Computer science
class:10th
ch#01
lecture#01

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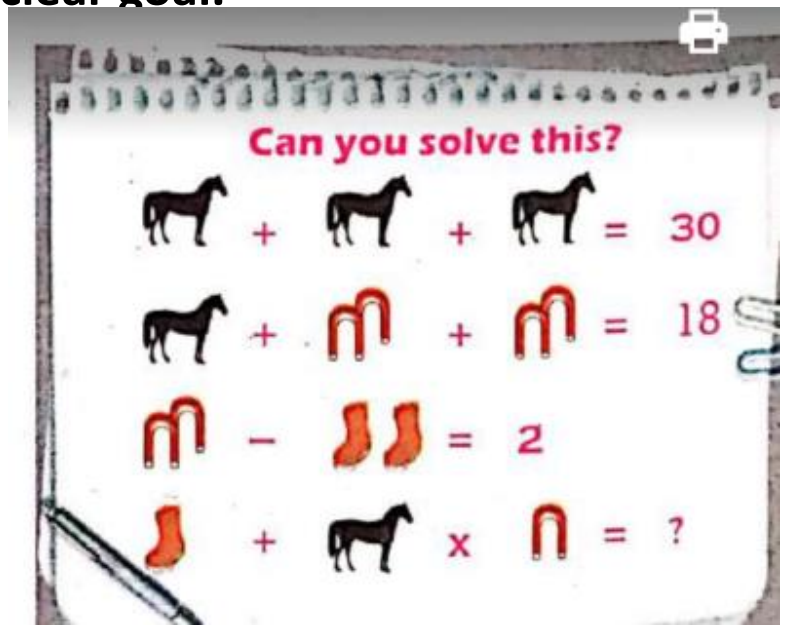
Problem solving: it is the process of solving complex problems.

Steps:

- **Defining the problem**
- **Analyzing the problem**
- **Planning the solution of the problem**
- **Candid solutions of the problems**
- **Best solution**

Defining the problem:

- **A well- defined problem is the one that does not contain ambiguities.**
- **All the conditions are clearly specified and it has a clear goal.**
- **It is easy to understand and solve.**



Strategies to solve the problem:

- **Gain background knowledge**
- **Use guesses**
- **Draw a picture**

Analyzing the problem

- We can analyze the problem by identifying 5 Ws in the problem.

❖What

❖Who

❖Why

❖When

❖Where

Figure 1-2 From problem to solution

"Suppose your class teacher assigns you a task to prepare a list of students in your school whose names start with letter 'A'. The list is required in order to prepare an alphabetical directory of all school students and there is only one week to complete the task."

We can analyse this problem by identifying 5Ws in the problem statement as given below:

- **What:** List of students' names starting with letter 'A'.
- **Who:** Students.
- **Why:** To prepare the directory of students.
- **When:** Within a week.
- **Where:** School.

Planning the solution of a problem

- It is a creative stage of problem solving
- It refers to dividing the solution into steps and arranging them into proper order

Strategies:

- Divide and conquer
- Guess, check and improve
- Act it out
- Prototype (draw)

Defining the candid solution:

- The word candid refers to something spontaneous and unplanned.
- All the possible solutions of a problem that produce correct result are known as candid solution

Example: your task is to find average height of your class fellows.

Selecting the best solution:

After finding the candid solutions, only one solution can be selected.

Strategies:

- Speed
- Cost
- Complexity

Algorithm

- It is a set of steps to solve a problem.
- It means method, procedure, technique or plan.
- It is written in natural language, so it is easily understandable by human.
- The word “algorithm” comes from the nature of Arabic writer Muhammad ibn musa alkhwarzami.

Example:

1. **To find the sum, product and average of five given numbers.**

Step 1. Start

Step 2. Input numbers, $n0, n1, n2, n3, n4$

Step 3. Set *sum* to $n0 + n1 + n2 + n3 + n4$.

Step 4. Set *product* to $n0 \times n1 \times n2 \times n3 \times n4$

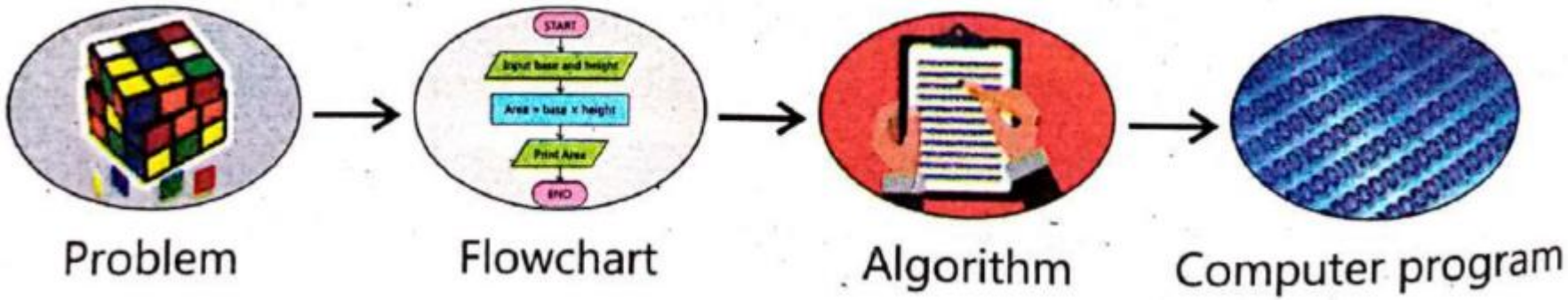
Step 5. Set *average* to $\frac{n0+n1+n2+n3+n4}{5}$

Step 6. Output *sum, product, average*

Step 7. End

Role of algorithm in problem solving

- It plays an important role in computer programming.
- Computer programming is the process of taking an algorithm and coding it in a programming language.
- It is a complete description of the solution.



Efficiency of an algorithm

- More than one algorithms to solve the same problem which one is better depends upon the efficiency of the available solution algorithms.
- It is measured on the basis of two metrics,

➢ Number of steps

➢ Space used in computer memory

Example:

Let's suppose we have two algorithms to solve a certain problem. One algorithm has N steps whereas the other algorithm has N^2 steps. In this case the former algorithm is considered more efficient than the latter one.

Do you know?

There are 64 squares on a chess board. If we place wheat upon each square such that one grain is placed on the first square, two on the second, four on the third, and so on (doubling the number of grains at each square), then there will be 18,446,744,073,709,551,615 grains of wheat on the chessboard at the finish.

Home work:

Write the algorithms of all problems starting from pg# 12 to 18 on your note book.