

EXAMINATION PAPER 1	Matching the syllabus written by MEI (OCR B) 2004+
No Calculators	
© ZigZag Education 2005	Introduction to Advanced Mathematics - C1
Time Allowed:-1 hour 30 minutes	

Section A: (36)

1. Solve the inequality: $2x - x^2 > 0$. [3]

2. Simplify the following $\frac{10}{\sqrt{200}}$. [3]

3. $x^2 + y^2 + 4x + 8y + 1 = 0$
Determine the centre and radius of this circle. [4]

4. a) Calculate the remainder when $x^3 + 5x^2 + 2x - 8$ is divided by $x - 1$. [1]
b) Hence solve the equation $x^3 + 5x^2 + 2x - 8 = 0$ [3]

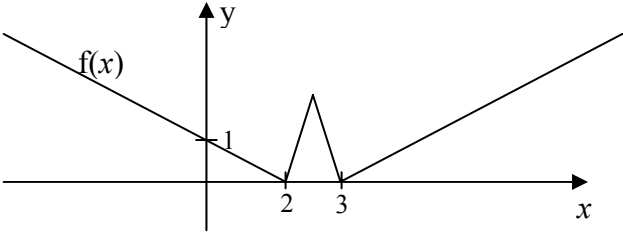
5. A computer company charges a total price £Q for n computers, where $Q = 10000n - 50n^2$.
a) If I buy one computer, how much will it cost? [1]
b) Given that I buy 10 computers, what is the average cost per computer? [2]
c) Explain why this offer would not be appropriate for a particularly large order. [2]

6. The line $y = x + 2$ intersects the curve $4y + 3x^2 = 7$ **in two places**.
Find the coordinates of the two points of intersection. [4]

7. Use the binomial expansion to fully expand $(x + y)^5$ [2]

8. The perpendicular from the centre of a circle to a chord bisects the chord.
a) State the converse of this theorem. [2]
b) State whether the converse is true. [1]

9. Sketch separately the following graphs:
a) $f(x) + 1$ [2]
b) $f(x+2)$ [2]



10. Simplify i) $\frac{(\sqrt{x})^3}{x}$ ii) $\frac{2}{4 - \sqrt{3}}$ [2, 2]

[36]

Section B: (36)

11. a) Solve the quadratic equation, $-x^2 + 3x + 10 = 0$ [2]
- b) Sketch the graph of $f(x)$, where $f(x) = -x^2 + 3x + 10$ [3]
- c) Calculate $f(x+1)$ and hence sketch the graph of $g(x) = -x^2 + x + 12$ [3]
- d) When does the quadratic equation, $-x^2 + 3x + A = 0$ have two distinct real roots? [3]
-

12. A straight line L_1 has equation $y = 2x - 4$. A straight line L_2 has equation $2y = 42 - x$.
- a) Sketch these 2 lines, and indicate where they cross the x and y -axes. [4]
- b) Prove that lines L_1 and L_2 are perpendicular. [2]
- c) Find the coordinates of where the 2 lines cross. [3]
- d) Calculate the area between the 2 lines and the x -axis. [3]
-

13. a) Sketch the graph of $x^2 + y^2 = 25$. *Clearly mark on your graph where it crosses the axes.* [2]
A circle C has equation $x^2 - 8x = 9 - y^2$
- b) i) By completing the square, express the equation in the form $(x - A)^2 + y^2 = r^2$ [3]
- ii) Describe a geometrical transformation by which C can be obtained from the equation given in part a). [2]

The equation given in part a) intersects C in two places.

- c) Find the coordinates of the two points of intersection. [5]

The line $y = f(x)$ passes through these two points.

- d) Find $f(x)$. [1]

[36]

TOTAL: [72]