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Identification of Computational Problems

⇒ Part of scientific method

⇒ It is a systematic process to identify, evaluate and explore potential solutions.

Two steps of Identification :

i) Identifying and acknowledging that there is a problem.

ii) Developing a problem identification statement.

Computational thinking

A way of thinking to identify the computational problem. Understanding of CT will give a solution for solving a problem. The problem solving process ends with writing a program.

* In order to make predictions using CT. four steps are used.

i) decomposition
ii) Patteren Recoginition
iii) Abstraction
iv) Algorithm Design

i) Decomposition

⇒ Analysing the problem
⇒ stating it precisely
⇒ Establishing the solution

Breaking the problem into smaller, more familiar components. So they can be managed easier.

ii) Patteren Recoginition

Find the similarities and trends within the problem.
similar problem can be solved using similar or repeated techniques.
Doing so will save the time.

iii) Abstraction

Rather than looking all specific details filter out unnecessary elements of a problem and focus on the important element.

iv) Algorithm Design

Step by Step procedure or set of instructions are created which explain how to solve the problem.

ALGORITHMS

* An Algorithms is an ordered sequnce of finite, well-defined unambiguous instructions for completing a task. It is a step-By-step procedure for solving any problem.

* Algorithm is an english-like representation of the logic which is used to solve the problem.

* To accomplish a particular task, different algorithms can be written. They differ by their time and space.

* The programmer selects the best suited algorithm for the given task to be solved.

* The algorithm can be implemented in many different languages by using different methods & Programs.

* The algorithm is independent of any programming language.

(Q1) write an algorithm to add any two numbers.

Step 1 : Start the process

Step 2 : Read any two numbers in a and b

Step 3 : Compute c = a + b

Step 4 : Print the Output, c.

Step 5 : Stop the Process.

Note : Abdullah Muhammed bin Musa al-Khwarizmi - Father of algebra / Algorithmist (one who created guidelines for Algorithm)

Q2: write an algorithm to find the product of any two numbers.

Step 1 : Start the process

Step 2 : Read any two numbers in x and y

Step 3 : Compute $z = x * y$

Step 4 : Display the result, z.

Step 5 : Stop the process.

Guidelines for writing an algorithm

a) The Algorithm should be clear, precise and well-defined.

b) ~~The~~ It should begin with Start the process and ends with stop the process.

c) Each step should be written in separate lines

d) Steps should be numbered as Step 1, Step 2 and so on.

Properties of an algorithm.

a) Finiteness b) Definiteness c) Input

d) Output e) Effectiveness

Advantages :

i) simple to understand

ii) Step by step solution of the problem.

iii) Easy to debug

iv) Independent of programming langs.

v) It is compatible to computers, because each step of an algorithm can be easily