Role of computer in daily life

- Computers can be used for solving various day to day problem.
- some of the uses are :
- Document editing
- Calculator /Diary /Drawing /painting.
- Internet browsing.
- E-mail.
- Computer games.

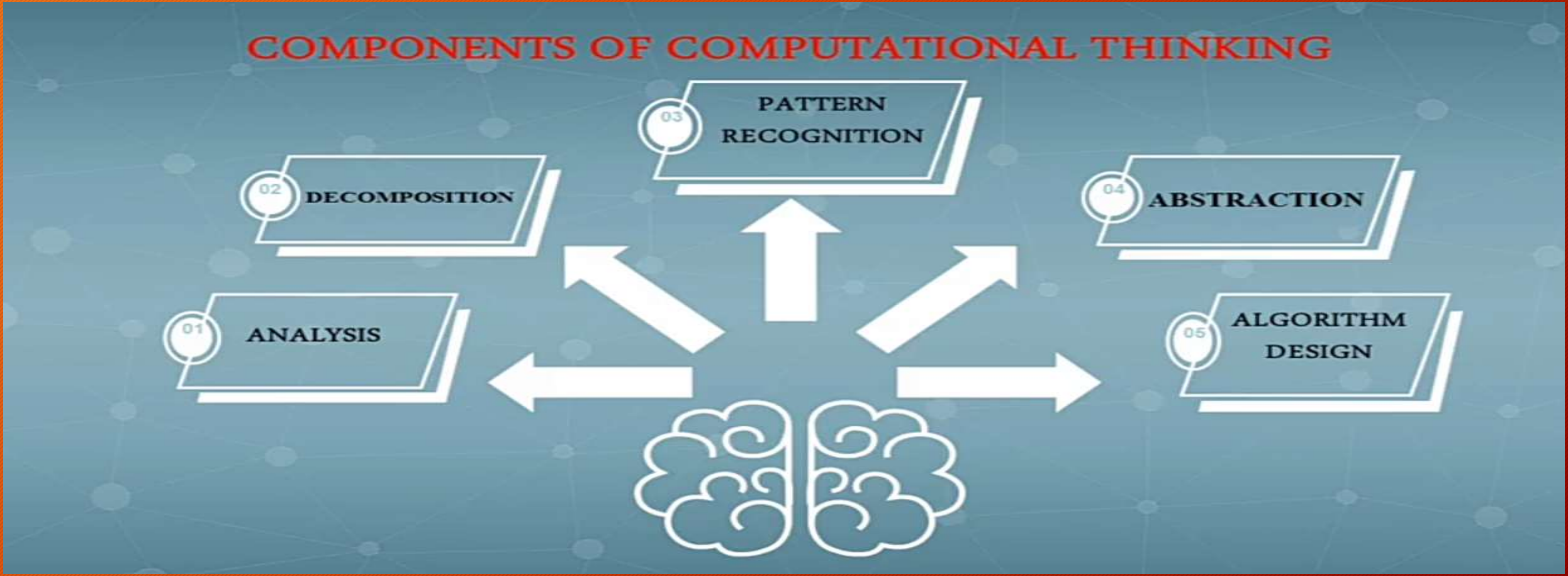
Role of computer in government /industry

- E-governance.
- Video surveillance.
- Biometric attendance.
- E-commerce /M-commerce.
- Industry quality testing.
- IRCTC.

Computational thinking

- The knowledge of using computers to perform our daily activities is called computational thinking.
- The skill is needed for everyone in modern society for survival.

Components of computational thinking



Algorithimc thinking

- Algorithmic thinking is the necessary analytical skill required to solve the problem.
- The skill is not unique to algorithms but rather general in nature and applicable for all domain like civil engineering.

Role of algorithm in computer science

- Computer science is the domain where algorithmic thinking is taught so one can write efficient program and application.

Formal definition of computer science by Gibbs and Tucker (1986).

Computer science is the study of algorithm and precisely

Formal and mathematical properties of algorithm.

Hardware realization of algorithm.

Linguistic realization of algorithm.

Application of algorithm.

Role of algorithm in computer science explained

Formal and Mathematical properties of algorithm :

It includes algorithm correctness, algorithm design and analysis.

Hardware realization of algorithm :

It includes computer hardware for running algorithm.

Linguistic realization of algorithm :

It includes compilers, interpreter and linker.

Application of algorithm :

It includes tools and packages.

The message

- Algorithms is the core of computer science.
- Computer science is the study of realization of algorithm.
- So we need to study algorithm.
- **Without studying algorithms computer science study is not complete**

Key terminology

- Instance of an algorithm.
- Domain of an algorithm.
- Input size.

Key terminology explanation

- **Instance of an algorithm :** A valid input from legal set of input data for the algorithm is called an instance of an algorithm.
- **Domain of an algorithm :** All possible input of an algorithm is called a domain of the input data.
- **Input size :** the number of binary bits used to represent the given input is called input size.

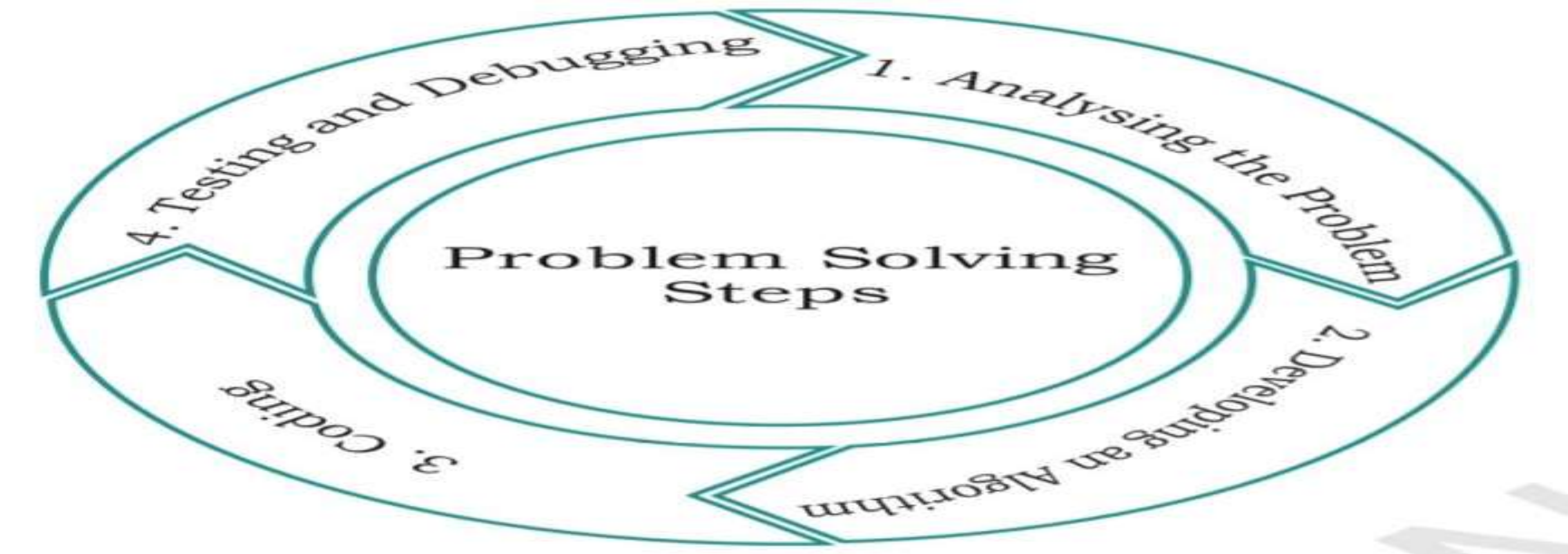
Introduction to problem solving

- Computers can be used for solving various day to day problem.
- Problem solving an essential skill for computer science student.
- Success of computer in solving a problem depends on how correctly and precisely we define the ***problem*,*design*** a solution(***algorithm)*** and implement the solution (***program)*** using a programming language.
- Problem solving is the process of identifying a problem,developing an algorithm for the identified problem,developing an algorithm for the identified problem and finally implementing the algorithm to develop computer program.

Steps for problem solving

- For a complex problem a methodical approach is needed for right solution.
- Problem solving technique begins with the precise identification of the problem and ends with a complete solution of problem in terms of a program or software.

Problem solving steps



Analyising the problem

- Important to clearly understand the problem.
- Read and analyze the problem statement carefully in order to list the principle component of the problem and decide the core functionalites that core solution should have.
- By analyzing the problem we would be able to figure out what is the input that our program takes and the output that it should produce.

Developing an algorithm

- It is essential to device a solution before writing a program code for a given problem.
- The solution is represented in natural language and is called ***Algorithm***.
- Algorithm is a set of exact steps which when followed solve the problem or accomplished required task.

Coding

- After finalizing the algorithm we need to convert the algorithm into format which can be understood by the computer to generate the desired solution.
- Different high level programming language can be used for writing a program .
- Details of coding procedure followed is recorded and document the solution.this is helpful when revisiting the program at later stage.

Testing and debugging

- The program created should be tested on various parameters.
- The program should meet the requirements of the user.
- It must respond within the expected time.
- It should generate correct output for all possible input.
- Different types of testing are used to ensure that software meets all the business and technical requirements and works as expected.

Testing and debugging

- The error or defect found in the testing phase are debugged or rectified and the program is again tested this continues till all the error are removed from the program.
- Once the software has been delivered to the user, still the problem in terms of functioning can come up and need to be resolved from time to time.

Example of problem solving

- Problem :to sort the given number in ascending order.

Analysis of problem

In the analysis of problem we will observe how the numbers are related to each other if there is two number say x and y:

Then there is only three possibilities .

1. $x>y$
2. $x<y$
3. $x=y$

Example contd.

- If any two subsequent number is not in proper position we can interchange the position of those two numbers.
- And keep on scanning the given list of number of number until the all number is in sorted order.

Algorithm

- Purose: arrange the number in ascending order
- Input :
- n – the number of items present in the set.
- a – the items to be sorted are present in the set.
- Output :
- a: contains the sorted list.

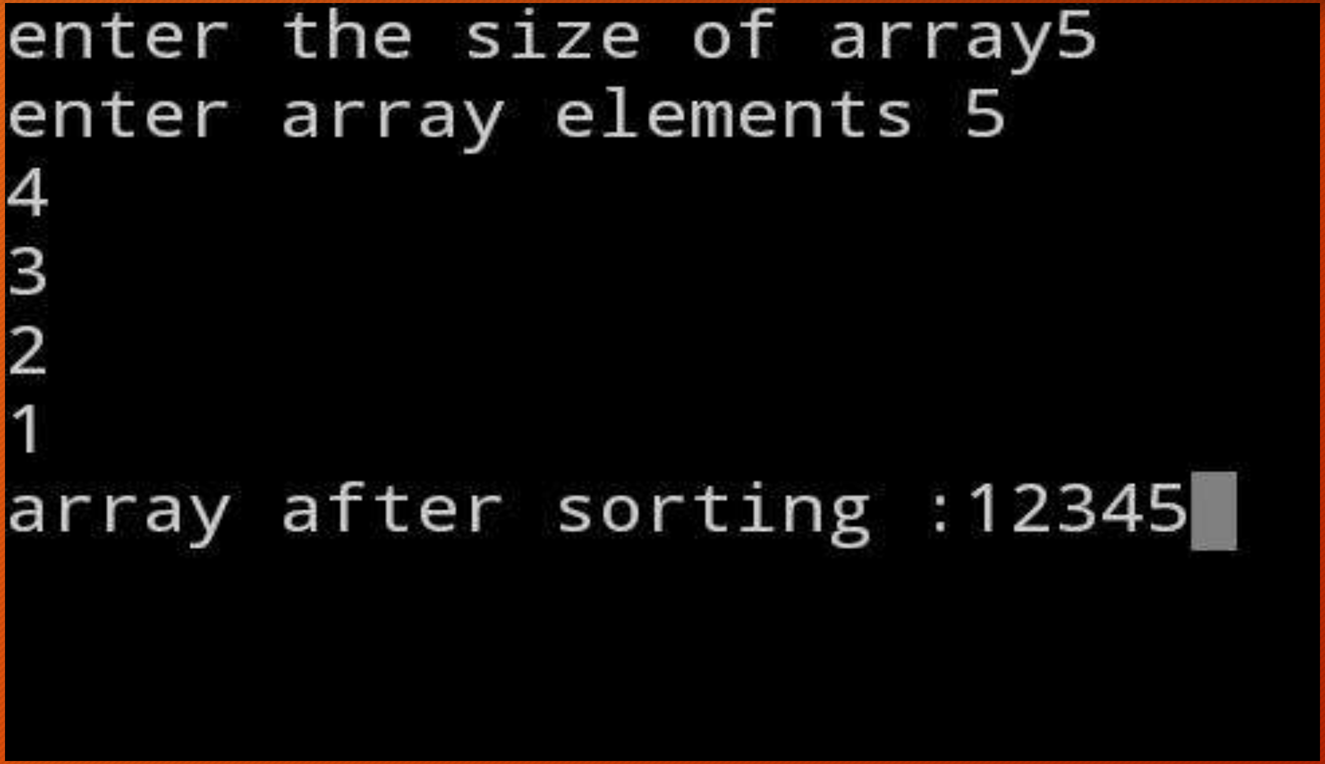
Algorithm for sorting

```
• for i=1 to n-1
      for j=0 to n-1
       if (a[j]>a[j+1])
         temp :=a[j]
          a[j] :=a[j+1]
          a[j+1]:=temp
 end if
end for
end for
```

Program for sorting

```
#include<stdio.h>
 int main ()
{
 int a[50];
  int i,j,size,temp;
printf ("enter the size of array");
  scanf("%d",&size);
  printf("enter array elements");
   for(i=0;i<size;i++)
scanf("%d",&a[i]);
for(i=0;i<size-1;i++)
 {        for(j=0;j<size-1;j++)
  {            if (a[j]>a[j+1])
  {        temp=a[j];
   a[j]=a[j+1];
a[j+1]=temp;            }        }        }
   printf("array after sorting :")
;    for(i=0;i<size;I
    printf("%d",a[i]);    }
```

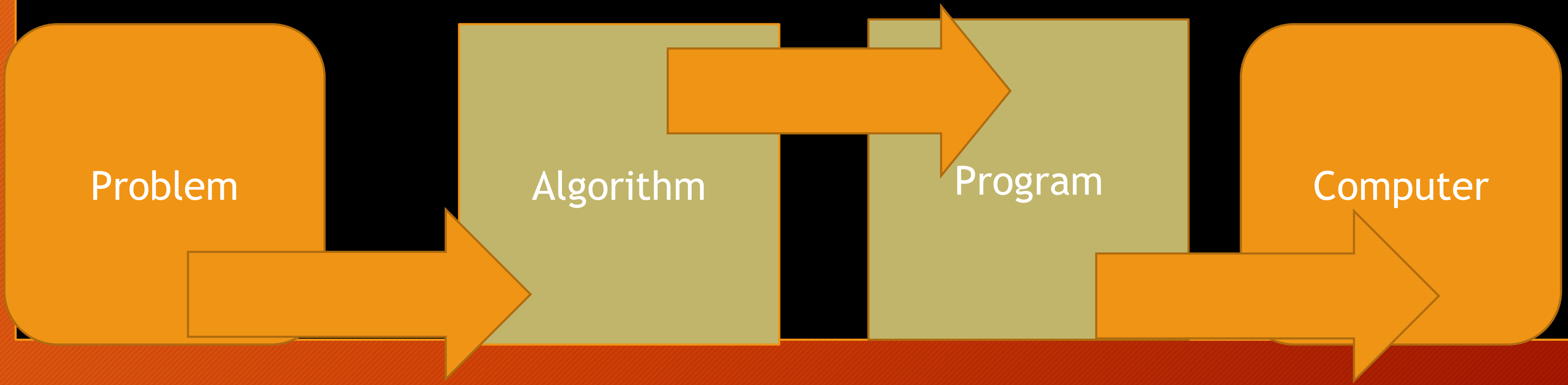
Output



```
enter the size of array5
enter array elements 5
4
3
2
1
array after sorting :12345
```

Revisiting algorithm

- An algorithm is defined as finite sequence of unambiguous instructions followed to accomplish a given task.



Problem

Algorithm

Program

Computer

Properties of algorithm

- Input.
- Output.
- Definiteness.
- Effectiveness.
- Finiteness.

Properties explained

- Input :Each algorithm should have zero or more inputs.
- Output :the algorithm should produce correct output.
- Atleast one output should be produced.
- Definiteness :each instruction should be clear and unambiguous.
- Effectiveness :the algorithm should contain instructions that are simple and should transform given input to desired output.
- Finiteness:the algorithm should terminate after a finite sequence of instruction.

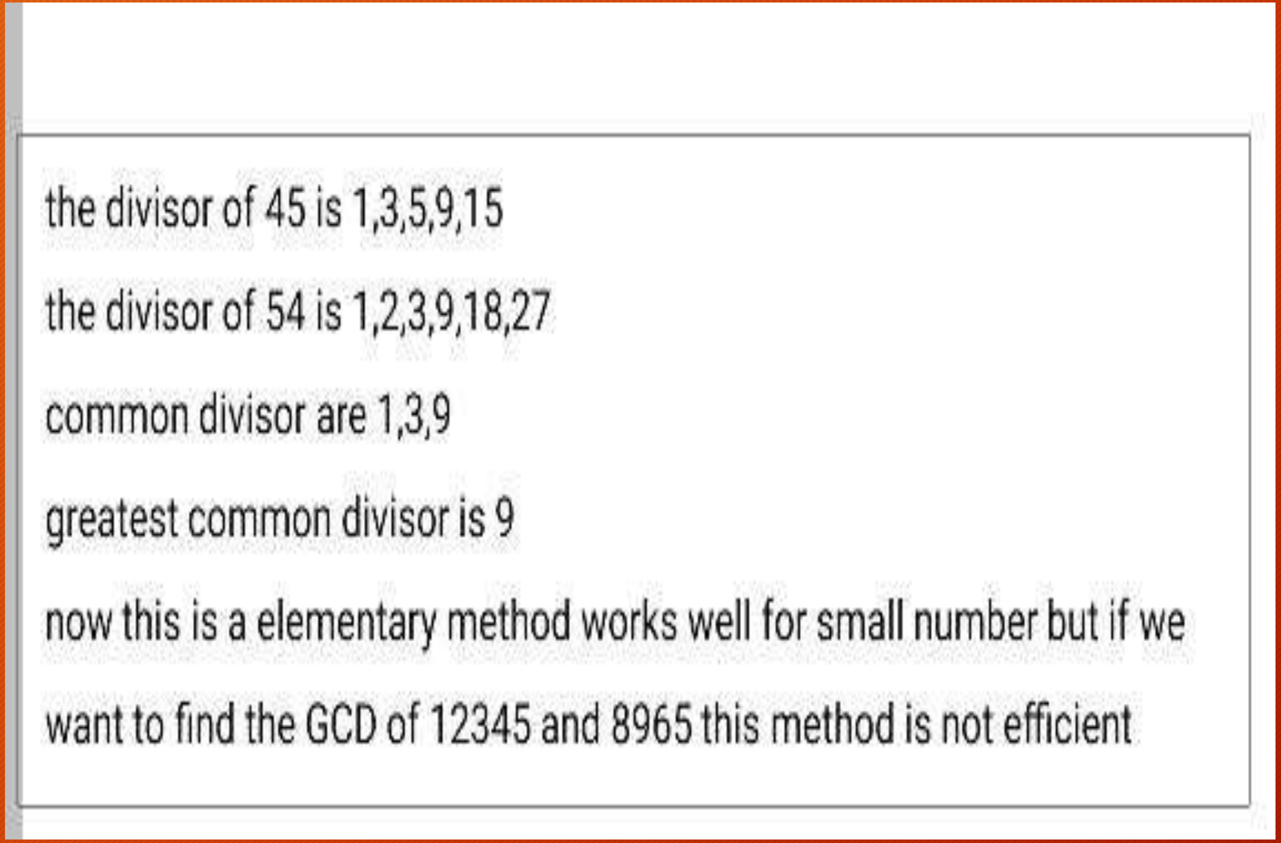
Why algorithm is needed

- Acts as roadmap for before final solution.
- Algorithm is building blocks of a computer program.
- Algorithm increases the relibility ,accuracy and efficiency of solutions.

Some real life analogy for algorithm

- talking to friends over mobile.
- 2 minute Maggie is ready! .
- Finding phone number by name in phone directory.

Understanding need of algorithm



the divisor of 45 is 1,3,5,9,15

the divisor of 54 is 1,2,3,9,18,27

common divisor are 1,3,9

greatest common divisor is 9

now this is a elementary method works well for small number but if we want to find the GCD of 12345 and 8965 this method is not efficient

Finding the GCD understanding the need of algorithm

- Greatest common divisor
- GCD is the largest number that divides both the give number
- Let’s say we have to find the GCD of 45 and 54.
- Gcd of 45 and 54 is 9

While writing an algorithm we need to identify the following

- The input to be taken from the user.
- Processing or computation to be performed to get the desired results

. The output desired by the user.