MODULE K ALGORITHM DESIGN · K7

Turning a problem into an algorithm

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

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**.

1

Total: 6 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 15p. A program is needed that takes the number of pages a member has printed today and works out the charge in pence.
For example, a member who prints 45 pages is charged 225 pence.

(a) Complete the table to identify **one** input, **one** process and **one** output for this program. **[3]**

	Description
Input	
Process	
Output	

(b) The problem is broken down into steps. Tick (✓) **one** box in each row to show whether each step needs 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**

Write an algorithm for the printing charge in Question 1. The algorithm must:

- take as input the number of pages printed
- work out the charge in pence, using the rules in Question 1
- output the charge.

You may use pseudocode, a flowchart, OCR Exam Reference Language or a high-level programming language. **[5]**

3 **Total: 3 marks**

The printing algorithm is refined so that the number of pages entered must be from 1 to 500 (inclusive).

(a) Write an algorithm that takes the number of pages as input and keeps asking for it to be entered again until a number from 1 to 500 is entered. You may use pseudocode, a flowchart, OCR Exam Reference Language or a high-level programming language. **[3]**

4 **Total: 7 marks**

A ferry makes 8 crossings each day. At the end of each crossing, a member of the crew enters the number of passengers who were on board. A program is needed that:

- takes as input the number of passengers for each of the 8 crossings
- adds up the total number of passengers for the day
- counts how many crossings had **more than** 150 passengers
- outputs the total and the count after all 8 crossings have been entered.

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

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

(b) Write the program described above. **[5]**
You must use either:
• OCR Exam Reference Language, or
• a high-level programming language that you have studied.

Total for this worksheet: 21 marks