OCR
RECOGNISING ACHIEVEMENT

ADVANCED GCE

MATHEMATICS (MEI)   4754B

Applications of Advanced Mathematics (C4) Paper B: Comprehension

Candidates answer on the question paper.

OCR supplied materials:
*   Insert (inserted)
*   MEI Examination Formulae and Tables (MF2)

Other materials required:
*   Scientific or graphical calculator
*   Rough paper

Monday 1 June 2009
Morning

Duration: Up to 1 hour

INSTRUCTIONS TO CANDIDATES
*   The insert will be found in the centre of this document.
*   Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
*   Write your answer to each question in the space provided. 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.
*   The insert contains the text for use with the questions.
*   You are permitted to use a scientific or graphical calculator in this paper.
*   Final answers should be given to a degree of accuracy appropriate to the context.

INFORMATION FOR CANDIDATES
*   The number of marks is given in brackets **[ ]** at the end of each question or part question.
*   You may find it helpful to make notes and do some calculations as you read the passage.
*   You are **not** required to hand in these notes with your question paper.
*   You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is being used.
*   The total number of marks for this paper is **18**.
*   This document consists of **4** pages. Any blank pages are indicated.

1   On lines 90 and 91, the article says "The average score for each player works out to be 0.25 points per round". Derive this figure.   **[2]**

1	

2   Line 47 gives the inequality $b > c > d > w$.

Interpret each of the following inequalities in the context of the examples from the 1st World War.

   (i) $b > w$ **[1]**

  (ii) $c > d$ **[1]**

2 (i)	

2 (ii)	

3   Table 3 illustrates a possible game where you always co-operate. In lines 98 and 99 the article says "Clearly the longer the game goes on the closer your average score approaches -2 points per round and that of your opponent approaches 3."

How many rounds have you played when your average score is −1.999?   **[3]**

3	

4 A Prisoner's Dilemma game is proposed in which

$$b = 6, \ c = 1, \ d = -1 \ \text{and} \ w = -3.$$

Using the information in the article, state whether these values would allow long-term co-operation to evolve. Justify your answer. **[2]**

4	

5 In a Prisoner's Dilemma game both players keep strictly to a Tit-for-tat strategy. You start with C and your opponent starts with D. The scoring system of $b = 3$, $c = 1$, $d = -1$ and $w = -2$ is used.

  (i) The table shows the first 8 out of many rounds. Complete the table. **[3]**

  (ii) Find your average score per round in the long run. **[2]**

5 (i)

Round	You	Opponent	Your score	Opponent's score
1	C	D		
2				
3				
4				
5				
6				
7				
8				
…	…	…	…	…

5 (ii)

6 In the article, the scoring system is $b = 3$, $c = 1$, $d = -1$ and $w = -2$.

In Axelrod's experiment, negative numbers were avoided by taking $b = 5$, $c = 3$, $d = 1$ and $w = 0$.

State the effect this change would have on

(i) the players' scores, **[1]**

(ii) who wins. **[1]**

6 (i)	
6 (ii)	

7 Two companies, X and Y, are the only sellers of ice cream on an island. They both have a market share of about 50%. Although their ice cream is much the same, both companies spend a lot of money on advertising.

(i) What agreement might the companies reach if they decide to co-operate? **[1]**

(ii) What advantage would a company hope to gain by 'defecting' from this agreement? **[1]**

7 (i)	
7 (ii)	