

ADVANCED SUBSIDIARY GCE
MATHEMATICS
Core Mathematics 1

4721/01

Candidates answer on the Printed Answer Book

OCR Supplied Materials:

- Printed Answer Book (inserted)
- List of Formulae (MF1)

Other Materials Required:

None

Wednesday 9 January 2008
Afternoon

Duration: 1 hour 30 minutes

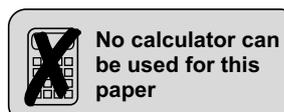


INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the spaces provided on the Printed Answer Book.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Write your answer to each question in the space provided. If you need more space for an answer use additional paper; label your answer clearly and attach the additional paper securely to the Printed Answer Book.
- Do **not** write in the bar codes.
- 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.
- **You are not permitted to use a calculator in this paper.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **72**.
- This document consists of **4** pages. Any blank pages are indicated.



Answer all questions on the Printed Answer Book provided.

- 1 Express $\frac{4}{3 - \sqrt{7}}$ in the form $a + b\sqrt{7}$, where a and b are integers. [3]
- 2 (i) Write down the equation of the circle with centre $(0, 0)$ and radius 7. [1]
 (ii) A circle with centre $(3, 5)$ has equation $x^2 + y^2 - 6x - 10y - 30 = 0$. Find the radius of the circle. [2]
- 3 Given that $3x^2 + bx + 10 = a(x + 3)^2 + c$ for all values of x , find the values of the constants a , b and c . [4]
- 4 Solve the equations
 (i) $10^p = 0.1$, [1]
 (ii) $(25k^2)^{\frac{1}{2}} = 15$, [3]
 (iii) $t^{-\frac{1}{3}} = \frac{1}{2}$. [2]
- 5 (i) Sketch the curve $y = x^3 + 2$. [2]
 (ii) Sketch the curve $y = 2\sqrt{x}$. [2]
 (iii) Describe a transformation that transforms the curve $y = 2\sqrt{x}$ to the curve $y = 3\sqrt{x}$. [3]
- 6 (i) Solve the equation $x^2 + 8x + 10 = 0$, giving your answers in simplified surd form. [3]
 (ii) Sketch the curve $y = x^2 + 8x + 10$, giving the coordinates of the point where the curve crosses the y -axis. [3]
 (iii) Solve the inequality $x^2 + 8x + 10 \geq 0$. [2]
- 7 (i) Find the gradient of the line l which has equation $x + 2y = 4$. [1]
 (ii) Find the equation of the line parallel to l which passes through the point $(6, 5)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [3]
 (iii) Solve the simultaneous equations

$$y = x^2 + x + 1 \quad \text{and} \quad x + 2y = 4. \quad [4]$$

- 8 (i) Find the coordinates of the stationary points on the curve $y = x^3 + x^2 - x + 3$. [6]
- (ii) Determine whether each stationary point is a maximum point or a minimum point. [3]
- (iii) For what values of x does $x^3 + x^2 - x + 3$ decrease as x increases? [2]
- 9 The points A and B have coordinates $(-5, -2)$ and $(3, 1)$ respectively.
- (i) Find the equation of the line AB , giving your answer in the form $ax + by + c = 0$. [3]
- (ii) Find the coordinates of the mid-point of AB . [2]
- The point C has coordinates $(-3, 4)$.
- (iii) Calculate the length of AC , giving your answer in simplified surd form. [3]
- (iv) Determine whether the line AC is perpendicular to the line BC , showing all your working. [4]
- 10 Given that $f(x) = 8x^3 + \frac{1}{x^3}$,
- (i) find $f''(x)$, [5]
- (ii) solve the equation $f(x) = -9$. [5]

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MATHEMATICS

Core Mathematics 1

4721/01

PRINTED ANSWER BOOK

Candidates answer on the Printed Answer Book

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- List of Formulae (MF1)

Other Materials Required:
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Candidate Forename		Candidate Surname	
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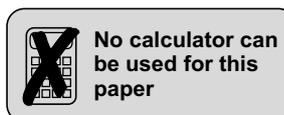
Centre Number						Candidate Number				
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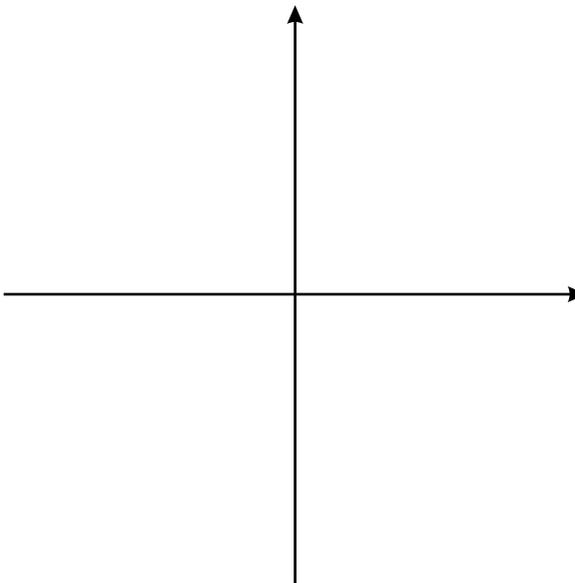
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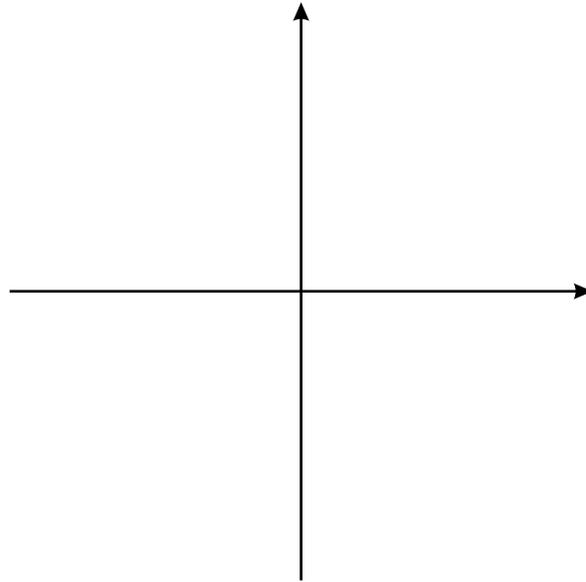
- This document consists of **12** pages. Any blank pages are indicated.



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2 (i)	
2 (ii)	
3	

4 (i)	
4 (ii)	
4 (iii)	
5 (i)	

5 (ii)



5 (iii)

6 (iii)	
7 (i)	
7 (ii)	

7 (iii)	

8 (iii)	
9 (i)	
9 (ii)	

9 (iii)	
9 (iv)	
10 (i)	

10 (ii)	

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