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

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

COMPUTING **9691/22**

Paper 2 **May/June 2012**

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 **11** printed pages and **1** blank page.

1 Anna wants to find out about her fellow students' reading habits. It will be part
Literature coursework.
She will ask questions online, so starts by designing a screen layout. The first fo
questions will ask for:

- student's first name
- date of birth
- type of book they prefer (printed, audio-book or e-book)
- whether student reads novels (yes/no)

(a) Draw a suitable screen layout.

[4]

(b) Justify the design of your screen layout in **(a)**.

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..... [3]

(c) The responses from each student will be stored as a record consisting of the fo
fields:

- FirstName
- DateOfBirth
- BookType
- ReadsNovels

Complete the following table. Only a single value should be given for the Field Size.

Field Name	Data Type	Field Size (bytes)
FirstName		
DateOfBirth		
BookType		
ReadsNovels		

[8]

(d) Anna is to write a program to analyse the responses.

Using nested IF...THEN statements, complete the pseudocode to calculate the tota for each BookType (printed, audio-book or e-book).

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```
REPEAT

    READ next record
```

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```
UNTIL no more student records
```

[5]

(e) Anna will want a report that shows these totals.

Design a printed report that shows for each BookType:

- the total for that type
- the percentage for that type

[3]

(f) The records will be held in a serial file.

Give **three** statements from a high-level language that may be used for the file handling and explain what each does.

Language .....

1 .....

.....

2 .....

.....

3 .....

..... [6]

2 Philipe is trying different ways of designing the process of entering data into an array.
He declares a variable called `ArraySize` and sets it to 3.
He declares an array `Number[ArraySize]`.

He then writes the following pseudocode.

```
Element ← 1
WHILE Element < ArraySize DO
    INPUT Number[Element]
    Element ← Element + 1
ENDWHILE
```

(a) In the following table trace the effect of entering 24, 57, 12.

ArraySize	Element	Element<ArraySize	Number		
			[1]	[2]	[3]
3					
	1				
		true			

[5]

(b) (i) There appears to be an error in the above pseudocode. State the type of error.

.....

[1]

(ii) The error can be corrected by changing **one** line. Write the corrected line of pseudocode.

.....

.....

[1]

(c) Philipe is not convinced that a WHILE loop was the best choice for this pseud
Instead he considers using a REPEAT...UNTIL loop.
Rewrite the corrected pseudocode using a REPEAT...UNTIL loop.

.....

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..... [2]

(d) Philipe wants to increase the size of the array to 500. This is too large to check with a trace table.
Describe how you would check that the logic of the pseudocode is correct for 500 iterations.

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..... [3]

3 Gina is developing her programming skills in string handling.
She is going to input two strings.
Each string is made up of three parts:

- letters, followed by
- a single '*' character, followed by
- letters

The groups of letters after the '*' characters are joined together to form a new string which is then output.

For example, with "DFG*COM" and "B*PUTER" as inputs, the new string output will be "COMPUTER".

(a) Using a high-level programming language, write the code to perform this task. (Ensure that you use meaningful variable names and lay the code out clearly.)

Programming language ....

Code ....

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.... [8]

(b) She writes this code as the function `JoinStrings` because it is to be used s... times.

(i) State the parameters of the function.

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..... [2]

(ii) Write the function header in the language you used in part **(a)**.

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..... [2]

(iii) State why Gina used a function rather than a procedure.

.....

..... [1]

4 Raul writes software for a melon packing plant. He wants to check his understanding of different arithmetic operators for a melon packing problem that he has to solve.

(a) Evaluate the following expressions for Raul.

(i) 10/3 .....

(ii) 10 MOD 3 .....

(iii) 10 DIV 3 ..... [3]

(b) Raul has Y melons which are to be packed into boxes. Each box contains X melons. Write expressions to calculate:

(i) the number of full boxes

.....

..... [1]

(ii) the number of melons left over

.....

..... [1]

5 Romana is learning about recursion. She designs a recursive function.

```
01        FUNCTION Happening(Num)
02          IF Num = 1
03            THEN
04              Happening ← 1
05            ELSE
06              Happening ← Happening(Num - 1) + Num
07          ENDIF
08        ENDFUNCTION
```

(a) Calculate the value returned by the function call `Happening(4)`.
Show your working.

`Happening(4)` = ... [6]

(b) **(i)** State **two** line numbers in the given pseudocode (other than lines 01 and 0 show the subroutine is a function. Give your reason for choosing these.

Line numbers .....

Reason .....

..... [3]

(ii) State the line number in the given pseudocode that shows the function is recursive. Give your reason for choosing this.

Line number .....

Reason .....

..... [2]

(c) State what will happen if the function is called with `Happening(-1)`.

.....

..... [1]

(d) The same process could have been solved iteratively using a FOR loop.
Discuss the merits of iterative and recursive solutions to this problem, particularly when the initial value of `Num` is very large.

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..... [4]

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