AQA

AS
COMPUTER SCIENCE

Paper 1

June 2022

Preliminary Material

To be opened and issued to candidates on or after **1 March 2022** 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 Summer 2022 examination. 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.

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 yourself 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.

Candidates will need access to a text file editor, such as Notepad or TextEdit.

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 `puzzle1.txt, puzzle1P.txt` and `puzzle1S.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.

Number Puzzle

The **Skeleton Program** accompanying this **Preliminary Material** is a number puzzle program for a single user.

A puzzle consists of a 9 x 9 grid with nine 3 x 3 sub-grids. The grid contains some given digits between 1 and 9.

To solve the puzzle, the user fills in the grid with single digits so that each row, each column and each of the nine sub-grids contain all of the digits from 1 to 9.

Figure 1 shows the main menu that is displayed when the program is started.

Figure 1

```
Main Menu
=========
L - Load new puzzle
P - Load partially solved puzzle
S - Solve puzzle
C - Check solution
K - Keep partially solved puzzle
X - Exit
```

There are six options on the menu:

Option `L`
The program loads a new puzzle. When loading a new puzzle, the program starts with a partially complete grid of digits (referred to as given digits).

Option `P`
The program loads a partially solved puzzle that has previously been saved (see Option `K` below).

Option `S`
The program enters solve mode, allowing the user to attempt to solve the loaded puzzle.

In solve mode the user enters the co-ordinates and the digit as a single string.
For example, entering `257` means place the digit 7 in row 2, column 5

To exit solve mode, the user presses the Enter key.

Option `C`
The program checks the digits the user has placed and calculates a score.

Option `K`
The program saves a partially solved puzzle. This can be reloaded by the user (see Option `P`).

Option `X`
The program ends.

Data File Naming Convention

The **Skeleton Program** stores puzzle data in data files. The naming convention for these files is as follows, where N represents a positive integer:

- `puzzleN.txt` contains the data for an unsolved puzzle (a partially complete grid)
- `puzzleNS.txt` contains the solution to `puzzleN`
- `puzzleNP.txt` contains the data for a partial solution of `puzzleN`

The **`puzzle1.txt`** file contains data for the puzzle shown in **Figure 2**.

Figure 2

```
   1   2   3   4   5   6   7   8   9
 |===.===.===|===.===.===|===.===.===|
1| 8 .   . 5 |   .   .   |   .   . 7 |
 |...........|...........|...........|
2| 9 .   .   | 5 .   . 4 |   .   .   |
 |...........|...........|...........|
3| 4 . 1 .   |   . 6 .   |   .   .   |
 |===.===.===|===.===.===|===.===.===|
4|   .   .   | 7 .   .   | 1 . 6 .   |
 |...........|...........|...........|
5| 1 .   .   | 4 .   . 6 |   .   . 3 |
 |...........|...........|...........|
6|   . 5 . 8 |   .   . 1 |   .   .   |
 |===.===.===|===.===.===|===.===.===|
7|   .   .   |   . 1 .   |   . 4 . 9 |
 |...........|...........|...........|
8|   .   .   | 2 .   . 7 |   .   . 1 |
 |...........|...........|...........|
9| 2 .   .   |   .   .   | 5 .   . 6 |
 |===.===.===|===.===.===|===.===.===|
```

The contents of file **`puzzle1S.txt`**, shown in **Figure 3**, contains data for the solution of `puzzle1`.

Figure 3

```
865192437
932574618
417863952
324789165
179456823
658321794
783615249
596247381
241938576
```

The file **`puzzle1P.txt`** contains the data shown in **Figure 4**.

Figure 4

```
puzzle1
-1
4
257
337
616
527
```

Figure 5 shows the partially solved `puzzle1`.

Figure 5

```
   1   2   3   4   5   6   7   8   9
 |===.===.===|===.===.===|===.===.===|
1| 8 .   . 5 |   .   .   |   .   . 7 |
 |...........|...........|...........|
2| 9 .   .   | 5 . 7 . 4 |   .   .   |
 |...........|...........|...........|
3| 4 . 1 . 7 |   . 6 .   |   .   .   |
 |===.===.===|===.===.===|===.===.===|
4|   .   .   | 7 .   .   | 1 . 6 .   |
 |...........|...........|...........|
5| 1 . 7 .   | 4 .   . 6 |   .   . 3 |
 |...........|...........|...........|
6| 6 . 5 . 8 |   .   . 1 |   .   .   |
 |===.===.===|===.===.===|===.===.===|
7|   .   .   |   . 1 .   |   . 4 . 9 |
 |...........|...........|...........|
8|   .   .   | 2 .   . 7 |   .   . 1 |
 |...........|...........|...........|
9| 2 .   .   |   .   .   | 5 .   . 6 |
 |===.===.===|===.===.===|===.===.===|
```

END OF PRELIMINARY MATERIAL

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