

ADVANCED SUBSIDIARY GCE MATHEMATICS (MEI)

4751/01

Introduction to Advanced Mathematics (C1)

THURSDAY 15 MAY 2008

Morning

Time: 1 hour 30 minutes

Additional materials: Answer Booklet (8 pages)

MEI Examination Formulae and Tables (MF2)

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the spaces provided on the Answer Booklet.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- You are **not** permitted to use a calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 72.
- You are advised that an answer may receive no marks unless you show sufficient detail of the working to indicate that a correct method is being used.



WARNING

You are not allowed to use a calculator in this paper.

This document consists of 4 printed pages.

Section A (36 marks)

- 1 Solve the inequality 3x 1 > 5 x. [2]
- 2 (i) Find the points of intersection of the line 2x + 3y = 12 with the axes. [2]
 - (ii) Find also the gradient of this line. [2]
- 3 (i) Solve the equation $2x^2 + 3x = 0$. [2]
 - (ii) Find the set of values of k for which the equation $2x^2 + 3x k = 0$ has no real roots. [3]
- **4** Given that *n* is a positive integer, write down whether the following statements are always true (T), always false (F) or could be either true or false (E).
 - (i) 2n + 1 is an odd integer
 - (ii) 3n + 1 is an even integer
 - (iii) n is odd $\Rightarrow n^2$ is odd
 - (iv) n^2 is odd $\Rightarrow n^3$ is even [3]
- 5 Make x the subject of the equation $y = \frac{x+3}{x-2}$. [4]
- **6** (i) Find the value of $(\frac{1}{25})^{-\frac{1}{2}}$. [2]
 - (ii) Simplify $\frac{(2x^2y^3z)^5}{4y^2z}$. [3]
- 7 (i) Express $\frac{1}{5+\sqrt{3}}$ in the form $\frac{a+b\sqrt{3}}{c}$, where a,b and c are integers. [2]
 - (ii) Expand and simplify $(3-2\sqrt{7})^2$. [3]
- 8 Find the coefficient of x^3 in the binomial expansion of $(5-2x)^5$. [4]
- 9 Solve the equation $y^2 7y + 12 = 0$.

Hence solve the equation $x^4 - 7x^2 + 12 = 0$. [4]

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Section B (36 marks)

- 10 (i) Express $x^2 6x + 2$ in the form $(x a)^2 b$. [3]
 - (ii) State the coordinates of the turning point on the graph of $y = x^2 6x + 2$. [2]
 - (iii) Sketch the graph of $y = x^2 6x + 2$. You need not state the coordinates of the points where the graph intersects the x-axis.
 - (iv) Solve the simultaneous equations $y = x^2 6x + 2$ and y = 2x 14. Hence show that the line y = 2x 14 is a tangent to the curve $y = x^2 6x + 2$. [5]
- 11 You are given that $f(x) = 2x^3 + 7x^2 7x 12$.
 - (i) Verify that x = -4 is a root of f(x) = 0. [2]
 - (ii) Hence express f(x) in fully factorised form. [4]
 - (iii) Sketch the graph of y = f(x). [3]
 - (iv) Show that $f(x-4) = 2x^3 17x^2 + 33x$. [3]
- 12 (i) Find the equation of the line passing through A(-1, 1) and B(3, 9). [3]
 - (ii) Show that the equation of the perpendicular bisector of AB is 2y + x = 11. [4]
 - (iii) A circle has centre (5, 3), so that its equation is $(x 5)^2 + (y 3)^2 = k$. Given that the circle passes through A, show that k = 40. Show that the circle also passes through B. [2]
 - (iv) Find the x-coordinates of the points where this circle crosses the x-axis. Give your answers in surd form.

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