



Computer Science (H046, H446)

Year 12 BASELINE

Mr Singh

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:

Additional resources may be supplied with this paper.

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- The total number of marks may take into account some 'either/or' question choices.

i. Convert the hexadecimal number 66 into a denary number. Show your working.

[2]

ii. State **two** reasons why a programmer would prefer to use hexadecimal numbers rather than binary numbers.

1 -----
2 -----

[2]

- i. Convert the hexadecimal value **B7E** to a binary number.

----- [1]

- ii. 110010101 is a binary number that is represented using sign and magnitude.

Convert this binary number to a denary number.

----- [1]

- iii. Complete this binary subtraction. Both numbers are 8-bit integer values represented using two's complement.

Show the result in the same format and show your working.

0110 1101 –
0011 0100

----- [3]

i. Convert the denary number 97 into an 8-bit binary number.

[1]

ii. Convert the denary number 171 into a hexadecimal number.

[1]

iii. Convert the denary number -97 into an 8-bit binary number using two's complement.

[1]

iv. Convert the denary number -17 into an 8-bit binary number using sign and magnitude.

[1]

4(a) Beryl has to write a program that explains patterns in crystals, using the following information.

All the patterns in crystals have two lengths, x and y, and an angle A.

- If A is 90° you need to check the lengths.
 - If the lengths are equal it is a square crystal.
 - If the lengths are **not** equal it is a rectangular crystal.
- If A is **not** 90° it may be a hexagonal crystal. These crystals have angles of 60° and 120° and the lengths are always equal.
- If A is **not** 60° or 90° or 120° it must be a parallelogram crystal if the lengths are not equal, or a rhombic crystal if the lengths are equal.



During alpha testing, both white box testing and black box testing are used.

- i. State what is meant by alpha testing.

[1]

ii. Describe how Beryl will use white box testing in her program.

[2]

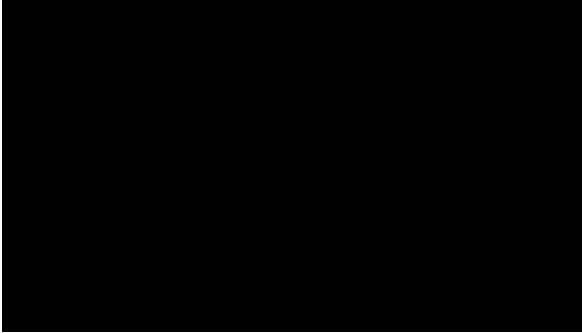
iii. Beryl prepares a set of test data for black box testing. Three test cases where the angle is exactly 90° are given in the table below.

Complete the table by stating the values of x and y to be tested, the reason for the test and the expected outcome. The first row has been completed as an example.

Test data	Reason for test	Expected outcome
A = 90 x = 100 y = 100	The angle is exactly 90 and the two sides are exactly equal	SQUARE
A = 90 x = ----- y = -----		
A = 90 x = ----- y = -----		

[6]

(b) Here are the first few lines of code Beryl produces.



An end-user will measure crystals and enter the measurements into the program. The code should allow for small errors in measurements.

i. Rewrite the IF statement in line 05 so that it allows for an error of up to 2° in the measurement of A.

----- [2]

ii. Rewrite the IF statement in line 06 so that the condition is true if the difference between x and y is less than 10% of the length of x.

----- [4]

5 Using the denary number 89 as an example, explain the relationship between binary and hexadecimal representations.

[3]

6 Programming languages consist of three basic programming constructs. For each construct, state its name and give a working example.

Construct 1: -----

Example: -----

Construct 2: -----

Example: -----

Construct 3: -----

Example: -----

[6]

7 A programmer has been given this pseudocode algorithm.

```
01 do
02 data = input("Enter the code")
03 until data.length > 20
04 first = data.substring(0,1)
05 second = data.substring(1,1)
06 first = int(first)
07 second = int(second)
08 if first > second then
09 print(str(first) + "wins")
10 elseif first == second then
11 print("It's a draw")
12 else
13 print(second + "wins")
14 endif
```

The pseudocode algorithm calls different subroutines.

Name the programming constructs that start on line 01 and line 08 in the pseudocode algorithm.

01

08

[2]

8 An insertion sort can be used to sort the array instead of a merge sort.

Explain why an insertion sort might use less memory than a merge sort.

.....

.....

.....

.....

[2]

A country's national rail operator provides an app for customers to purchase tickets. An array is used to store the names of the stations on the network. Customers must enter a departure station into the app.

The current contents of the array are shown:

Cavalry	Bridge	Walkway	Museum	Monument	Council House	Theatre	Cinema
---------	--------	---------	--------	----------	---------------	---------	--------

A linear search is used to check if the entered departure station exists in the array.

- i. Identify **one** precondition that is needed before a binary search could be used with the station array.

[1]

- ii. A user enters the departure station 'Bridge Heights'

Explain how a linear search would check if the departure station exists in the array.

[4]

i. Describe how a merge sort differs from a bubble sort.

[4]

ii. Name **two** sorting algorithms, other than a bubble sort and merge sort.

1

2

[2]

11(a) The following strings are stored in an array.

"rainbow"	"moon"	"sun"	"stars"	"clouds"	"tornado"
-----------	--------	-------	---------	----------	-----------

Explain how a linear search would search the array for the index that stores "clouds".

[3]

12 The contents of a stack are stored in the 1-dimensional array called `numbers`.

`topStack` stores the index of the next free space in the stack.

The array is declared with space for 100 elements.

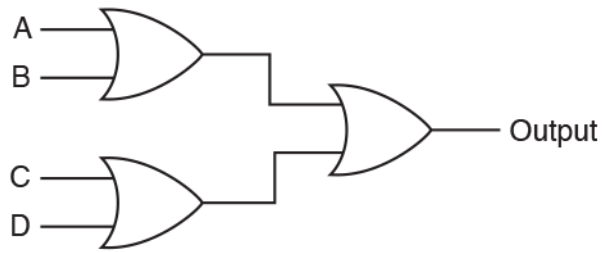
The function `push()` inserts its parameter called `dataValue` onto the stack and updates the appropriate pointers.

Complete the function `push()` using pseudocode or program code.

```
function push(... .....)
  if ..... != 100 then
    numbers [.....] = dataValue
    topStack = topStack + .....
    return true
  else
    return false
  endif
endfunction
```

[4]

13 A circuit contains the logic gates shown below.



i. Complete the logic table below.

A	B	C	D	Output
1	1	1	1	
1	1	1	0	
1	1	0	1	
1	1	0	0	
1	0	1	1	
1	0	1	0	
1	0	0	1	
1	0	0	0	
0	1	1	1	
0	1	1	0	
0	1	0	1	
0	1	0	0	
0	0	1	1	
0	0	1	0	
0	0	0	1	
0	0	0	0	

[4]

ii. Complete the Boolean expression below to represent the circuit.

----- \equiv Output

[2]

14 The Von Neumann architecture uses a Control Unit and an Arithmetic Logic Unit.

Tick the stage of the fetch decode execute cycle in which an accumulator would receive a value from the Arithmetic Logic Unit.

Stage	Tick one
Fetch	
Decode	
Execute	

[1]

15 A variable can be declared as global or local and is said to have scope.

i. Explain what is meant by the term 'variable'.

----- [2]

ii. Explain what is meant by 'scope' in relation to global and local variables.

----- [2]

16(a) Each record in CardFile contains data as in the table below.

For each item of data, state the most appropriate data type and the size in bytes.

Item	Data type	Size in bytes
The card's six digit identification number		
The amount of credit on the card		
Whether the owner of the card is entitled to free school meals		

[6]

(b) The school has 100 pupils.

Calculate an estimate of the size of the file in bytes.

You must show your working.

[3]

When a pupil tops up a card, the following algorithm is used to update the amount of credit on the card. The algorithm is written in pseudocode.

```
01 INPUT CardToTopUp, AmountToAdd
02 OPEN CardFile in READ MODE
03 OPEN NewFile in WRITE MODE
04 REPEAT
05     READ CardId, Amount, FreeMeals FROM Cardfile
06     IF CardID = CardToTopUp THEN
07         NewAmount = Amount + AmountToAdd
08         WRITE CardID, NewAmount, Freemeals TO NewFile
09     ELSE
10         WRITE CardID, Amount, FreeMeals TO NewFile
11     END IF
12 UNTIL CardFile at end of file
13 CLOSE CardFile
14 CLOSE NewFile
15 Replace CardFile with NewFile
```

(c) Explain the difference in the use of = in lines 06 and 07, identifying the type of operator being used in each case.

[4]

- (d) At the start of each day, a routine is executed which tops up the cards of all pupils who are entitled to free school meals with £3.50.

```
01  OPEN CardFile in READ MODE

02  OPEN NewFile in WRITE MODE

03  REPEAT

04      READ CardId, Amount, FreeMeals FROM Cardfile

05      IF ..... THEN

06          NewAmount = .....

07          WRITE CardID, NewAmount, Freemeals TO NewFile

08      ELSE

09          WRITE CardID, Amount, ..... TO NewFile

10      END IF

11  UNTIL CardFile at end of file

12  CLOSE CardFile

13  CLOSE NewFile

14  Replace CardFile with NewFile
```

Complete the algorithm for this routine by filling in the spaces.

[3]

[8]

END OF QUESTION PAPER

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
1	i	<ul style="list-style-type: none"> • 102 (correct answer) • Suitable working out 	AO2.2 (2)	<p><u>Examiner's Comments</u></p> <p>This question was generally answered well. Candidates tended to be awarded either full or no marks. If the working was correct for calculating the denary value, the response was usually correct as this only required simple addition.</p>	
	ii	<ul style="list-style-type: none"> • Hexadecimal values are shorter than binary as 4 bits/nibble can be represented by one hex character. • Hexadecimal values are faster / more reliable to communicate / enter / write down / read. 	AO2.2 (2)	<p>Do not accept Hexadecimal is "easy" communicate/enter etc...</p> <p><u>Examiner's Comments</u></p> <p>Many candidates achieved 1 mark for this question. Many candidates correctly stated that hexadecimal numbers are easier/faster to read/write, but were not given the second mark as they didn't state that hexadecimal numbers are shorter than binary numbers.</p>	
		Total	4		
2	i	<ul style="list-style-type: none"> • 1011 0111 1110 	1	CAO	
	ii	<ul style="list-style-type: none"> • -149 	1	CAO	

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
	iii	0011 1001 <ul style="list-style-type: none"> • One mark for correct left hand nibble (CAO) • One mark for correct right hand nibble (CAO) • One mark for working clearly shown 	3	Working could include showing “borrowing” values from other columns or making the second number negative and adding. Answer must be 8 bits to achieve full marks (stated in question). No marks if only working is denary <u>Examiner’s Comments</u> Most candidates were able to gain some marks, with many gaining full marks. A popular method was to do two’s complement addition. Candidates should be encouraged to show their working in binary and not do the subtraction in denary and then just give the answer in binary. The question asks them to complete a binary subtraction.	
		Total	5		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance
3	i	<ul style="list-style-type: none"> • 0110 0001 	1 (AO2.2) (1)	<p>Must get the whole answer right for the mark to be awarded.</p> <p><u>Examiner's Comments</u> To gain the mark, the candidate was required to use all 8 bits. Some used 7 bits and therefore did not achieve the mark. Candidates should be reminded to read through each question carefully.</p>
	ii	<ul style="list-style-type: none"> • AB 	1 (AO2.2) (1)	<p>Must get the whole answer right for the mark to be awarded.</p> <p><u>Examiner's Comments</u> This question was answered well with most errors relating to a miscalculation.</p>
	iii	<ul style="list-style-type: none"> • 1001 1111 	1 (AO2.2) (1)	<p>Must get the whole answer right for the mark to be awarded.</p> <p><u>Examiner's Comments</u> This was generally answered well although some candidates were confused between two's complement and sign and magnitude.</p>
	iv	<ul style="list-style-type: none"> • 1001 0001 	1 (AO2.2) (1)	<p>Must get the whole answer right for the mark to be awarded.</p> <p><u>Examiner's Comments</u> As with Question 4 (b) (iii), this was answered well although some candidates gave an answer using two's complement.</p>
		Total	4	

Mark Scheme

Question			Answer/Indicative content	Marks	Part marks and guidance	
4	a	i	<ul style="list-style-type: none"> Testing done by the programmer / Beryl / Developers employee(s) 	1	<p>Examiner's Comments</p> <p>On the whole this was answered well, and also in the context of the question.</p>	
		ii	<ul style="list-style-type: none"> Using the source code Check every possible path / condition statements Dry Runs / Trace Tables 	2	<p>Accept statements</p> <p>Examiner's Comments</p> <p>It was not clear from the answers given by some candidates whether they were describing black or white box testing. Few mentioned the use of Dry Runs or Trace Tables.</p>	
		iii	<p><i>Award marks in groups of three, for:</i></p> <ul style="list-style-type: none"> Outcome: Rectangle Reason :Angle 90 and difference between x and y \geq 10% of x Test data matches the expected outcome Outcome: Square Reason: Angle 90 and difference between x and y $<$10% of x Test data matches expected outcome 	6	<p>Note: If expected outcome is wrong then do not award marks for other columns</p> <p>Examiner's Comments</p> <p>This question was on the whole answered poorly. Few candidates took into account the tolerance of $<$ 10% when deciding the outcome, with a few candidates just repeating the example given.</p>	
	b	i	<p><i>Example: IF (A\geq88) AND (A\leq92) THEN</i></p> <p><i>Award marks for a range that</i></p> <ul style="list-style-type: none"> includes 90 has the correct limits 	2	<p>Accept >87 as equivalent to ≥ 88 etc... (i.e. candidates may assume that A is an integer)</p> <p>Examiner's Comments</p> <p>On the whole this was poorly answered with candidates not using the correct programming construct. The typical answer given was IF $88 \geq A \leq 92$.</p>	

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
	ii	<p><i>Example: IF $(x - y) < 0.1x$ OR $((y - x) < 0.1x)$ THEN</i></p> <p><i>Award marks for answers that</i></p> <ul style="list-style-type: none"> • find the difference between x and y • find the difference between y and x • work out 10% of x • comparison between difference 	4	<p>Accept multi-staged answers, and use of an ABS function or $x-y$</p> <p>Do not except DIV</p> <p>Examiner's Comments</p> <p>Most candidates only provided an answer for one boundary, usually $(x-y)$, and did not attempt $(y-x)$.</p>	
		Total	15		
5		<p>–Split the binary number in groups of 4</p> <p>–Change each into a single value/(Hexadecimal) digit</p> <p>–Digits which are between 10 and 15 are given letters A to F</p> <p>–In this example: 0101 = 5 and 1001 = 9/Therefore 89 = 59(hex)</p> <p style="text-align: right;">(1 per –, max 3)</p>	3	<p>Examiner's Comments</p> <p>Candidates who answered this question by demonstration, scored well. Those who tried to describe the process using prose invariably lacked clarity and therefore did not achieve full credit.</p>	
		Total	3		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
6		<ul style="list-style-type: none"> • Selection / Branching (1) (AO1.1) • Working selection example (1) (AO1.2) e.g. <pre>if a>b then c=b+42 endif</pre> • Iteration (1) (AO1.1) • Working iteration example (1) (AO1.2) e.g. <pre>for count=1 to 10 print(count) next count</pre> • Sequence (1) (AO1.1) • Working Sequence example (1) (AO1.2) 	6	<p>Max 6 marks</p> <p>Do not penalise pseudocode if it does not conform to the specification pseudocode guidelines.</p> <p>Examiner's Comments</p> <p>The programming constructs of sequence, iteration and branching are specifically identified within the specification. Many candidates were unaware of these named constructs. Of those who were, many then failed to give a working example as required by the question, but went on to describe rather than exemplify. Responses such as looping were too vague as candidates are expected to know the correct technical vocabulary at AS Level.</p>	
		Total	6		
7		<p>1 mark each to max 2:</p> <ul style="list-style-type: none"> • 01 – Iteration // Looping • 08 - Branching // Selection 	2	<p>Do not accept if statement, for loop etc. Type of construct not example of construct required.</p> <p>Examiner's Comments</p> <p>Most candidates correctly identified iteration and selection, but some gave these structures in reverse order.</p>	
		Total	2		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
8		<p>1 mark per bullet</p> <ul style="list-style-type: none"> • Merge sort might create a new array each time it splits and merges / often implemented recursively which places additional data on the stack • Insertion sort does not use any additional arrays//Insertion sort is an in-place algorithm. 	<p>2</p> <p>AO1.2 (2)</p>	<p><u>Examiner's Comments</u></p> <p>Many candidates recognised that merge sort could generate an additional array each time a list was split. Fewer could explain that insertion sort worked in-situ and has a space complexity $O(1)$.</p>	
		Total	2		
9	i	The data needs to be sorted / in alphabetical order	<p>1</p> <p>AO2.1 (1)</p>	<p><u>Examiner's Comments</u></p> <p>Most candidates knew that the list had to be sorted before a binary search could be performed.</p>	
	ii	<p>1 mark per bullet to max 4</p> <ul style="list-style-type: none"> • Start at the first item (Cavalry) • Compare with departure station 'Bridge Heights' • If matched, report found • Otherwise continue to the next item in list (Bridge) • Continue until item found, or end of list reached... • and then False returned 	<p>4</p> <p>AO2.1 (2)</p> <p>AO2.2 (2)</p>	<p><u>Examiner's Comments</u></p> <p>The majority of candidates described a linear search, but some described a binary search by mistake. Where candidates did describe a linear search, they generally did so with sufficient precision.</p>	
		Total	5		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
10	i	1 mark per bullet to max 4 <ul style="list-style-type: none"> • Merge sort splits the data • Merge sorts the split data as it is put back together • Bubble moves through the data in a linear way • Bubble moves through the data repeatedly • Merge is more efficient with larger volumes of data to sort • Merge may require more memory space 	4	Allow points by demonstration/example	
	ii	1 mark per example e.g. <ul style="list-style-type: none"> • Insertion • Quick 	2		
		Total	6		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
11	a	<p>1 mark each</p> <ul style="list-style-type: none"> • Compare the first element (rainbow) to search item / clouds • If it is equal to the search item return index / found • If it is not equal move to the next element • Repeat until either search item / clouds is equal // or the end of the list has been reached 	3	<p>Allow answers by example from the given dataset</p> <p><u>Examiner's Comments</u></p> <p>Most candidates scored the majority of the marks available and demonstrated a clear understanding of a linear search. Many candidates answered by example with values from the given list.</p>	
	b	<p>1 mark for: the data is not in order/sorted</p>	1	<p><u>Examiner's Comments</u></p> <p>Most candidates correctly identified the requirement for data to be sorted/ordered for a binary search to work. 'Organised' was too vague and was not accepted.</p>	

Mark Scheme

Question	Answer/Indicative content	Marks	Part marks and guidance																																																	
c	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">t o r n a d o</td> <td style="text-align: center;">Marking Guidance</td> <td style="text-align: center;">Marking Guidance</td> </tr> <tr> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">t o r n a d o</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">t o r n a d o</td> <td style="text-align: center;">Value s change</td> <td style="text-align: center;">1 Mark</td> </tr> <tr> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">t o r n a d o</td> <td></td> <td style="text-align: center;">1 Mark</td> </tr> <tr> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">t o r n a d o</td> <td style="text-align: center;">Value s change</td> <td style="text-align: center;">1 Mark</td> </tr> <tr> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">t o r n a d o</td> <td style="text-align: center;">Value s change</td> <td style="text-align: center;">1 Mark</td> </tr> <tr> <td style="text-align: center;">c l o u d s</td> <td style="text-align: center;">r a i n b o w</td> <td style="text-align: center;">s t a r</td> <td style="text-align: center;">s u n</td> <td style="text-align: center;">t o r n a d o</td> <td></td> <td style="text-align: center;">1 Mark</td> </tr> </table>	r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o	Marking Guidance	Marking Guidance	r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o			r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o	Value s change	1 Mark	r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o		1 Mark	r a i n b o w	s t a r	s u n	c l o u d s	t o r n a d o	Value s change	1 Mark	c l o u d s	r a i n b o w	s t a r	s u n	t o r n a d o	Value s change	1 Mark	c l o u d s	r a i n b o w	s t a r	s u n	t o r n a d o		1 Mark	5	<p>If candidate has given <u>descending</u> order, max 4.</p> <p>MP1, MP3 and MP4 are lines that show a change of values during a pass.</p> <p>MP2 and MP5 do not have to be explicitly given in full if there is a comment to identify no change occur during the pass.</p> <p>Award no marks if not an insertion sort.</p> <p>Examiner's Comments</p> <p>Nearly half the candidates achieved full marks and clearly demonstrated the steps involved in an insertion sort for the given data. Some candidates confused insertion sort with either bubble, merge or selection sort, and so scored no marks for not answering the question.</p> <p>Exemplar 3</p> <p>(a) Show how an insertion sort will sort the given data into ascending alphabetical order.</p> <p>rainbow moon sun stars clouds tornado</p> <p>rainbow moon sun stars clouds tornado</p> <p>moon rainbow sun stars clouds tornado</p> <p>moon rainbow stars clouds tornado</p> <p>moon rainbow stars clouds tornado</p> <p>clouds moon rainbow stars sun tornado</p> <p>clouds moon rainbow stars sun tornado</p> <p><small>* A sorted list is made with an element in the list. The element is inserted into the list (using) and sorted with the new list (step) in ascending order.</small></p> <p>This exemplar demonstrated the state of the dataset after each pass of the insertion sort. The candidate has separated the sorted and unsorted parts of the list to make the response much clearer.</p>
r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o	Marking Guidance	Marking Guidance																																														
r a i n b o w	s u n	s t a r	c l o u d s	t o r n a d o																																																
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c l o u d s	r a i n b o w	s t a r	s u n	t o r n a d o		1 Mark																																														
	Total	9																																																		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
12		<p>1 mark for each completed statement</p> <pre>function push (dataValue) if topStack != 100 then numbers[topStack] = dataValue topStack = topStack + 1 return true else return false endif end function</pre>	4	<p><u>Examiner's Comments</u></p> <p>The majority of candidates scored three or more marks. Some candidates erroneously used <code>numbers.length</code> or <code>len(numbers)</code> in the second space instead of <code>topStack</code>.</p>	
		Total	4		

Mark Scheme

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13	i <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>Output</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>	A	B	C	D	Output	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	0	1	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	0	1	0	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	4 AO2.2	<p><u>Examiner's Comments</u></p> <p>This question was well received by candidates with most achieving full marks.</p>	
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	ii <p>$(A \vee B) \vee (C \vee D) \equiv \text{Output}$</p> <p>$A \vee B$ (1 Mark)</p> <p>$\vee (C \vee D)$ (1 Mark)</p>	2 AO2.2	<p>Accept answer without brackets.</p> <p>Accept alternative notation i.e. OR , +</p> <p><u>Examiner's Comments</u></p> <p>Boolean expressions were in the main correct. All standard notations was credited provided it was used consistently.</p>																																																																																						
	Total	6																																																																																							
14	<table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 60px;"></th> <th>Tick (✓)</th> </tr> </thead> <tbody> <tr><td style="text-align: left;">Stag e</td><td></td></tr> <tr><td style="text-align: left;">Fetc h</td><td></td></tr> <tr><td style="text-align: left;">Dec ode</td><td></td></tr> <tr><td style="text-align: left;">Exe cute</td><td>✓</td></tr> </tbody> </table>		Tick (✓)	Stag e		Fetc h		Dec ode		Exe cute	✓	1 AO2.1 (1)	<p><u>Examiner's Comments</u></p> <p>Most candidates correctly selected 'execute' on this question.</p>																																																																												
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Mark Scheme

Question			Answer/Indicative content	Marks	Part marks and guidance	
15		i	<ul style="list-style-type: none"> Identifier/name of a ... Memory location used to store data 	2	<u>Examiner's Comments</u> Generally well answered.	
		ii	<ul style="list-style-type: none"> A range of statements/procedure/function/method that a variable is valid for A local variable takes precedence over a global variable of the same name/allow the same identifier to be used for different purposes without conflict 	2	Accept block of code <u>Examiner's Comments</u> Most gained a mark, although many vague references to code were given which were rescued by definitions of global and local variables.	
			Total	4		

Mark Scheme

Question		Answer/Indicative content	Marks	Part marks and guidance	
16	a	<p>Card identification number:</p> <ul style="list-style-type: none"> • Data type: String / text / alphanumeric • Size: 6 <p>Amount of credit:</p> <ul style="list-style-type: none"> • Data type: Real / decimal / float / double • Size: 4 / 8 <p>Free meals:</p> <ul style="list-style-type: none"> • Data type: Boolean • Size: 1 	6	<p>Currency size 4/8 bytes</p> <p>Examiner's Comments</p> <p>Mostly well answered, though a large minority of candidates do not know how many bytes each data type uses.</p>	
	b	<ul style="list-style-type: none"> • Adds up sizes eg $6 + 4 + 1 = 11$ • Multiplies by 100 eg $11 * 100 = 1100$ • Adds 10% for overhead eg $1100 * 1.1 = 1210$ bytes 	3	<p>Allow follow through from b and between steps</p> <p>If 8 bytes used for Amount the corresponding answers are 15, 1500, 1650</p> <p>Examiner's Comments</p> <p>Most candidates gained all 3 marks here though some lost the "overhead" mark.</p>	
	c	<ul style="list-style-type: none"> • In line 06 = is a relational / comparison operator • To check whether two items are the same • In line 07 = is an assignment operator • To change the value of a variable / NewAmount 	4	<p>Do not accept conditional operator for line 06</p> <p>Examiner's Comments</p> <p>The comparison operator was generally well known as was the assignment operator but often candidates missed out the term "assignment".</p>	

Mark Scheme

Question	Answer/Indicative content	Marks	Part marks and guidance
d	<p><i>In order:</i></p> <ul style="list-style-type: none"> • FreeMeals (= TRUE) • Amount + 3.50 • FreeMeals 	3	<p>Accept a reasonable test for free meals. For this question case is irrelevant for variable names Allow correct cast i.e float(3.50, real(3.50) Do not accept £3.50</p> <p>Examiner's Comments</p> <p>Most candidates gained the 3 marks. The most common error was to put the £ sign before the 3.50 (i.e. £3.50)</p>

Mark Scheme

Question	Answer/Indicative content	Marks	Part marks and guidance	
e	<p>Example:</p> <pre>// Input data and open files INPUT NewID, NewAmt, NewFree OPEN CardFile in READ MODE OPEN NewFile in WRITE MODE Inserted = FALSE //loop through file REPEAT READ Id, Amt, Free from CardFile //find insertion point IF Id > NewId AND Inserted = FALSE THEN WRITE NewID, NewAmt, NewFree to NewFile Inserted = TRUE END IF WRITE Id, Amt, Free to NewFile UNTIL CardFileAtEndOfFile //if not yet inserted, append IF Inserted = FALSE THEN WRITE NewID, NewAmt, NewFree to NewFile END IF //close files and replace CLOSE CardFile CLOSE NewFile Replace CardFile with NewFile</pre>	8	<p>Content</p> <p>Examiner's Comments</p> <p>Candidates who believed a sequential file was one where records are added to the end inevitably failed to score more than 2 marks in this question. It was generally not well answered; candidates who did try to find an insertion point often did it poorly. This is one of the standard algorithms that candidates should ensure they are familiar with.</p>	<p style="text-align: center;">Levels of response</p> <p>High level response (6-8 marks) Candidate offers a complete, working algorithm which both shows clearly how insertion point is determined and how the new file is produced. The algorithm is in correctly structured pseudocode with indentation, suitable identifiers or comments as appropriate. Technical terms and spelling will be used appropriately and correctly.</p> <p>Medium level response (3-5 marks) Candidate has an algorithm which is not fully explained or contains some errors for example in determining the insertion point. There is an attempt to structure the code correctly but may contain some errors, however the overall structure of the code can still be understood. Technical terms and spelling are mostly correct.</p> <p>Low level response (0-2 marks) Candidate's algorithm neither shows fully how the insertion point is determined nor explains how a record is inserted. The code is poorly structured or not structured at all, and errors with spelling and technical terms make the algorithm difficult to understand.</p>
	Total	24		