



# Cambridge International AS & A Level

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**COMPUTER SCIENCE**

**9618/04**

Paper 2 Practical

END OF COURSE REVIEW CHALLENGES #3

Additional Materials Required

EVIDENCE DOCUMENT

EXAMINATION INSERT

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- 1 A 1-dimensional array, `staffInfo`, stores data. Here is a sample array:

|          |          |          |          |          |          |          |     |          |
|----------|----------|----------|----------|----------|----------|----------|-----|----------|
| 'LN-103' | 'PS-125' | 'LN-031' | 'MN-033' | 'PS-112' | 'PS-011' | 'MN-092' |     | 'PS-061' |
| 1        | 2        | 3        | 4        | 5        | 6        | 7        | ... | 100      |

The first 2 characters refer to the office location, Paris(PS), London(LN), Milan(MN).

The 4th and 5th characters refer to the month when the employed joined the company, "01" represents January, "02" represents February etc.

The final character is a random number between 0 and 9.

- (a) A function, `countEmployees`, takes a 2-character string as a parameter. It counts how many strings in the array start with these 2 characters. It returns the result.

Implement the function `countEmployees` in pseudocode. Use the exam insert for any built-in functions your solution uses.

Save your answer in your evidence document as Q1a.

[6]

- (b) Another function, `countMonth`, takes an integer as a parameter. The parameter represents a month, 1 is January, 2 is February etc.

The function will count how many employees were employed in the same month as the parameter. For example, if the parameter is 1, and the data in the employee string is "01", then the count will be incremented.

Implement the function `countMonth` in pseudocode. Use the exam insert for any built-in functions your solution uses.

Copy and paste your solutions into the **evidence.doc as Q1b**

[6]

- (c) Write a procedure, `sortStaff`, which sorts the data in `staffInfo` in ascending order.

Pass the array to the procedure by reference ie the array is a global variable.

Note: if you use an efficient bubble sort, you can achieve the maximum 8 marks.  
If your solution uses a non-efficient bubble sort algorithm, you can achieve a maximum of 6 marks.

Copy and paste the program code into the **evidence.doc as Q1c**

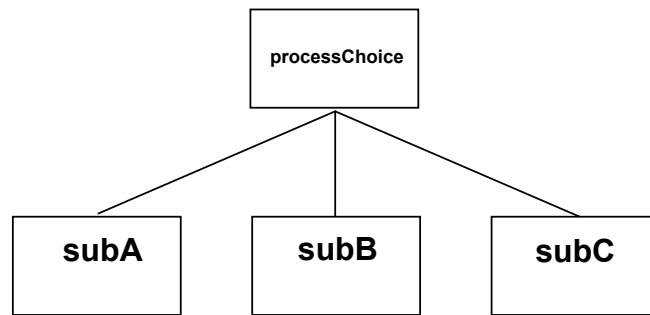
[8]

- (d) In your evidence document, clearly state the lower bound, upper bound and length of `staffInfo`

Enter your answer into your **evidence doc as Q1d**

[8]

- 2 The following structure chart shows the relationship between 4 modules.



- (a) Redraw the chart to show that:

each of the lower level modules returns a Boolean flag.  
processChoice will call only 1 of the 3 modules at the lower level.

Enter your answer into your **evidence doc as Q2a**

[2]

- (b) As well as showing module hierarchy, passing parameters and selection, name one other feature of a computer program that a structure chart can show.

Enter your answer into your **evidence doc as Q2a**

[1]

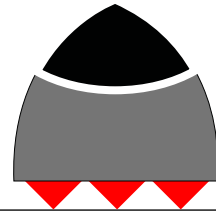
- (c) A structure chart is one way of illustrating the process of stepwise refinement. Write a definition for the term “stepwise refinement”.

Enter your answer into your **evidence doc as Q2a**

[1]

3 A Bomb has:

A name eg "MOAB"  
 A radioactivity rating eg 125.7  
 A nuclear flag eg TRUE



(a) Define the Bomb record structure.

Copy and paste the pseudocode into the **evidence.doc as Q3a**

[3]

(b) (i) Declare a new Bomb record, `moab`

Assign the following data to `moab`'s fields:

Name : "MOAB"  
 radioactivity rating: 356.8  
 nuclear flag: FALSE

Copy and paste the pseudocode into the **evidence.doc as Q3bi**

(ii) A 2-dimensional array of Bomb records, `bombs`, stores individual Bomb records. [2]

Declare this array. It has 30 rows and 75 columns.

Copy and paste the pseudocode into the **evidence.doc, as Q3bii**

[2]

(iii) A procedure, `resetRadioactivity`, processes the global array `bombs`.

The array is passed to the function **by reference**. Another parameter, `threshold`, is passed to the function **by value**.

The function iterates through every element in the array. If a record has a radioactivity rating which is greater than `threshold` and the record's nuclear flag is FALSE, then the radioactivity rating of that record is set to the same value as `threshold`.

Implement the function `resetRadioactivity` in pseudocode. Use the exam insert for any built-in functions your solution uses.

Copy and paste the pseudocode into the **evidence.doc, as Q3biii**

[8]

- 4 A file, `rainfall.txt`, is used by scientists to enter rainfall data.

A sample line of text in the file is:

`<date>,<level>,<scientistID>`

A function `addData` is called to store new data into the file.

Here is an algorithm in structured English describing the actions of the function:

1. Prompt the user for the date
2. Input the date
3. Prompt the user for the rainfall level
4. Input the rainfall level
5. Validate the level. If the number entered is less than 0 or greater than 150, repeat from step 3.
6. Prompt the user for the ID.
7. Input the ID.
8. Form the string to be appended to the file - see sample above
9. Write the string to the text file.
10. Return TRUE

- (a) Write pseudocode for the function `addData`.

Copy and paste the pseudocode into the **evidence.doc** as **Q4a**