OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

MATHEMATICS

4721

Core Mathematics 1

QUESTION PAPER

Candidates answer on the printed answer book.

OCR supplied materials:
- Printed answer book 4721
- List of Formulae (MF1)

Other materials required:
None

Wednesday 18 May 2011
Morning

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES
These instructions are the same on the printed answer book and the question paper.

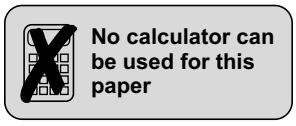
- The question paper will be found in the centre of the printed answer book.
- Write your name, centre number and candidate number in the spaces provided on the printed answer book. Please write clearly and in capital letters.
- **Write your answer to each question in the space provided in the printed 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. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- 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 destroyed.



1 Express $3x^2 - 18x + 4$ in the form $p(x + q)^2 + r$. **[4]**

2 **(i)** Sketch the curve $y = \frac{1}{x}$. **[2]**

(ii) Describe fully the single transformation that transforms the curve $y = \frac{1}{x}$ to the curve $y = \frac{1}{x} + 4$. **[2]**

3 Simplify

(i) $\frac{(4x)^2 \times 2x^3}{x}$, **[2]**

(ii) $\left(36x^{-2}\right)^{-\frac{1}{2}}$. **[3]**

4 Solve the simultaneous equations

$$y = 2(x - 2)^2, \qquad 3x + y = 26.$$ **[5]**

5 **(i)** Express $\sqrt{300} - \sqrt{48}$ in the form $k\sqrt{3}$, where k is an integer. **[3]**

(ii) Express $\frac{15 + \sqrt{40}}{\sqrt{5}}$ in the form $a\sqrt{5} + b\sqrt{2}$, where a and b are integers. **[3]**

6 Solve the equation $3x^{\frac{1}{2}} - 8x^{\frac{1}{4}} + 4 = 0$. **[5]**

7 Solve the inequalities

(i) $-9 \leqslant 6x + 5 \leqslant 0$, **[3]**

(ii) $6x + 5 < x^2 + 2x - 7$. **[5]**

8 **(i)** Find the coordinates of the stationary point on the curve $y = 3x^2 - \frac{6}{x} - 2$. **[5]**

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

9 The points A (1, 3), B (7, 1) and C (−3, −9) are joined to form a triangle.

(i) Show that this triangle is right-angled and state whether the right angle is at A, B or C. **[5]**

(ii) The points A, B and C lie on the circumference of a circle. Find the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$. **[7]**

10 A curve has equation $y = (2x - 1)(x + 3)(x - 1)$.

(i) Sketch the curve, indicating the coordinates of all points of intersection with the axes. **[3]**

(ii) Show that the gradient of the curve at the point $P(1, 0)$ is 4. **[6]**

(iii) The line l is parallel to the tangent to the curve at the point P. The curve meets l at the point where $x = -2$. Find the equation of l, giving your answer in the form $y = mx + c$. **[4]**

(iv) Determine whether l is a tangent to the curve at the point where $x = -2$. **[3]**

There are no questions printed on this page.