

ADVANCED GCE

MATHEMATICS (MEI)

4754B

Morning

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

Duration: Up to 1 hour

Monday 1 June 2009

Candidate forename			Candidate surname			
				_		

Centre number			Candidate number		

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

$$b = 6$$
, $c = 1$, $d = -1$ 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	
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.
 - (ii) Find your average score per round in the long run.

	Round	You	Opponent	Your score	Opponent's score
	1	С	D		
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	8				
(ii)					

[3]

[2]

[1]

[1]

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,
- (ii) who wins.

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	it the companies reach if t	hey decide to co-opera	ate? [1]
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(ii) What advantage would a company hope to gain by 'defecting' from this agreement? [1]

7 (i)	
7 (ii)	
7 (ii)	
7 (ii)	



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