

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Friday 24 May 2019 – Morning

AS Level Computer Science

H046/02 Algorithms and problem solving

**Time allowed: 1 hour 15 minutes
plus your additional time allowance**

**DO NOT USE:
a calculator**

Please write clearly in black ink.

Centre number

Candidate number

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS

Use black ink.

Answer ALL the questions.

Write your answer to each question in the space provided.

Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).

INFORMATION

The total mark for this paper is 70.

The marks for each question are shown in brackets [].

Quality of extended responses will be assessed in questions marked with an asterisk (*).

NO CALCULATOR CAN BE USED FOR THIS PAPER

BLANK PAGE

- 1 Janet is designing a piece of software for a furniture company.**

The software will allow a user to plan the position of furniture in a room. Users will be able to set the size and shape of a room, and then choose furniture from a library of furniture items. These pieces of furniture will have set sizes and designs and the user will be able to view the room in 3D to see how it looks from a variety of angles.

- (a) Janet is using computational thinking techniques during the design process.**

- (i) Janet is removing some aspects during the design of the software to simplify it and to make it easier to produce.**

State the name of the computational thinking technique that Janet is using.

_____ **[1]**

- (ii) The computational thinking technique in PART (a)(i) makes it easier to produce the software.**

Identify ONE additional reason why this technique is necessary.

_____ **[1]**

(iii) Explain, with examples, TWO ways in which Janet will apply the computational thinking technique in PART (a)(i) to this project.

1 _____

2 _____

[4]

(b) Janet is planning the inputs and outputs for the software.

(i) Identify TWO inputs that the software will need to take.

1 _____

2 _____

[2]

(ii) Identify TWO outputs that the software will need to produce.

1 _____

2 _____

[2]

(c) Janet is going to decompose the problem to produce a set of subprograms.

Explain the benefits of using subprograms to produce this software.

[4]

- (d) The program allows the user to enter dimensions of the room and the furniture. There are preconditions that must be met before the software will draw the room and furniture.

Suggest TWO preconditions that must be met before the software will run.

1 _____

2 _____

[2]

2 A procedure is shown in the pseudocode opposite.

The arrays that are passed to the procedure store integer values.

length returns the total number of elements the array can hold.

(a) A decision is made on line 02.

(i) Identify the line where the second decision is made.

_____ [1]

(ii) Explain the purpose of the code in lines 02 to 06.

_____ [3]

```
01 procedure calculateOnce(data[]:byRef, nextData[]:byRef)
02   if data.length > nextData.length then
03     loopCount = nextData.length - 1
04   else
05     loopCount = Data.length - 1
06   endif
07   count = 0
08   while count <= loopCount
09     data[count] = data[count] + nextData[count]
10     count = count + 1
11   endwhile
12 endprocedure
```

(b) The procedure has parameters passed by reference.

(i) Give the identifiers of the TWO parameters.

1 _____

2 _____

[2]

(ii) State the effect of the array `data []` being passed by reference and not by value.

_____ [1]

(c) The program needs a second procedure, `sortData`. It will be called taking the array `data []` as a parameter by reference.

The procedure will then perform a bubble sort on the data in the array.

(i) Show each stage of a bubble sort on the following contents of `data []`: [4]

95	10	5	33	100	77	45
----	----	---	----	-----	----	----

3 The current contents of a queue, colours, implemented in an array is shown in Fig. 3.1.

FIG. 3.1

red	yellow	green	blue	grey			
-----	--------	-------	------	------	--	--	--

front = 0

end = 4

(a) Describe the purpose of front and end.

[2]

(b) The queue has the subprograms enqueue and dequeue. The subprogram enqueue is used to add items to the queue and the subprogram dequeue removes items from the queue.

(i) Use the following diagram to show the queue shown in Fig. 3.1 after the following program statements have run:

```
enqueue ("orange")
dequeue ()
enqueue ("maroon")
dequeue ()
dequeue ()
```



front = _____

end = _____ [4]

(ii) enqueue and dequeue are both functions.

State the difference between a procedure and a function.

_____ [1]

(b) The procedure, `fullStop`, needs to:

ask for a file name as input

read the data from the file using the function `getText`

replace the first letter after each full stop with a capital letter if it is currently lower case (if the next character is a space, it must check each successive character until it finds a letter)

write the edited data back to the text file.

You can assume the text file only contains upper and lower case letters, spaces and full stops.

Part of the ASCII table has been provided:

ASCII Value	Character
65	"A"
90	"Z"
97	"a"
122	"z"
32	" " (space)
46	". " (full stop)

BLANK PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.