

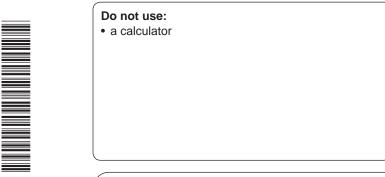


# Friday 24 May 2019 - Morning

# **AS Level Computer Science**

H046/02 Algorithms and problem solving

Time allowed: 1 hour 15 minutes





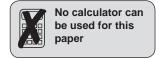
Please write clearly in black ink. Do not write in the barcodes.											
Centre number						Candidate number					
First name(s)											
Last name											

#### **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 (\*).
- This document consists of 16 pages.



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.

		[4]
	2	· • • • • •
	1	· • • • • •
(iii)	Explain, with examples, <b>two</b> ways in which Janet will apply the computational think technique in <b>part (a)(i)</b> to this project.	king
		[1]
	Identify one additional reason why this technique is necessary.	
(ii)	The computational thinking technique in <b>part (a)(i)</b> makes it easier to produce software.	the
		[1]
	State the name of the computational thinking technique that Janet is using.	
(i)	Janet is removing some aspects during the design of the software to simplify it and make it easier to produce.	ot b

(b)	Jan	et is planning the inputs and outputs for the software.	
	(i)	Identify <b>two</b> inputs that the software will need to take.	
		1	
		2	 [2]
	(ii)	Identify <b>two</b> outputs that the software will need to produce.	,
	( )	1	
		2	
			[2]
(c)	Jan	et is going to decompose the problem to produce a set of subprograms.	
	Ехр	lain the benefits of using subprograms to produce this software.	
			[4]
(d)		program allows the user to enter dimensions of the room and the furniture. There a conditions that must be met before the software will draw the room and furniture.	are
	Sug	gest <b>two</b> preconditions that must be met before the software will run.	
	1		
	2		
			[2]

4

**(e)\*** Janet is planning the testing strategy for the software.

WITHOUT OTHES SI	e should use.			
				[C

[2]

2 A procedure is shown in the following pseudocode.

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

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

```
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
      count = 0
07
      while count <= loopCount
08
09
              data[count] = data[count] + nextData[count]
10
              count = count + 1
      endwhile
11
12 endprocedure
(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]
(b) The procedure has parameters passed by reference.
  (i) Give the identifiers of the two parameters.
```

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1 ......

2 ......

6

	(ii)	State t	the effect	of the a	ray data	a[]bein	g passed	by refer	ence and	not by v	alue.
											[1]
(c)			m needs neter by r			ure, sor	tData. <b>lt</b>	will be c	alled taki	ng the ar	ray data[]
	The	proced	dure will t	hen perf	orm a bu	bble sort	on the da	ata in the	e array.		
	(i)	Show	each sta	ge of a b	ubble so	rt on the	following	contents	s of data	.[]:	
			95	10	5	33	100	77	45		
											***************************************
		•••••									
											[4]

(ii)	Write, using pseudocode, the procedure sortData.
	ro

(	(iii)	An alternative	sorting	method is	the	insertion	sort
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Show how an insertion sort will sort the data in the following array.

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.

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

front = 0 end = 4

Fig. 3.1

(a)	Des	scribe the pu	rpose of fro	nt <b>and</b> end.						
								[2]		
(b)					e <b>and</b> deque			queue is used ne queue.		
	(i)		llowing diagi atements hav		the queue	shown in Fi	g. 3.1 after	the following		
		enqueue("orange") dequeue()								
		enqueue( dequeue( dequeue(								
		uequeue (	,							
		front = .								
		end =	•••••					[4]		
	(ii)	enqueue a	enqueue and dequeue are both functions.							
		State the di	ifference betv	ween a proce	edure and a fo	unction.				
								[1]		

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(iii)	Describe the steps involved in the enqueue algorithm.
	F.4

- 4 A program corrects the grammar in a line of text. The text is read in from a text file.
  - (a) The function, getText, needs to:
    - take the file name as a parameter
    - open the file
    - read the line of data in the text file into one string
    - return the string of data.

	[4]
Write the function getText.	

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- (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)

The following functions may be used in your answer:

asc(character)	returns	the	ASCII	value	for	а	single	character,	e.g.	asc("A")	would
return 65.											

upper(character) returns the single character in upper case, e.g. upper("a") would return "A".

Write the procedure fullStop.	[7]


## **END OF QUESTION PAPER**

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