MODULE L STANDARD ALGORITHMS · L7

Totalling, counting, maximum, minimum and average

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 2.1.2, 2.2.1, 2.2.3

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 **21 marks**. All code on this sheet is written in OCR Exam Reference Language. Arrays are indexed from 0.

1

Total: 3 marks

A café stores the number of cakes it sold each month in the array `sales`. The array holds **12** values. This algorithm should calculate the mean number of cakes sold per month.

```
01 total = ..........
02 for i = 0 to sales.length - 1
03     total = total .......... sales[i]
04 next i
05 average = total / ..........
06 print(average)
```

(a) Complete the algorithm by filling in the **three** gaps. Write your answers below. **[3]**

Line 01 .....

Line 03 .....

Line 05 .....

2

Total: 6 marks

A weather station stores the rainfall, in mm, for five days in the array `rain`. This program finds the wettest day's rainfall and counts the dry days (days with 0 mm).

```
01 wettest = rain[0]
02 dryDays = 0
03 for day = 1 to 4
04     if rain[day] > wettest then
05         wettest = rain[day]
06     endif
07     if rain[day] == 0 then
08         dryDays = dryDays + 1
09     endif
10 next day
11 print(wettest)
12 print(dryDays)
```

(a) Complete the trace table when `rain = [4, 12, 0, 15, 9]` **[4]**

You may not need to use all the rows.

day	wettest	dryDays	Output

(b) In a different week, `rain = [0, 3, 0, 7, 2]`. There were two dry days, but the program outputs `1` for `dryDays`. **[2]**

Explain why the program gives the wrong number of dry days, and refine line 03 so that it counts correctly.

Refined line 03 .....

3 **Total: 4 marks**

A plant nursery measures 30 seedlings. Their heights, in cm, are stored in the array `heights` (indexes 0 to 29).

(a) Write an algorithm that finds and outputs the **smallest** height in the array. **[4]**
Do **not** use a built-in function such as `min()`.
You must use either: OCR Exam Reference Language, or a high-level programming language that you have studied.

4 **Total: 2 marks**

A freezer records 24 temperatures, in °C, in the array `temps`. Every temperature is below 0 °C, for example `-18`, `-21` and `-16`. A programmer starts the search for the highest temperature like this:

```
01 highest = 0
02 for t = 0 to 23
03     if temps[t] > highest then
04         highest = temps[t]
05     endif
06 next t
07 print(highest)
```

(a) Explain why this program will **not** output the highest temperature in the array. **[1]**

(b) Refine line 01 so that the program works for any set of temperatures. **[1]**

Line 01 .....

5 **Total: 6 marks**

A bicycle repair workshop wants a program to summarise each day's work.

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

- asks the user how many repairs were completed today
- asks the user to enter the time, in minutes, of each repair
- outputs the total time of all the repairs
- outputs how many repairs took **more than** 45 minutes
- outputs the mean (average) time of a repair.

You must use either: OCR Exam Reference Language, or a high-level programming language that you have studied.

Total for this worksheet: 21 marks