MODULE K ALGORITHM DESIGN · K1

Sub-systems, abstraction, decomposition, and inputs, processes, outputs and storage

Original practice questions · 21 marks · ~25 minutes · Cambridge 0478 syllabus 7.1 (analysis), 7.2(a), 7.2(b)

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: 1 mark

(a) Tick (✓) **one** box to show which statement about computer systems is true. **[1]**

	Statement	Tick (✓)
A	A sub-system is only the hardware part of a computer system.	
B	Every computer system is made up of sub-systems, which are made up of further sub-systems.	
C	A sub-system cannot be broken down into any smaller parts.	
D	Only very large computer systems are made up of sub-systems.	

2

Total: 4 marks

A heating system for a house is a computer system. It reads the temperature in each room, lets the owner set a target temperature and a weekly timetable using a phone app, and switches the radiators on and off.

(a) Identify **two** sub-systems that the heating system could be made up of. **[2]**

(b) Choose **one** of your sub-systems from part (a). Identify **two** further sub-systems that it could be made up of. **[2]**

Sub-system chosen: .....

3 **Total: 4 marks**

A ferry company is designing a map of its ship for passengers. The map will be shown on screens on each deck. Passengers use it to find their cabin, the café, the toilets and the lifeboat stations. Abstraction is used in the analysis stage when the map is designed.

(a) Describe what is meant by **abstraction**. **[2]**

(b) Identify **two** details that can be left out of the passengers' map. **[2]**

4 **Total: 4 marks**

A fitness watch is decomposed into its component parts: inputs, processes, outputs and storage.

(a) Tick (✓) **one** box in each row to show which component part each item is. **[4]**

Item	Input	Process	Output	Storage
The number of steps walked today, shown on the watch face				
The heart rate, read from a sensor on the back of the watch				
The step totals for the last 30 days, kept on the watch so the owner can look at them later				
Working out the average heart rate for the day				

5 **Total: 8 marks**

A leisure centre uses a computer system to control the entry gate to its swimming pool. At the start of each day, a lifeguard enters the maximum number of people allowed in the pool. A member scans their membership card at the gate. The system looks up the member's details and checks that their membership has not expired. If the membership is valid and the pool is not full, the gate opens and a screen shows a welcome message with the member's name. Otherwise the screen shows a message explaining why the member cannot enter. The system keeps a record of the date and time of every entry, and adds 1 to the number of people in the pool.

(a) Decompose the entry system into its component parts. Complete the table with **two** inputs, **two** processes, **two** outputs and **two** items of data that must be stored. **[8]**

Component part	**1**	**2**
Inputs		
Processes		
Outputs		
Storage		

Total for this worksheet: 21 marks