



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

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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\* 4 9 9 1 3 2 4 7 3 0 \*

**COMPUTING**

**9691/23**

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.

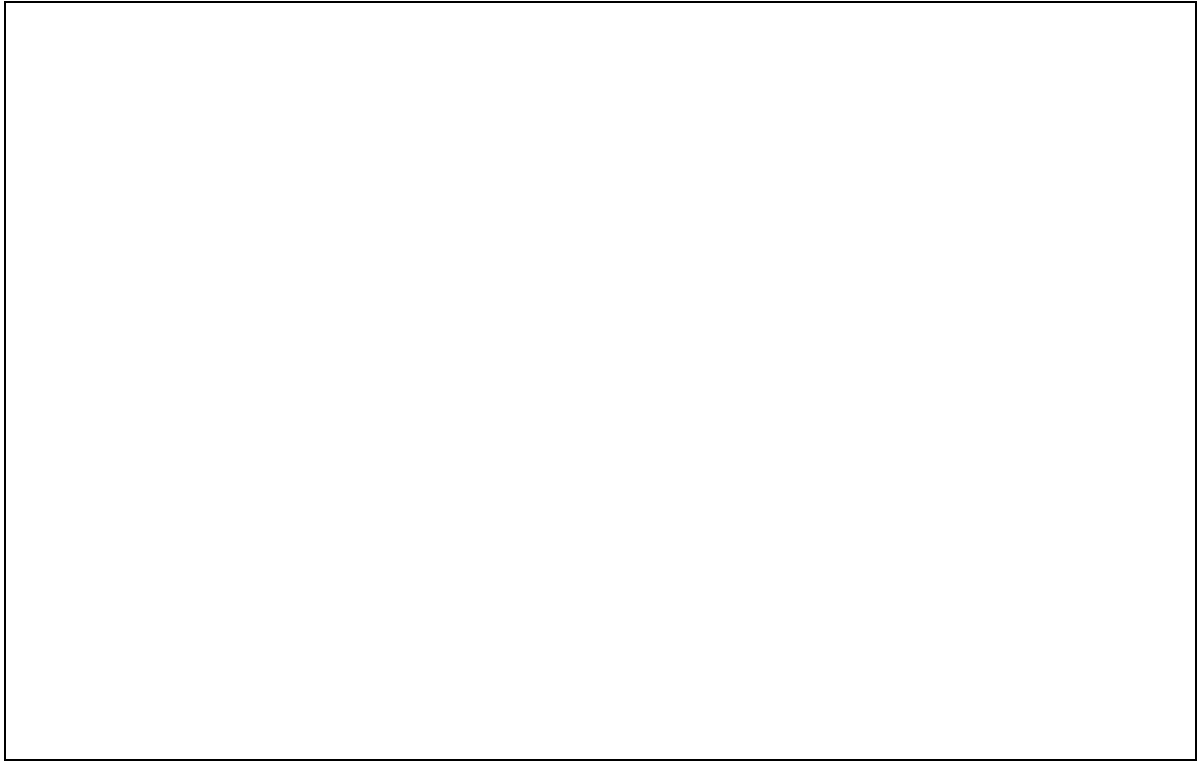
This document consists of **13** printed pages and **3** blank pages.



1 Anna wants to find out about her fellow students' sporting activities. It will be part of her Sports Studies coursework. She will ask questions online, so starts by designing a screen layout. The first four questions will ask for:

- student's first name
- age (16,17,18 or 19)
- favourite sport
- whether student is a member of a sports club (yes/no)

(a) Draw a suitable screen layout.



[4]

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

.....

.....

.....

.....

.....

.....

.....

[3]

(c) Several of the students are visually impaired. Describe the design issues that Anna should consider to ensure these students answer the questions online.

.....  
.....  
.....  
..... [2]

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

- FirstName
- Age
- FavouriteSport
- ClubMember

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

Field Name	Data Type	Field Size (bytes)
FirstName		
Age		
FavouriteSport		
ClubMember		

[8]

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

Using a SELECT/CASE construct write the pseudocode to count the number of students for each age group who completed the questionnaire.

.....  
.....  
.....  
.....

REPEAT

    READ next record

.....  
.....  
.....  
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.....  
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.....  
.....  
.....  
.....  
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.....  
.....  
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.....  
.....  
.....

UNTIL no more student records

[5]

- (f) The records will be held in a direct access file.  
Give **four** statements from a high-level programming language that may be used for the file handling and explain what each does.

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Programming language .....

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

4 .....

.....

..... [8]





(b) She writes this code as the function `ChangeString` because it will be used  $s$  times.

(i) State the parameter of the function.

.....  
..... [1]

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

.....  
..... [2]

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

.....  
..... [1]

- 3 Liliane wants to write a program to play chess. She will represent the board on squares, using the 2-dimensional array `Board[8, 8]`. Each element of the array will need initialising to zero. Later, if a chess piece is on square, it will take a value of 1. She starts by writing pseudocode for the initialisation of a 4 x 4 board. This is easier to trace.

```

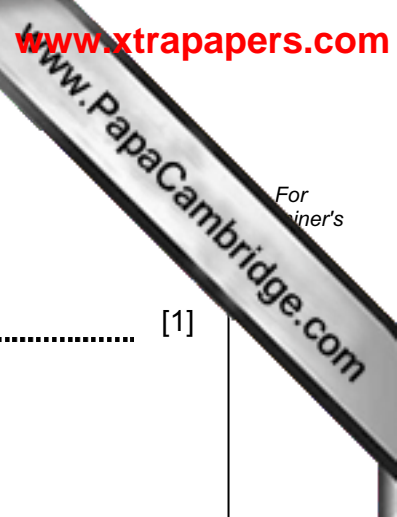
01          RowNo ← 1
02          WHILE RowNo < 4 DO
03              ColumnNo ← 1
04              WHILE ColumnNo < 4 DO
05                  Board[RowNo,ColumnNo] ← 0
06                  ColumnNo ← ColumnNo + 1
07              ENDWHILE
08              RowNo ← RowNo + 1
09          ENDWHILE
    
```

- (a) To test this pseudocode she traces it until the first five elements of `Board` have been initialised.

Complete the headings and the trace for these first five elements of the array.

RowNo	ColumnNo	RowNo<4	ColumnNo<4	Board				
				[1,1]				
1	1	True	True	0				





(b) There is an error in the pseudocode.

State the type of error.

..... [1]

(c) Rewrite **two** lines that will make the pseudocode work as intended.

Line number	Pseudocode
.....	.....
.....	.....

[2]

(d) State the count-controlled loop that would be better for this initialisation.

.....  
..... [1]

(e) On a full 8 x 8 board, state the relative positions of the squares Board[1, 8] and Board[8, 1] .

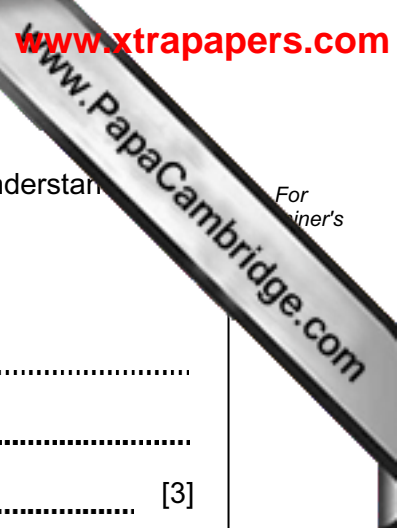
.....  
..... [1]

- (f) Liliane's next task is to indicate that there are pieces occupying the first two rows of an 8 x 8 board. Each square in rows 1 and 2 will be given the value 1.

Draw a flowchart that shows how to do this, using loop structures and the variable names previously used (Board, RowNo, ColumnNo).

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

(a) Evaluate the following expressions for Raul.

(i)  $7/4$  .....

(ii)  $7 \text{ MOD } 4$  .....

(iii)  $7 \text{ DIV } 4$  ..... [3]

(b) Raul has Y litres of oil to put into drums. Each drum can hold X litres of oil.

Write expressions to calculate:

(i) the number of full drums

.....  
..... [1]

(ii) the number of litres of oil left over

.....  
..... [1]

(c) Explain the difference between the operators / and DIV.

.....  
.....  
.....  
..... [2]

5 Ramon is learning about recursion. He has designed a recursive function.

```
FUNCTION Something(Number)
  IF Number = 7
    THEN
      Something ← 1
    ELSE
      Something ← Something(Number + 1) + Number
    ENDIF
  ENDFUNCTION
```

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

Something(4) = ..... [6]

(b) State what will happen if the function is called with `Something(8)`.

.....  
..... [1]

(c) State what would happen if the fourth line, '`Something ← 1`', was not present.

.....  
.....  
.....  
..... [2]

(d) The same process could have been designed using a FOR loop.  
Write the pseudocode to do this.

.....  
.....  
.....  
.....  
.....  
..... [2]





