MODULE M PROGRAMMING · M14

Nested selection and nested loops

Original practice questions · 22 marks · ~25 minutes · OCR J277 spec 2.1.2, 2.2.1

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**. Code is written in OCR Exam Reference Language. All data on this sheet is made up.

1

Total: 3 marks

Look at these three pieces of code.

Code A

```
if temperature > 30 then
    if humidity > 80 then
        print("Alert")
    endif
endif
```

Code B

```
for day = 1 to 7
    for hour = 0 to 23
        print(day * hour)
    next hour
next day
```

Code C

```
for i = 1 to 3
    print(i)
next i
for j = 1 to 2
    print(j)
next j
```

(a) Tick (✓) **one** box in each row to show what each piece of code contains. **[3]**

Code	Nested selection	Nested iteration	No nesting
Code A			
Code B			
Code C			

2

Total: 4 marks

Look at this algorithm.

```
01 total = 0
02 for row = 1 to 2
03     for seat = 1 to 3
04         if seat != 2 then
05             total = total + row * seat
06         endif
07     next seat
08 next row
09 print(total)
```

(a) Complete the trace table for this algorithm. You may not need to use all the rows. **[4]**

row	seat	total	Output

3 **Total: 4 marks**

A parcel collection point uses this program to tell staff where to put each parcel.

```
01 weight = real(input("Enter weight in kg"))
02 size = input("Enter size S, M or L")
03 if weight <= 20 then
04     if size == "L" then
05         print("Use a large locker")
06     else
07         print("Use a standard locker")
08     endif
09 else
10     print("Take to counter")
11 endif
```

(a) Complete the table to show the output for each set of inputs. **[3]**

weight	size	Output
12	"M"	
25	"L"	
20	"L"	

(b) State why line 04 is **not** run when the weight entered is 25. **[1]**

4 **Total: 5 marks**

A warehouse has 4 aisles, numbered 0 to 3. Each aisle has 6 shelves, numbered 0 to 5. The 2D array `stock` holds the number of boxes on each shelf, so `stock[aisle, shelf]` is the number of boxes on one shelf.

This program should output, for every aisle, how many of its shelves are empty (hold 0 boxes). The program contains **two** errors.

```
01 for aisle = 0 to 3
02     empty = 0
03     for shelf = 0 to 6
04         if stock[aisle, shelf] == 0 then
05             empty = empty + 1
06         endif
07     next shelf
08     print("Aisle " + str(aisle) + ": " + str(empty) + " empty")
09 next shelf
```

(a) Identify the line number of each error and write the corrected line of code. **[4]**

Error 1 Line number ..... Corrected line

Error 2 Line number ..... Corrected line

(b) The errors have been corrected. State how many times line 04 is run when the program is run once. **[1]**

5 **Total: 6 marks**

A car park has 3 levels, numbered 1 to 3. Each level has 20 parking spaces, numbered 1 to 20. On every level, spaces 1 to 4 are badge spaces for disabled drivers.

(a) Write a program that: **[6]**

- uses nested loops to go through every space on every level
- outputs a code for each space, made of the level number, a dash and the space number, for example `2-15`
- adds `(badge)` after the code when the space number is from 1 to 4, for example `2-3 (badge)`
- counts the badge spaces and outputs this total after all the codes.

You must use either:

- OCR Exam Reference Language, or
- a high-level programming language that you have studied.

Total for this worksheet: 22 marks