8 Algorithms and Flowcharts

LESSON OUTCOMES

After this lesson, students will be able to:

- » Define and describe algorithms.
- » Create algorithms for everyday tasks.
- » List the qualities of a good algorithm.
- » Define and describe a flowchart.
- » List the advantages of creating flowcharts.
- » Draw and list each symbol used in a flowchart.
- » Create a flowchart.
- » List the rules for making a flowchart.
- » Create loops in a flowchart.
- » Differentiate between algorithms and flowcharts.

WARM UP

- » List the process of making a cup of hot coffee.

Ans. Do it yourself.

CHAPTER NOTES

- » An algorithm is nothing but a step-by-step procedure to solve a particular problem or accomplish a task. Algorithms are

everywhere. Whatever system you develop, you first develop an algorithm to run it.

» In computer programming, an algorithm is a set of well-defined instructions in sequence to solve any problem.

» Qualities of a good algorithm:

  o Input and output should be defined clearly.

  o Each steps in the algorithm should be clear.

  o An algorithm shouldn't have computer code. Instead, it should be written in such a way that it can be used in any programming language.

  o A flowchart is a diagrammatic representation of an algorithm. Flowcharts are very helpful in writing computer programs or for explaining programs to others.

» Advantages of Flowcharts:

  o Simplify the Logic: As a flowchart provides a pictorial representation in steps, it simplifies the process of writing computer coding using any computer language.

  o Useful in Coding: A flowchart also helps in providing efficiency in the coding process as it gives directions on what to do, when to do and where to do. It makes the work easier.

  o Proper Testing: Flowcharts also help in finding errors in a program.

  o Saves time: A flowchart saves our time while writing the actual program.

» Different steps of an algorithm are depicted using flowchart shapes having different meanings.

» The rules followed to make flow charts are as follows:

  o Generally, a flow chart flows from top to bottom or left to right.

  o No cross lines are allowed in a flowchart.

  o Always use connectors at the end when drawing a flowchart longer than one sheet of paper.
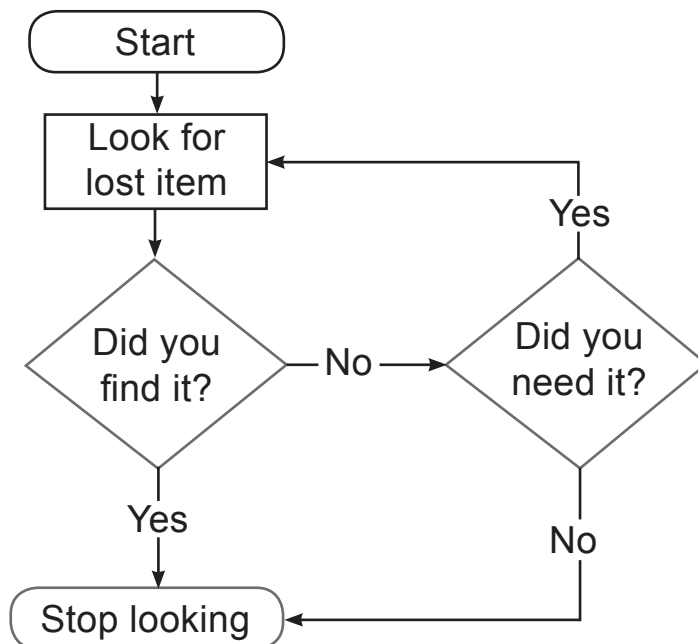
o Connector must be referred to by the same name in both the pages.

o Only one flow line should come out from a process symbol.

o Only one flow line should enter a decision box, while outgoing flow lines can be any in number.

o Ensure that the flowchart has a start as well as finish.

» A loop is a sequence of instructions that repeats itself a specified number of times until a particular condition is met. By using loops, we can repeat instructions as many times as we want.

DEMONSTRATION

» The different shapes or symbols in a flowchart their names and their functions.

LAB ACTIVITIES

» Using shapes in Word, create a flowchart. Here is an example:

```
        ┌─────────────┐
        │    Start     │
        └──────┬───────┘
               ↓
        ┌─────────────┐
        │  Look for    │←──────────────────┐
        │  lost item   │                   │
        └──────┬───────┘              Yes  │
               ↓                            │
           ◇ Did you ◇ ──No──→  ◇ Did you ◇
           ◇ find it? ◇          ◇ need it? ◇
               │                       │
              Yes                      No
               ↓                        │
        ╭─────────────╮←────────────────┘
        │ Stop looking │
        ╰─────────────╯
```

ASSESSMENT

Teacher can assess students on the basis of the following questions.

1. While computing, a program is implemented by a computer to solve any problem. It involves three steps. What are they?
2. What is an algorithm?
3. Write any two advantages of algorithm.
4. What is a flowchart?
5. Which language is used to write an algorithm?
6. Which box is used to display the final result?
7. Which symbol indicates the sequence of steps and direction of flow in a flowchart?
8. Write an algorithm to find the product of two numbers.
9. Which box is used for decision making?

SUGGESTED CLASS ACTIVITIES

A. Write T for true and F for false statements.

1. An algorithm is set of instructions given in a required order to solve a problem.
2. A flowchart consists of a number of boxes of different types.
3. A terminal box is used either at the beginning or at the end of a flowchart.
4. The boxes of a flowchart are joined by dots.
5. A flowchart is a graphical representation of the sequence of steps required to solve a particular problem.

B. Write an algorithm to do each of the following:

1. Make a vegetable sandwich.
2. Buy a pair of shoes from a shop.
3. Catch a bus to go to school.

C. Draw a flowchart for the following:

1. Compare two numbers.
2. Print a series of numbers from 1 to 10.
3. Divide two numbers.