

Computer programming is the process of designing and building an executable computer program to accomplish a specific computing result or to perform a specific task. Programming involves tasks such as: analysis, generating algorithms, profiling algorithms' accuracy and resource consumption, and the implementation of algorithms in a chosen programming language (commonly referred to as coding)

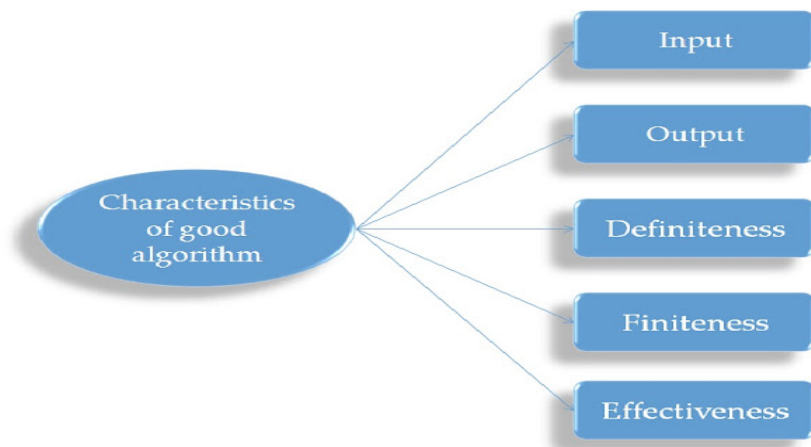
ALGORITHM

An Algorithm is a step-by-step procedure or instructions to solve a given problem.

Each step performs one or more operations.

Properties/characteristics of Algorithm:

1. Input: It should accept input values
2. Output: It should produce one or more output values.
3. Definite: Each step should be clear and unambiguous.
4. Finite: It should terminate after a finite number of steps.
5. Effective: Each step must be basic and necessary.



Algorithm to create Maggie noodles:

Step 1: Start

Step 2: Take pan with water

Step 3: Put pan on the burner

Step 4: Switch on the gas/burner

Step 5: Put maggi and masala

Step 6: Give two minutes to boil

Step 7: Switch off the gas/burner

Step 8: Take off the pan

Step 9: Take out the maggi with the help of spoon

Step 10: Put the Maggi on the plate and serve it

Step 11: Stop.

Advantages of Algorithm:



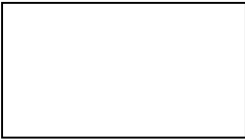
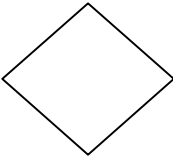
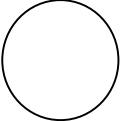
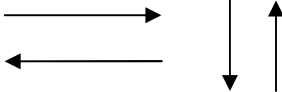
1. Algorithms can be easily written.
2. Easily understood by everyone.
3. Algorithms once written can be easily converted to program.
4. If a program is written based on algorithm, it has fewer errors.
5. Algorithms are same for any language.

FLOWCHART:

Pictorial or graphical representation of an algorithm is known as flowchart.

It uses symbols to represent the order of instructions.

The symbols used in flowchart are given below

Symbol	Name	Function
	Start/End	An oval represents a start or end point
	Input/output	A parallelogram represents input or output
	Process	A rectangle represents a process (calculations)
	Decision	A diamond indicates a decision (condition)
	Connector	A circle represents a connector
	Arrows	A line represents the direction of flow of control.

1. Problem: Algorithm and flowchart to add 2 numbers:

Step 1: Start

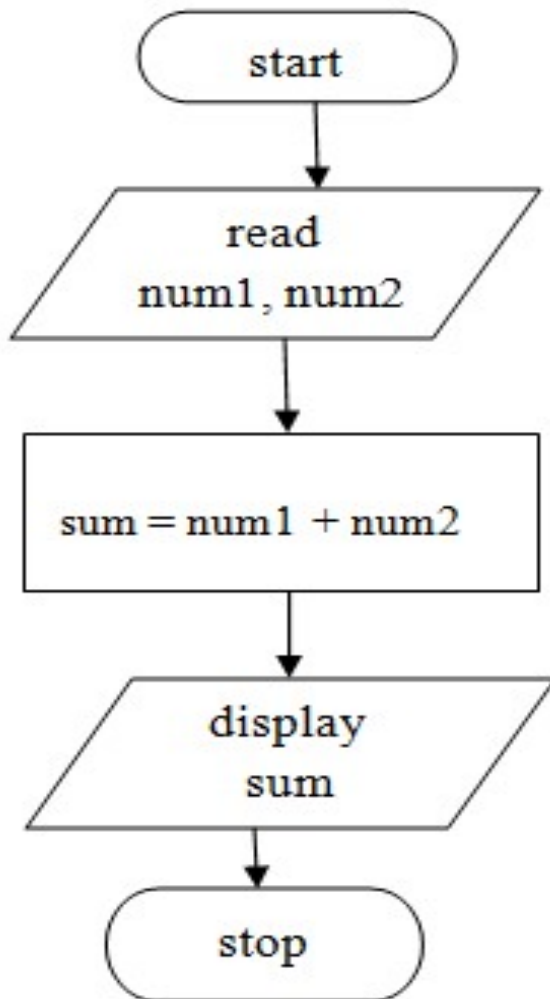
Step 2: read two numbers and store in num1 and num2

Step 3: calculate the sum

$$\text{sum} = \text{num1} + \text{num2}$$

Step 4: display sum

Step 5: Stop.

**2. Problem: Algorithm and flowchart to subtract 2 numbers:**

Step 1: Start

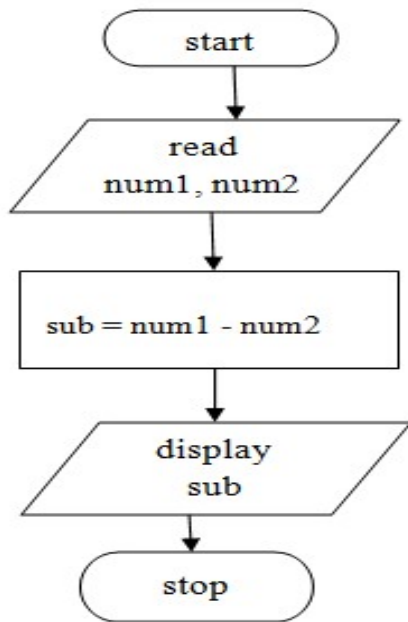
Step 2: read two numbers and store in num1 and num2

Step 3: calculate the difference

$$\text{sub} = \text{num1} - \text{num2}$$

Step 4: display sub

Step 5: Stop.



3. Problem: Algorithm and flowchart to add 3 numbers:

Step 1: Start

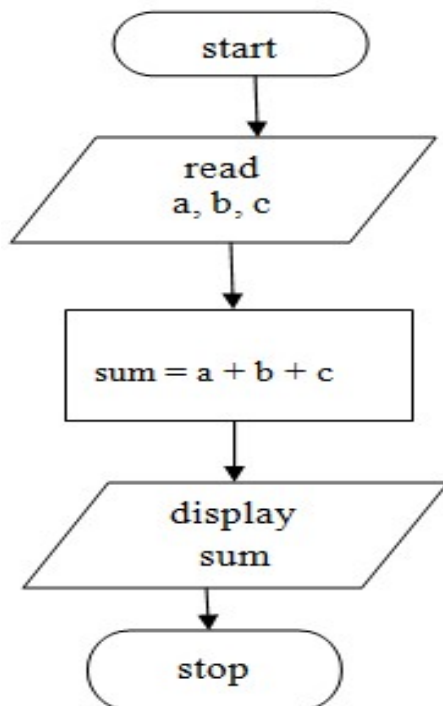
Step 2: read three numbers and store in a, b and c

Step 3: calculate the sum

$$\text{sum} = a + b + c$$

Step 4: display sum

Step 5: Stop.



4. Problem: Algorithm and flowchart to calculate average of 3 numbers:

Step 1: Start

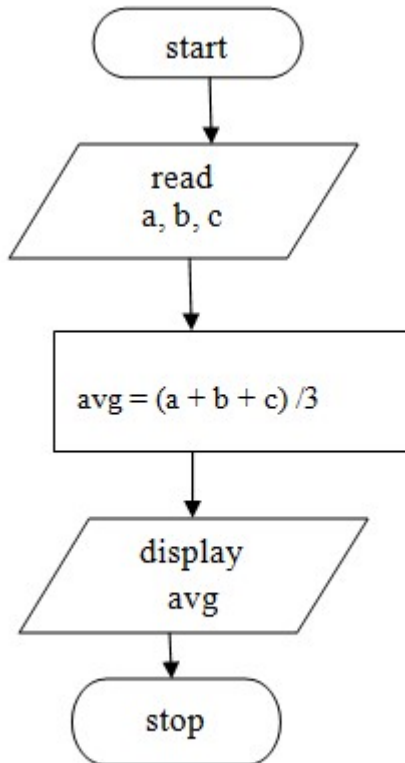
Step 2: read three numbers and store in a, b and c

Step 3: calculate the average

$$\text{avg} = (a + b + c) / 3$$

Step 4: display avg

Step 5: Stop.

**5. Write an algorithm and flowchart to check given number is even or odd.**

Step 1: Start

Step 2: read one number (num)

Step 3: calculate the remainder using modulo operator

$$\text{rem} = \text{num} \% 2$$

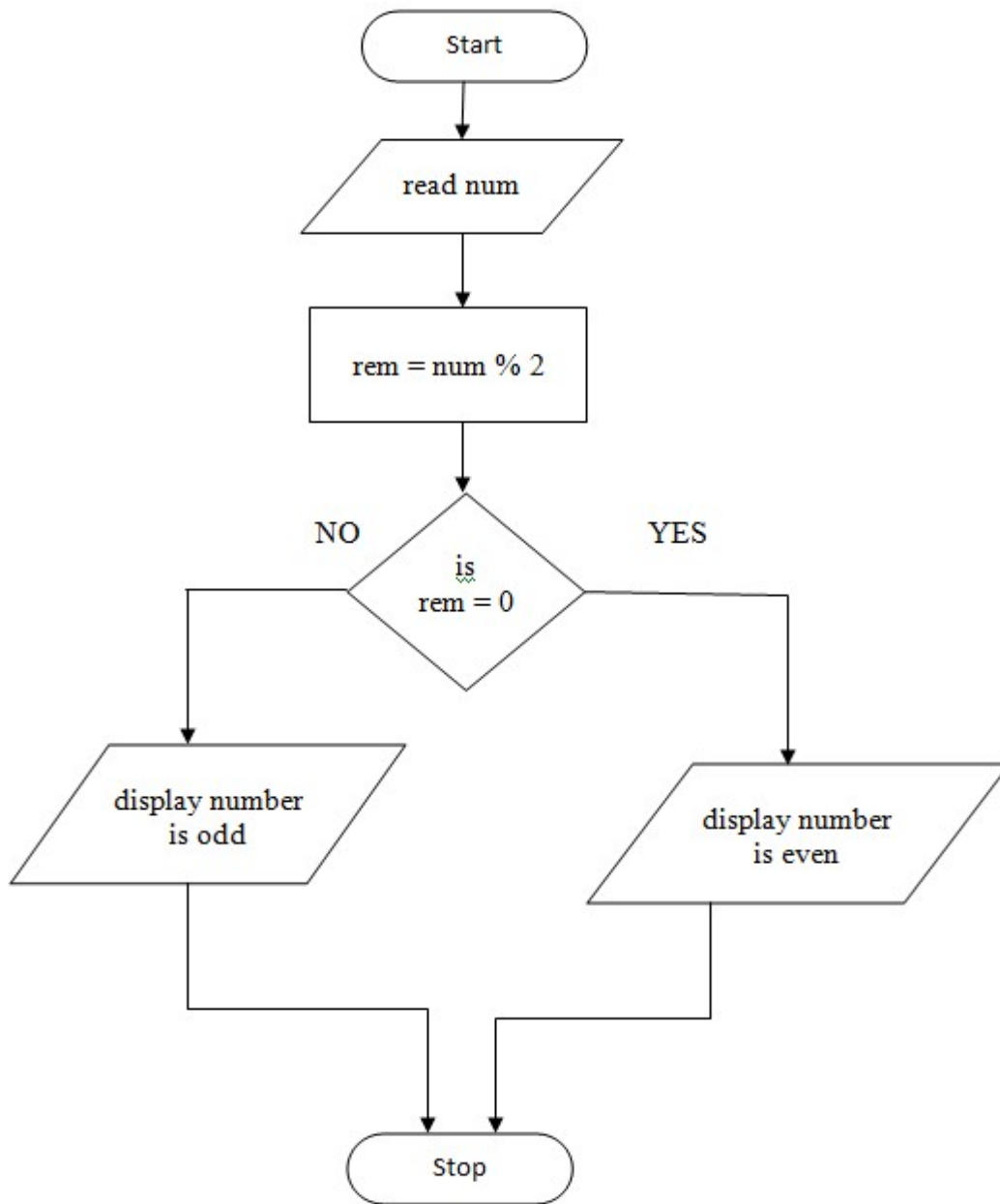
Step 4: if rem = 0

display "given number is even"

else

display "given number is odd"

Step 5: Stop.



6. Write an algorithm and flowchart to check given number is divisible by 7 or not.

Step 1: Start

Step 2: read one number (num)

Step 3: calculate the remainder using modulo operator

$\text{rem} = \text{num} \% 7$

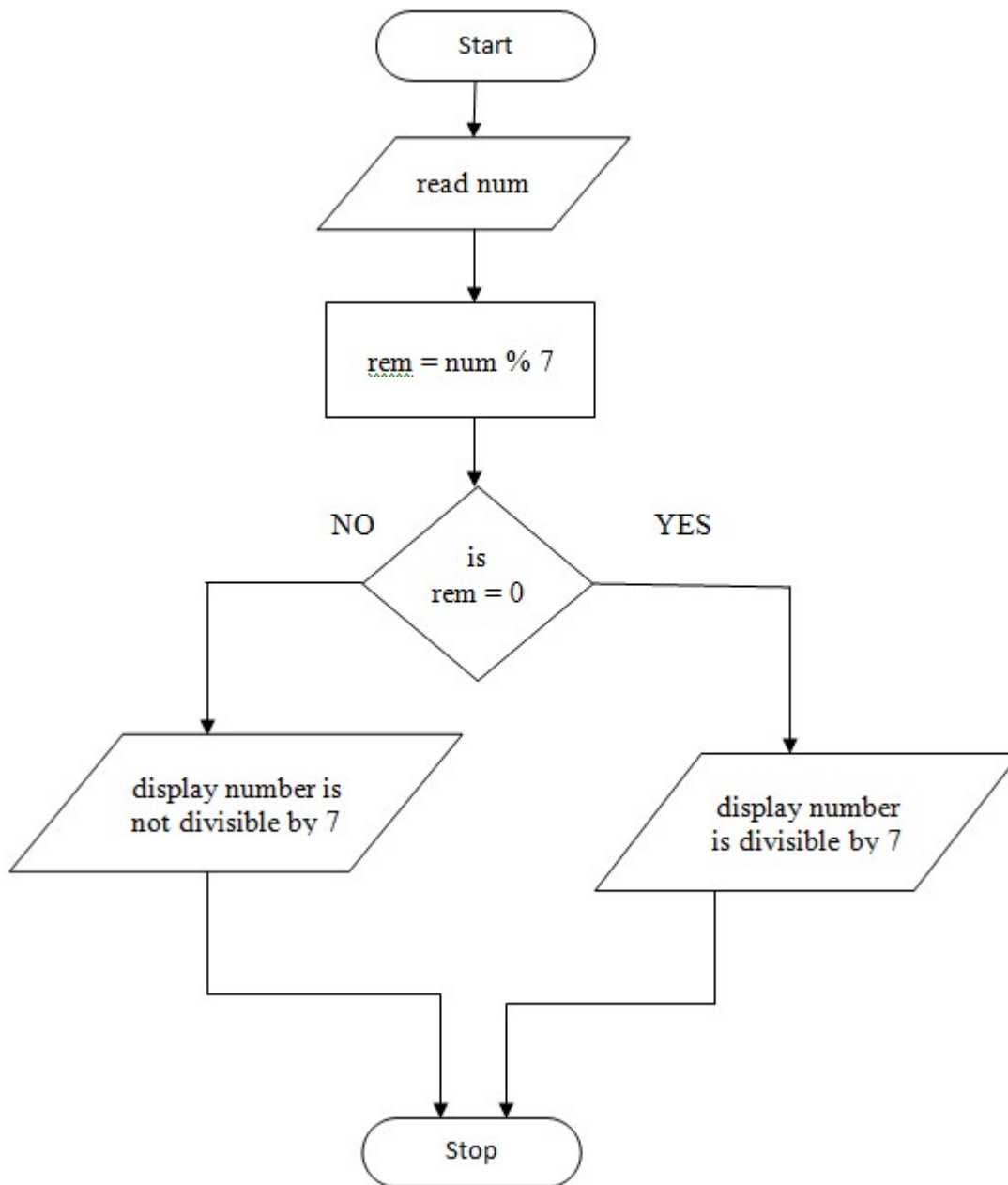
Step 4: if rem = 0

display "given number is divisible by 7"

else

display "given number is not divisible by 7"

Step 5: Stop.



7. Draw flowchart to accept the length of 2 different line segments and check whether they are equal or unequal.

Step 1: Start

Step 2: read 2 line segments L1, L2

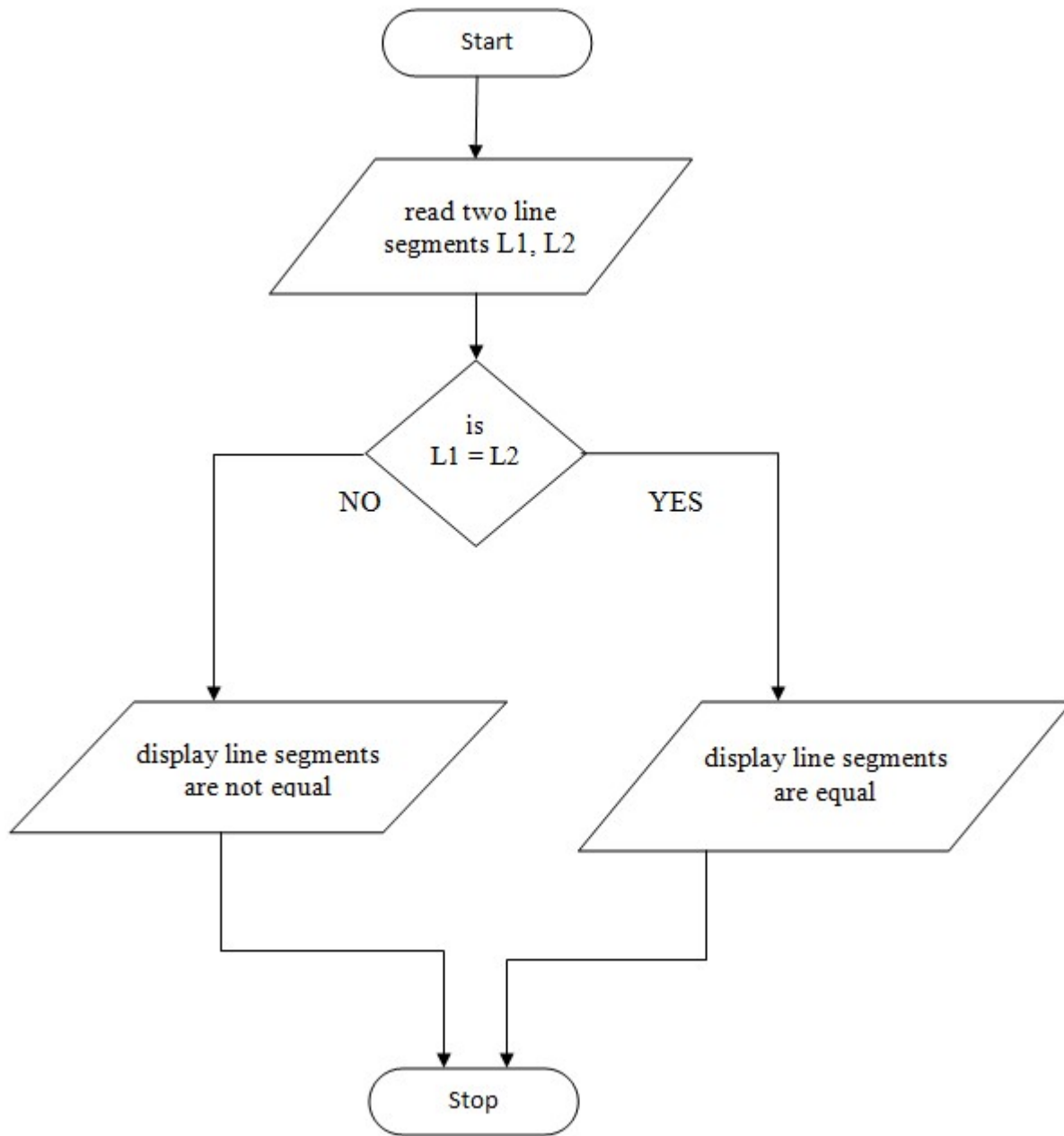
Step 3: if L1 = L2

display "2 line segments are equal"

else

display "2 line segments are not equal"

Step 5: Stop.



8. Write an algorithm and flowchart to find the largest of 2 numbers.

Step 1: Start

Step 2: read two numbers a, b

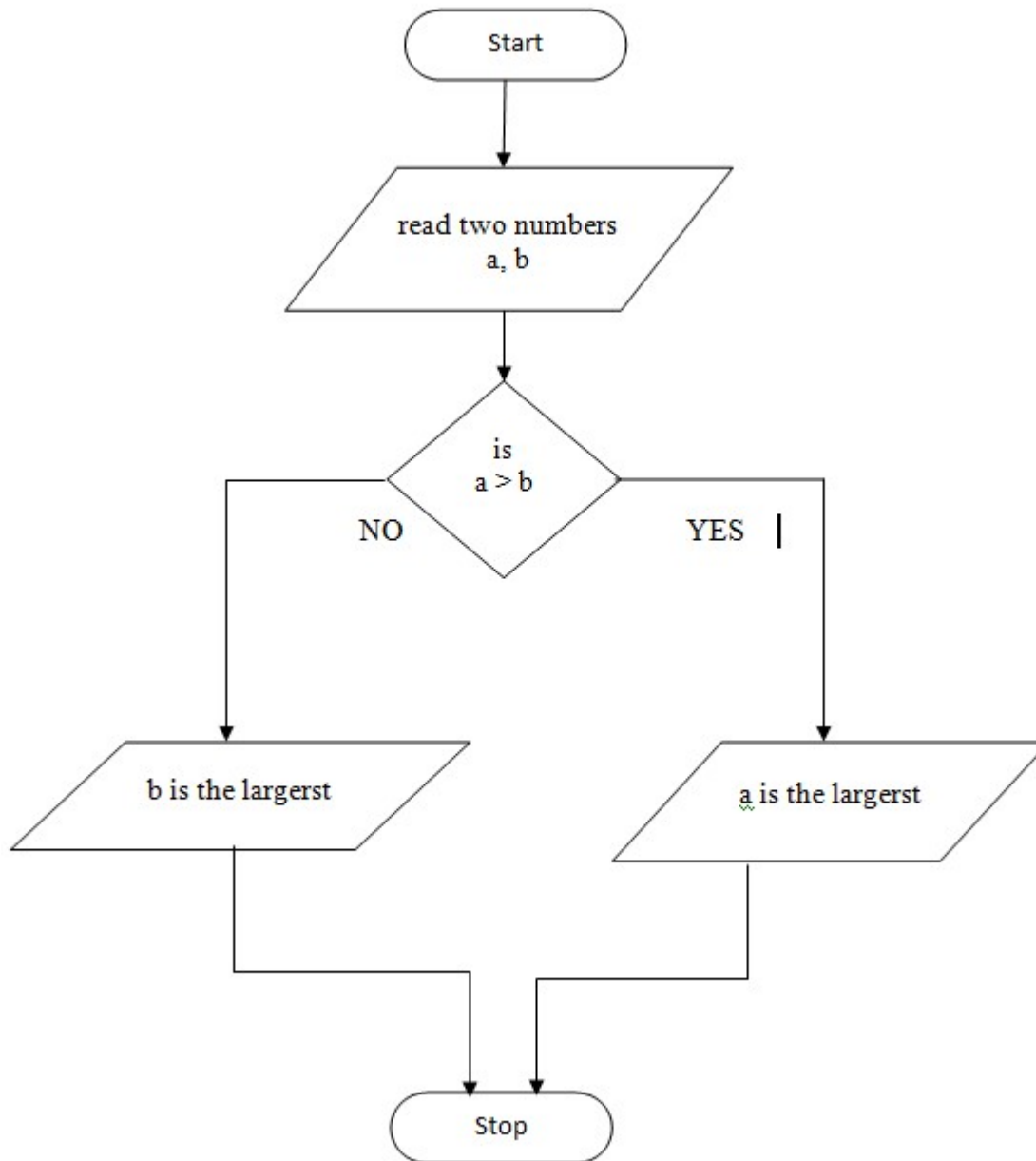
Step 3: if $a > b$

display "a is largest"

else

display "b is largest"

Step 4: Stop.



9. Write an algorithm and flowchart to compute simple interest.

Step 1: Start

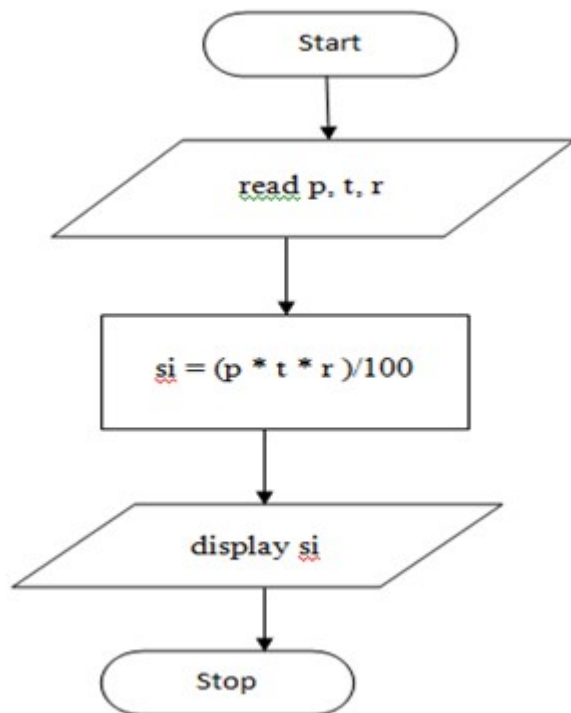
Step 2: read principal amount, time and rate of interest (p, t, and r)

Step 3: calculate the simple interest

$$si = (p * t * r) / 100$$

Step 4: display simple interest si

Step 5: Stop.



10. Write an algorithm and flowchart to calculate area of a circle.

Step 1: Start

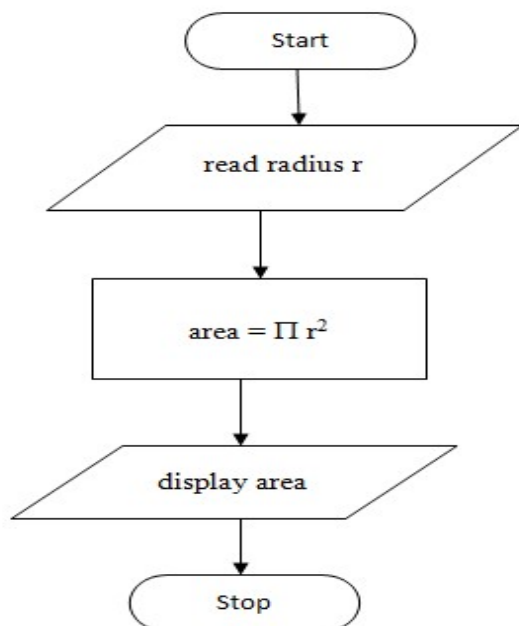
Step 2: read radius r

Step 3: calculate the area of a circle

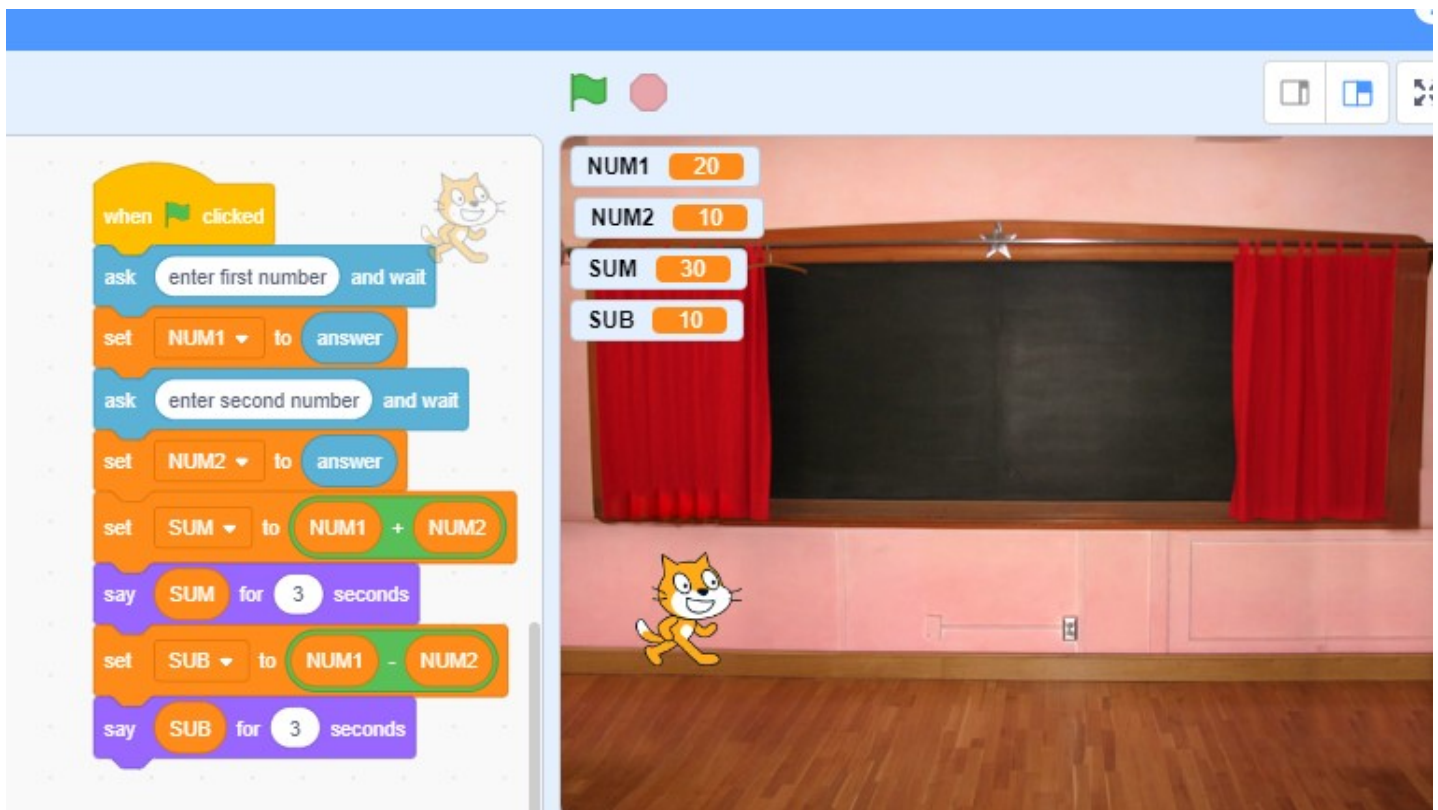
$$\text{area} = \pi r^2$$

Step 4: display area

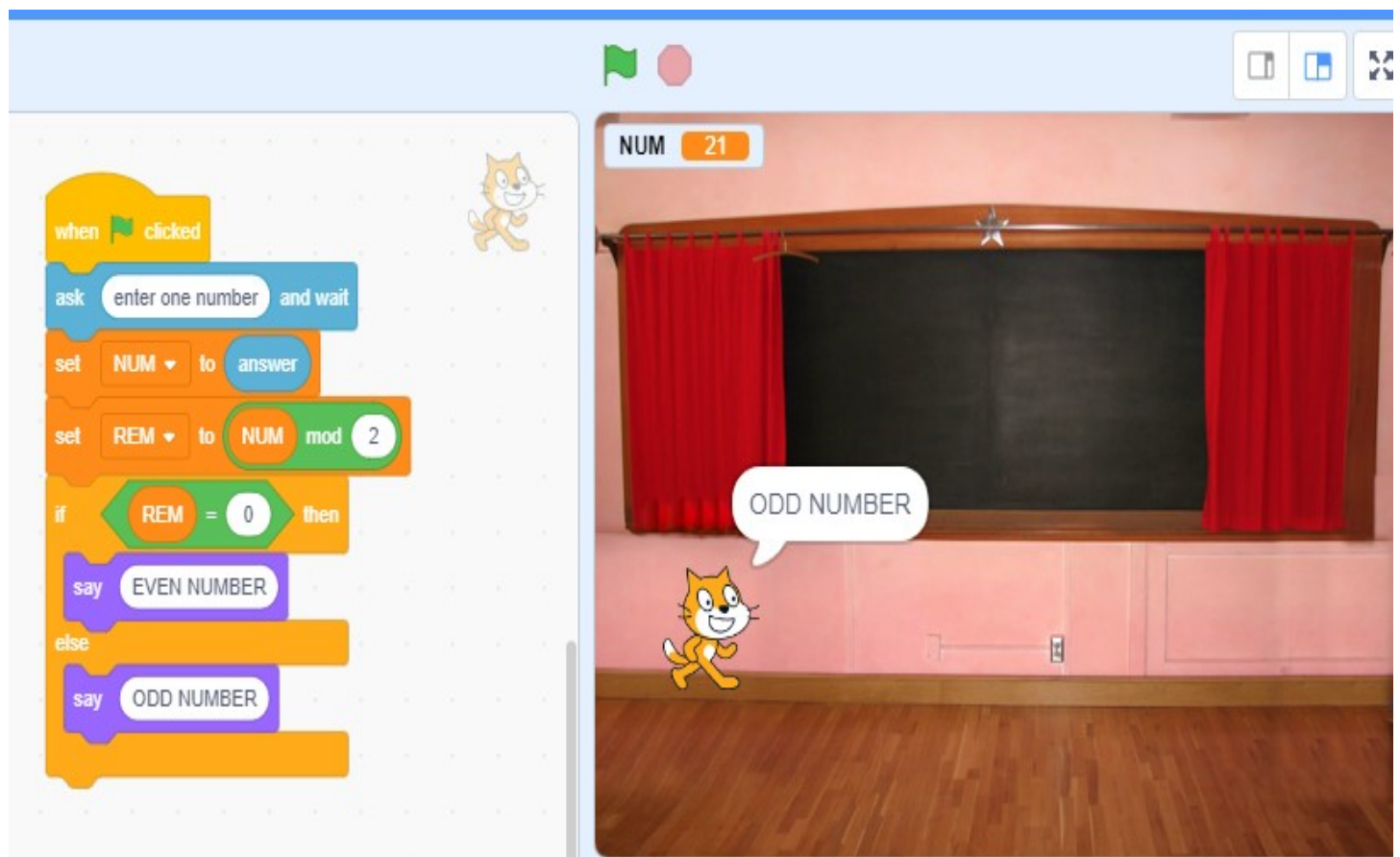
Step 5: Stop.



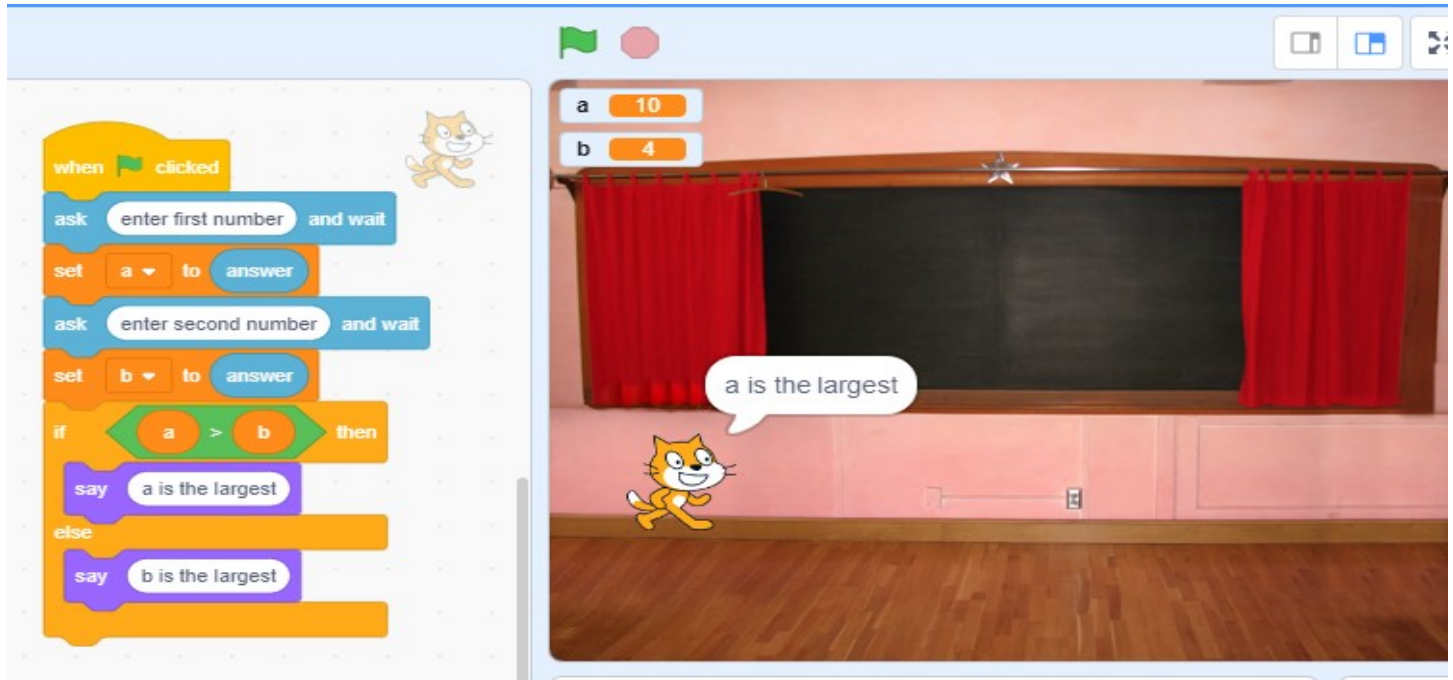
1. SCRATCH PROGRAM TO ADD AND SUBTRACT 2 NUMBERS



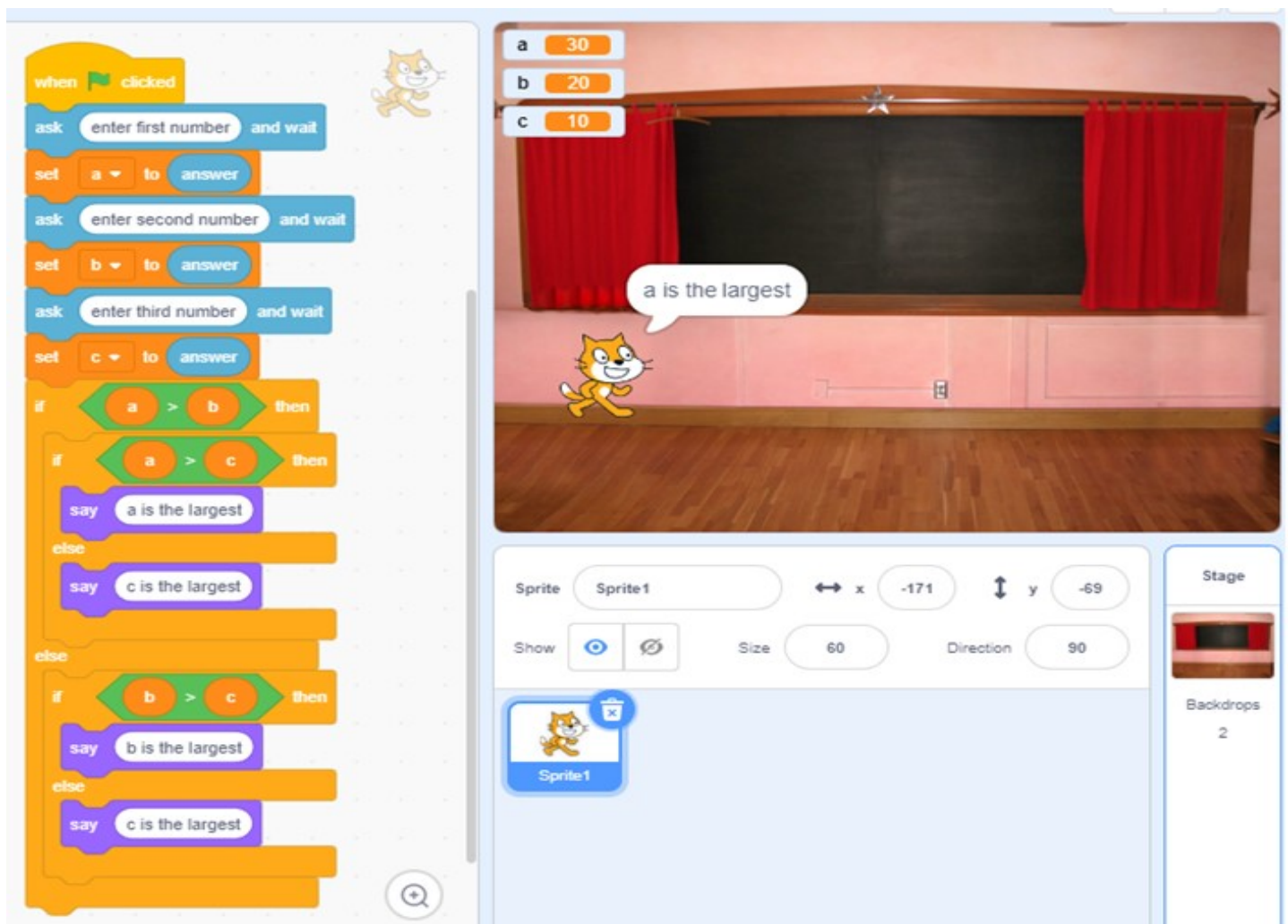
2. SCRATCH PROGRAM TO CHECK WHETHER GIVEN NUMBER IS ODD OR EVEN



3. SCRATCH PROGRAM TO FIND LARGEST OF 2 NUMBERS



4. SCRATCH PROGRAM TO FIND LARGEST OF 3 NUMBERS



Introduction to Application Development

An application is software that is used to accomplish specific requirements of user. For ex. To read PDF files, creating documents, gaming applications, applications to play audio and video files etc.

Before developing any application, it is to be decided which technology and which type of application will be developed.

Types of Applications

Applications can be categorized on various factors like: type of interface, architecture on which it will be operated, platform on which it will be executed and the devices through which a user can access it.

Categorization on the basis of Interface:

Interface is the medium through which a user can interact with the application. On this basis applications are of following types:

Character User Interface (CUI): In these types of applications user is provided a console screen on which instructions can be given in form of commands, that means only using keyboard a user can provide instructions.

Graphical User Interface (GUI): In this type of applications a user can provide instruction through graphical components like: menus, icons, buttons, windows, and links etc. In this mode user can use various input devices like mouse, mice, touch screen, joystick etc for interaction. The best example of GUI applications is windows operating system.

Categorization on the basis of architecture:

On the basis of architecture an application can be categorized in following layers:

- Presentation layer: Provides Interface to user
- Business logic layer: It controls the flow of execution and communication between presentation and data layer.
- Data layer: It contains data storage.

On the basis of all these layers, applications may contain one of the following architecture:

- Single Tier Architecture
- Two Tier Architecture
- Three Tier Architecture

Categorization on the basis of platform:

On the basis of platform on which application will be executed, can be of following types:

- **Desktop applications**

These applications are specifically used on a desktop, laptop or other device. It can be used only on that device, on which it is installed. If the same application is being used on other device, it has to be installed on other device also. Like word, excel pdf reader etc applications.

- **Web applications**

These applications are not installed; these are hosted on web server on internet or on intranet. To access these applications we need web browser desktop application. For ex. Google, Facebook, Twitter are example of these applications.

- **Cloud applications:**

These types of applications does not need any browser to run, they are evolved Web applications. These applications are the combination of desktop applications and Web applications. Cloud applications are scalable and flexible and can be consumed by a variety of clients. Example of cloud applications are Google docs and Microsoft office web applications.

- **Mobile applications**

These applications are specifically developed for mobile devices.

Categorization on the basis of devices:

In today's scenario various types of devices are being used by people to access various types of applications. Mostly used devices apart of laptops and desktops are smart-phones, tablets and Personal digital Assistants etc. So developers keep in mind all the aspects and devices when developing applications.

On the basis of devices, on which they can be installed and used applications can be classified as:

- **Native**

Native applications are those applications, those are device specific. That means they are specially developed for a particular device, if the same application is to be used on other device different version of the same application should be used.

- **Device agnostic**

Device agnostic applications are designed for a wide range of devices, in which there is no need to develop different versions of application for different devices. Today the most popular demand is of this kind of applications. Today for all the devices apps are developed that is a short form of application. Just like the name shortened the size is also reduced. Apps are small software used to perform specific task like: gaming apps, antivirus apps, eBook reader apps, audio and video apps etc.

Software developing Models

While developing application, developers follow various phases in SDLC (Software development Life cycle).

These phases are:

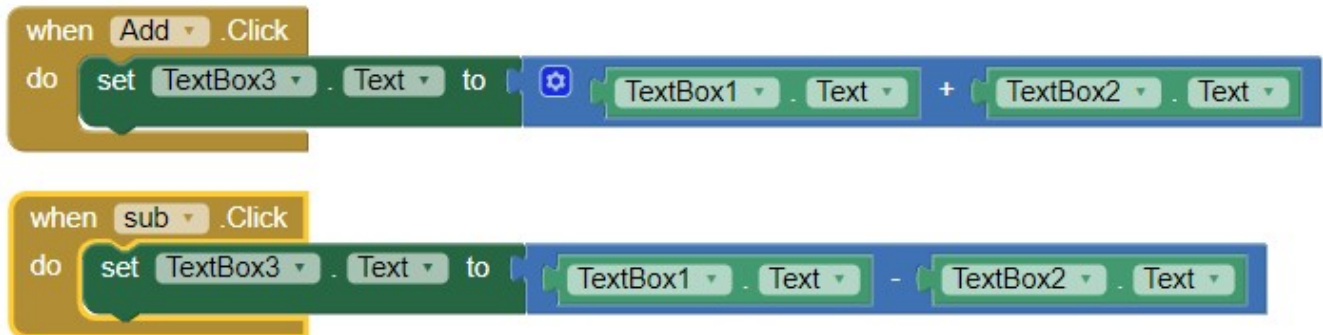
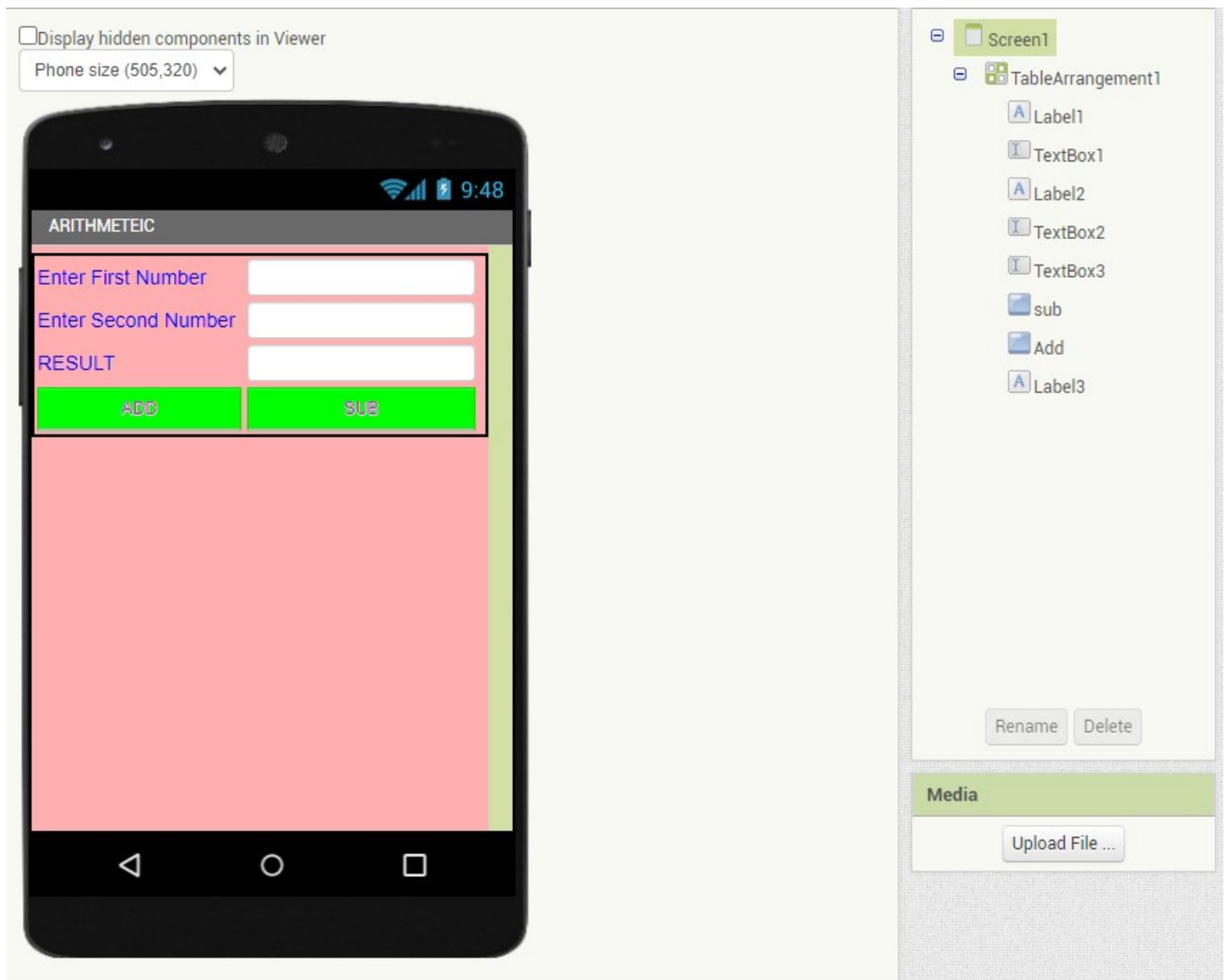
- Requirement Analysis
- Designing
- Developing (Coding)
- Testing or debugging
- Deploying or Implementing
- Maintenance
- Correction
- Adaptation
- Enhancement
- Prevention

Different kinds of Model are designed in which all the above phases are performed differently.

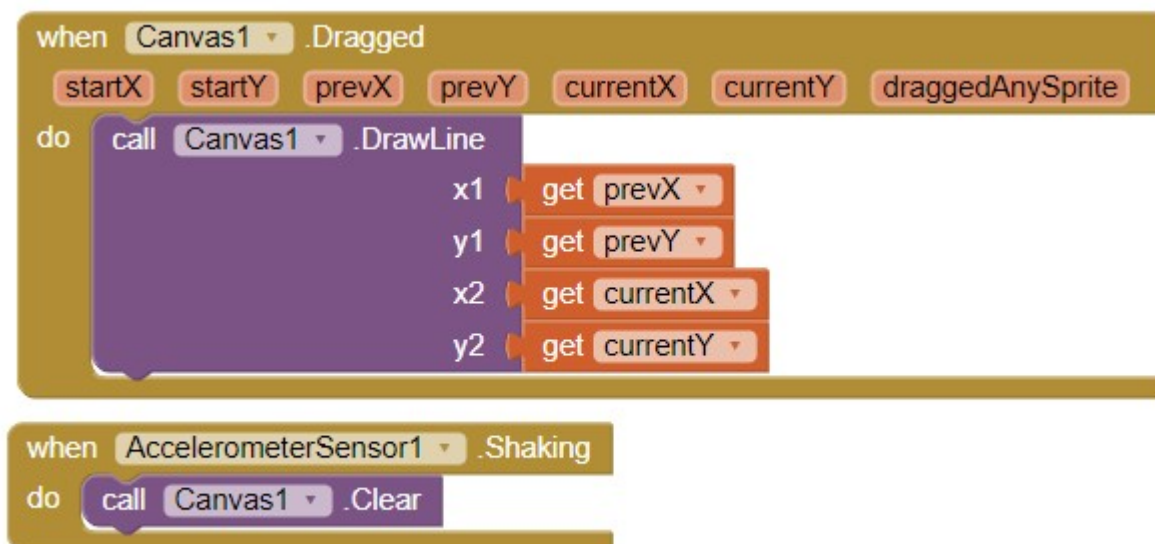
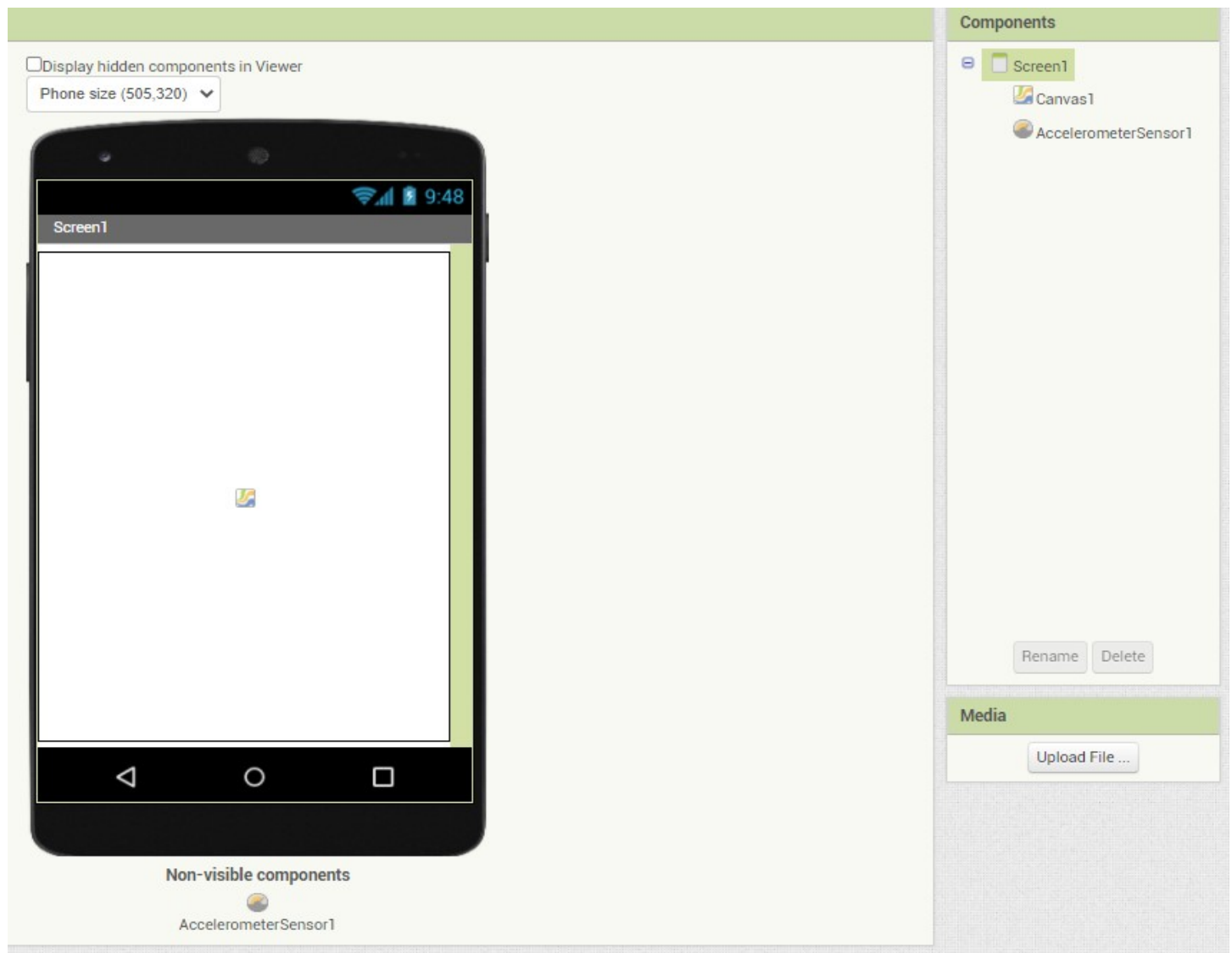
Application Development Models:

- Waterfall Model
- Prototype Model
- Spiral Model
- RAD (Rapid Application Development) Model
- Incremental Model
- V-Shaped Model
- WINWIN Spiral Model
- Agile Model

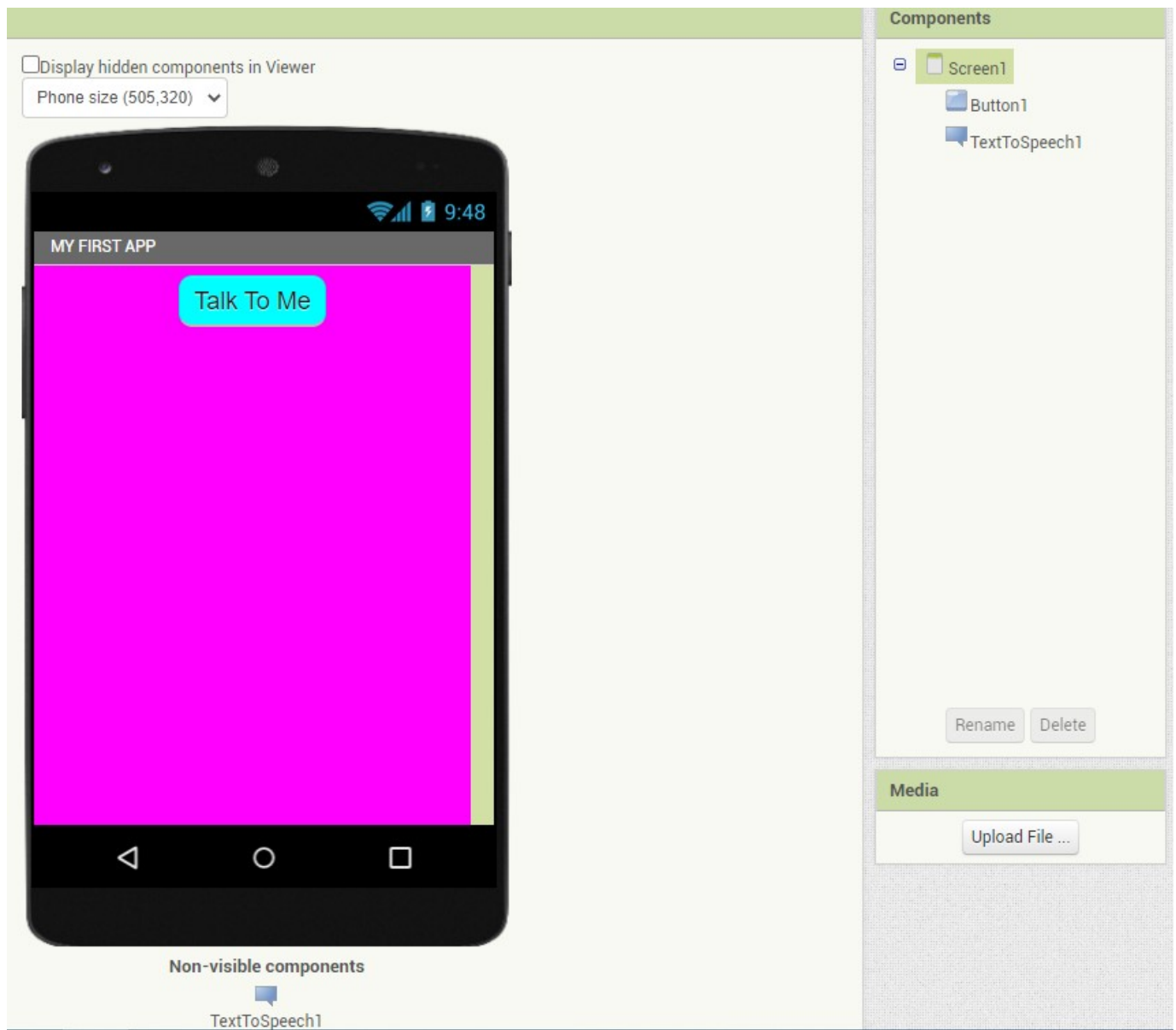
1. MIT android application to add and subtract 2 numbers



2. MIT Android application to demonstrate canvas



3. MIT Android application to demonstrate TextToSpeech



4. MIT Android application to demonstrate Simple Paint

