FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C1

Paper D

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. Express $\sqrt{50} + 3\sqrt{8}$ in the form $k\sqrt{2}$. **(3)**

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2. Differentiate with respect to x

$$3x^2 - \sqrt{x} + \frac{1}{2x}.$$ **(4)**

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3. A sequence is defined by the recurrence relation

$$u_{n+1} = u_n - 2, \quad n > 0, \quad u_1 = 50.$$

(a) Write down the first four terms of the sequence. **(1)**

(b) Evaluate

$$\sum_{r=1}^{20} u_r.$$ **(3)**

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4. *(a)* Find the value of the constant k such that the equation

$$x^2 - 6x + k = 0$$

has equal roots. **(2)**

(b) Solve the inequality

$$2x^2 - 9x + 4 < 0.$$ **(4)**

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5. Solve the simultaneous equations

$$x + y = 2$$

$$3x^2 - 2x + y^2 = 2$$ **(7)**

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6. Given that

$$\frac{dy}{dx} = 3\sqrt{x} - x^2,$$

and that $y = \frac{2}{3}$ when $x = 1$, find the value of y when $x = 4$. **(7)**

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7. The first three terms of an arithmetic series are $(12 - p)$, $2p$ and $(4p - 5)$ respectively, where p is a constant.

(a) Find the value of p. **(2)**

(b) Show that the sixth term of the series is 50. **(3)**

(c) Find the sum of the first 15 terms of the series. **(2)**

(d) Find how many terms of the series have a value of less than 400. **(3)**

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

(a) Solve the equation $f(x) = 0$. **(2)**

(b) Sketch the curve with equation $y = f(x)$, showing the coordinates of any points of intersection with the coordinate axes. **(2)**

(c) Find the coordinates of the points where the curve with equation $y = f(\frac{1}{2}x)$ crosses the coordinate axes. **(3)**

When the graph of $y = f(x)$ is translated by 1 unit in the positive x-direction it maps onto the graph with equation $y = ax^2 + bx + c$, where a, b and c are constants.

(d) Find the values of a, b and c. **(3)**

Turn over

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9.

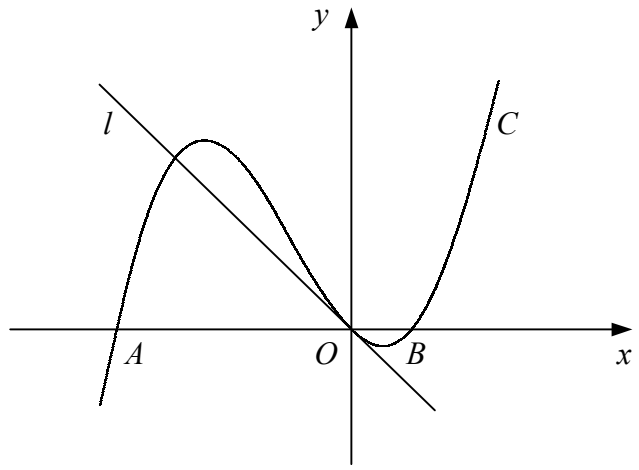


Figure 1

Figure 1 shows the curve C with the equation $y = x^3 + 3x^2 - 4x$ and the straight line l.

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

(a) Find the coordinates of A and B. **(3)**

The line l is the tangent to C at O.

(b) Find an equation for l. **(4)**

(c) Find the coordinates of the point where l intersects C again. **(4)**

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10. The straight line l_1 has equation $2x + y - 14 = 0$ and crosses the x-axis at the point A.

(a) Find the coordinates of A. **(2)**

The straight line l_2 is parallel to l_1 and passes through the point B $(-6, 6)$.

(b) Find an equation for l_2 in the form $y = mx + c$. **(3)**

The line l_2 crosses the x-axis at the point C.

(c) Find the coordinates of C. **(1)**

The point D lies on l_1 and is such that CD is perpendicular to l_1.

(d) Show that D has coordinates $(5, 4)$. **(5)**

(e) Find the area of triangle ACD. **(2)**

END

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