MODULE K ALGORITHM DESIGN · K10

Explaining what an algorithm does

Original practice questions · 21 marks · ~25 minutes · OCR J277 spec 2.1.2, 2.1.3, 2.3.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. All code is written in OCR Exam Reference Language. The total for this worksheet is **21 marks**.

1

Total: 4 marks

A shop's program uses the four code fragments **A** to **D** below. Here are five descriptions:

1. Keeps the largest value seen so far
2. Adds one each time a value meets a condition
3. Keeps asking for a value until it is in an allowed range
4. Adds each value to a running total
5. Keeps the smallest value seen so far

(a) Write the number of the description (1 to 5) that matches each code fragment. Each description may be used once or not at all. **[4]**

Fragment	Code	Description number
A	`total = total + cost`	

B	`if cost > top then`
	`  top = cost`
	`endif`	

C	`while hours < 0 OR hours > 24`
	`  hours = int(input("Re-enter hours"))`
	`endwhile`	

D	`if cost < 5 then`
	`  cheap = cheap + 1`
	`endif`	

2 **Total: 5 marks**

A weather station records overnight temperatures in °C. A worker enters four temperatures into this algorithm.

```
01 z = int(input("Enter temperature"))
02 for y = 1 to 3
03     x = int(input("Enter temperature"))
04     if x < z then
05         z = x
06     endif
07 next y
08 print(z)
```

(a) Complete the trace table when the worker enters **3**, then **-1**, then **5**, then **-4**. You may not need to use all the rows. **[4]**

Line	x	y	z	Output

(b) State the purpose of the algorithm. **[1]**

3 **Total: 4 marks**

A delivery depot weighs parcels before they are loaded onto a van. This algorithm is used for each van.

```
01 heavy = 0
02 for parcel = 1 to 20
03     do
04         weight = float(input("Enter weight in kg"))
05     until weight > 0 AND weight <= 30
06     if weight > 25 then
07         heavy = heavy + 1
08     endif
09 next parcel
10 print("Heavy parcels: " + str(heavy))
```

(a) Describe what the algorithm does. Refer to the variables and values in the algorithm in your answer. **[4]**

4 **Total: 3 marks**

A café stores its menu prices in the array `prices`. This algorithm is run on the array.

```
01 do
02     swapped = false
03     for i = 0 to prices.length - 2
04         if prices[i] > prices[i + 1] then
05             temp = prices[i]
06             prices[i] = prices[i + 1]
07             prices[i + 1] = temp
08             swapped = true
09         endif
10     next i
11 until swapped == false
```

(a) Identify the standard algorithm shown. **[1]**

(b) State the purpose of the variable `swapped` in this algorithm. **[1]**

(c) State the order the prices are in after the algorithm has finished. **[1]**

5 **Total: 5 marks**

A river sensor stores water levels, in cm, in an array. When the sensor fails to take a reading, the value **-1** is stored instead.

```
01 function check(r)
02     t = 0
03     n = 0
04     for i = 0 to r.length - 1
05         if r[i] != -1 then
06             t = t + r[i]
07             n = n + 1
08         endif
09     next i
10     if n == 0 then
11         return 0
12     else
13         return t / n
14     endif
15 endfunction
```

(a) The array `levels` contains `[12, -1, 15, 9]`. State the value returned by `check(levels)`. **[1]**

(b) Explain the purpose of the function `check`. Refer to the variables in the function in your answer. **[3]**

(c) The name `check` does not describe what the function does. Suggest a more meaningful name for the function. **[1]**

Total for this worksheet: 21 marks