5

Algorithm and Flowchart

Can a computer solve your problem? Yes, it can! It needs step-by-step instructions from the user. This chapter discusses about algorithm, a logical step-by-step procedure to solve a problem, and the flowchart that represents an algorithm.

LET'S LEARN ABOUT

- Algorithm
- Flowchart

Problem-solving could be any activity or task that a human being or a machine does in order to achieve a specific goal or objective. For example, packing your school bag as per the timetable, watching your favourite channel, going for shopping or movie, and so on. The list is endless. To solve any problem, you need to perform a series of activities in a step-by-step manner.

ALGORITHM

Algorithm is a step-by-step procedure of solving a logical or mathematical problem. It involves the process of dividing any problem-solving process into proper sequential steps.
Let us learn the method of writing an algorithm with the help of some examples.

Example 1: Write an algorithm to buy a pack of bread and butter.

Your mother asks you to bring a pack of bread and butter from the nearby grocery shop. How will you do this task? You may simply answer, 'By going to the shop', which is correct! But, what if you have to write an algorithm for the same? Will the above answer be correct then? Of course not! This is because the above answer finishes in a sentence whereas an algorithm is a step-by-step procedure to solve a given problem. Here is an algorithm for this:

Step 1: Take money from your mother.
Step 2: Go to the shop.
Step 3: Ask for the grocery items.
Step 4: Pay the money.

Step 5: Collect the items and the remaining amount, if any.
Step 6: Return to your home.

Your algorithm is complete. It includes all the essential steps to perform the task. Remember, an algorithm is always written to the point and in simple English. It is quite easy to write an algorithm. All you have to do is to write the correct steps in a proper order or sequence.

Example 2: Write an algorithm to find the sum of two numbers.

Step 1: Start

Step 2: Read/Input the number A.

Step 3: Read/Input the number B.

Step 4: Find the sum of two numbers (Sum = A + B).

Step 5: Print Sum.

Step 6: Stop

« AVA'S PRACTICE TIME »

Write an algorithm to find the greatest of three different numbers.

Solution:

Step 1: Start

Step 2: Read three numbers X, Y, and Z.

Step 3: If X is greater than Y, then go to step 5, otherwise go to step 4.

Step 4: If Y is greater than Z, then Print "Y is the greatest" and go to step 7, otherwise go to step 6.

Step 5: If X is greater than Z, Print "X is the greatest" and go to step 7, otherwise go to step 6.

Step 6: Print "Z is the greatest"

Step 7: Stop

Likewise, a computer also functions in a step-by-step manner. It can solve a problem only when it knows the proper steps or instructions. These instructions are given by a user as a computer cannot work on its own. The user creates computer programs using algorithms or a set of instructions. A computer program is a set of step-by-step instructions given to a computer to do a particular task.

LET'S REVIEW

The steps given below represent the routine of a child after coming back from school. Rearrange the steps in the correct order.

1. Play football with friends _____
2. Complete your homework _____
3. Go to bed _____
4. Change uniform _____
5. Check your school diary _____
6. Have dinner _____

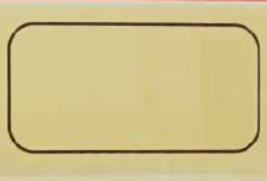
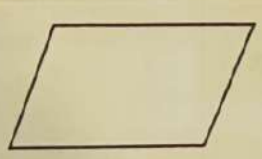
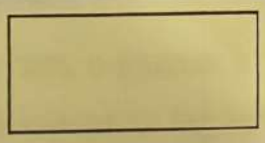
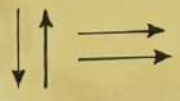
FLOWCHART

A flowchart is a type of diagram that represents an algorithm or the process to solve a problem. As the name indicates, a flowchart represents the flow of process in the form of charts using various symbols.

Different Flowchart Symbols and Their Functions

There are six basic symbols commonly used in a flowchart. Each symbol indicates a different function in a flowchart. All the symbols are connected to each other by flow lines. These symbols are described in table 5.1.

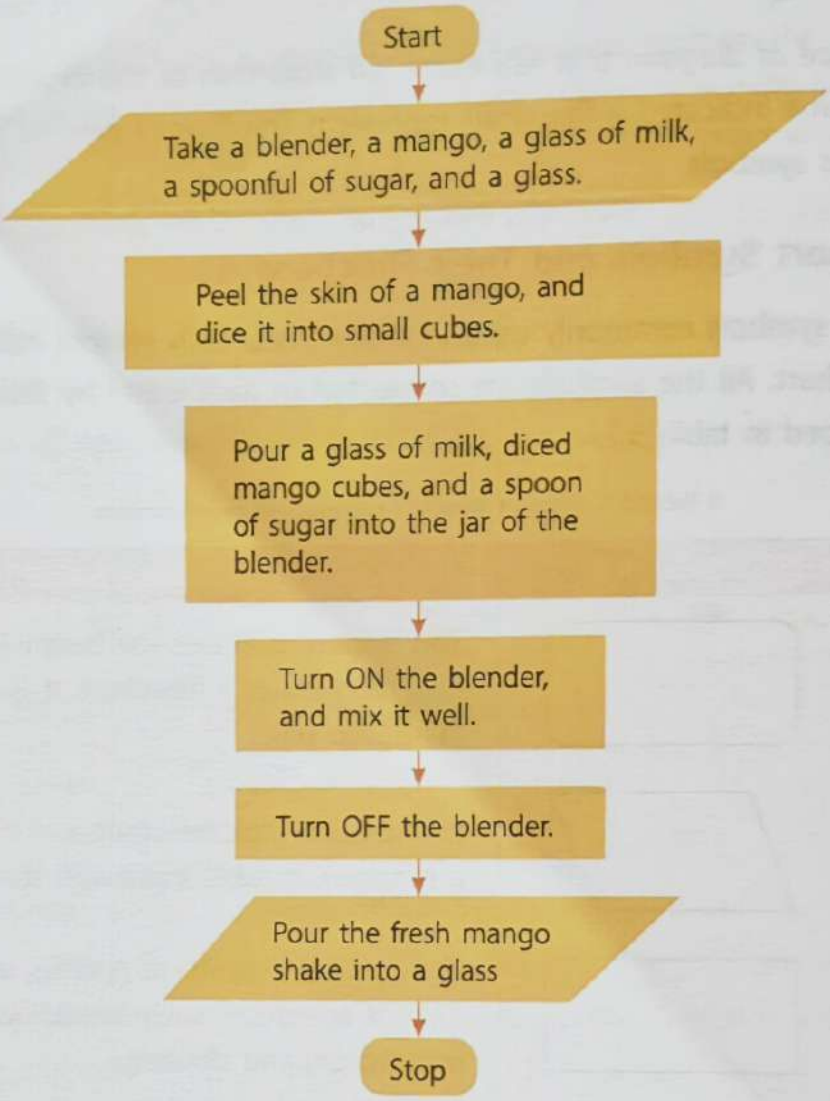
Table 5.1 Different flowchart symbols and their functions

Name	Symbol	Explanation
Terminal		This symbol indicates the beginning and ending of a program in a flowchart. It is also known as Start/Stop box.
Input/Output		It is used to indicate input and output of a program. It takes input and shows output.
Processing		This symbol indicates a process, action, or any type of operation, such as addition, multiplication, subtraction, and division.
Decision		It is used to raise a question or a condition in a program that can have either Yes/No or True/False as an answer. It is also known as Condition box.
Flow Lines		Flow lines show the direction of flow in a program. These lines are also used to connect various symbols in a flowchart.
Connectors		These are used to connect breaks in the flowchart.

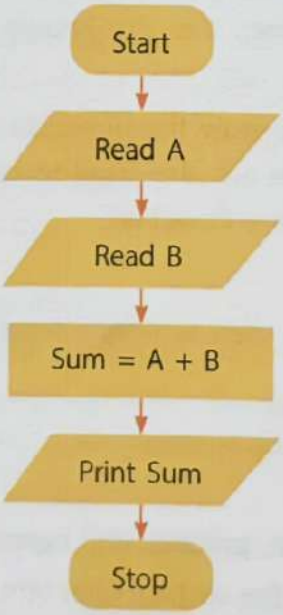
Simple Flowchart

Let us create simple flowcharts which involve only input, process, and output. These flowcharts are quite easy to create. A simple flowchart moves only in the vertical direction, that is, top to bottom.

Example 1: Draw a flowchart to show the process of making mango shake.



Example 2: Draw a flowchart to find the sum of two numbers.



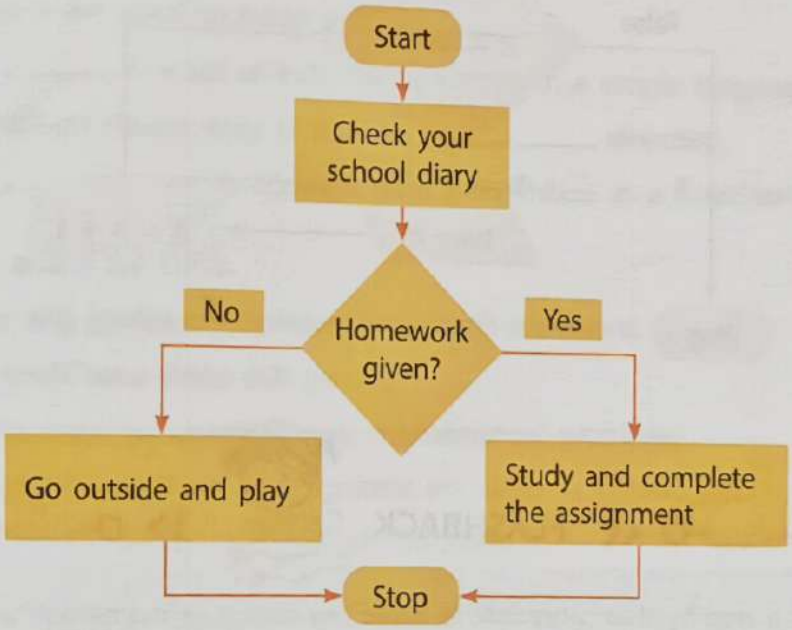
INFO BOX

In a flowchart, the general direction of flow is either top to bottom or left to right.

Decision-making Flowchart

Decision-making is an essential task that all of you indulge in everyday. Decision-making flowchart helps you to come to a decision on the basis of some logic. This kind of flowchart has at least one decision symbol. Decision symbols have two exit points, one for Yes/True and another for No/False. These flowcharts are used to raise a certain condition along with its solution.

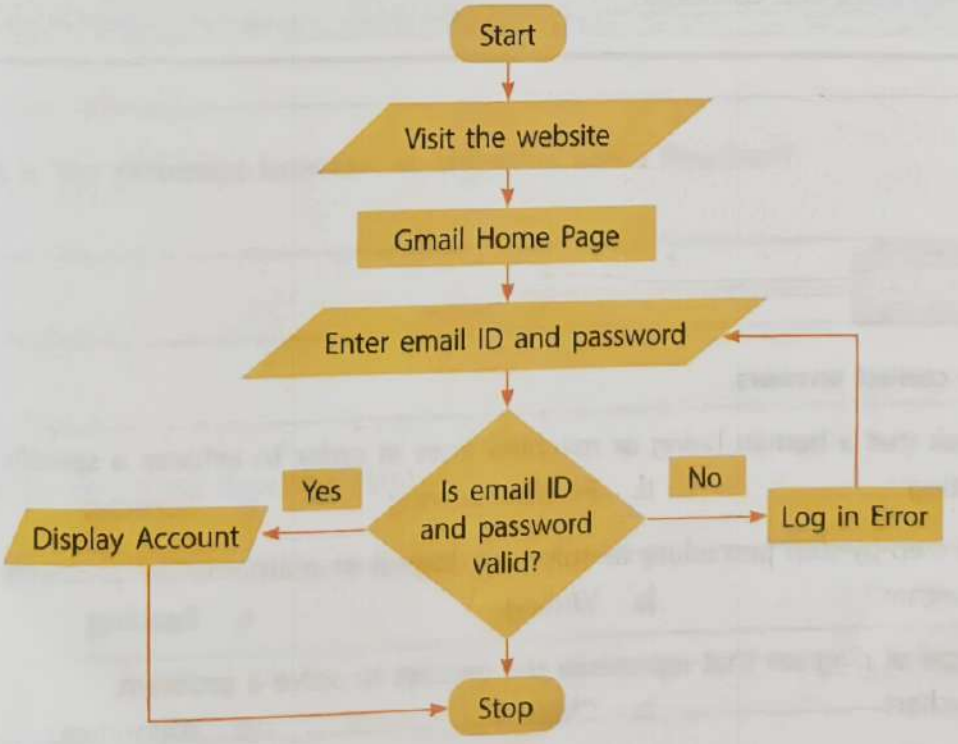
Example: Draw a flowchart to decide whether to play or study.



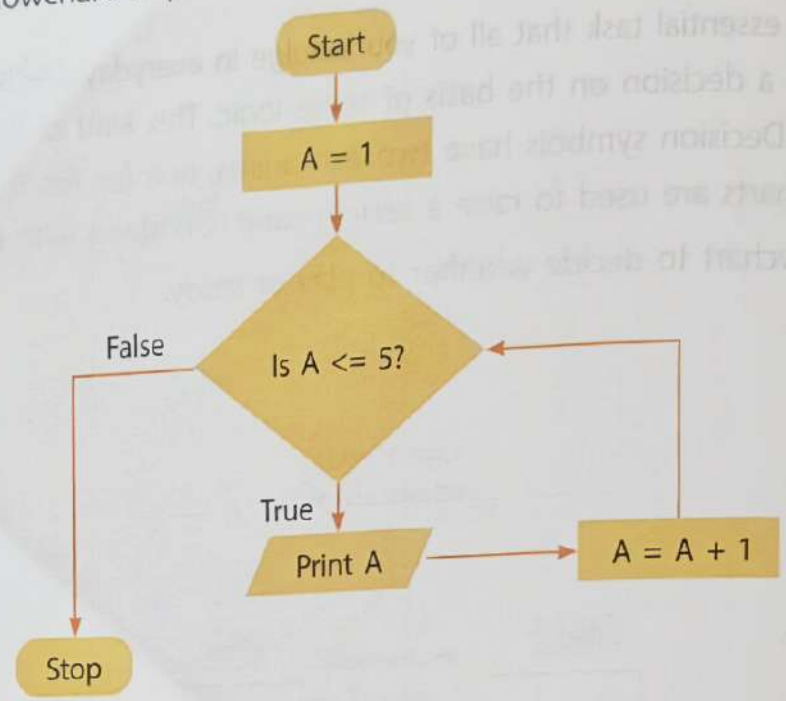
Loop Based Flowchart

In a loop based flowchart, a process is repeated until a certain condition is met or fulfilled.

Example 1: Draw a flowchart to log in to your Gmail account.



Example 2: Draw a flowchart to print the value of A from 1 to 5.



« FLASHBACK »

- An algorithm is a step-by-step procedure to solve any logical or mathematical problem.
- An algorithm is always written to the point and in simple English.
- A flowchart is a type of diagram that represents an algorithm or the process to solve a problem.
- The six basic symbols commonly used in a flowchart are Terminal, Input/Output, Processing, Decision, Flow Lines, and Connectors.

EXERCISES

A. Tick (✓) the correct answers.

1. It is a task that a human being or machine does in order to achieve a specific goal.
   a. Painting b. Problem-solving c. Running
2. This is a step-by-step procedure to solve any logical or mathematical problem.
   a. Algorithm b. Writing c. Reading
3. It is a type of diagram that represents the process to solve a problem.
   a. Flowchart b. Chart c. Algorithm

4. How many symbols are commonly used in flowcharts?
   a. Two b. Four c. Six
5. Which flowchart symbol indicates the beginning and ending of a program?
   a. Input/Output b. Terminal c. Connectors

B. Fill in the blanks.

1. In a _____, a process is repeated until a condition is met.
2. Different shapes are used to make a _____
3. An _____ is a set of instructions written in a simple language to solve a problem.
4. A simple flowchart moves only in the _____ direction.
5. _____ are used to connect different symbols in a flowchart.

C. Write T for True and F for False.

1. Algorithm for any problem is written in a single statement. ____
2. Decision symbols have three exit points. ____
3. Flowcharts are used to represent only mathematical problems. ____
4. The Input/Output and Processing symbols are same in a flowchart. ____
5. Algorithm must be written in a difficult language. ____

D. Answer the following questions.

1. What do you understand by problem-solving? List some problems related to daily routine.

2. What is the difference between an algorithm and a flowchart?

3. Describe any three flowchart symbols.

4. How are connectors different from flow lines?

5. Briefly explain the use of decision-making flowcharts.

AVA'S ACTIVITY ZONE

A. The steps to create a kite are all jumbled up. Write the steps in the correct flowchart symbols.

Steps:

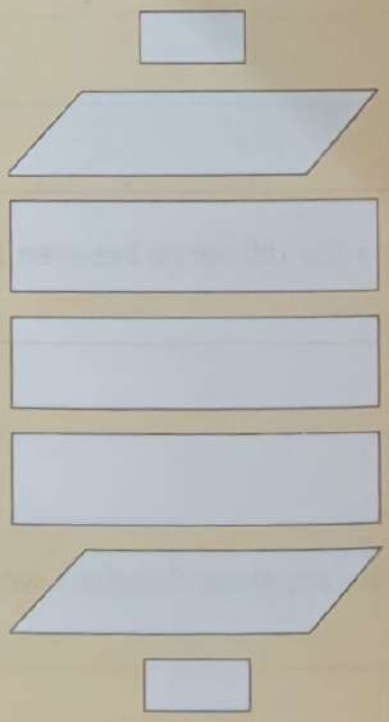
Cut and fold the craft paper.

You will need craft paper, glue stick, thread, and marker.

Hang the beautiful kite on the wall.

Draw a pair of eyes and a smile on it.

Take a loop of thread and stick it on the top.



B. Write an algorithm to plan your 'Family's visit to an Amusement Park' on a Sunday. (Open MS Word 2019, and type the algorithm describing the step-by-step process.)