



**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.

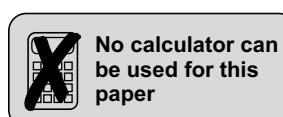
INFORMATION FOR CANDIDATES

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.



2

- 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]

3

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.

**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.