MODULE L STANDARD ALGORITHMS · L5

Insertion sort

Original practice questions · 20 marks · ~25 minutes · OCR J277 spec 2.1.3

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **20 marks**. Code is written in OCR Exam Reference Language. Arrays start at index 0.

1

Total: 4 marks

(a) While an insertion sort is running, the list is made up of two parts. State what the two parts are. **[1]**

(b) Describe the main steps of an insertion sort that puts a list into ascending order. **[3]**

2

Total: 4 marks

A delivery depot weighs five parcels. The weights, in kg, are stored in a list in the order they arrive.

(a) Complete the table to show the list after each item is inserted when an insertion sort puts the weights into ascending order. The starting list has been done for you. **[4]**

	List				
Start	31	18	42	7	25
After insertion 1					
After insertion 2					
After insertion 3					
After insertion 4					

3 **Total: 4 marks**

A garden centre's stock program uses an insertion sort to put plant names into alphabetical order. Part of the way through the sort, the list is:

```
Aster   Fern   Mint   Iris   Basil   Tulip
```

The first three items (Aster, Fern, Mint) are in the sorted part.

(a) State the next item that will be inserted into the sorted part. **[1]**

(b) Describe how the item you gave in part (a) is moved into its correct position. **[2]**

(c) The sort continues. Write the list after **Basil** has been inserted into the sorted part. **[1]**

4 **Total: 8 marks**

A sports centre records the times, in seconds, that four members take to swim one length. The algorithm below puts the times into ascending order.

```
01 times = [48, 35, 52, 29]
02 for i = 1 to times.length - 1
03     current = times[i]
04     j = i - 1
05     while j >= 0 AND times[j] > current
06         times[j + 1] = times[j]
07         j = j - 1
08     endwhile
09     times[j + 1] = current
10 next i
```

(a) Identify the sorting algorithm used in this code. **[1]**

(b) Identify the line number where `current` is placed into its correct position in the sorted part. **[1]**

(c) Describe what lines 05 to 08 do. **[2]**

(d) Complete the trace table to show the values of `i`, `current` and `j` as the algorithm runs. Start a new row each time a value changes. You may not need to use all the rows. **[4]**

i	current	j

Total for this worksheet: 20 marks