OCR
RECOGNISING ACHIEVEMENT

Monday 13 May 2013 – Afternoon

AS GCE MATHEMATICS

4721/01 Core Mathematics 1

QUESTION PAPER

Candidates answer on the Printed Answer Book.

OCR supplied materials:
- Printed Answer book 4721/01
- List of Formulae (MF1)

Other materials required:
None

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

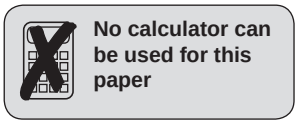
These instructions are the same on the Printed Answer Book and the Question Paper.
- The Question Paper will be found in the centre of the Printed Answer Book.
- Write your name, centre number and candidate number in the spaces provided on the Printed Answer Book. Please write clearly and in capital letters.
- **Write your answer to each question in the space provided in the Printed Answer Book**. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Do **not** write in the bar codes.
- You are **not** permitted to use a calculator in this paper.
- Give non-exact numerical answers correct to 3 significant figures unless a different degree of accuracy is specified in the question or is clearly appropriate.

INFORMATION FOR CANDIDATES

This information is the same on the Printed Answer Book and the Question Paper.
- The number of marks is given in brackets **[ ]** at the end of each question or part question on the Question Paper.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **72**.
- The Printed Answer Book consists of **12** pages. The Question Paper consists of **4** pages. Any blank pages are indicated.

INSTRUCTION TO EXAMS OFFICER / INVIGILATOR

- Do not send this Question Paper for marking; it should be retained in the centre or recycled. Please contact OCR Copyright should you wish to re-use this document.



DC (SLM) 63948/1

1 Express each of the following in the form $a\sqrt{5}$, where a is an integer.

(i) $4\sqrt{15} \times \sqrt{3}$ **[2]**

(ii) $\dfrac{20}{\sqrt{5}}$ **[1]**

(iii) $5^{\frac{3}{2}}$ **[1]**

2 Solve the equation $8x^6 + 7x^3 - 1 = 0$. **[5]**

3 It is given that $\mathrm{f}(x) = \dfrac{6}{x^2} + 2x$.

(i) Find $\mathrm{f}'(x)$. **[3]**

(ii) Find $\mathrm{f}''(x)$. **[2]**

4 **(i)** Express $3x^2 + 9x + 10$ in the form $3(x + p)^2 + q$. **[3]**

(ii) State the coordinates of the minimum point of the curve $y = 3x^2 + 9x + 10$. **[2]**

(iii) Calculate the discriminant of $3x^2 + 9x + 10$. **[2]**

5 **(i)** Sketch the curve $y = \dfrac{2}{x^2}$. **[2]**

(ii) The curve $y = \dfrac{2}{x^2}$ is translated by 5 units in the negative x-direction. Find the equation of the curve after it has been translated. **[2]**

(iii) Describe a transformation that transforms the curve $y = \dfrac{2}{x^2}$ to the curve $y = \dfrac{1}{x^2}$. **[2]**

6 A circle C has equation $x^2 + y^2 + 8y - 24 = 0$.

(i) Find the centre and radius of the circle. **[3]**

(ii) The point A (2, 2) lies on the circumference of C. Given that AB is a diameter of the circle, find the coordinates of B. **[2]**

7 Solve the inequalities

(i) $3 - 8x > 4$, **[2]**

(ii) $(2x - 4)(x - 3) \leqslant 12$. **[5]**

8 A is the point (–2, 6) and B is the point (3, –8). The line l is perpendicular to the line $x - 3y + 15 = 0$ and passes through the mid-point of AB. Find the equation of l, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. **[7]**

9 **(i)** Sketch the curve $y = 2x^2 - x - 6$, giving the coordinates of all points of intersection with the axes. **[5]**

(ii) Find the set of values of x for which $2x^2 - x - 6$ is a decreasing function. **[3]**

(iii) The line $y = 4$ meets the curve $y = 2x^2 - x - 6$ at the points P and Q. Calculate the distance PQ. **[4]**

10 The curve $y = (1 - x)(x^2 + 4x + k)$ has a stationary point when $x = -3$.

(i) Find the value of the constant k. **[7]**

(ii) Determine whether the stationary point is a maximum or minimum point. **[2]**

(iii) Given that $y = 9x - 9$ is the equation of the tangent to the curve at the point A, find the coordinates of A. **[5]**

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE