G.D.GOENKA PUBLIC SCHOOL

Subject: Computer Science

Aspect: Study Material

CHAPTER 10: Algorithm and Flowchart

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Algorithm:

An algorithm is a sequence of steps that produces a result and terminates in a finite time. Algorithm has the following characteristics

- **Input:** An algorithm may or may not require input.
- **Output:** Each algorithm is expected to produce at least one result.
- **Definiteness:** Each instruction must be clear and unambiguous.
- **Finiteness:** If the instructions of an algorithm are executed, the algorithm should terminate after finite number of steps.

The algorithm and flowchart include the three types of control structures.

- **Sequence:** in the sequence structure, statements are placed one after the other and the execution takes place starting from up to down.
- **Branching (Selection):** In branch control, there is a condition and according to a condition, a decision of either TRUE or FALSE is achieved. In the case of TRUE, one of the two branches is explored, but in the case of FALSE condition, the other alternative is taken. Generally, the 'IF – THEN' is used to represent branch control.
- **Loop(Repetition):** The loop or repetition allows a statement(s) to be executed repeatedly based on certain loop condition e.g. WHILE, FOR loops.

Advantages of algorithm

- It is a step-wise representation of a solution to a given problem, which makes it easy to understand.
- An algorithm uses a definite procedure.
- It is not dependent on any programming language, so it is easy to understand for anyone even without programming knowledge.
- Every step in an algorithm has its own logical sequence so it is easy to debug.

How to write algorithms

Step 1

Define your Algorithm input: many algorithms take in data to be processed e.g., to calculate the area of rectangle input may be the height and width of the rectangle.

Step 2

Define the variables: Algorithm's variables allow you to use it for more than one place. We can define two variables for a rectangle height and width as HEIGHT and WIDTH or H and W. We should use meaningful name e.g. instead of using H and W use HEIGHT and WIDTH as variable name.

Step 3

Outline the Algorithm's operations: Use input variables for computation purpose, e.g. to find the area of rectangle multiply the HEIGHT and WIDTH variable and store the value in new variable (say) AREA. An algorithm's operations can take the form of multiple steps and even branch, depending on the value of the input variables.

Step 4

Output the results of your algorithm's operations: In case of area of rectangle output will be the value stored in variable AREA. If the input variables described a rectangle with a HEIGHT of 2 and a WIDTH of 3, the algorithm would output the value of 6.

Examples:

Algorithm to set your school bag

Step 1: Open the bag.

Step 2: Take out your school dairy.

Step 3: See the Time Table.

Step 4: Go to your bookshelf.

Step 5: Take out the books and notebooks.

Step 6: Keep them in a bag.

Step 7: Close the bag.

Algorithm to calculate the sum of two numbers

Step 1: Input first number [A].

Step 2: Input second number [B].

Step 3: Find the sum of two numbers [Sum = A+B].

Step 4: Print Sum.

Step 5: Stop.

A	B	Sum
2	3	5

Algorithm to compare two numbers and find the greater one

Step 1: Start

Step 2: Input two numbers and store them in A and B.

Step 3: Check weather A=B or not. If true then go to step 4, else go to step 5.

Step 4: Print "Both numbers are equal" and go to step 8.

Step 5: Compare A and B. If A is greater than B, go to step 6, else go to step 7.

Step 6: Print "A is greater" go the step 8.

Step 7: Print "B is greater" and go to step 8.

Step 8: Stop.

A	5
B	**89**
Print	**B is greater**