

**ADVANCED SUBSIDIARY GCE
MATHEMATICS**

Core Mathematics 1

4721

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.

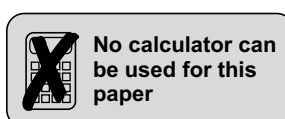
INFORMATION FOR CANDIDATES

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) $(36x^{-2})^{-\frac{1}{2}}$. [3]
- 4 Solve the simultaneous equations
- $$y = 2(x - 2)^2, \quad 3x + y = 26. \quad [5]$$
- 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) $-9 \leq 6x + 5 \leq 0$, [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.



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