OCR
RECOGNISING ACHIEVEMENT

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

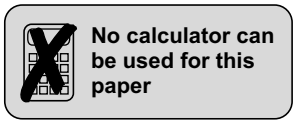
* 4 7 2 1 0 1 *

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 $\dfrac{4}{3-\sqrt{7}}$ 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) $\left(25k^2\right)^{\frac{1}{2}} = 15$, [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 $x^2 + 8x + 10 \geqslant 0$. [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

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

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 $\mathrm{f}(x) = 8x^3 + \dfrac{1}{x^3}$,

(i) find $\mathrm{f}''(x)$, [5]

(ii) solve the equation $\mathrm{f}(x) = -9$. [5]

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MATHEMATICS

Core Mathematics 1

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PRINTED ANSWER BOOK

Candidates answer on the Printed Answer Book

OCR Supplied Materials:
- Question Paper 4721/01
- List of Formulae (MF1)

Other Materials Required:
None

Wednesday 9 January 2008
Afternoon

Duration: 1 hour 30 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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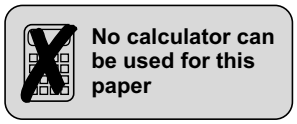
INFORMATION FOR CANDIDATES

- This document consists of **12** pages. Any blank pages are indicated.



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4 (i)

4 (ii)

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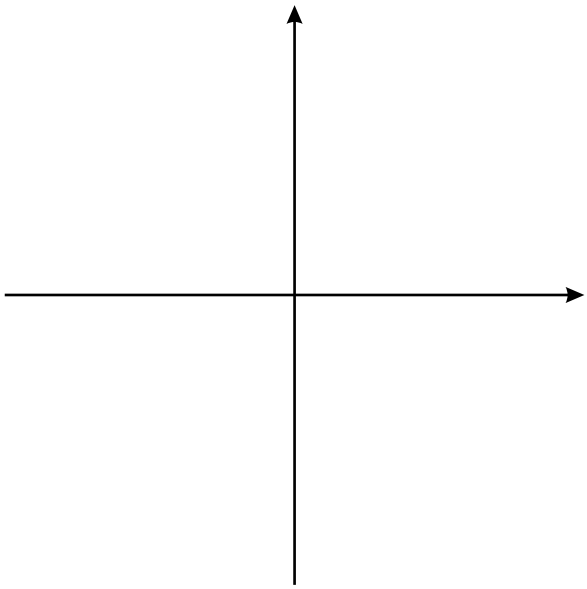

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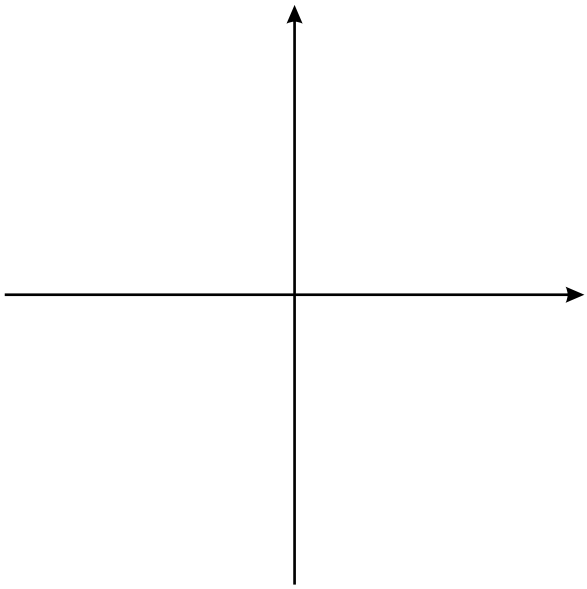

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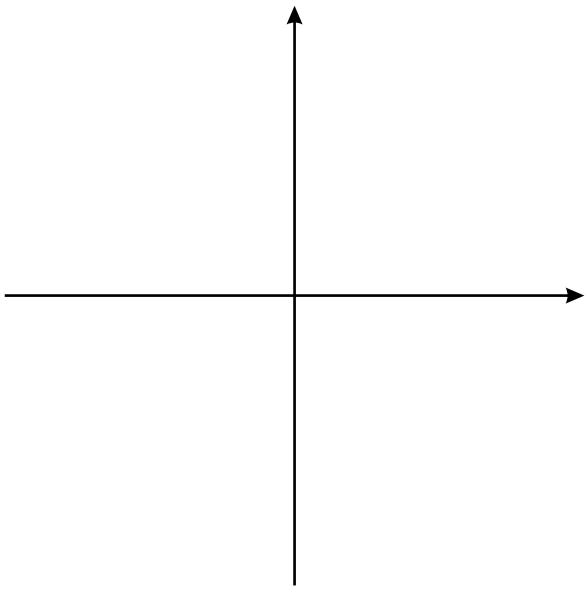

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8 (iii)

9 (i)

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

10 (ii)

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