MODULE L STANDARD ALGORITHMS · L3

Bubble sort

Original practice questions · 20 marks · ~25 minutes · Cambridge 0478 syllabus 7.4, 7.7, 7.8, 7.9

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**. All algorithms are written in pseudocode. Write any code you give in pseudocode.

1

Total: 4 marks

(a) Describe how a bubble sort puts the values stored in an array into ascending order. **[4]**

2

Total: 4 marks

A ferry company records the number of cars carried on six crossings:

`34 21 40 15 28 19`

The values are sorted into ascending order using a bubble sort.

(a) Complete the table to show the order of the values after each of the first three passes. **[3]**

	Values					
Start	34	21	40	15	28	19
After pass 1						
After pass 2						
After pass 3						

(b) State the number of swaps made during pass 1. **[1]**

3 **Total: 6 marks**

A plant nursery stores the number of seedlings in each of four trays in the array `Stock[1:4]`. The array already contains these values:

`Stock[1]` = 4 `Stock[2]` = 9 `Stock[3]` = 2 `Stock[4]` = 7

This algorithm sorts the array.

```
01 DECLARE Index : INTEGER
02 DECLARE Temp : INTEGER
03 DECLARE Swapped : BOOLEAN
04 REPEAT
05     Swapped ← FALSE
06     FOR Index ← 1 TO 3
07         IF Stock[Index] > Stock[Index + 1]
08           THEN
09             Temp ← Stock[Index]
10             Stock[Index] ← Stock[Index + 1]
11             Stock[Index + 1] ← Temp
12             Swapped ← TRUE
13         ENDIF
14     NEXT Index
15 UNTIL NOT Swapped
```

(a) Complete the trace table for the algorithm. The first row has been done for you. **[5]**

Swapped	Index	Temp	Stock[1]	Stock[2]	Stock[3]	Stock[4]
			4	9	2	7

(b) The nursery wants the trays sorted into **descending** order. Write the new line 07 needed. **[1]**

07

4 **Total: 3 marks**

A climbing centre stores the lengths, in metres, of five ropes in the array `Lengths[1:5]`. This algorithm should sort the lengths into ascending order, but it contains **three** errors.

```
01 DECLARE Pass : INTEGER
02 DECLARE Position : INTEGER
03 DECLARE Hold : REAL
04 FOR Pass ← 1 TO 4
05     FOR Position ← 1 TO 5
06         IF Lengths[Position] < Lengths[Position + 1]
07           THEN
08             Hold ← Lengths[Position]
09             Lengths[Position] ← Hold
10             Lengths[Position + 1] ← Hold
11         ENDIF
12     NEXT Position
13 NEXT Pass
```

(a) Identify the line numbers of the **three** errors and suggest a correction for each error. **[3]**

Error 1: line ..... Correction

Error 2: line ..... Correction

Error 3: line ..... Correction

5 **Total: 3 marks**

The plant nursery in **Question 3** also stores the name of the plant in each tray in a second array, `Plant[1:4]`. `Plant[1]` is the plant in the tray counted in `Stock[1]`, and so on. When the algorithm in Question 3 sorts `Stock`, each plant name must stay matched to its number of seedlings.

(a) Write the pseudocode statements that must be added to the algorithm in Question 3 so that the names stay matched. State where in the algorithm your statements go. You do not need to declare any variables. **[3]**

Total for this worksheet: 20 marks