

FLOWCHART AND TRACE TABLE

Chapter 9

FLOWCHARTS

- It use symbols to represent different steps, actions, and decisions
- Flowcharts provide a visual representation of a process, making it easier for individuals to understand the sequence of activities, decisions, and interactions within a system
- Flowcharts serve as a universal language that enables effective communication between team members, stakeholders, and individuals with different levels of technical expertise

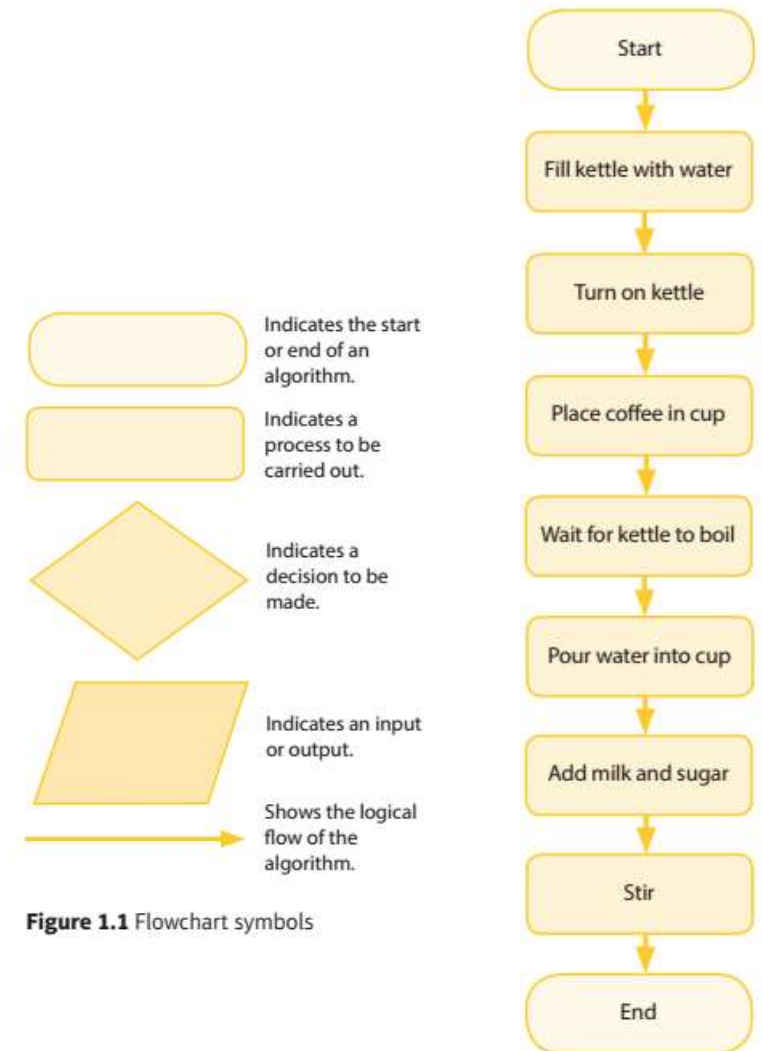


Figure 1.1 Flowchart symbols

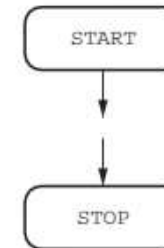
FLOWCHARTS

- **Start/End Symbol**

- The terminator symbol marks the starting or ending point of the system. It usually contains the word "Start" or "Stop"

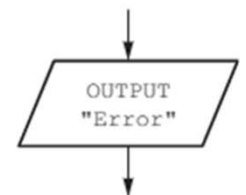
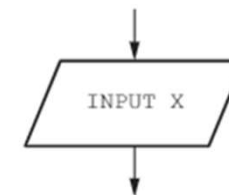


Begin/End Terminator flowchart symbols
flowchart.



- **INPUT/OUTPUT**

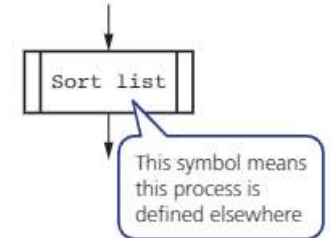
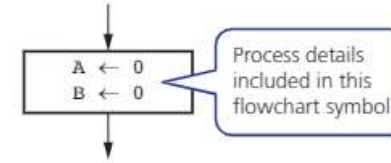
- Represents material or information entering or leaving the system



FLOWCHARTS

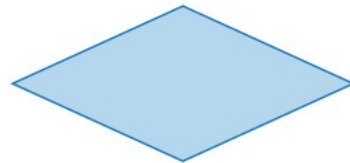
- Action or process

- A box can represent a single step or calculation

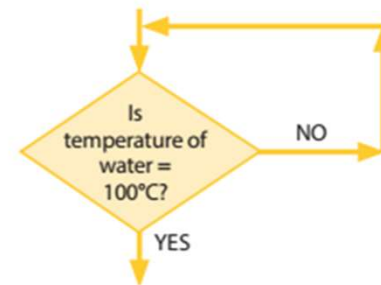


- Decision

- allows a choice to be made between two alternatives



There is a question with two alternatives. This represents the selection.



These arrows represent the iteration. If the answer is 'NO' then the selection question is repeated until the answer is 'YES' – the desired outcome.

Figure 1.6 Selection and iteration in a flowchart

FLOWCHARTS

- **IF...THEN...ELSE statement:** the IF...THEN...ELSE statement allows a choice to be made between two alternatives based on whether or not a condition is met

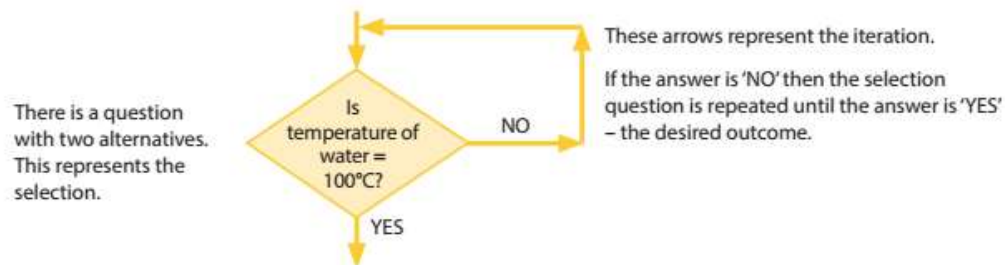


Figure 1.6 Selection and iteration in a flowchart

IF...THEN...ELSE statement

```
IF Temperature = 100°C THEN
    Switch off kettle
ELSE
    Keep waiting
END IF
```

IF...THEN statement

```
IF score >= 90 THEN
    SEND 'Excellent' TO DISPLAY
END IF
```

Relational operators

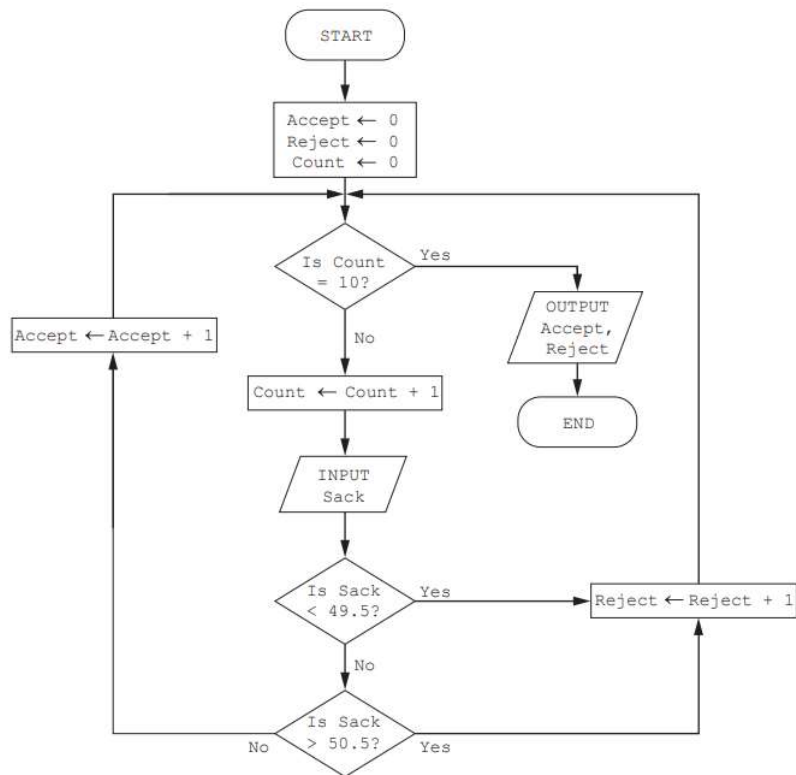
Relational operators are used to compare two values. The operators that you will be using are:

=	equal to
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to
<>	not equal to

- Question
- Write an algorithm using either pseudocode and flowchart:
 - input a positive integer
 - use this value to set up how many other numbers are to be input
 - input these numbers
 - calculate and output the total and the average of these numbers.

CONVERT A FLOWCHART TO PSEUDOCODE

- 5 (a) This flowchart checks a batch of 10 rice sacks for weight. Sacks should weigh 50 kilograms each. Sacks weighing over 50.5 kilograms or less than 49.5 kilograms are rejected. The number of sacks accepted and the number of sacks rejected is output.



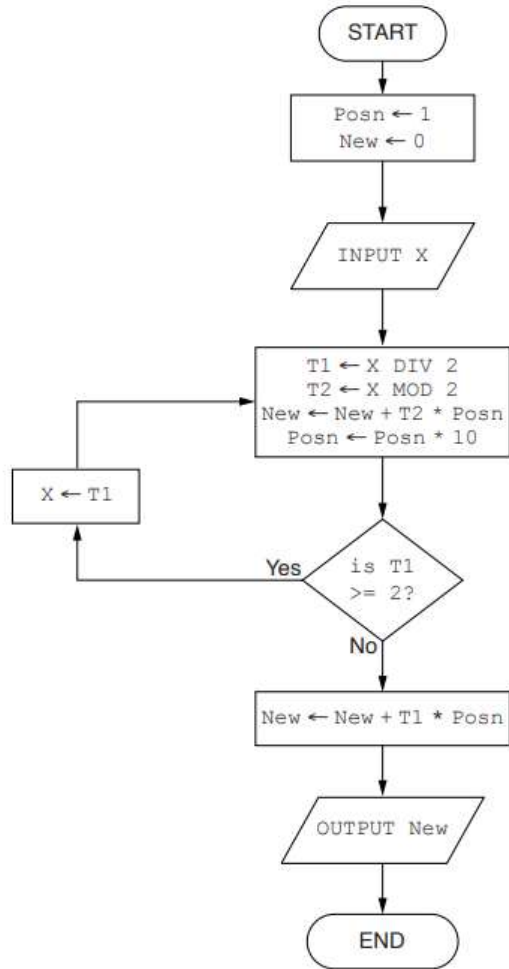
TRACE TABLE

- A trace table is a tool used debugging to track the values of variables during program execution.
- It is particularly helpful for understanding how the values of variables change at different points in the program and for identifying errors or logic issues
- It is also called “dry run”

```
FOR x = 1 to 3
  FOR y = 1 to 2
    z = x * y
  NEXT y
NEXT x
OUTPUT z
```

x	y	z	output
1			
	1	1	
	2	2	
2			
	1	2	
	2	4	
3			
	1	3	

The flowchart inputs an integer. The predefined function DIV gives the integer result of the division, e.g. $Y \leftarrow 10 \text{ DIV } 3$ gives the value $Y = 3$. The predefined function MOD gives the value of the remainder, e.g. $Y \leftarrow 10 \text{ MOD } 3$ gives the value $Y = 1$.



Trace table for input value 5

X	Posn	New	T1	T2	OUTPUT

Trace table for input value 12

X	Posn	New	T1	T2	OUTPUT

(b) State the purpose of the flowchart in part (a).

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