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COMPUTER SCIENCE

Paper 1

June 2019

7516/1/PM

Preliminary Material

To be opened and issued to candidates on or after 1 March 2019 subject to the instructions given in the Teachers' Notes (7516/1/TN).

NOTE

- **The Preliminary Material, Skeleton Program and Data Files are to be seen by candidates and their teachers ONLY, for use during preparation for the examination on Tuesday 21 May 2019. They CANNOT be used by anyone else for any other purpose, other than that stated in the instructions issued, until after the examination date has passed. They must NOT be provided to third parties.**

[Turn over]

INFORMATION

- **A Skeleton Program is provided separately by your teacher and must be read in conjunction with this Preliminary Material.**
- **You are advised to familiarise yourselves with the Preliminary Material and Skeleton Program before the examination.**
- **A copy of this Preliminary Material and the Skeleton Program will be made available to you in hard copy and electronically at the start of the examination.**
- **You must NOT take any copy of the Preliminary Material, Skeleton Program and Data Files or any other material into the examination room.**

INSTRUCTIONS FOR CANDIDATES

The question paper is divided into THREE sections.

SECTION A

You will be asked to create a new program and answer questions NOT related to the PRELIMINARY MATERIAL or SKELETON PROGRAM.

SECTION B

Questions will refer to the PRELIMINARY MATERIAL and the SKELETON PROGRAM, but will not require programming.

SECTION C

Questions will use the PRELIMINARY MATERIAL and the SKELETON PROGRAM and may require the game1 . txt, game2 . txt, game3 . txt and game4 . txt Data Files.

ELECTRONIC ANSWER DOCUMENT

Answers for ALL questions, for ALL sections, must be entered into the word-processed document made available to you at the start of the examination and referred to in the question paper rubrics as the ELECTRONIC ANSWER DOCUMENT.

PREPARATION FOR THE EXAMINATION

You should ensure that you are familiar with this PRELIMINARY MATERIAL and the SKELETON PROGRAM for your programming language.

[Turn over]

AQA BOARD GAME

The SKELETON PROGRAM accompanying this PRELIMINARY MATERIAL is a two-player board game. The players are referred to as Player A and Player B. The board contains 64 squares, arranged in an 8×8 grid. The squares containing \times s are not used. Each player has a maximum of 12 pieces. The number of pieces and their starting positions are determined by the contents of a text file. The pieces' IDs consist of the player's letter and consecutive numbers 1 to 12.

FIGURE 1, on the opposite page, shows a game with 12 pieces that has been loaded from the `game1.txt` text file.

Player A has twelve pieces with IDs a1 to a12, occupying rows 0 to 2.

Player B has twelve pieces with IDs b1 to b12, occupying rows 5 to 7.

FIGURE 1

	0	1	2	3	4	5	6	7
0	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a1	XXXXXX	a2	XXXXXX	a3	XXXXXX	a4
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
1		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	a5	XXXXXX	a6	XXXXXX	a7	XXXXXX	a8	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
2	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a9	XXXXXX	a10	XXXXXX	a11	XXXXXX	a12
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
3		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
4	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
5		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	b9	XXXXXX	b10	XXXXXX	b11	XXXXXX	b12	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
6	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	b5	XXXXXX	b6	XXXXXX	b7	XXXXXX	b8
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
7		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	b1	XXXXXX	b2	XXXXXX	b3	XXXXXX	b4	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX

[Turn over]

FIGURE 2, on the opposite page, shows a game with eight pieces that has been loaded from the `game2.txt` text file.

Player A has eight pieces with IDs `a1` to `a8`, occupying rows 0 to 1

Player B has eight pieces with IDs `b1` to `b8`, occupying rows 6 to 7

FIGURE 2

	0	1	2	3	4	5	6	7
0	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a1	XXXXXX	a2	XXXXXX	a3	XXXXXX	a4
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
1		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	a5	XXXXXX	a6	XXXXXX	a7	XXXXXX	a8	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
2	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
3		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
4	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
5		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
6	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	b5	XXXXXX	b6	XXXXXX	b7	XXXXXX	b8
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
7		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	b1	XXXXXX	b2	XXXXXX	b3	XXXXXX	b4	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX

[Turn over]

The rules are:

- **Player A always starts.**
- **Players take turns to move.**
- **A move consists of advancing one of the player's own pieces one square forward along the diagonal (left or right) while remaining on the board. For example, in FIGURE 2 piece a6, currently at row 1, column 2, could move to row 2, column 1 or row 2, column 3**
- **An alternative move is a jump over one of the player's own pieces that is diagonally immediately in front of the piece to be moved. For example, in FIGURE 2 piece a2, currently at row 0, column 3, could move to row 2, column 1 or row 2, column 5**
- **When a piece reaches the opposite end of the board (row 7 for Player A, row 0 for Player B) it is promoted to a dame and the letter of the ID is changed to uppercase. The dame is moved to an empty square in the player's first row (row 0 for Player A, row 7 for Player B). If there is no empty square in the player's first row the dame stays where it is and cannot move.**

The SKELETON PROGRAM presents the user with the current state of the board and shows the possible moves that the player whose turn it is can make.

The player enters the ID of the piece they want to move, followed by the row and column of the board square to which they want to move the piece.

The program confirms if the move was a jump and, if so which piece was jumped over.

When a player has no possible moves available when it is their turn, the game ends and that player has lost the game.

[Turn over]

FIGURE 3, on the opposite page, shows a game with eight pieces that has been loaded from the `game3.txt` text file.

FIGURE 3

	0	1	2	3	4	5	6	7
0	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a1	XXXXXX		XXXXXX		XXXXXX	a4
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
1		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX	b5	XXXXXX	a8	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
2	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX	a7	XXXXXX	a3
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
3		XXXXXX		XXXXXX		XXXXXX		XXXXXX
	a6	XXXXXX	a5	XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
4	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	b1	XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
5		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX	b4	XXXXXX	b3	XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
6	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a2	XXXXXX	b6	XXXXXX	b7	XXXXXX	b8
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
7		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX	b2	XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX

[Turn over]

FIGURE 4, on the opposite page, shows a game with 12 pieces that has been loaded from the `game4.txt` text file.

FIGURE 4

	0	1	2	3	4	5	6	7
0	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	A5	XXXXXX	a2	XXXXXX	a3	XXXXXX	
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
1		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		A6	XXXXXX	a1	XXXXXX	a7	XXXXXX	a4
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
2	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	a9	XXXXXX	a10	XXXXXX	a11	XXXXXX	a8
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
3		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		b9	XXXXXX	b6	XXXXXX	b10	XXXXXX	a12
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
4	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX	b5	XXXXXX	b1	XXXXXX	b11	XXXXXX	b12
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
5		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		b2	XXXXXX		XXXXXX	b4	XXXXXX	b3
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
6	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
	XXXXXX		XXXXXX		XXXXXX	b7	XXXXXX	b8
	XXXXXX		XXXXXX		XXXXXX		XXXXXX	
7		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX
		XXXXXX		XXXXXX		XXXXXX		XXXXXX

END OF PRELIMINARY MATERIAL

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