MODULE K ALGORITHM DESIGN · K7

Turning a problem into an algorithm

Original practice questions · 22 marks · ~25 minutes · Cambridge 0478 syllabus 7.2, 7.9, 8.1

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**.

1

Total: 7 marks

A coworking office charges its members for printing. The first 30 pages a member prints each day are free. Every page after the first 30 costs 15 cents. An algorithm is needed that takes the number of pages a member has printed today and works out the charge in cents.
For example, a member who prints 45 pages is charged 225 cents.

(a) Complete the table to identify **one** input, **one** process, **one** output and **one** item of data that must be stored for this algorithm. **[4]**

	Description
Input	
Process	
Output	
Storage	

(b) The problem is decomposed into steps. Tick (✓) **one** box in each row to show whether each step uses sequence, selection or iteration. **[3]**

Step	Sequence	Selection	Iteration
Multiply the number of extra pages by 15			
Charge nothing if 30 pages or fewer were printed			
Keep asking for the number of pages until a number from 1 to 500 is entered			

2 **Total: 5 marks**

Draw a flowchart for an algorithm to:

- input the number of pages printed
- calculate the charge in cents, using the rules in Question 1
- output the charge.

You must use the standard flowchart symbols. **[5]**

3 **Total: 3 marks**

The algorithm is amended so that the number of pages input must be from 1 to 500 inclusive.

(a) Write an algorithm using pseudocode to input the number of pages and to keep asking for the number of pages to be input again until a number from 1 to 500 is entered. **[3]**

4 **Total: 7 marks**

A ferry makes 8 crossings each day. At the end of each crossing, a member of the crew inputs the number of passengers who were on board. An algorithm is needed to:

- input the number of passengers for each of the 8 crossings
- total the number of passengers for the day
- count how many crossings had **more than** 150 passengers
- output the total and the count after all 8 crossings have been input.

(a) The algorithm needs two variables. Complete the table to give a suitable identifier and the initial value for each variable. **[2]**

What the variable stores	Identifier	Initial value
The total number of passengers for the day		
The number of crossings with more than 150 passengers		

(b) Write the algorithm described above using pseudocode. You do not need to declare your variables. All outputs must have suitable messages. **[5]**

Total for this worksheet: 22 marks