

# COMPUTERS

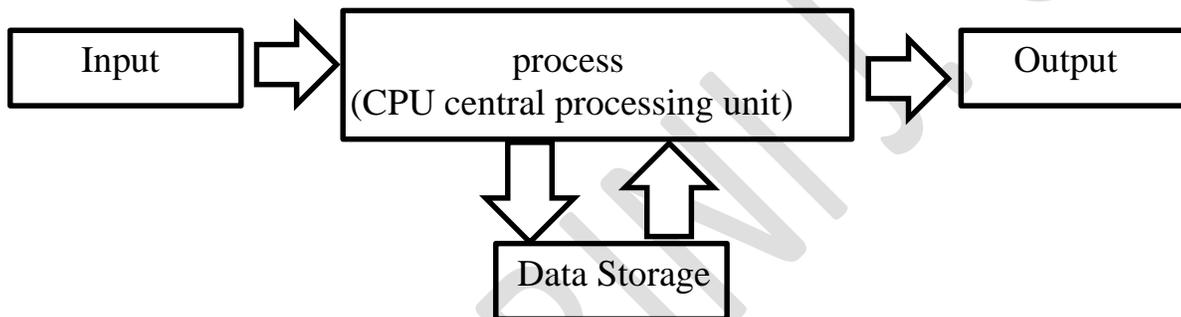
## **What is a computer?**

A computer is an electronic device capable of accepting data, processing it, giving it out and storing it for future use.

Taking into consideration the above definition, all computers regardless of their difference in size, capacity, speed, cost and number of users, have to perform four basic functions. These are:

- ❖ Acceptance of data
- ❖ Processing of data
- ❖ Giving out processed data and
- ❖ Storing data

## **Basic Elements of a computer**



## **Input Devices**

Input devices send data and instructions to the computers. There are so many input devices the most common ones are Keyboard, Mouse, Trackball, Scanner, Light pen, Touch screen, Modem, Joystick, Microphone, Bar code reader, Digital camera, Video digitizer.

## **Output Devices**

These are devices that display or output work which has been done by the computer in a form readable to the users. These include the following Monitor (VDU or SCREEN), Printer, Plotters, Actuators, Speakers

## **ALGORITHM**

Algorithm can be defined as: “A sequence of activities to be processed for getting desired output from a given input.”

Webopedia defines an algorithm as: “A formula or set of steps for solving a particular problem. To be an algorithm, a set of rules must be unambiguous and Before writing an algorithm for a problem, one should find out what is/are the inputs to the algorithm and what is/are expected output after running the algorithm. Now let us take some exercises to develop an algorithm for some simple problems: While writing algorithms we will use following symbol for different operations: Algorithms were originally developed as part of mathematics but now the word is intensely used in computer science. Algorithms are used for calculation, data processing, and many other fields.

### **Method of expressing an algorithm**

Algorithms can be expressed in many different notations, including, pseudocode, flowcharts and programming languages.

While writing algorithms, pseudocode and flowcharts we will use following symbol for different operations:

### **Symbols and their meaning in algorithms, pseudocode and flowcharts**

<b>SIGN</b>	<b>MEANING</b>
+	<i>Addition</i>
-	<i>Subtraction</i>
*	<i>Multiplication</i>
/	<i>Division</i>
^	<i>power</i>
=	<i>Equal to</i>
<	<i>Less than</i>
>	<i>Greater than</i>
<=	<i>less than or equal to</i>
>=	<i>greater than or equal to</i>
<>	<i>for is not equal to</i>
%	<i>percentage</i>

## Type of Algorithms

The algorithm and flowchart, classification to the three types of *control structures*.

They are:

- ❖ Sequence
- ❖ Branching (Selection)
- ❖ Loop (Repetition)

Now, we will discuss some examples on algorithms. These examples will help in proper understanding of algorithms technique.

### **Problem 1**

Algorithm to calculate the area of a circle

#### **Inputs to the algorithm:**

Radius  $r$  of the Circle.

#### **Expected output:**

Area of the Circle

#### **Algorithm:**

*Step1: Read /input/enter the Radius  $r$  of the Circle*

*Step2: if radius  $< 0$  then print invalid radius go to step 1*

*Step3: Area =  $\pi * r * r$*

*Step4: Print Area*

*Step5: end*

### **Problem 2**

Algorithm to find the sum of two numbers

#### **Inputs to the algorithm:**

First num1.

Second num2.

#### **Expected output:**

Sum of the two numbers.

#### **Algorithm:**

*Step1: Start*

*Step2: Read/input the first num1.*

*Step3: Read/input the second num2.*

*Step4: Sum  $\leftarrow$  num1+num2 // calculation of sum*

*Step5: Print Sum*

*Step6: End*

## FLOWCHART

### What is a flowchart?

- ❖ A flowchart is a picture (graphical representation) of the problem solving process.
- ❖ A flowchart gives a step-by-step procedure for solution of a problem.
- ❖ A flowchart is a diagram which visually presents the flow of data through processing systems.
- ❖ A flow is a systematic way of presenting the flow of a computer process using symbols.

### Elements of a flowchart:

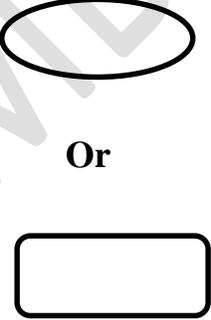
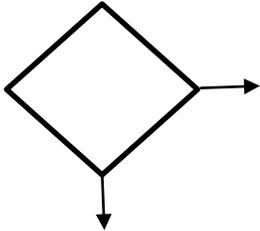
- ❖ Various geometrical shaped boxes represent the steps of the solution.
- ❖ The boxes are connected by directional arrows to show the flow of the solution.

### Uses of a flowchart:

- ❖ To specify the method of solving a problem.
- ❖ To plan the sequence of a computer program.
- ❖ Communicate ideas, solutions.

### Basic FlowChart Symbols

A flowchart in computer science typically has the following types of symbols to represent a process or program:

NAME	SYMBOL	USE IN FLOWCHART
<b>Oval/Rounded Rectangle/Circle</b>		<ul style="list-style-type: none"> <li>✓ When used at the start of the flowchart it means Start of program —beginning of the program.</li> <li>✓ When used at the end of the flowchart it means Stop of program — Marks the end of the program.</li> <li>✓ <b>Key words used</b> <ul style="list-style-type: none"> <li>• Start</li> <li>• Stop</li> <li>• Begin</li> <li>• End</li> </ul> </li> </ul>
<b>Diamond (Decision box)</b>		<ul style="list-style-type: none"> <li>✓ Decision block – Contains a question of condition which requires a Yes or No (True or False) Answers.</li> <li>✓ Denotes a decision (or branch) to be made. The program should continue along one of two routes. (e.g. IF/THEN/ELSE)</li> <li>✓ Used when you want to make a decision.</li> </ul>

<p><b>Rectangle</b></p>		<ul style="list-style-type: none"> <li>✓ Denotes a process to be carried out e.g. addition, subtraction, division etc.</li> <li>✓ Statement block – A statement to execute, or a behavior to perform.</li> <li>✓ Formulas are put here</li> <li>✓ <b>Key words used</b> <ul style="list-style-type: none"> <li>• Calculate</li> <li>• evaluate</li> <li>• solve</li> <li>• compute</li> <li>• calculate</li> <li>• add</li> <li>• sum</li> <li>• multiply</li> <li>• Display</li> </ul> </li> </ul>
<p><b>Parallelogram</b></p>		<ul style="list-style-type: none"> <li>✓ Denotes an input/output operation</li> <li>✓ <b>Key words used</b> <ul style="list-style-type: none"> <li>• Input</li> <li>• Output</li> <li>• Enter</li> <li>• Print</li> <li>• Read</li> <li>• Display</li> </ul> </li> </ul>
<p><b>Flow Arrows</b> (Arrow lines )</p>		<ul style="list-style-type: none"> <li>✓ Arrows are used to connect the steps in a flow chart, to show the flow or sequence of the problem solving process.</li> </ul>

**Basic Arithmetic symbols used in flowcharts**

**Mathematical language**

**Plus sign +**

**Minus sign –**

**Multiplication sign ×**

**Division ÷**

**Flowchart language**

+

–

\* (star)

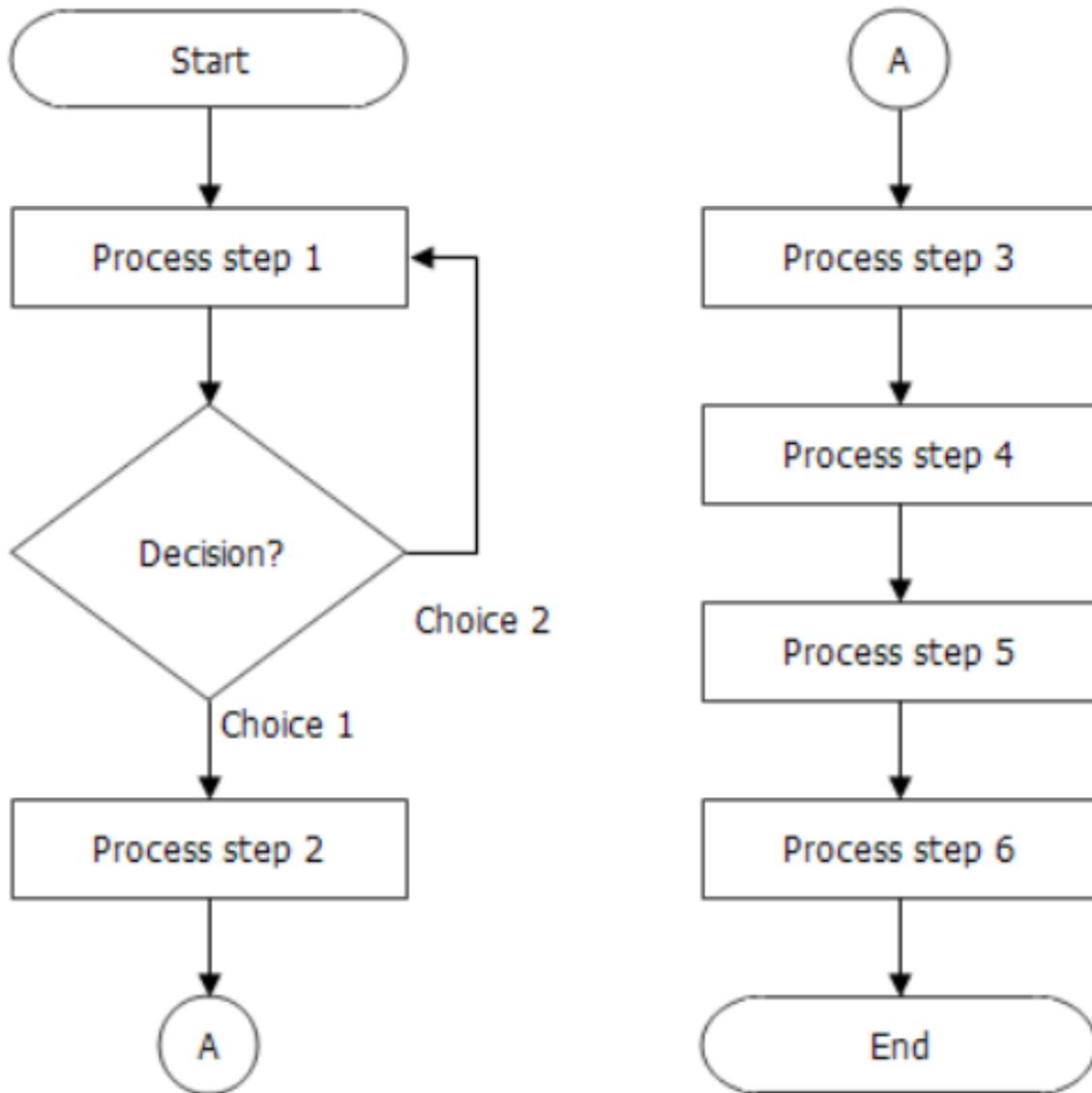
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Please **note** that only division and multiplication changes in flowchart language.

**How to read a flowchart**

**Identify** input and move downwards following the arrow down to the output. Move from step to step in the chart by following the lines between them. Perform any action or calculation listed when you reach a Statement Block (rectangle), and then when you reach a Decision Block (diamond) check if the condition is met and choose the appropriate path.

**Basic structure of a flow chart**



## Guidelines on drawing a flowchart

- ❖ **Identify** Input and Output
- ❖ **Apply** reasoning skills to solve the problem.
- ❖ **Draw** the flowchart using the appropriate symbols and arrows to show the sequence of steps in solving the problem.

### Some examples of Flowcharts

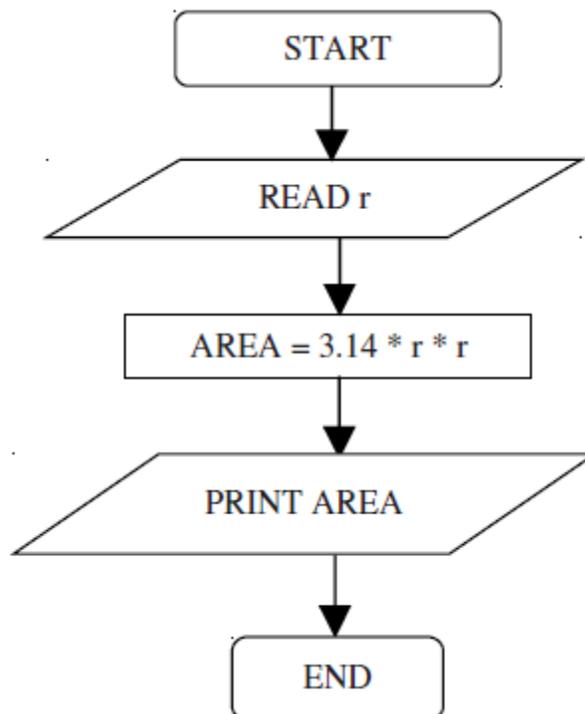
Now, we will discuss some examples on flowcharting. These examples will help in proper understanding of flowcharting technique.

**Problem 1:** Find the area of a circle of radius  $r$ .

#### Solution:

The first thing to note here is that area of a circle is given by  $A = \pi r^2$

From  $A = \pi r^2$ , we have  $A = \pi * r * r$ , where  $\pi = 3.14$

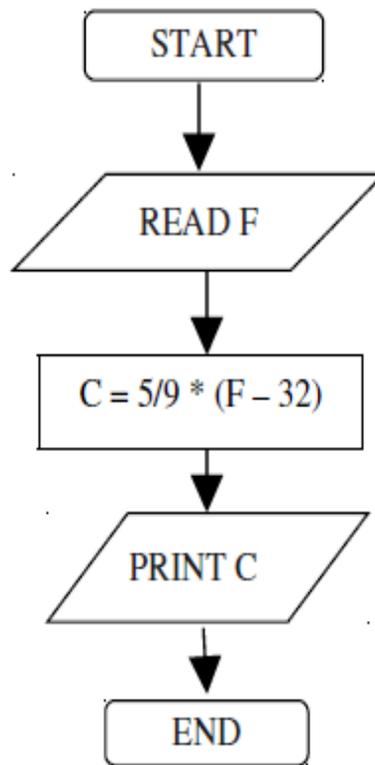


**Problem 2:** Convert temperature Fahrenheit to Celsius.

**Solution:**

The first thing to note here is that converting temperature in Fahrenheit to Celsius is given by the formula  $C = \frac{5}{9}(F - 32)$

So from  $C = \frac{5}{9}(F - 32)$ , we have  $C = 5/9 * (F - 32)$

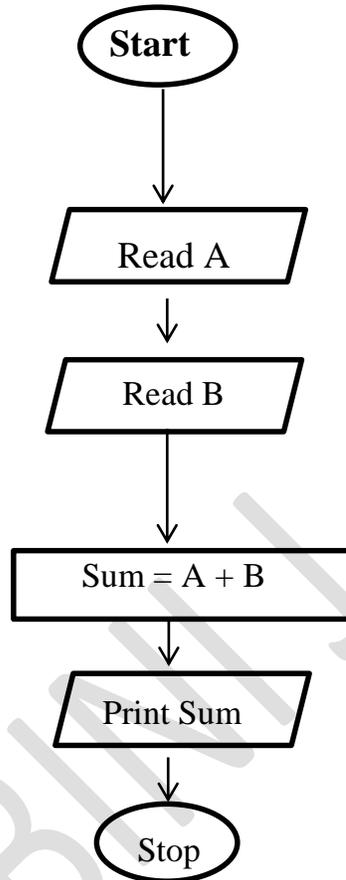


**Task**

1. Draw a flow chart on how to find the sum of two numbers.
2. Draw a flow chart on how to find loss or profit

**Expected Answers for the Task**

**Question 1**



**Question 2**

