

## ASSIGNMENT 1 FRONT SHEET

<b>Qualification</b>	<b>BTEC Level 5 HND Diploma in Computing</b>		
<b>Unit number and title</b>	Unit 1: Programming		
<b>Submission date</b>		<b>Date Received 1st submission</b>	
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<b>Student declaration</b>  I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			
		<b>Student's signature</b>	Duc

### Grading grid

P1	P2	M1	D1



⚙ **Summative Feedback:**

⚙ **Resubmission Feedback:**

**Grade:**

**Assessor Signature:**

**Date:**

**Lecturer Signature:**

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### 1.1 what is algorithms

An algorithm is a procedure used for solving a problem or performing a computation. Algorithms act as an exact list of instructions that conduct specified actions step by step in either hardware- or software-based routines.

Algorithms are widely used throughout all areas of IT. In mathematics, computer programming and computer science, an algorithm usually refers to a small procedure that solves a recurrent problem. Algorithms are also used as specifications for performing data processing and play a major role in automated systems.

An algorithm could be used for sorting sets of numbers or for more complicated tasks, such as recommending user content on social media. Algorithms typically start with initial input and instructions that describe a specific computation. When the computation is executed, the process produces an output.

### 1.2 type of algorithms

There are several types of algorithms, all designed to accomplish different tasks:

- **Search engine algorithm.** This algorithm takes search strings of keywords and operators as input, searches its associated database for relevant webpages and returns results.

- **Encryption algorithm.** This computing algorithm transforms data according to specified actions to protect it. A symmetric key algorithm, such as the Data Encryption Standard, for example, uses the same key to encrypt and decrypt data. If the algorithm is sufficiently sophisticated, no one lacking the key can decrypt the data.
- **Greedy algorithm.** This algorithm solves optimization problems by finding the locally optimal solution, hoping it is the optimal solution at the global level. However, it does not guarantee the most optimal solution.
- **Recursive algorithm.** This algorithm calls itself repeatedly until it solves a problem. Recursive algorithms call themselves with a smaller value every time a recursive function is invoked.
- **Backtracking algorithm.** This algorithm finds a solution to a given problem in incremental approaches and solves it one piece at a time.
- **Divide-and-conquer algorithm.** This common algorithm is divided into two parts. One part divides a problem into smaller subproblems. The second part solves these problems and then combines them to produce a solution.
- **Dynamic programming algorithm.** This algorithm solves problems by dividing them into subproblems. The results are then stored to be applied to future corresponding problems.
- **Brute-force algorithm.** This algorithm iterates all possible solutions to a problem blindly, searching for one or more solutions to a function.
- **Sorting algorithm.** Sorting algorithms are used to rearrange data structures based on a comparison operator, which is used to decide a new order for data.
- **Hashing algorithm.** This algorithm takes data and converts it into a uniform message with a hashing.
- **Randomized algorithm.** This algorithm reduces running times and time-based complexities. It uses random elements as part of its logic.

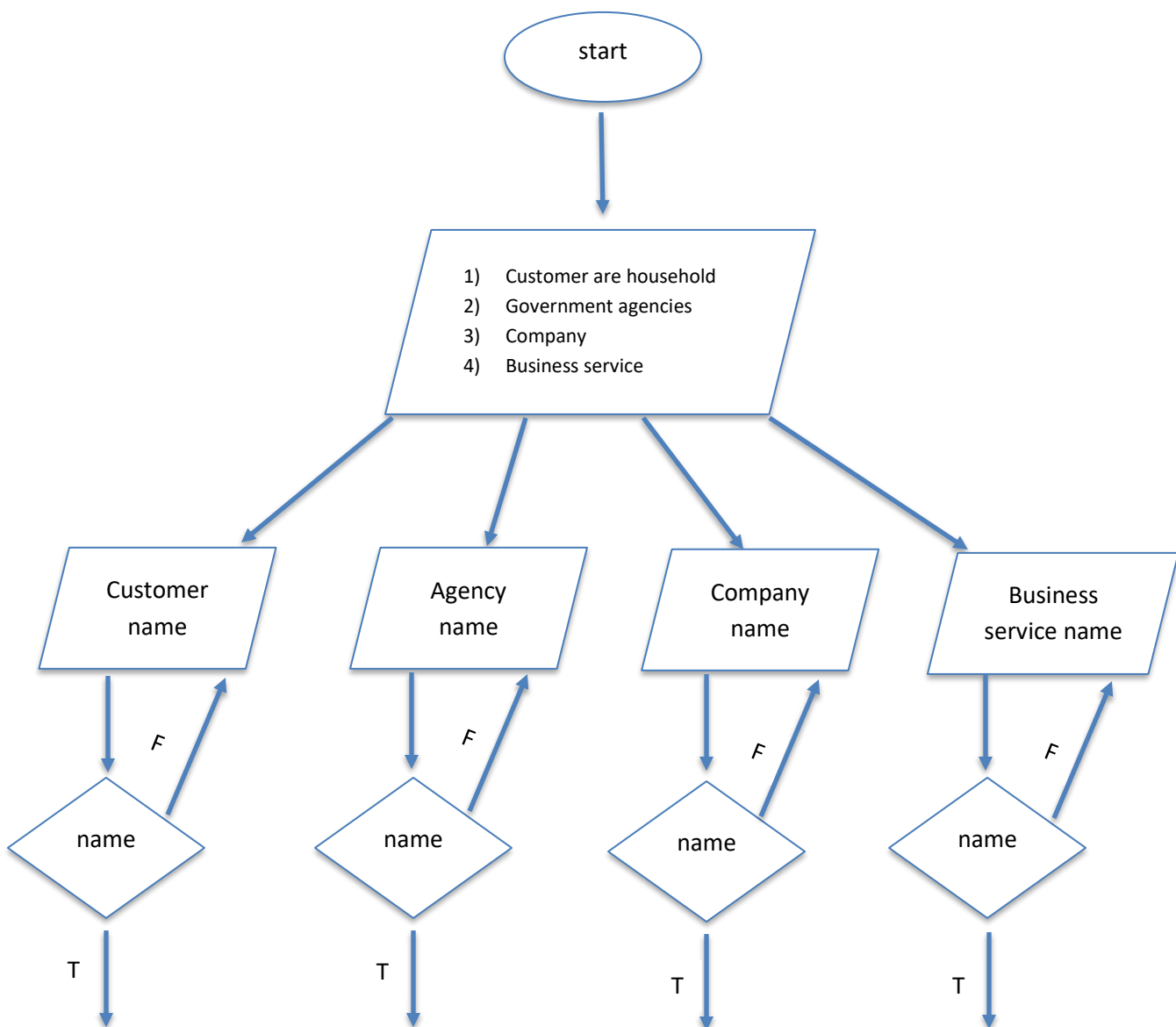
### 1.3 example about algorithm

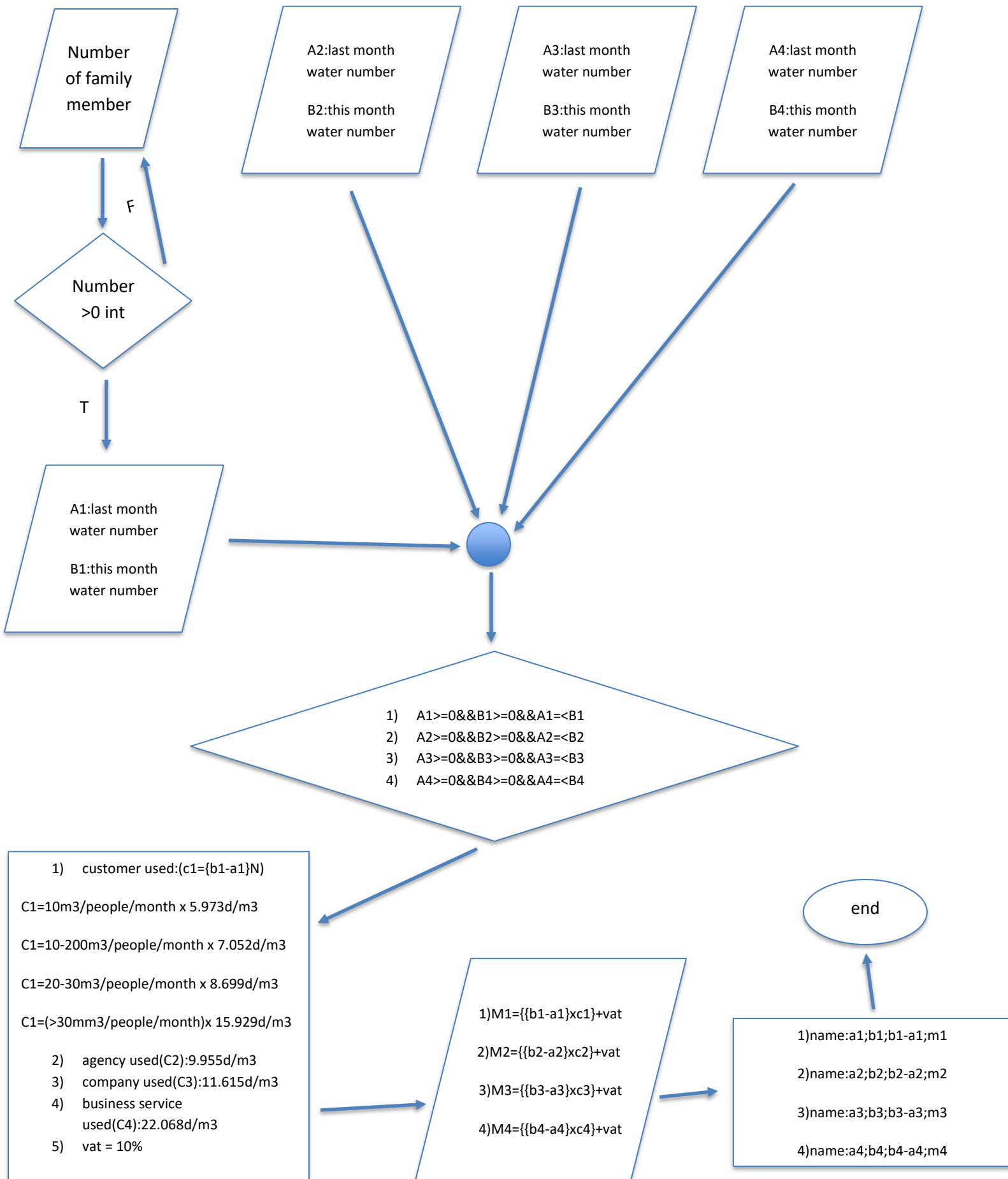
The following are some examples of algorithms used in real life:

- **Following a recipe.** Recipes provide a series of steps to achieve a particular objective, such as preparing blueberry muffins or making spaghetti sauce from scratch. Recipes aim to produce consistent results and help individuals -- regardless of their background -- create a specific dish by following detailed instructions. In this way, recipes mirror computer science algorithms, which outline steps for generating reproducible outcomes.
- **Tying shoelaces.** Tying shoelaces is another example of following an algorithm. For example, there are a finite number of steps that lead to a properly tied traditional shoelace knot, which is often referred to as the "bunny rabbit" or "loop, swoop and pull" knot.
- **Facial recognition.** Facial recognition is widely used in iPhone logins as well as Snapchat and Instagram filters. It works by projecting facial traits from a photo or video onto a biometrics map using an algorithm. The program then looks for a match between this map and a database of faces to confirm the user's identification. If facial recognition is used for Snapchat or Instagram filters, there is no need for searching the database because the algorithm simply builds a map of the face and applies the filter to it.
- **Traffic signals.** Traffic signals use smart algorithms to manage traffic flow. These algorithms group different algorithms or movements, such as going straight or turning right, into phases, which helps ensure safety and efficiency. For example, when a motorist approaches a red light, the traffic signal is cycling through these phases. By evaluating the volume of traffic, an algorithm decides when it's safe for the vehicle to move forward.
- **Sorting documents and papers.** This is a great example of how algorithms can be used for various tasks and purposes, such as sorting files alphabetically, by word count, by date, or by any other specifications. When someone arranges their personal or professional documents according to a set of instructions, they are applying algorithmic thinking to simplify the organization process by using small tasks.

- **Searching for a book in the library.** Finding a library book is like following an algorithm or a step-by-step plan. For example, there are different ways to do it, such as using the library's computer system or looking for labels on the shelves that show the book's genre, subject or author. No matter which method one chooses, if it can be explained and done by others, then it can be classified as an algorithm.

#### 1.4 flowchart







## 1.5 reference

Gillis, A. (2022). *What is algorithm?* [online] WhatIs.com. Available at:  
<https://www.techtarget.com/whatis/definition/algorithm>.

