

**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.

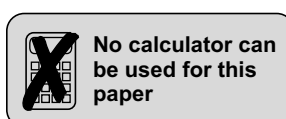
**INFORMATION FOR CANDIDATES**

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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