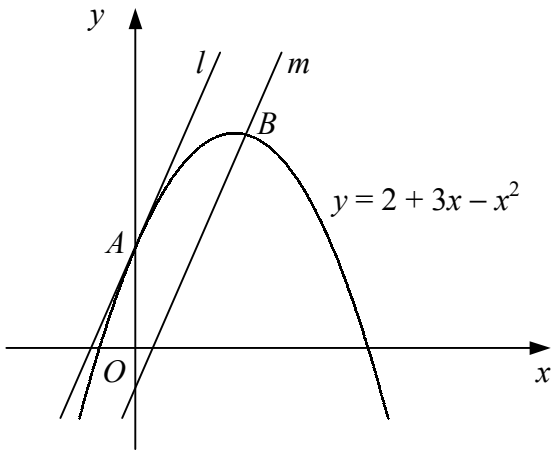


Figure 1

Figure 1 shows the curve with equation $y = 2 + 3x - x^2$ and the straight lines l and m.

The line l is the tangent to the curve at the point A where the curve crosses the y-axis.

(a) Find an equation for l. **(5)**

The line m is the normal to the curve at the point B.

Given that l and m are parallel,

(b) find the coordinates of B. **(6)**

END

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