

OCR

Oxford Cambridge and RSA

Wednesday 17 May 2017 – Morning

AS GCE MATHEMATICS

4721/01 Core Mathematics 1

QUESTION PAPER

Candidates answer on the Printed Answer Book.

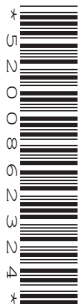
OCR supplied materials:

- 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 inside 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.** If additional space is required, you should use the lined page(s) at the end of the Printed Answer Book. The question number(s) must be clearly shown.
- 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 barcodes.
- 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.

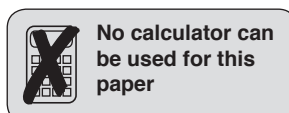
INFORMATION FOR CANDIDATES

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 **16** 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 recycled. Please contact OCR Copyright should you wish to re-use this document.



No calculator can be used for this paper

Answer **all** the questions.

- 1 Express $\frac{2+\sqrt{7}}{\sqrt{7}-2}$ in the form $a+b\sqrt{7}$, where a and b are rational numbers. [3]
- 2 Solve the simultaneous equations

$$y = x^2 - 6x, \quad 2y + x - 6 = 0. \quad [5]$$
- 3 It is given that $f(x) = (3+x^2)(\sqrt{x}-7x)$. Find $f'(x)$. [5]
- 4 Sketch the curve $y = -\frac{1}{2}(x+1)^2 + 2$, giving the coordinates of the turning point and indicating all points of intersection with the axes. [5]
- 5 Find the roots of the equation $4t^{\frac{2}{3}} = 15 - 17t^{\frac{1}{3}}$. [5]
- 6 (i) Express $3x^2 - 5x + 1$ in the form $a(x+b)^2 + c$. [4]
 (ii) Work out the value of the discriminant of $3x^2 - 5x + 1$ and hence state the number of real roots of the equation $3x^2 - 5x + 1 = 0$. [2]
- 7 (i) Find the x values of the stationary points of the curve $y = 2x^4 - x^2$. [3]
 (ii) Determine, in each case, whether the stationary point is a maximum point or a minimum point. [2]
 (iii) Hence state the set of values of x for which curve $2x^4 - x^2$ is a decreasing function. [2]
- 8 (i) Sketch the curve $y = -2\sqrt{x}$. [2]
 (ii) The curve $y = -2\sqrt{x}$ is translated by three units in the negative x direction. State the equation of the curve after it has been translated. [2]
 (iii) Describe fully a single transformation that transforms the curve $y = -2\sqrt{x}$ to $y = -3\sqrt{5x}$. [2]
- 9 A curve has equation $y = 2x^2 + x - 10$.
 (i) Determine the set of values of x for which the graph of the curve lies above the x -axis. [4]
 (ii) The line $3x + y = c$ is a tangent to the curve. Find the value of c . [5]

- 10 The circle $x^2 + y^2 - 8x + 2y = 0$ passes through the origin O. Line OA is a diameter to this circle.
- (i) Find the equation of the line OA, giving your answer in the form $ax + by = 0$, where a and b are integers. [5]
 - (ii) The tangent to the circle at point A meets the x -axis at the point B. Find the area of triangle OAB. [6]
- 11 The normal to the curve $y = \frac{k}{x^2}$ at the point where $x = -3$ is parallel to the line $\frac{1}{2}y = 2 + 3x$.
- (i) Determine the value of the constant k . [6]
 - (ii) Find the equation of the normal where $x = -3$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [4]

END OF QUESTION PAPER

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