MODULE M PROGRAMMING · M12

Post-condition loops, and choosing the right loop

Original practice questions · 22 marks · ~25 minutes · Cambridge 0478 syllabus 8.1.4(c), 7.7, 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 **22 marks**. Write all algorithms in pseudocode. All data on this sheet is made up.

1

Total: 3 marks

(a) Complete the table by writing the type of loop that matches each description: **count-controlled**, **pre-condition** or **post-condition**. **[3]**

Description	Type of loop
The statements in the loop are always executed at least once, and the condition is tested after them.	
The statements in the loop are executed a set number of times.	
The condition is tested before the statements, so the statements may not be executed at all.	

2 **Total: 6 marks**

A packing robot places items in a crate. The crate is full when the total weight of its items is more than 50 kg. This algorithm counts the items placed in one crate.

```
01 Total ← 0
02 Count ← 0
03 REPEAT
04     INPUT Weight
05     Total ← Total + Weight
06     Count ← Count + 1
07 UNTIL Total > 50
08 OUTPUT "Items in crate: ", Count
```

(a) Complete the trace table for the algorithm using the input data: 12, 18, 9, 15, 20 **[4]**

The first row has been done for you. You may not need to use all the rows.

Weight	Total	Count	OUTPUT
	0	0	

(b) The algorithm is run again with the input data: 60, 5

(i) State the output. **[1]**

(ii) Explain why only one value is input this time. **[1]**

3 **Total: 5 marks**

(a) Complete the table by writing the most suitable type of loop for each task: **count-controlled**, **pre-condition** or **post-condition**. **[3]**

Task	Most suitable type of loop
A test program for a set of traffic lights runs the red, amber, green sequence exactly 20 times.	
A staff entrance asks for a staff code. It must always ask at least once, and keeps asking until a valid code is entered.	
A car park barrier stays raised for as long as a sensor detects a car underneath it. Usually no car is underneath when the sensor is first checked.	

(b) Explain why a post-condition loop is suitable for the staff entrance task. **[2]**

4 **Total: 3 marks**

A lift display shows the floors a lift passes on its way down.

```
01 Floor ← 10
02 WHILE Floor > 0 DO
03     OUTPUT "Floor ", Floor
04     Floor ← Floor - 3
05 ENDWHILE
```

(a) Rewrite this algorithm in pseudocode using a `REPEAT ... UNTIL` loop. Your algorithm must give exactly the same output. **[3]**

5 **Total: 5 marks**

A garden centre takes online orders for plant pots. The number of pots in one order must be from 1 to 40 inclusive.

(a) Write an algorithm using pseudocode and a **post-condition** loop to: **[5]**

- ask the user to enter the number of pots, and input it
- output an error message each time the number is not from 1 to 40 inclusive
- keep asking until a number from 1 to 40 inclusive is entered
- then output a message that includes the number of pots ordered.

You may assume the user always enters a whole number. You do not need to declare any variables.

Total for this worksheet: 22 marks