

ATAL INNOVATION MISSION

# Let's Summarize learnings from Day 1





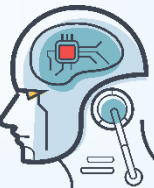
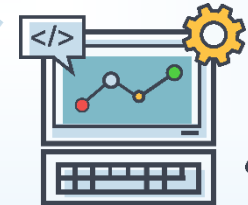
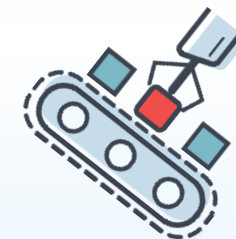
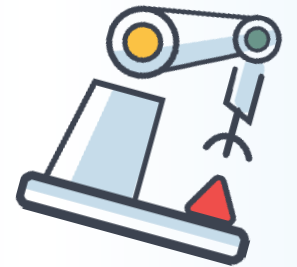
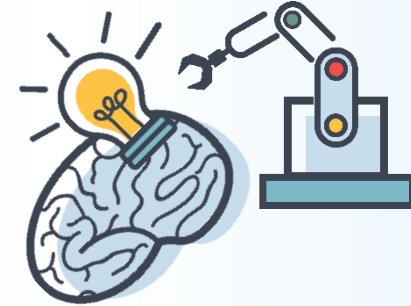
# ACTIVITY – Ice Breaker



Share one key quality about your team-mate from yesterday's activity



'What I will learn today' – Which would help you solve that problem on a sticky note and place it on a wall





# INTRODUCTION TO Computational Thinking

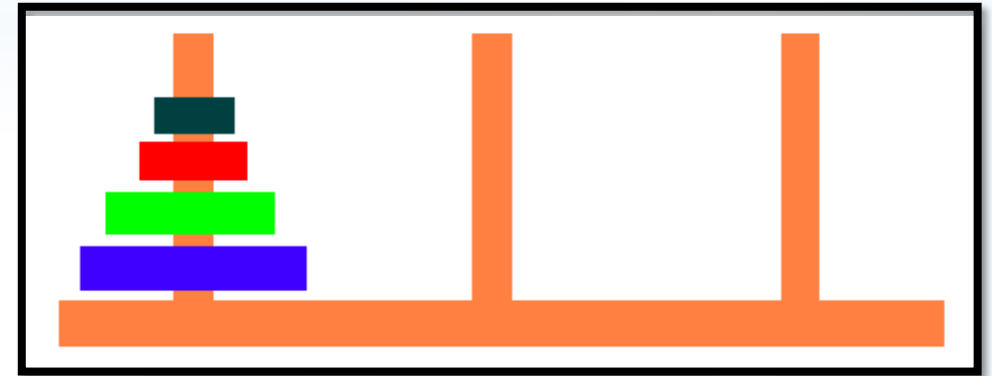


# Let's play “TOWER OF HANOI”

✓ Move all the disks/rings to tower 3 (on extreme right). But you cannot place a larger disk on to a smaller disk.

✓ As you take steps to move the disks, keep writing the commands you use for the transfer of disks on a sheet of paper.

✓ Example, if you move a disk to the left, write that down as 'Shift red disk to the right' and so on.



## Tower of Hanoi

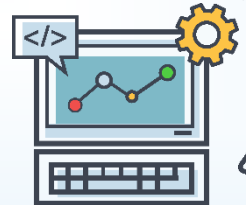
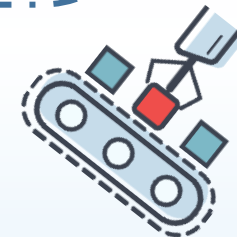
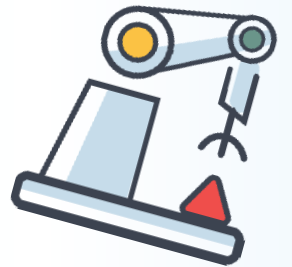
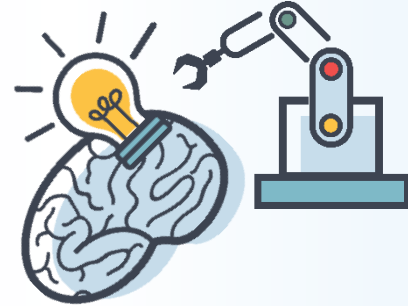
Move only one disk at a time. Move disk from one post to another. Transfer the disks from the left post to the right. Never put a larger disk on top of a smaller one



# Challenge

Given, the number of disks find out minimum number of steps required to solve the puzzle.

Write down the steps you have taken to solve this puzzle.



**Computational thinking** is the thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer—human or machine—can effectively carry out.

## What is Computational Thinking?



# WHY COMPUTATIONAL THINKING?



**Builds  
Confidence**



**Builds  
Analytical Skills**



**Fosters a Problem  
Solving approach**



**Future  
Opportunities**



**Improves  
Logical Thinking**



***Computational thinking***



**01**

Is not thinking like a computer

**02**

Does not always requires use of computer

**03**

Does not limit creativity





# Computational Thinking

- Computational Thinking (CT) is the process of breaking down a complex problem into simple steps, understand what the problem is and develop possible solutions. These solutions can be presented in a way that a computer, a human, or both can understand.
- The important elements of computational thinking are Decomposition, Pattern Recognition, Abstraction and Algorithms.





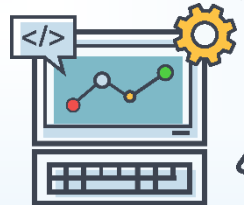
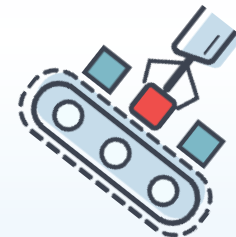
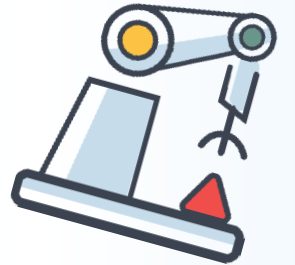
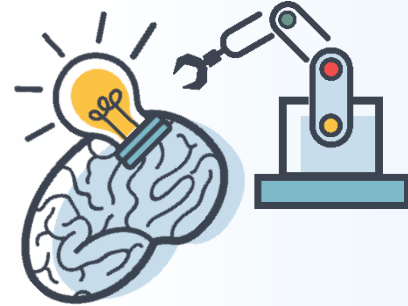


# Activity Math

Try solving math this math problem.

*Add numbers 1 to 100 in one min*

$$1 + 2 + 3 + 4 + 5 ..... + 99 + 100$$



# STEPS OF COMPUTATIONAL THINKING



## STEP 1

**Decomposition:** Breaking down the problem into simple and easily manageable parts

## STEP 2

**Pattern matching:** Observing patterns, trends and regularities in the problem situation

## STEP 4

**Algorithm:** Listing do-able steps to solve the problem

## STEP 3

**Abstraction:** Removing or Ignoring the unimportant information and retaining only that information which will be useful to formulate a solution



# Decomposition

Decomposition is the process by which we breakdown a problem / task in to minute details such that we clearly express the individual attributes or variables to a computer or another person or even to oneself!

**Decomposition-** To add the numbers between 1 to

100 we usually do

$$1+2=3$$

$$3+4=7$$

$$5+6=11$$

7+8=15      Or we can break it into

$$100+1=101$$

$$99+2=101$$

$$98+3=101$$

$$97+4=101 \text{ etc.....}$$

## Decomposition

Breaking down into parts

Decomposition is breaking a problem or system down into its parts.



# Pattern Recognition

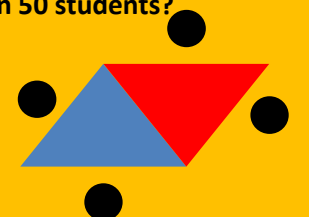
Pattern recognition is important as it allows us to identify important / critical information and leave the rest of the data.

**Pattern Recognition:** Observing patterns, trends, and regularities in data, We need to figure out how many times the 101 pattern repeats.

To find out the number of times 101 repetition we can divide 100 by 2  
 $100/2=100$  Pairs.



All Tables in a School are equilateral triangles, seating one student at a side. By joining two tables, we can sit 4 students. How many tables are needed to join 50 students?



# Abstraction



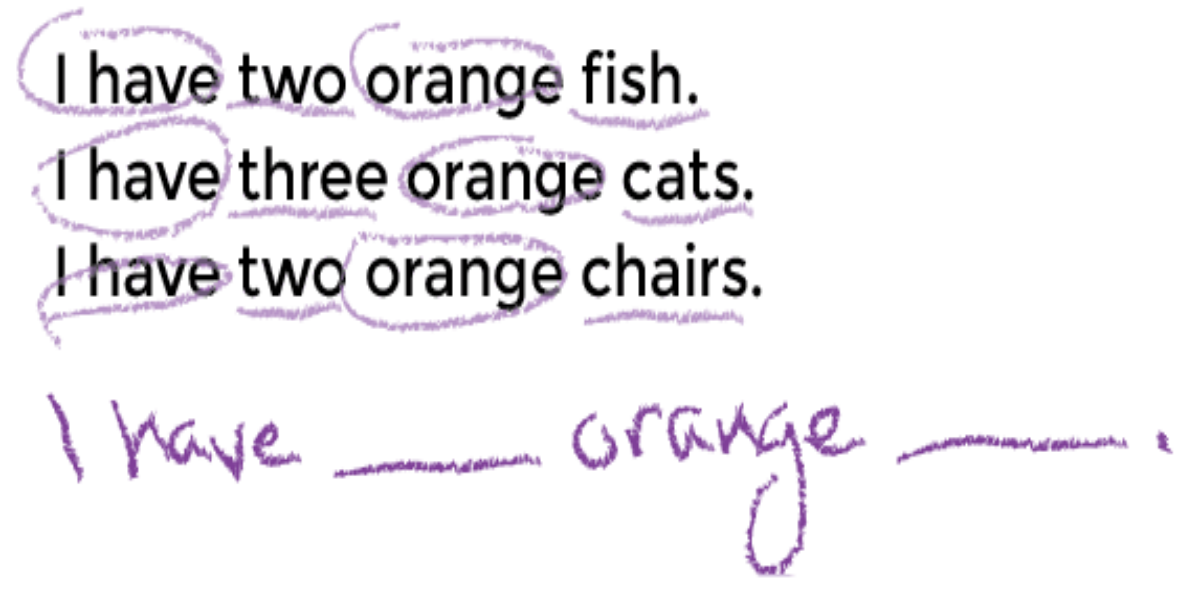
Abstraction is the process of filtering out – ignoring - the characteristics of patterns that we don't need in order to concentrate on those that we do. It is also the filtering out of specific details. From this we create a representation (idea) of what we are trying to solve.

**Abstraction:** Identifying the general principles that generate these patterns

All the pairs have the same sum, so we can get rid of these now. If we focus only on the important details, we see that we can express the problem as an equation.

$$(100+1)*(100/2)=5050$$

Sum of each pair \* number of pairs



I have two orange fish.  
I have three orange cats.  
I have two orange chairs.  
I have — orange —



# Algorithm

Ability to develop a step by step solution for solving a problem. In computer programming, algorithm are written abstractly using variables instead of specifics.

**Algorithm Design:** Developing the step by step instructions for solving this and similar problems

So finally

We did the following steps to get the final results

STEP1:  $100+1=101$

STEP2:  $100/2=50$

STEP 3:  $101*50=5050$

## white sauce pasta with vegetables

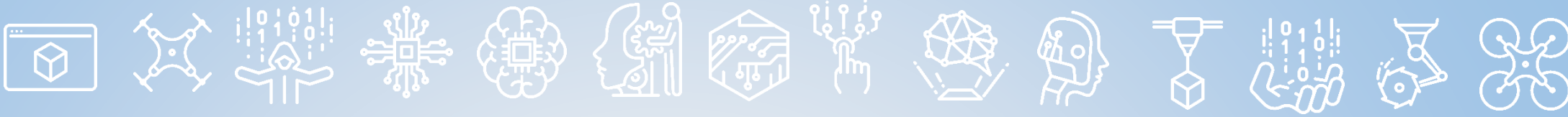
★ ★ ★ ★ ★  
5 from 1 reviews



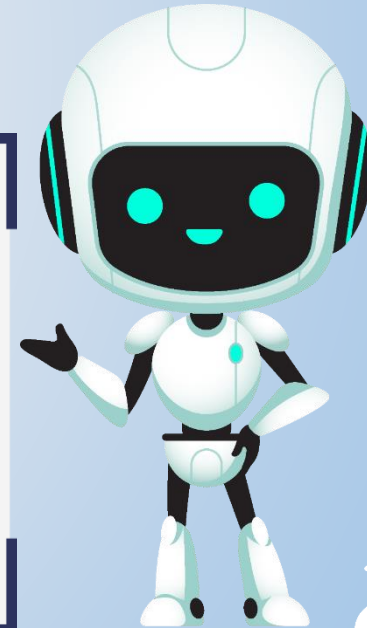
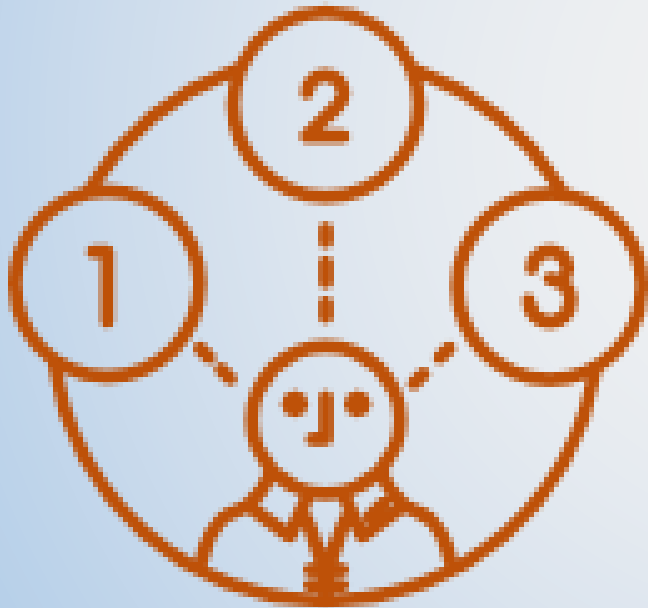
*Prep Time:* 15 minutes *Cook Time:* 20 minutes  
*Yield:* 4 Servings ☐ *Category:* Mains *Cuisine:* Italian

### INGREDIENTS

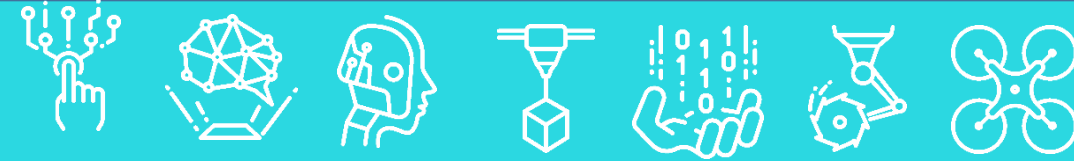
- 150 grams or 1 1/2 cups dried Pasta (Macaroni/Penne/Fusilli/Orecchiette/Rigatoni)
- 2 tablespoon Salt
- 5 cups Water
- 2 tablespoon Butter
- 1 tablespoon Olive Oil
- 4-5 cloves Garlic, minced
- 1 cup Onion, diced
- 1/2 cup Broccoli florets



Learn how to solve complex problems with **computational thinking**. Decomposition, Pattern Recognition etc.







# Worksheet Time



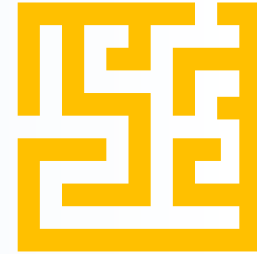




SEYMOUR PAPERT, WAS  
THE PERSON TO TERM  
COMPUTATIONAL  
THINKING.



THE FIRST CHILDREN'S TOYS WITH  
BUILT-IN COMPUTATION WERE CREATED  
IN SEYMOUR PAPERT'S LABORATORY IN  
THE 1960'S .



PUZZLES ARE A GREAT AND FUN  
WAY TO DEVELOP COMPUTATIONAL  
THINKING SKILLS.

