UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2022548822

COMPUTING **9691/23**

Paper 2 **May/June 2013**

2 hours

Candidates answer on the Question Paper.

No additional materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **12** printed pages.

UNIVERSITY of CAMBRIDGE International Examinations

1 Meena wants to develop a program to keep a record of her examination results. She will want to enter, sort and print out data which is stored as a file of records.

Each record will contain at least the following data:

- subject
- examination title
- level
- date sat
- mark

An example of an examination title is 'General Certificate of Education'.
The `DateSat` field will contain only the month and year that the examination was taken.
For all subjects the mark is between 0 and 100 inclusive.
The level is 'O' or 'A'.

(a) Complete the table. Use a single value for the size.

Data	Identifier	Data Type	Size (in bytes)
subject	`Subject`	`STRING`	
examination title			
level	`Level`		1
date sat	`DateSat`		
mark	`Mark`		

[6]

(b) Estimate how many records could be held in the file if there are 5 KB available for the file.

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..... [4]

For Examiner's Use

(c) (i) Each record needs another field to uniquely identify that record.

State an appropriate identifier for this field and state a suitable data type for it.

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..... [2]

(ii) In a programming language write the declaration for the record structure, giving it the identifier `Exam`.

Programming language .....

Declaration .....

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..... [4]

(d) Meena decides to modularise the solution.

Describe **two** ways in which a procedural programming language is appropriate when modularising a solution.

1 .....

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2 .....

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..... [4]

(e) Describe what the function `EOF()` does when used in a program.

For Examiner's Use

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..... [2]

2 The data in each field is validated as it is entered.

(a) Write the logic expression to validate `Mark`.

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..... [3]

(b) The following table shows the four records currently stored in the file `ExamResults` for the examinations sat so far.

Subject	Title	Level	DateSat	Mark
Art	…	…	…	**28**
Music	…	…	…	**57**
Biology	…	…	…	**75**
History	…	…	…	**41**

Meena will write a module based on the following pseudocode.

```
OPENFILE ExamResults FOR INPUT
Count ← 1
REPEAT
   FILEREAD next ExamResults record
   IF Mark > 70
      THEN
         Count ← Count + 1
   ENDIF
UNTIL EOF()
OUTPUT Count
CLOSEFILE ExamResults
```

For Examiner's Use

(i) Complete the trace table below using the file `ExamResults`.

Count	Mark	Mark > 70	Output

[4]

(ii) There is an error in the pseudocode.

Write the correct statement.

.....

[1]

(iii) State the type of error.

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[1]

(iv) Write a suitable comment that could be added to explain the line
`Count ← Count + 1`.

.....

.....

[1]

(c) The pseudocode given in **(b)** uses a REPEAT-UNTIL loop:

For Examiner's Use

```
OPENFILE ExamResults FOR INPUT
Count ← 1
REPEAT
   FILEREAD next ExamResults record
   IF Mark > 70
      THEN
         Count ← Count + 1
   ENDIF
UNTIL EOF()
OUTPUT Count
CLOSEFILE ExamResults
```

Rewrite the pseudocode to count how many records have a mark below 40. This time use a WHILE-ENDWHILE loop.

```
OPENFILE ExamResults FOR INPUT
```

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```
CLOSEFILE ExamResults
```

[4]

For Examiner's Use

3 Meena needs to be aware of her average mark and declares a variable with identifier `MyAvMark` which she decides will be a global variable.

(a) State where in the program a global variable will be declared.

.....

[1]

(b) Using only global variables is poor programming practice.

Give a possible problem that could result from this.

.....

.....

[1]

The program will read the marks from the file into a one-dimensional array, `MyMarks`. The array has 50 elements, and marks range from 0 to 100 inclusive.

(c) State a suitable value to initialise each element of the array.

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[1]

(d) In a programming language, write code that will declare and initialise `MyMarks`.

Programming language .....

Code .....

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[4]

(e) 20 marks have been read into elements 1 to 20. In a programming language, write code that will print out the highest and lowest marks that have been entered.

For Examiner's Use

Programming language .....

Code .....

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[6]

(f) `MyAvMark` is a variable of data type REAL.
Meena wants the value of `MyAvMark` converted to the nearest whole number.

State a function that will perform the conversion.

.....

[1]

The module to calculate the average mark could be written as a procedure or a function.

For Examiner's Use

(g) (i) State **one** difference between a procedure and a function.

.....

..... [1]

(ii) State why the module to calculate the average mark could be written as a procedure or a function.

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..... [2]

For Examiner's Use

4 **(a)** Meena hopes some of her friends will use her program. When designing the user interface, state **three** design features she can incorporate if one of her friends has a sight impairment.

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..... [3]

(b) Design the interface. It must allow for entry of marks and the output of the average mark. Remember, one of her friends has a sight impairment.

[6]

(c) Meena has compiled the program and she thinks it is working.

For Examiner's Use

What **two** types of error could still occur in the program?
For each type give an example.

Error type 1 .....

Example .....

.....

.....

Error type 2 .....

Example .....

.....

..... [4]

5 Meena wants to refine her program using the marks in `MyMarks`.
She wants the program to output:

- the word 'Failed' if the mark is less than 40,
- the word 'Distinction' if the mark is over 70,
- the phrase 'Well done' if there are more than three distinctions.

Using pseudocode, produce the algorithm that does this.

For Examiner's Use

[9]