

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.

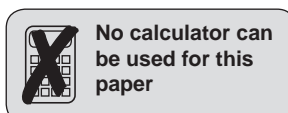
INFORMATION FOR CANDIDATES

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

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No calculator can
be used for this
paper

- 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) $\frac{20}{\sqrt{5}}$ [1]
- (iii) $5^{\frac{3}{2}}$ [1]
- 2 Solve the equation $8x^6 + 7x^3 - 1 = 0$. [5]
- 3 It is given that $f(x) = \frac{6}{x^2} + 2x$.
- (i) Find $f'(x)$. [3]
- (ii) Find $f''(x)$. [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 $y = \frac{2}{x^2}$. [2]
- (ii) The curve $y = \frac{2}{x^2}$ 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 $y = \frac{2}{x^2}$ to the curve $y = \frac{1}{x^2}$. [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) $(2x - 4)(x - 3) \leq 12$. [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



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