

Core Mathematics C1

Advanced Subsidiary

Practice Paper 2

Time: 1 hour 30 minutes

(1) Find (a) $\int \left(2x^{\frac{3}{2}} - x + 5x^{-2} \right) dx$ (3 marks)

(b) $\frac{d}{dx} \left(4x^3 - 3\sqrt{x} + \frac{5}{x^4} \right)$ (3 marks)

(2) (a) Express $-x^2 + 4x - 7$ in the form $a(x+b)^2 + c$ (3 marks)

(b) Hence sketch the graph $y = -x^2 + 4x - 7$ stating the coordinates of the minimum point. (3 marks)

(c) Show the equation $0 = -x^2 + 4x - 7$ has no real roots. (2 marks)

(3) Find the values of a, b and c such that $\frac{1 + \sqrt{12}}{1 + \sqrt{3}} \equiv \frac{a + b\sqrt{3}}{c}$ (4 marks)

(4) Solve the equation $x^{0.5} - \frac{6}{x^{0.5}} = 1$ (5 marks)

(5) (a) Find the equation of the line l which is perpendicular to the line $3x + 4y - 7 = 0$ and passes through the point $A(1, 2)$ in the form $y = mx + c$ (4 marks)

(b) The line l crosses the x axis at C and the y axis at D . Find the length of CD giving your answer as a simplified fraction. (5 marks)

(6) Find the set of values of k for which the equation $2x^2 + kx + (k - 3) = -1$ has two distinct real roots. (5 marks)

(7) John starts running each day. He runs 2 miles on the first day and doubles the distance each day after. (a) Explain why John's mileage doesn't form an arithmetic sequence. (1 marks)

Fred also starts running on the same day as John. Fred runs 1 mile on the first day and then increases the number of miles he runs each day by m miles such that his mileage forms an arithmetic sequence.

(b) Given John and Fred run the same distance on the 4th day find the value of m . (4 marks)

(c) Find the total number of miles Fred had run after the 6th day. (3 marks)

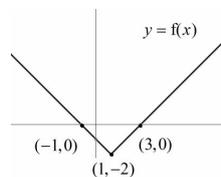
(8) The diagram below shows part of the graph $y = f(x)$. On separate diagrams draw the graphs of:

(a) $y = 2f(x)$ (3 marks)

(b) $y = f(-x)$ (3 marks)

(c) $y = f(x+1) + 2$ (3 marks)

State the coordinates on each graph.



(9) (a) Solve the simultaneous equations

$$\begin{aligned} y + 9 &= 6x \\ x^2 - y &= 0 \end{aligned} \quad (7 \text{ marks})$$

(b) Sketch the graphs $y + 9 = 6x$ and $x^2 - y = 0$ on the same set of axis. Using your answer from part (a) label any points where the 2 graphs meet. (4 marks)

(10) (a) Find an equation of the tangent to the curve $y = x^2 - 2\sqrt{x}$ at the point where $x = 4$ (6 marks)

(b) By drawing two separate graphs on the same set of axis state the number of solutions to the equation $0 = x^2 - 2\sqrt{x}$ (4 marks)

End of Questions