



BOPAL

**DELHI
PUBLIC
SCHOOL
AHMEDABAD**

Delhi Public School-Bopal Ahmedabad

(Affiliated to CBSE)

Class XI Computational Thinking Graphic Novel

Acknowledgement

It takes a good team and commitment to create an interesting piece of literary work. This graphic novel is the collective effort of a team of educators with varied subject backgrounds.

TRAINING AND IDEATION

Sandeep Sethi
Director Education M.S.M.S.II.Museum Trust

ADVISORY BOARD

Mr. Surender Pal Sachdeva
(Principal)

Ms. Deepti Malhotra
(Vice Principal)

Ms. R. Umamaheswari
(In-charge Senior
Secondary)

**Illustrations &
Creative inputs**

Ms. Meenakumari Damre
(Department Coordinator Art & Craft,
PGT - Fine Arts)

Ms. Avni Shah
PRT -
Art and Craft

Content & Language Editor

Ms. Tulika Saha
(TGT - English)

**Script, Dialogue
Technical support
&
Project Coordinator**

Ms. Niharika Hariramani
(TGT - Computer Science)

PREFACE

This Graphic Novel explains different problem solving techniques related to computers using imaginary characters, interesting pictures and exciting dialogues. The main purpose of creating this graphic novel is to provide students with content in the form of text and images to draw inferences and amalgamate information. Teachers can use this novel as an effective teaching tool.

INDEX

Topic	Page No.
1. Learning Outcomes	5
2. Story Board	6
3. Characters	7
4. Story – Part 1 – Flowcharts and Algorithm (Sequential)	8
5. Assignment 1	22
6. Assignment 2	23
7. Story – Part 2 – Selection and iteration construct	24
8. Assignment 3	31
9. Story – Part 3 – Pseudocode	32
10. Assignment 4	34
11. Assignment 5	35
12. Bibliography	36
13. Acknowledgement	37
14. Disclaimer	38

QRickit



11120CH04



DIKSHA

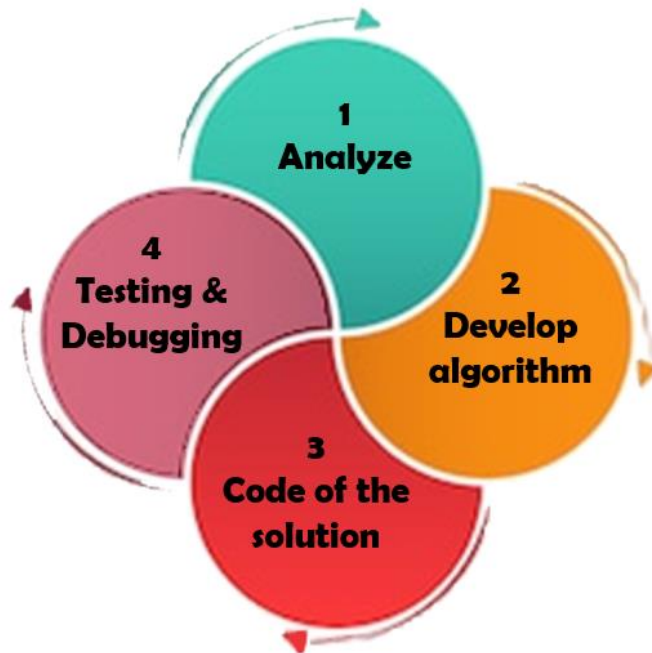
To access the comic book and additional interactive digital content, download the DIKSHA app from Google Play Store on your Android smartphone or tablet and scan the QR code using DIKSHA app.

Learning Outcomes

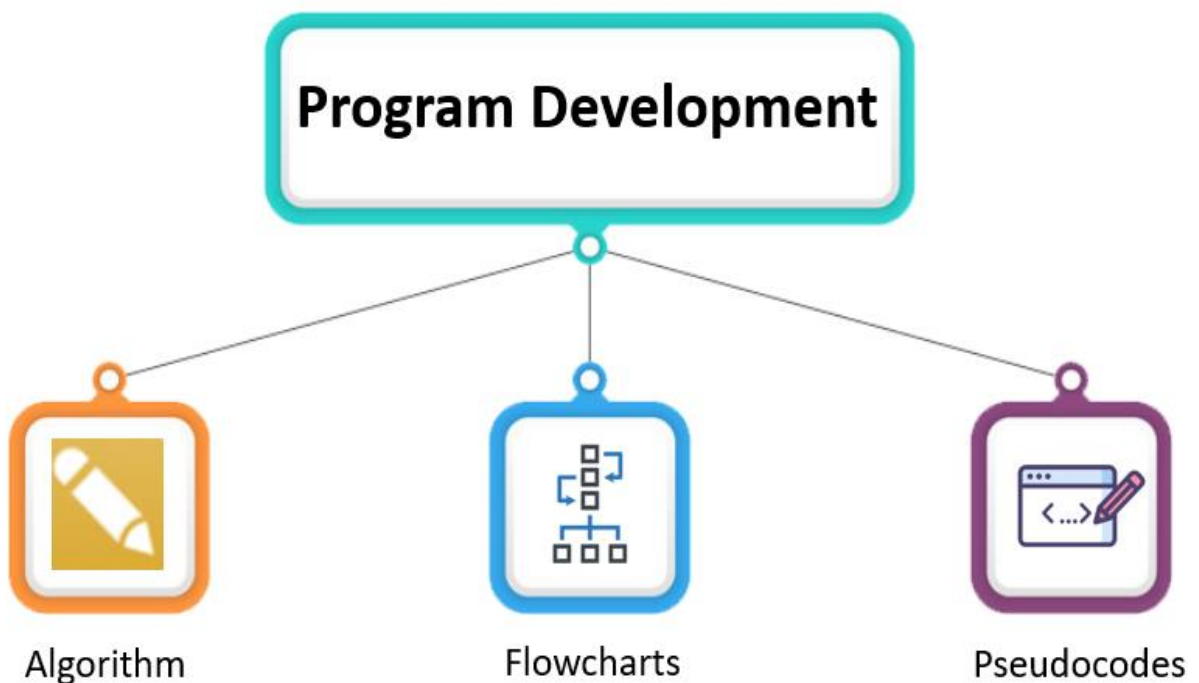
After reading this chapter students will be able to:

- **write algorithms for solving daily life problems as well as for problems based on various academic subjects being taught to them in the school.**
- **make flow charts based on the algorithms framed.**
- **use suitable programming language to code the algorithm.**
- **demonstrate debugging skills.**
- **solve problems by using Algorithms and Flowcharts.**
- **apply problem solving cycle to varied problems.**
- **practice developing sequential, branching and looping programming.**
- **appreciate the significance of Algorithms and Flowcharts in learning processes.**

Story Board



PROBLEM SOLVING CYCLE



Characters



Mohit is a 16 year old boy studying in class 11 who has a good understanding of the subject 'computer science'

Aisha is a 16 year old girl studying in class 11 and she wants to understand computer science



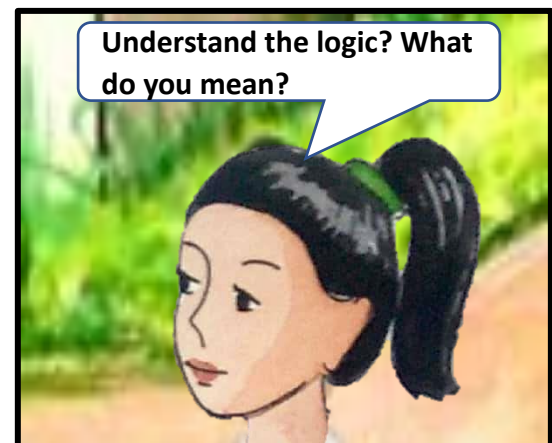
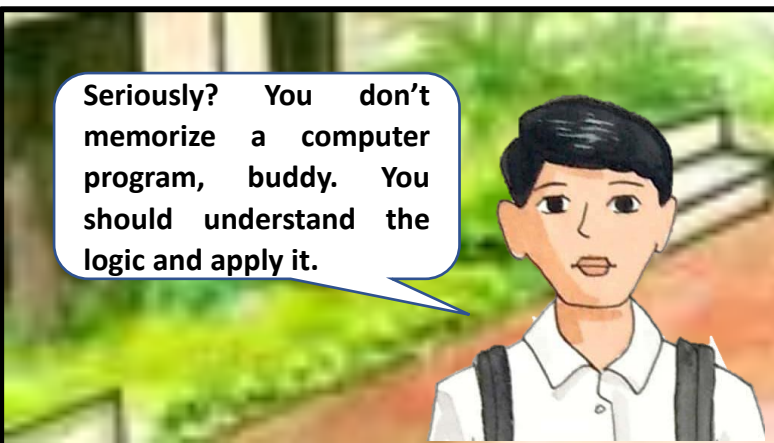
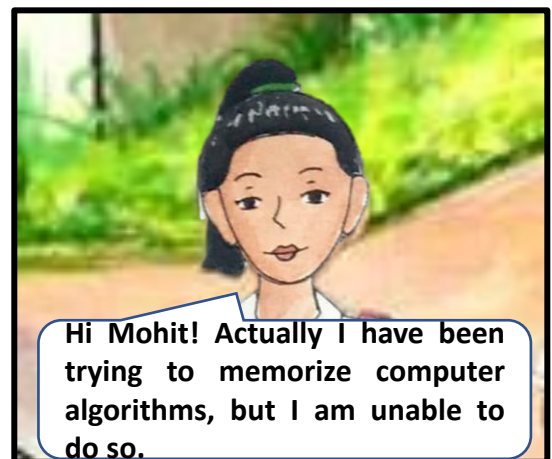
Mrs. Nisha is Aisha's mother.

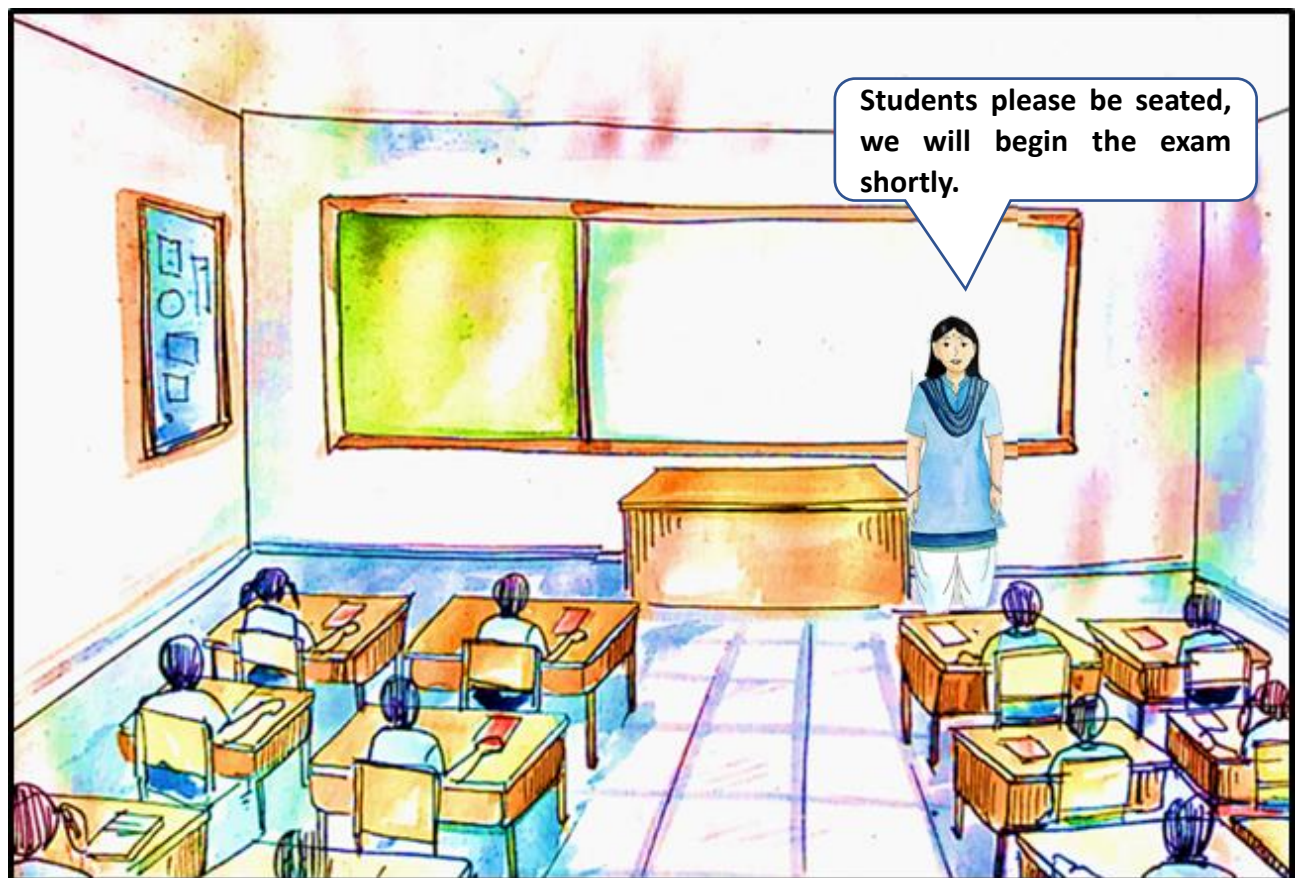
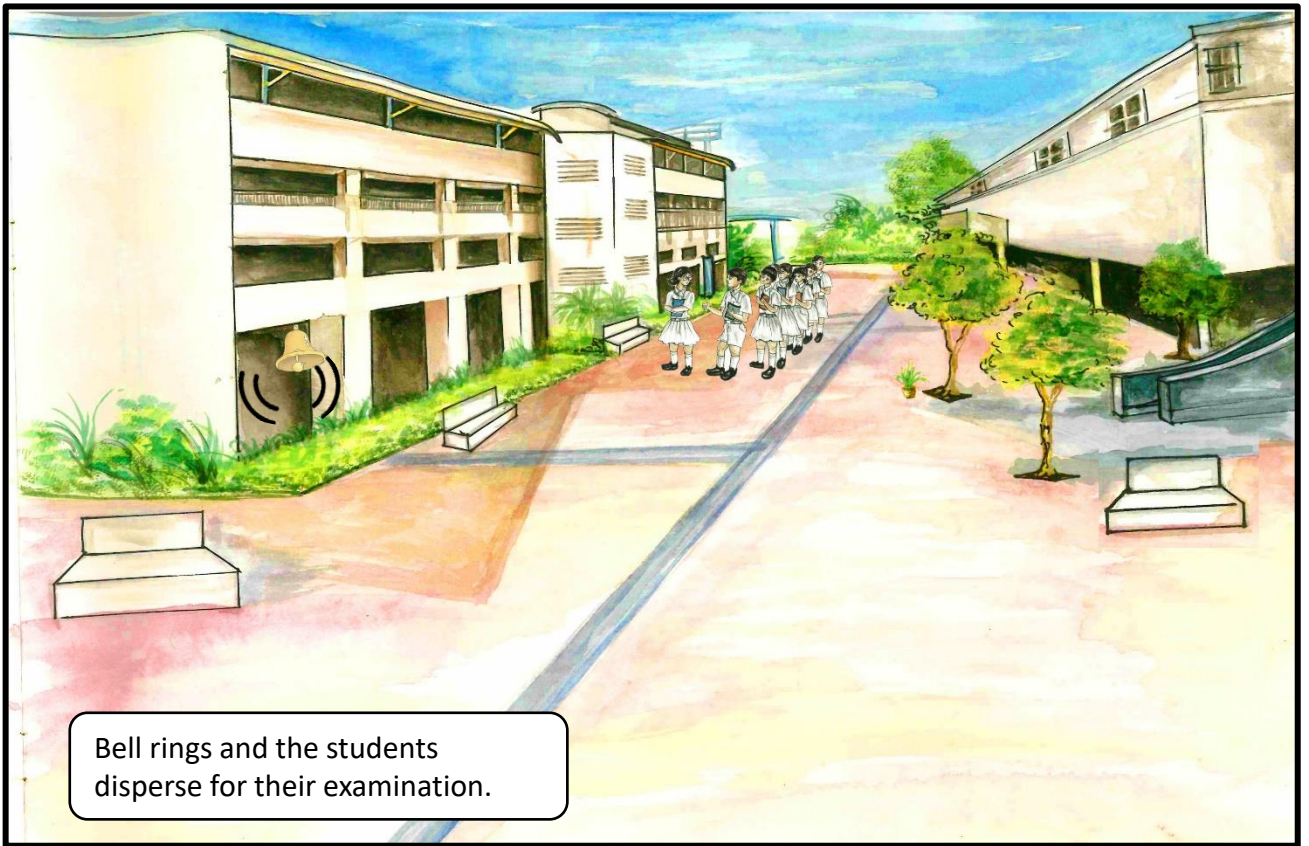
Ms. Sakshi is a teacher in the school



PART 1 – FLOWCHARTS AND ALGORITHM (SEQUENTIAL)

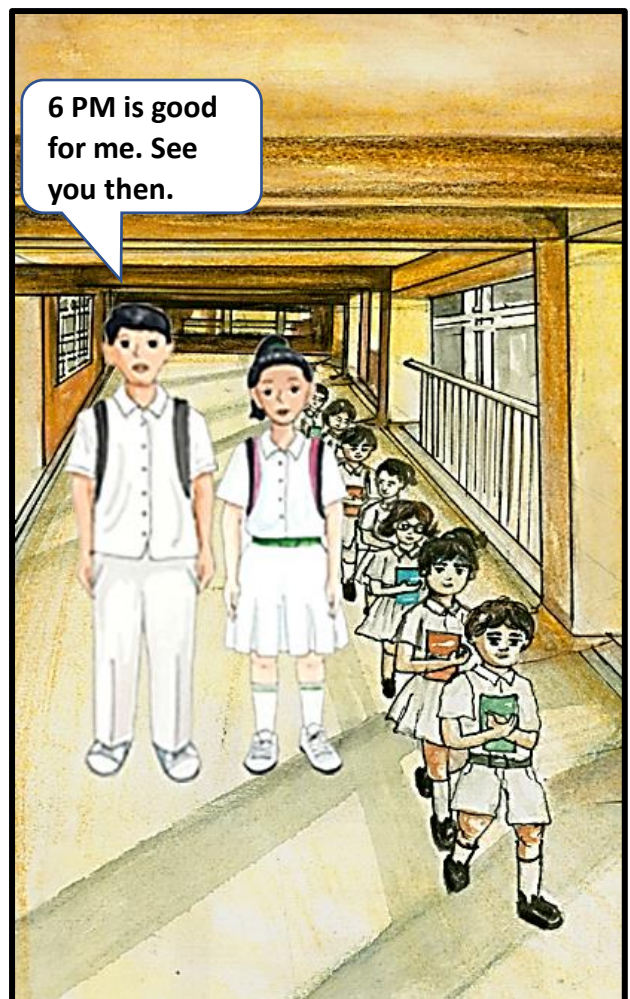
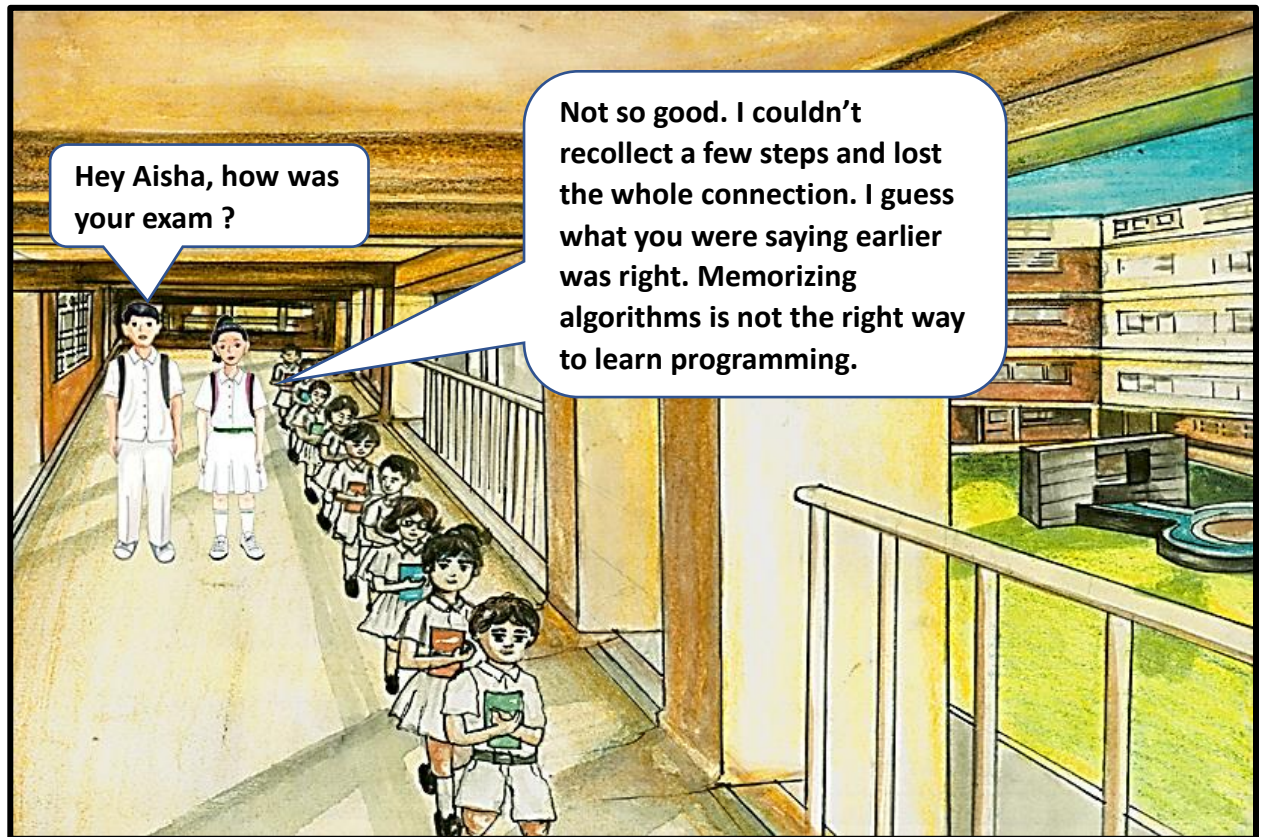
One morning, in school, Mohit notices Aisha looking glum and worried. They were about to take a Computer Science exam.



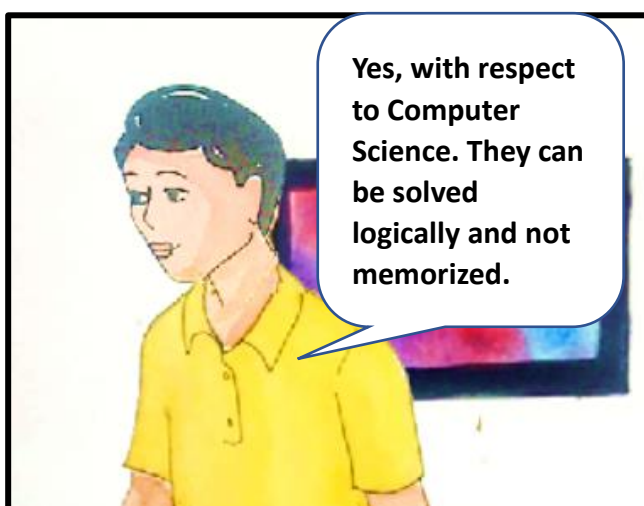
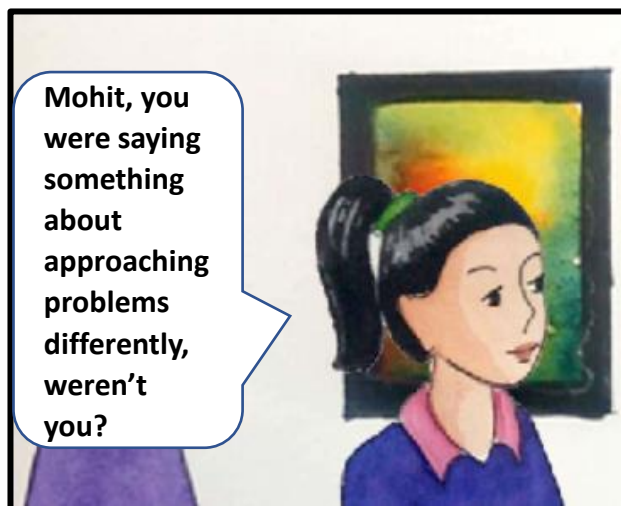
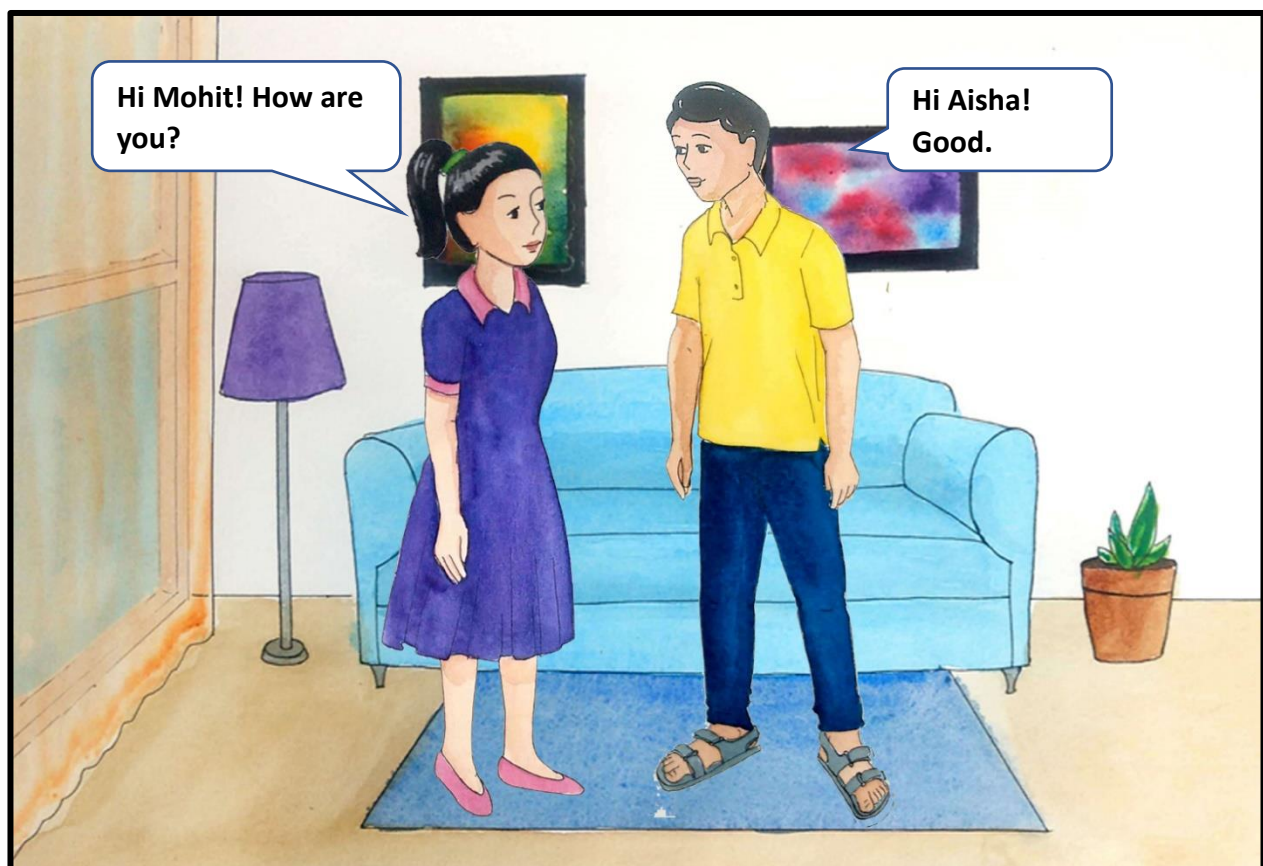


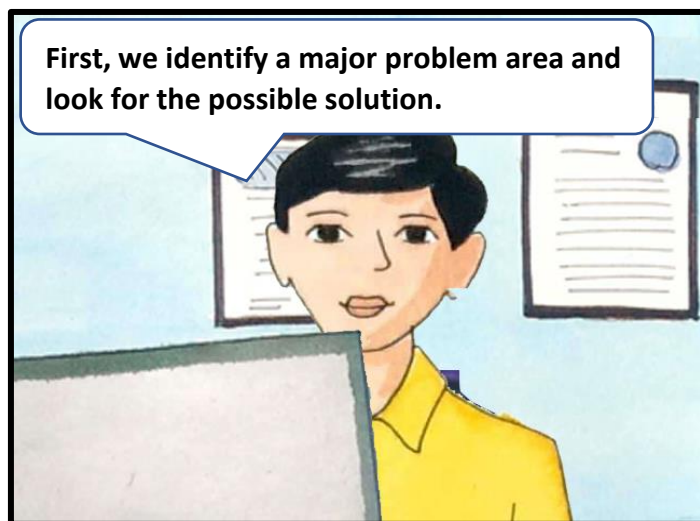
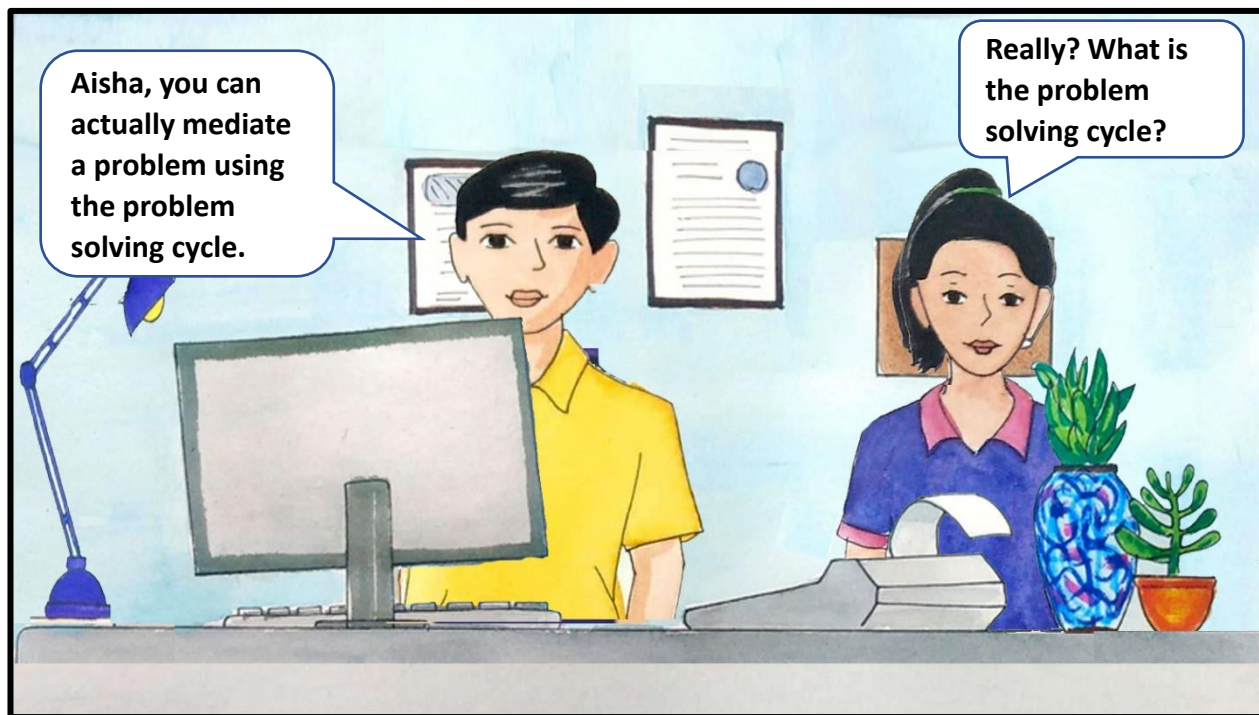
During the exam, Aisha is perplexed by several questions. Mohit, on the other hand, is relaxed.

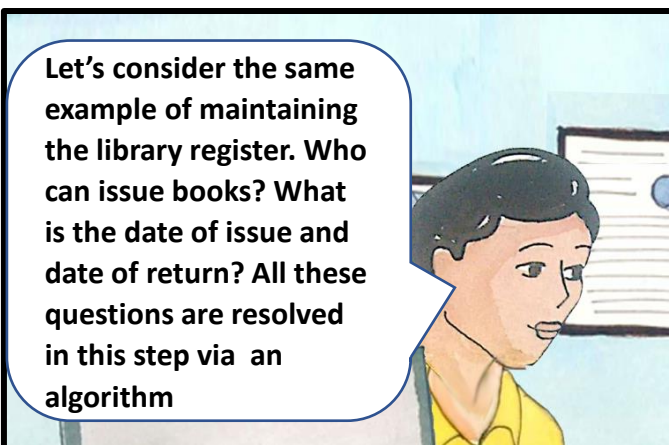
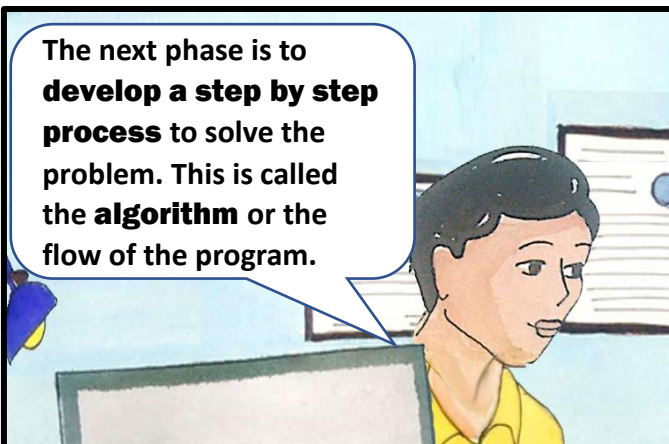
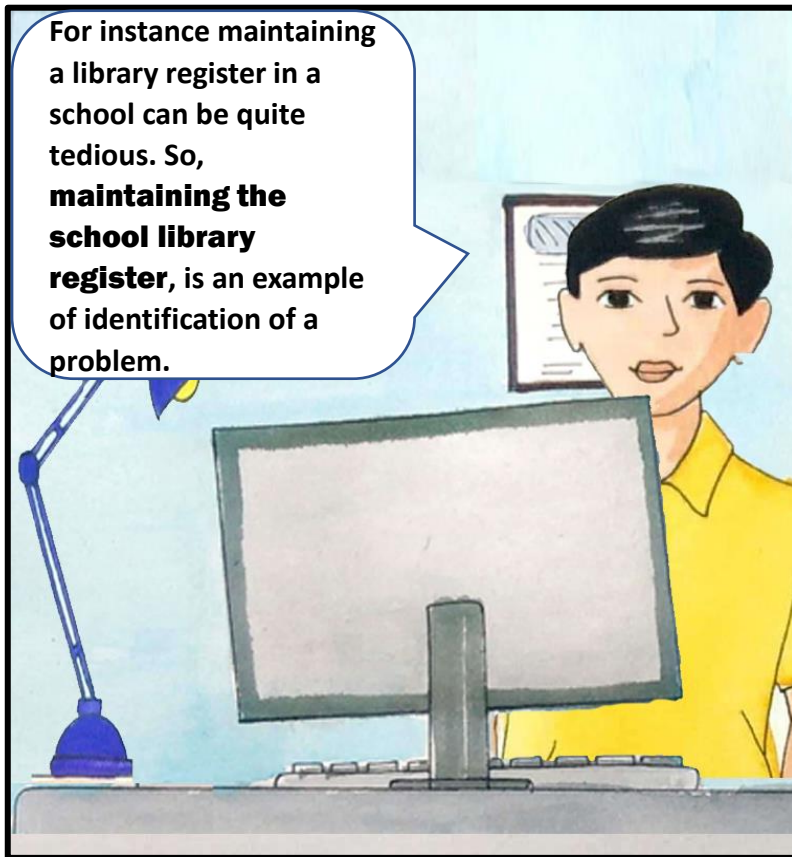
Mohit catches up with Aisha as they leave the room.....

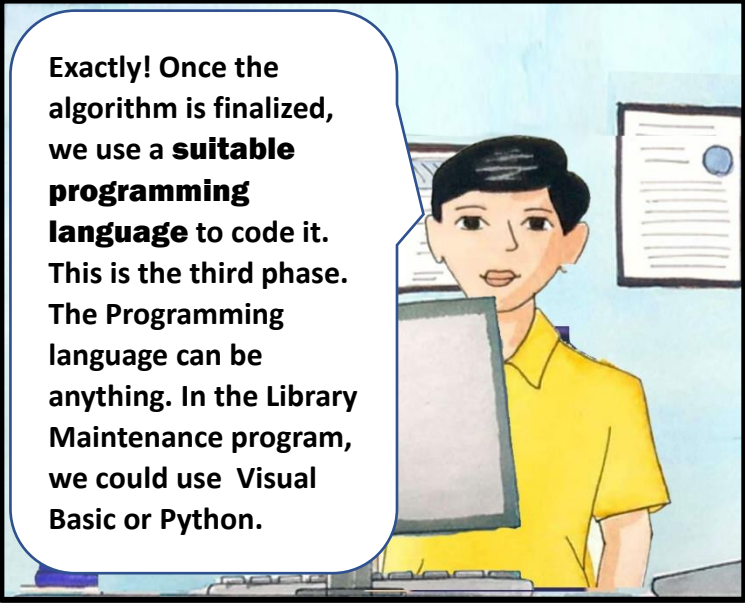


The next day, Mohit meets Aisha at her place.





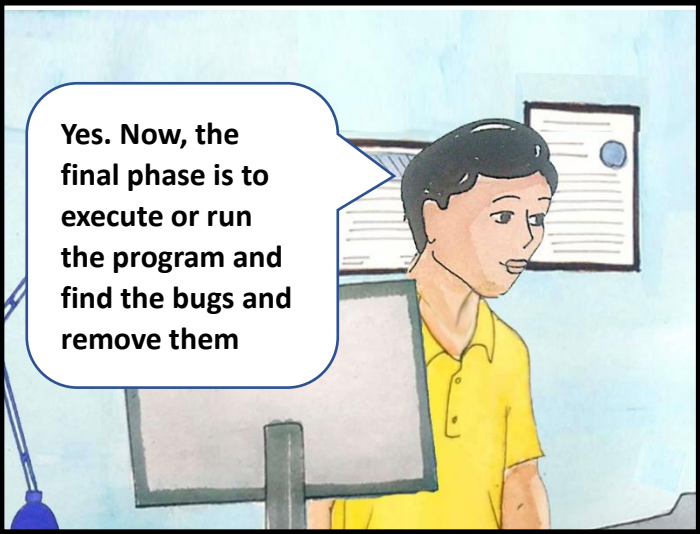




Exactly! Once the algorithm is finalized, we use a **suitable programming language** to code it. This is the third phase. The Programming language can be anything. In the Library Maintenance program, we could use Visual Basic or Python.



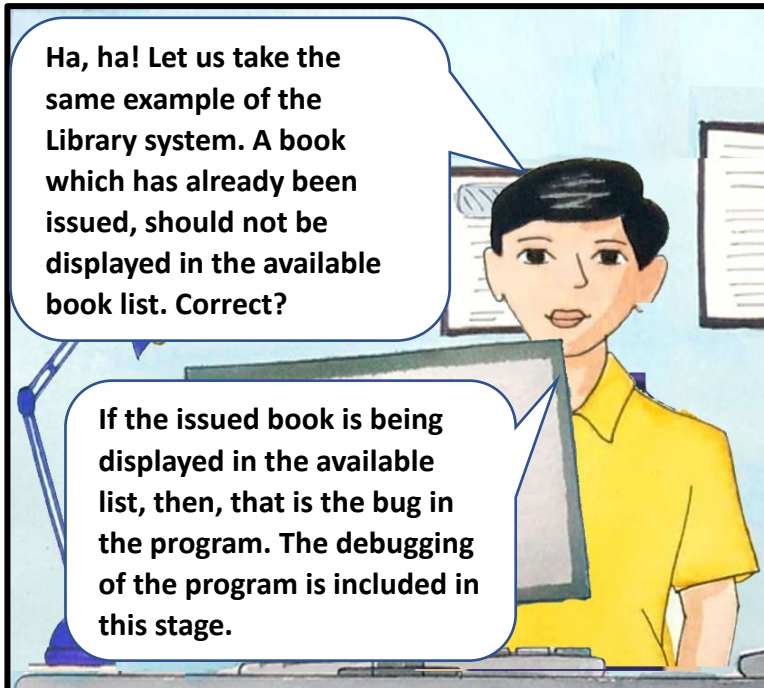
So, programming languages come into the picture here!



Yes. Now, the final phase is to execute or run the program and find the bugs and remove them

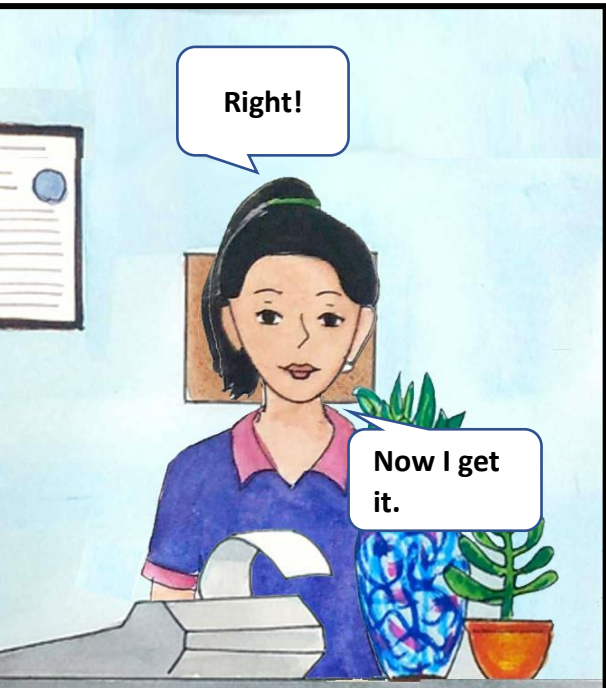


Bugs? Oh! I hate those creepy crawly things! But how did they get into your program?



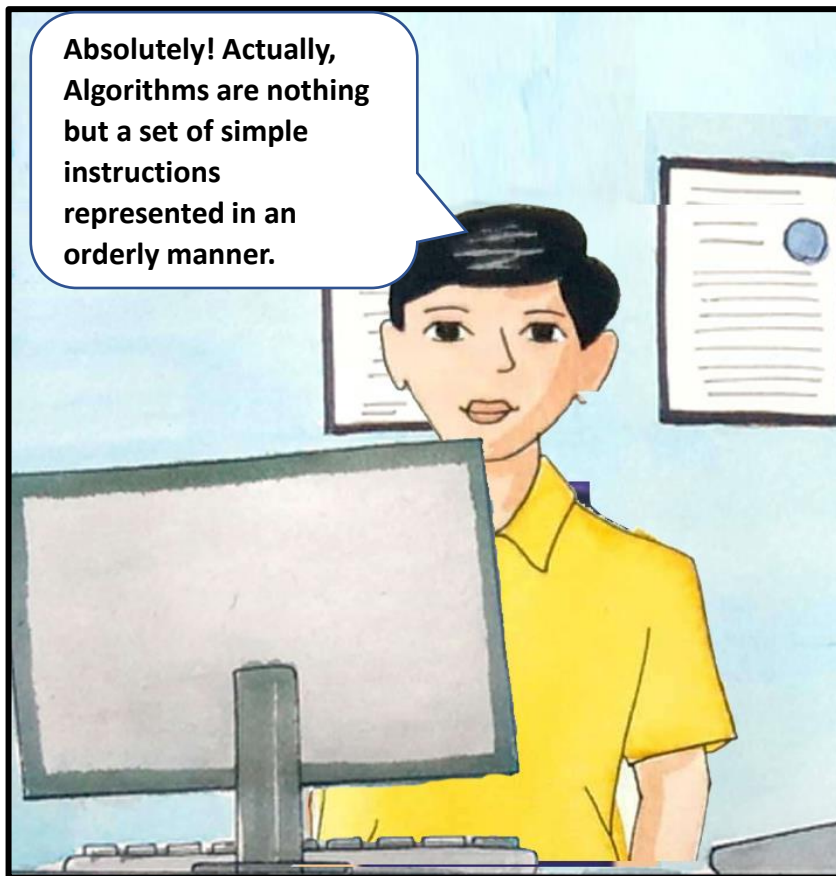
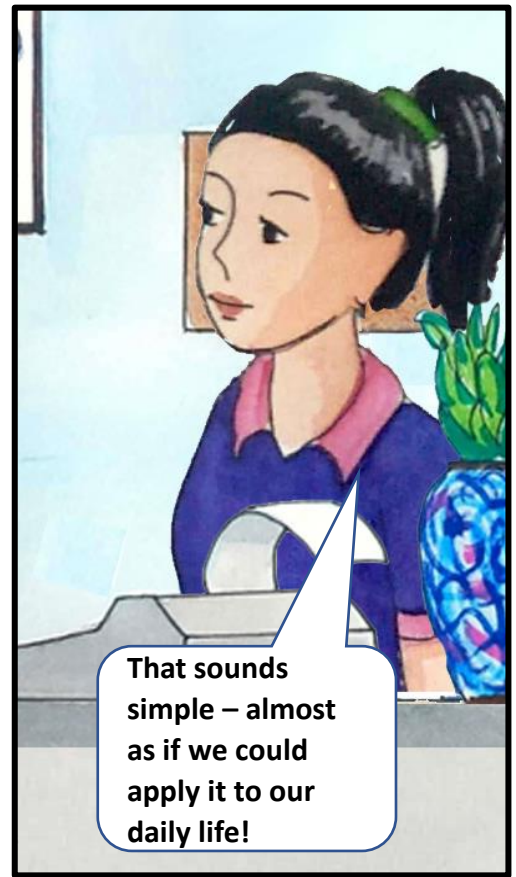
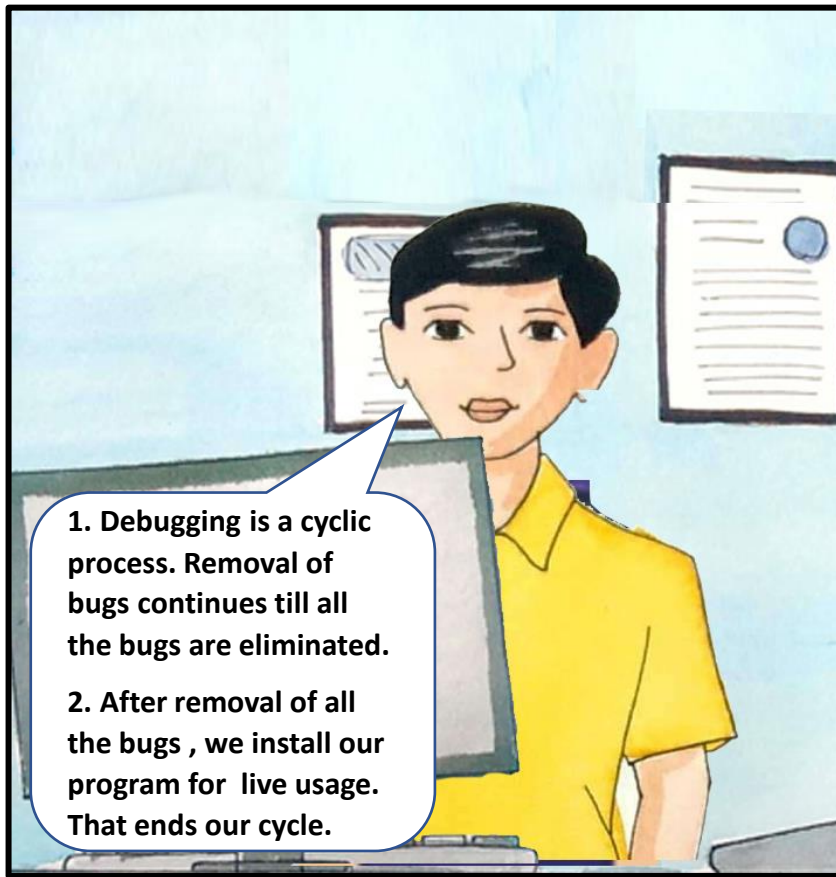
Ha, ha! Let us take the same example of the Library system. A book which has already been issued, should not be displayed in the available book list. Correct?

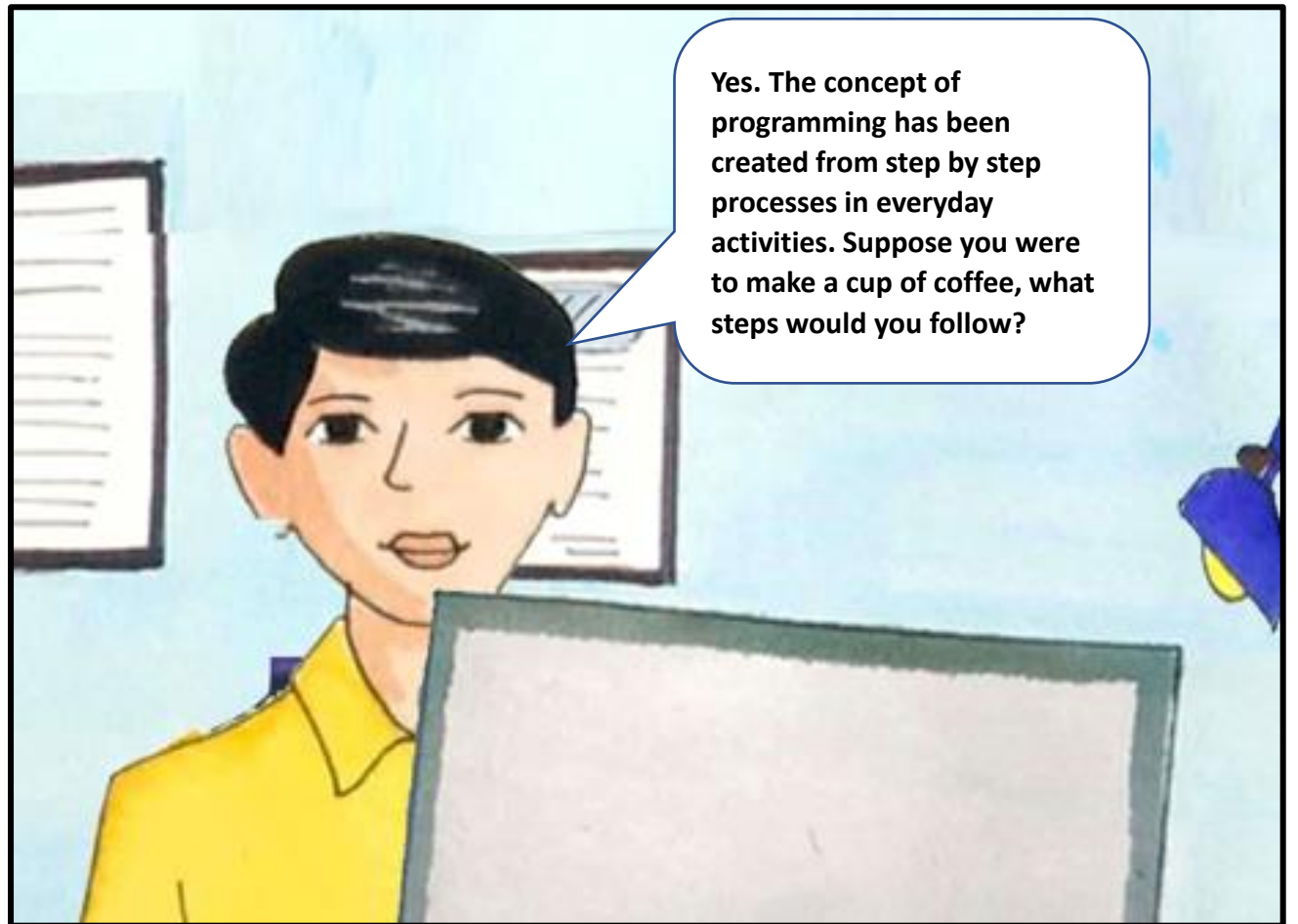
If the issued book is being displayed in the available list, then, that is the bug in the program. The debugging of the program is included in this stage.

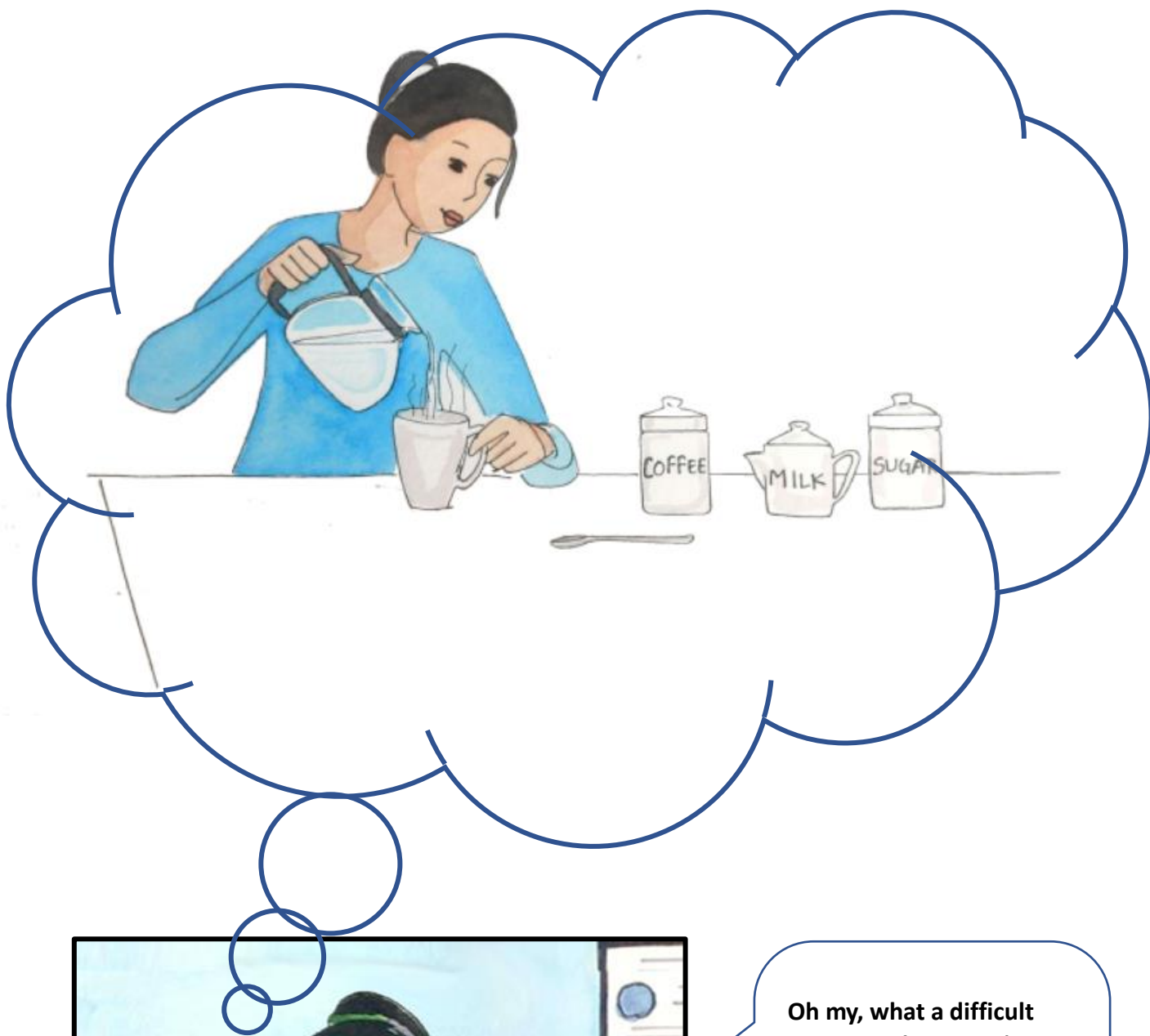


Right!

Now I get it.





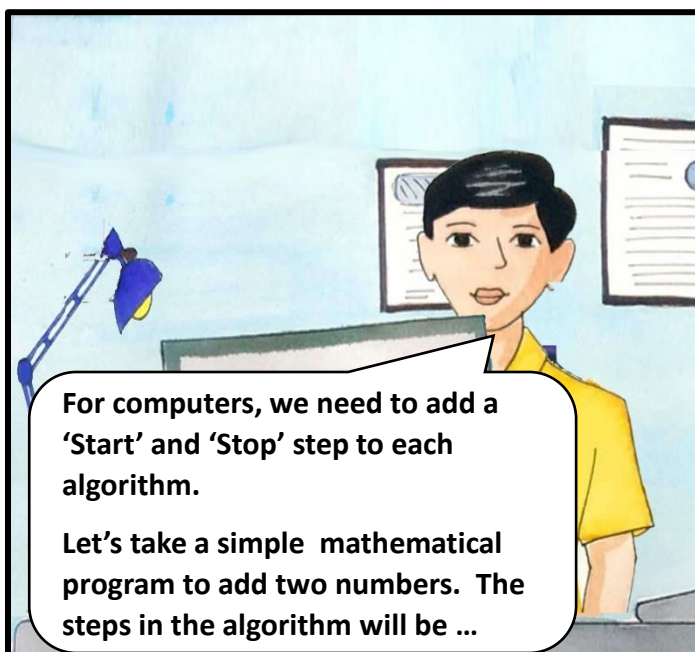
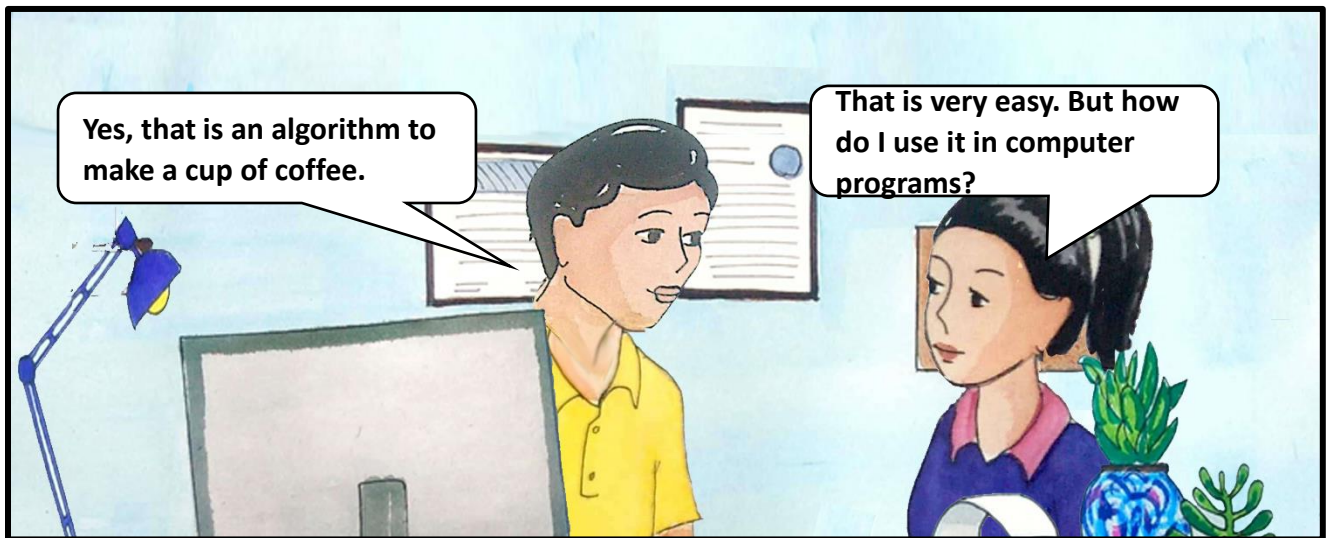
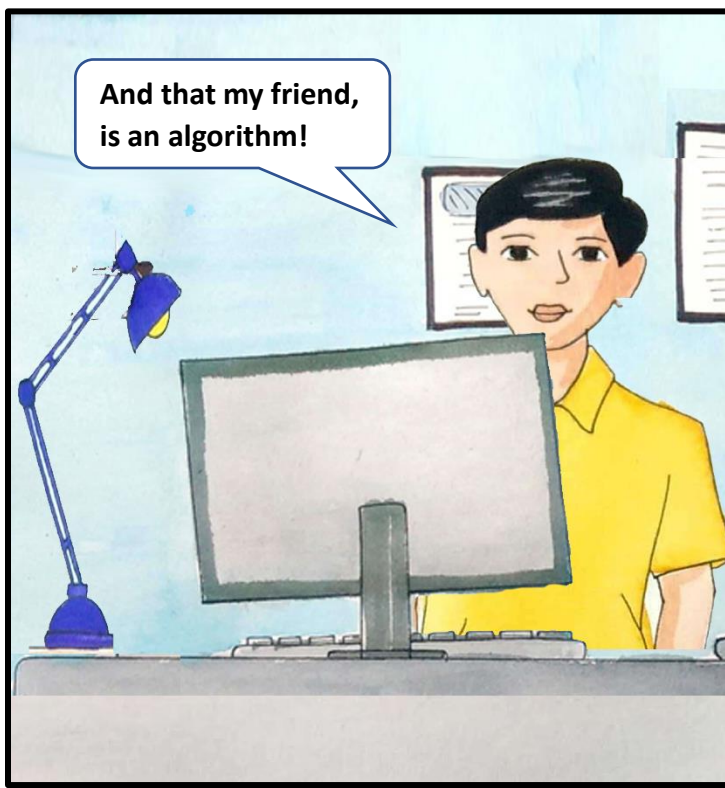


Oh my, what a difficult question! *(laughing)*

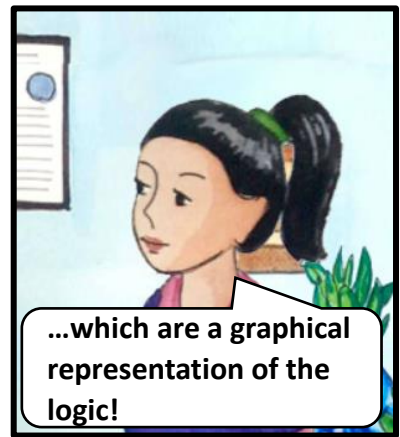
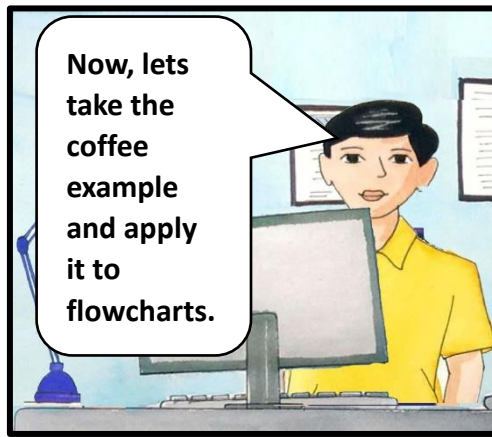
Let me see

- Boil water in a kettle.
- Add coffee to a cup.
- Add boiling water,
- Add milk and then Add sugar.

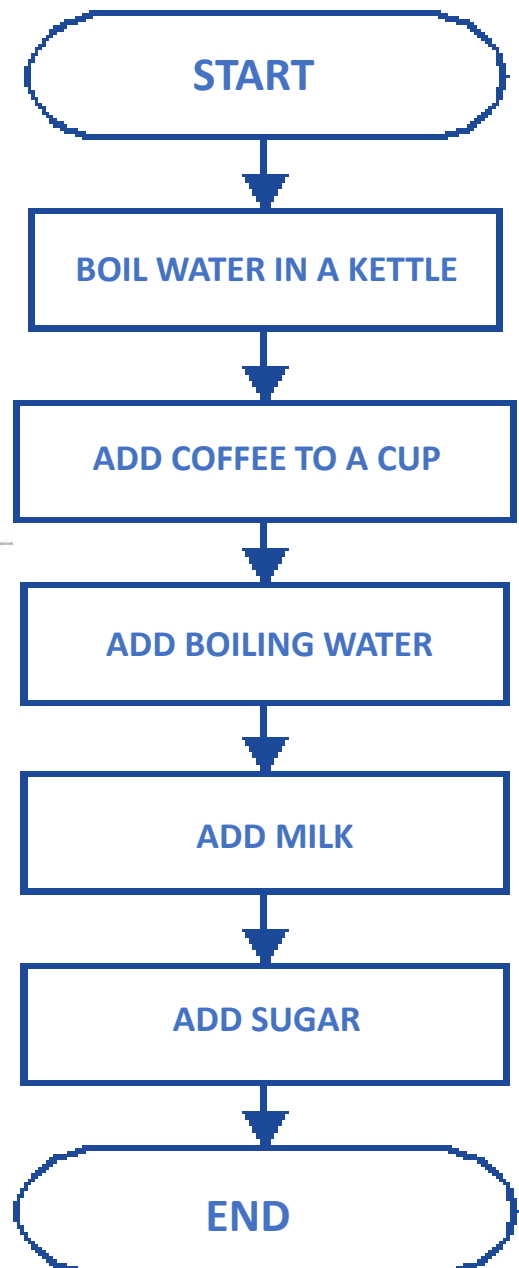
And your coffee is ready!



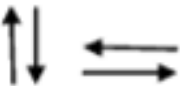
- 1) Start
- 2) Get two numbers N1 and N2
- 3) $S \leftarrow N1 + N2$
- 4) Print the result
- 5) Stop.

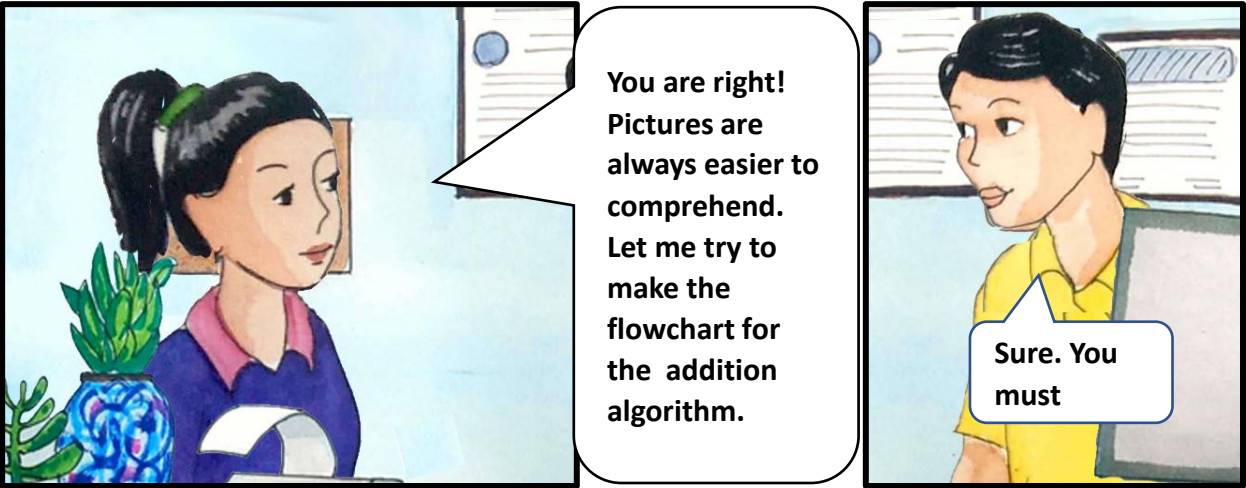


FLOWCHARTS



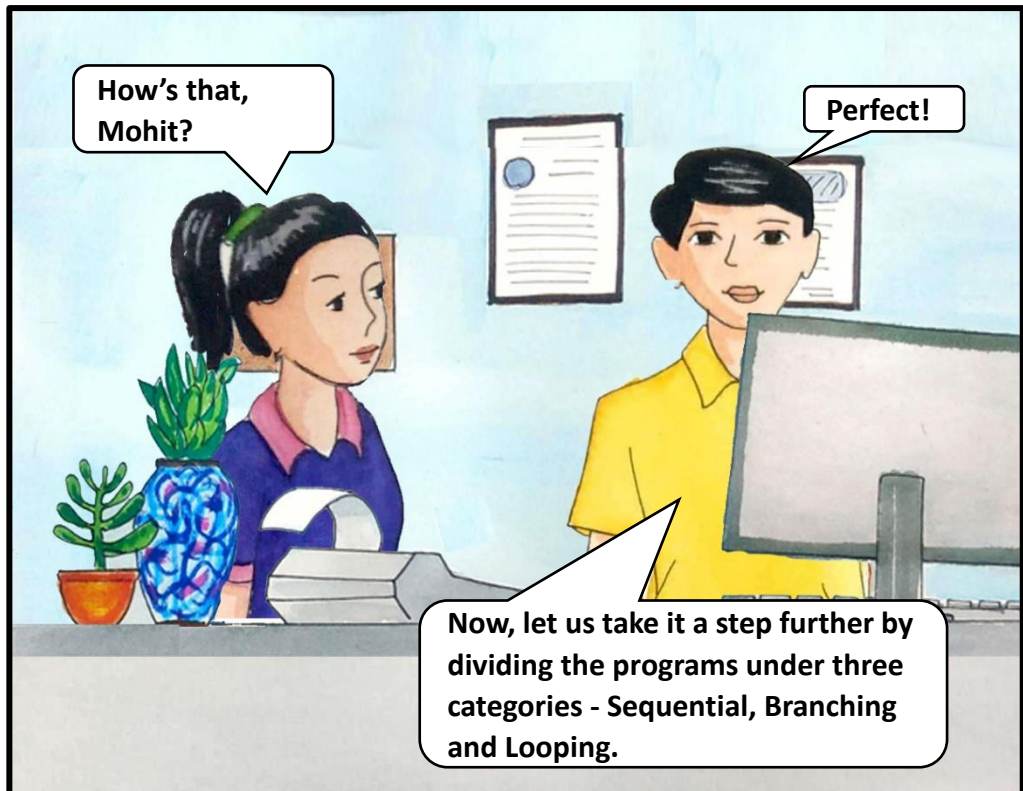
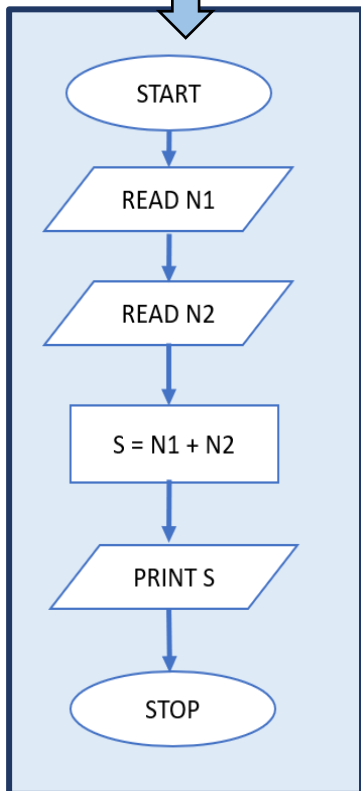


Symbol	Name	Function
	Process	Indicates any type of internal operation inside the Processor or Memory
	Input / Output	Used for any Input/Output operation. Indicates that the computer is to obtain data or output results
	Decision	Used to ask a question that can be answered in a binary format (Yes/NO, True/False)
	Connector	Allows the flowchart to be drawn without intersecting lines or without a reverse flow.
	Flow Lines	Shows direction of flow
	Annotation	For comments



Flowchart for Two Number addition

Aisha solves the problem and shows it to Mohit

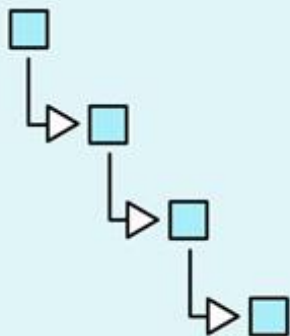


Mohit explains about the three types of programming statements



SEQUENCES

A set of logical steps carried out in order.



SELECTIONS

Selection statements allow the flow of execution to jump to a different part of the program

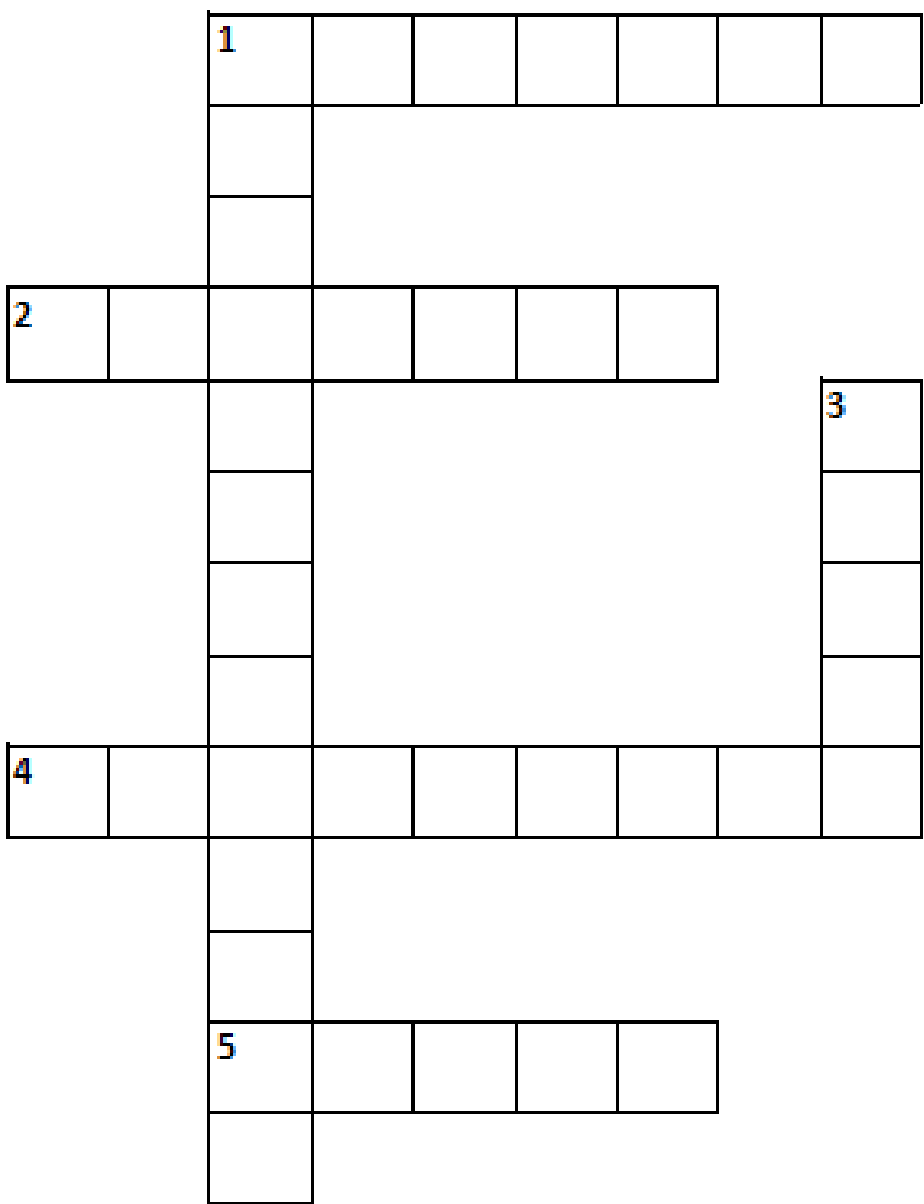


LOOPS

Loops repeat a sequence of instructions until a specific condition is met.



Assignment 1



Across

- 1. I am a rectangle in a flowchart. What do I represent?
- 2. In this box conditions can be given
- 4. You can use me to communicate ideas, graphically represent a problem solving.
- 5. I connect two geometrical boxes in a flowchart

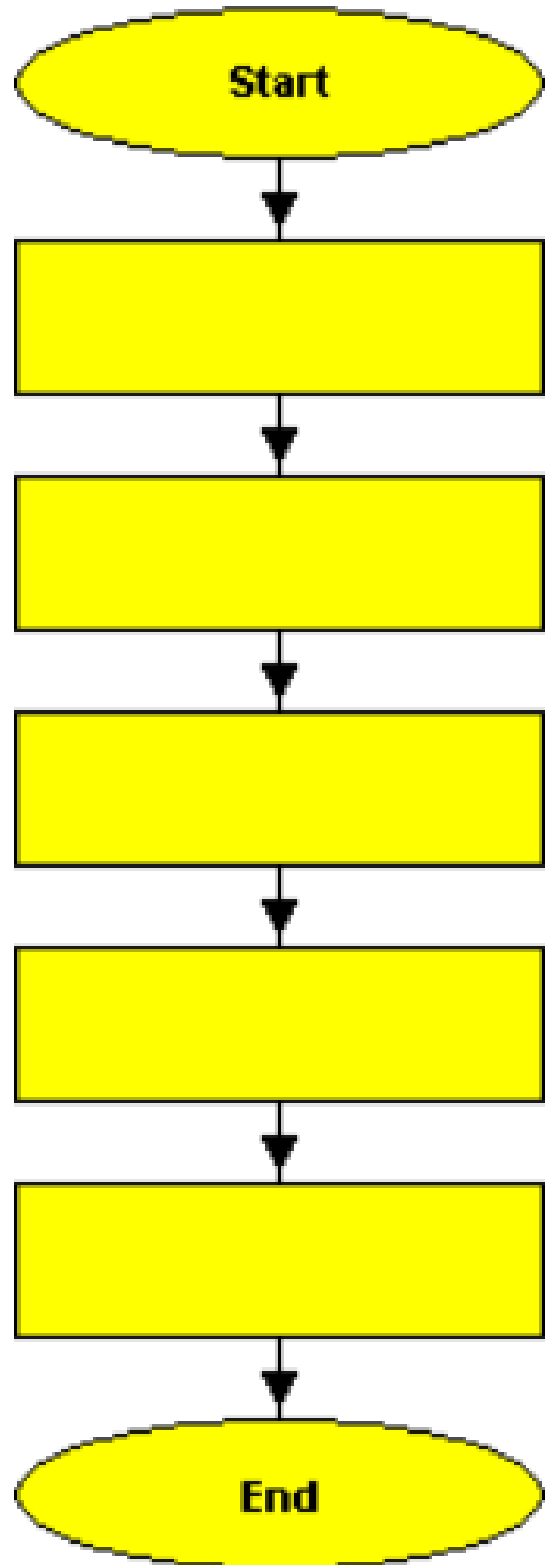
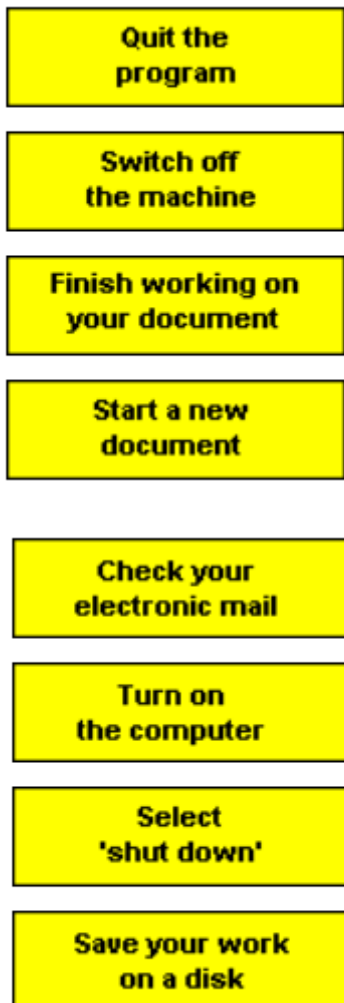
Down

- 1. In the flowchart, I represent data or information that is available.
- 3. All flowcharts begin with me. I am elliptical in shape

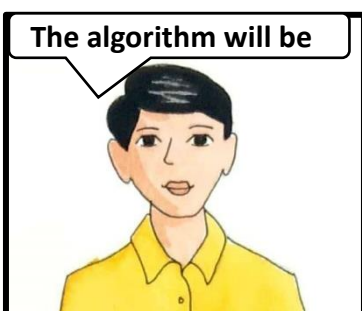
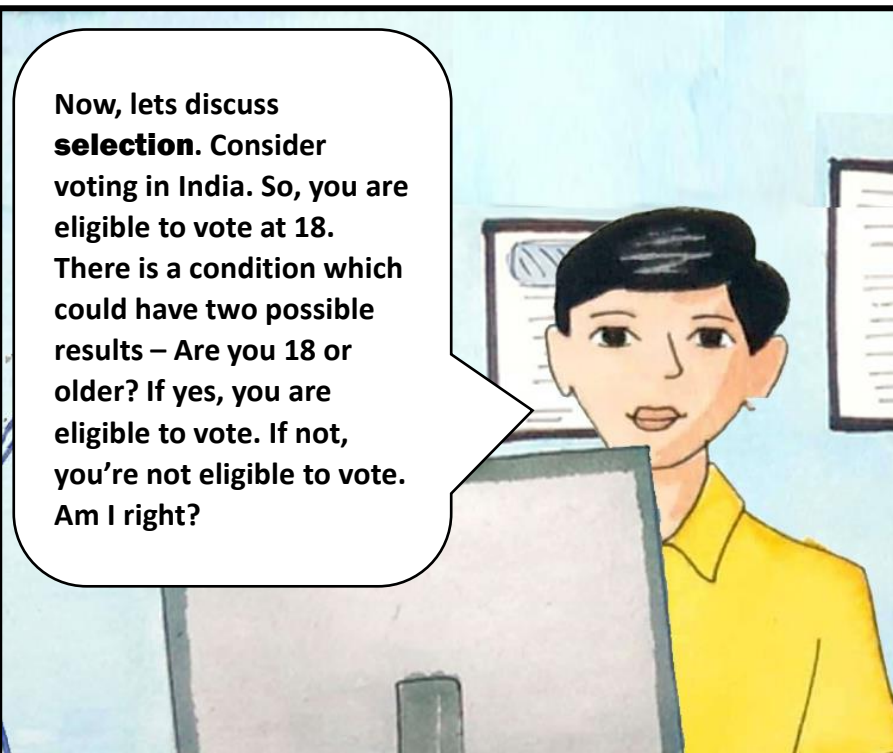
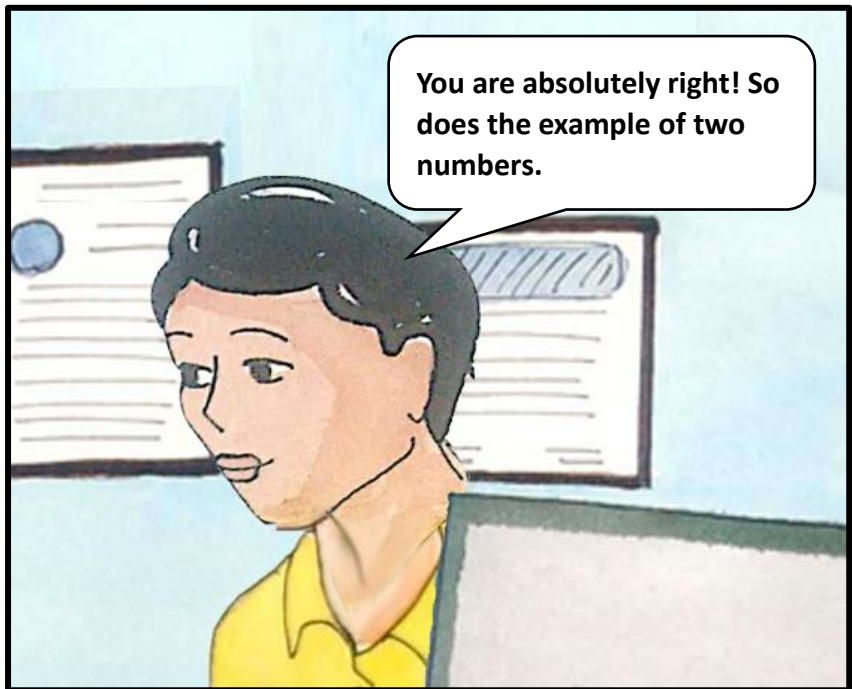
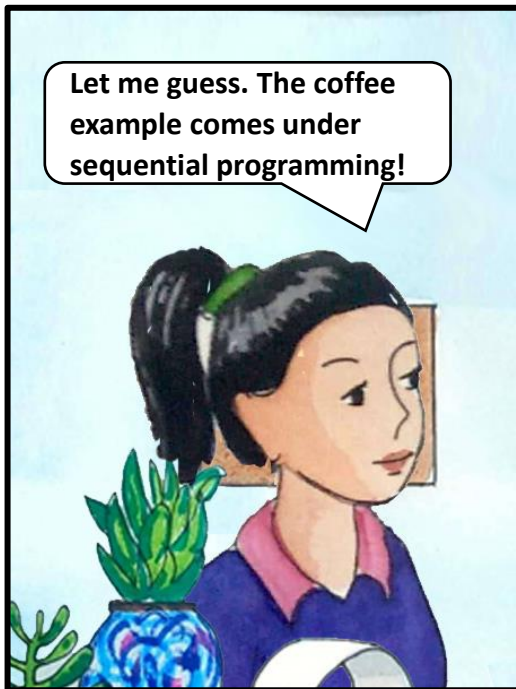
Assignment 2

The flow chart on the right hand side shows the steps to close all the applications on your computer and shut down.

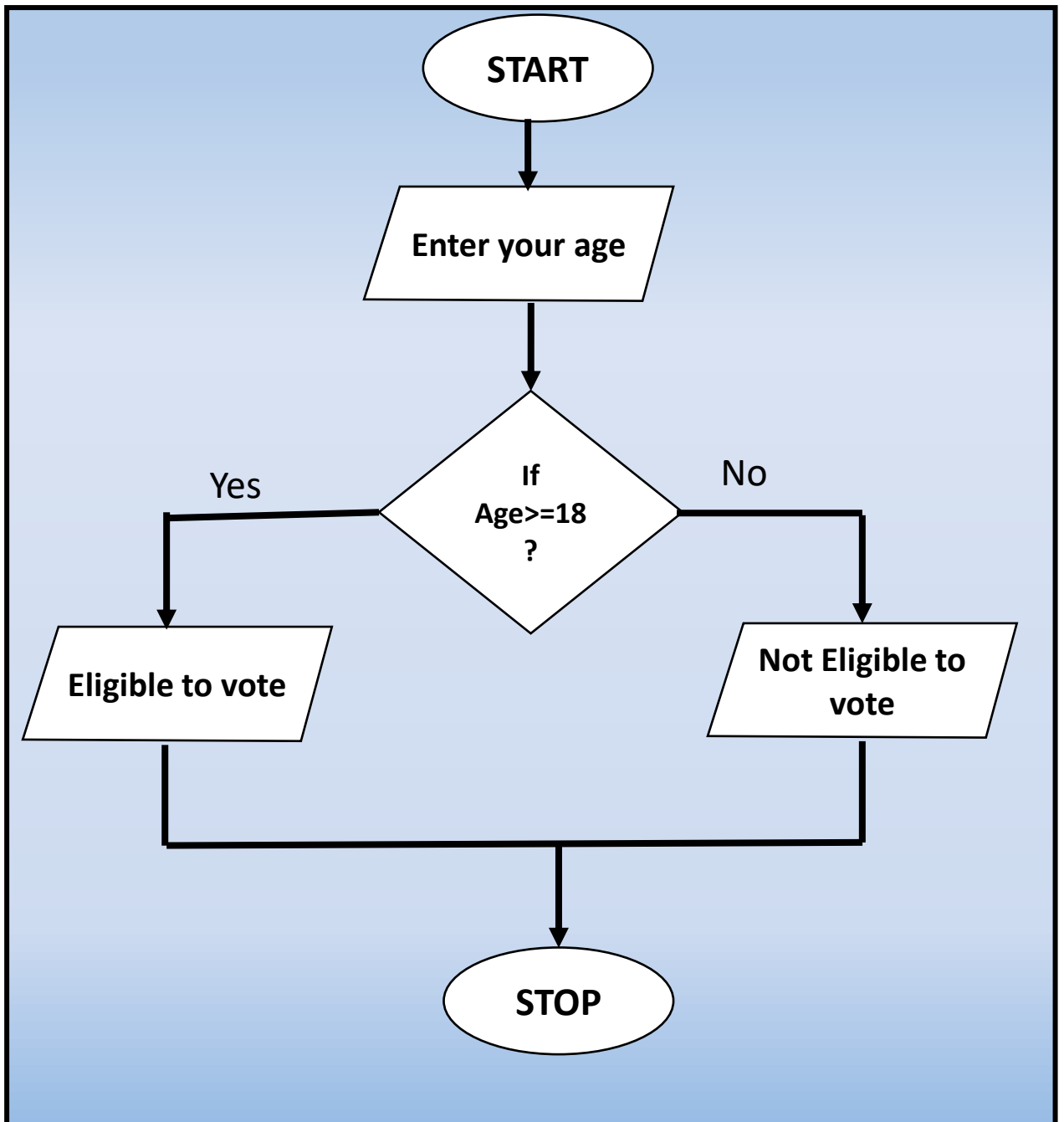
Some instructions are given below. Place them in the flowchart.



PART 2 - SELECTION AND ITERATION CONSTRUCT



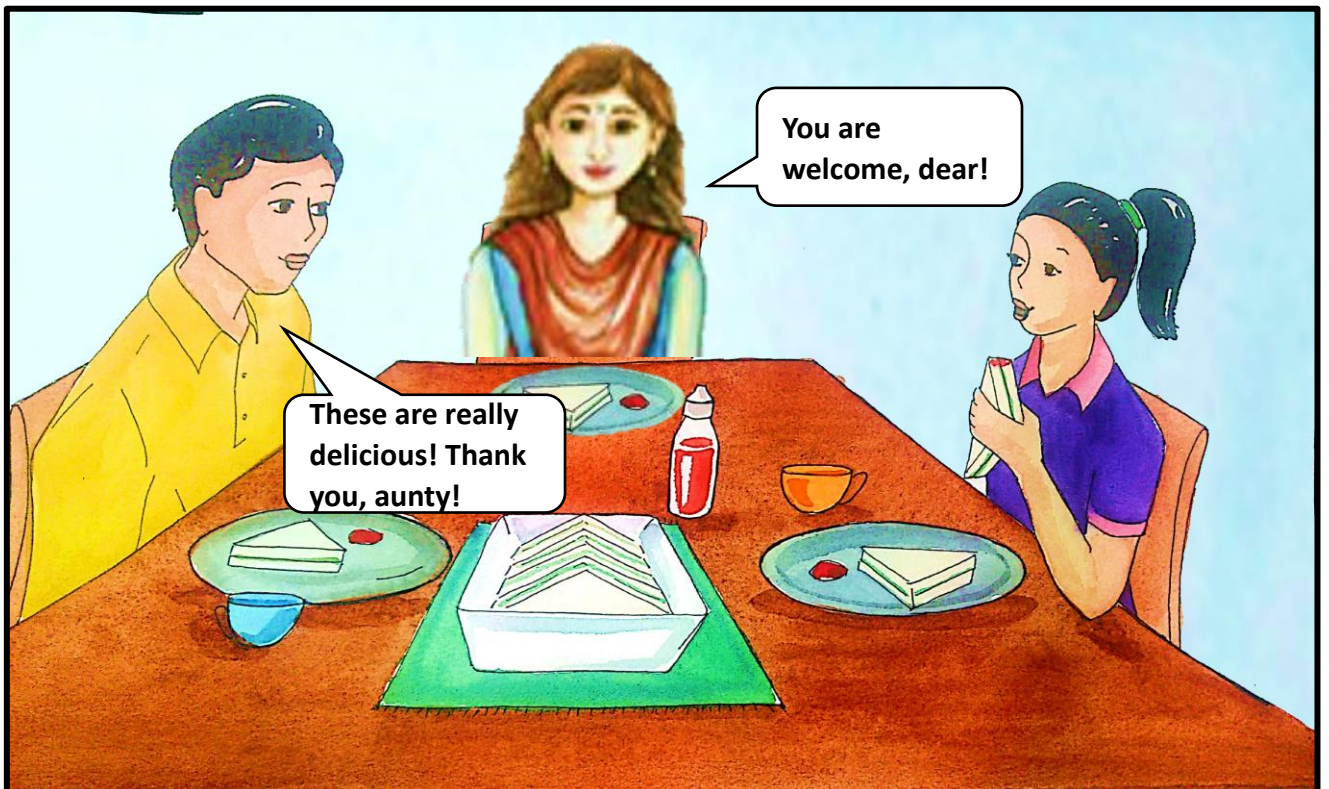
- 1) Start
- 2) Enter the Age
- 3) If the Age is greater than or equal to 18
- 4) Print "Eligible to vote"
- 5) Else Print "Not eligible to vote"
- 6) Stop



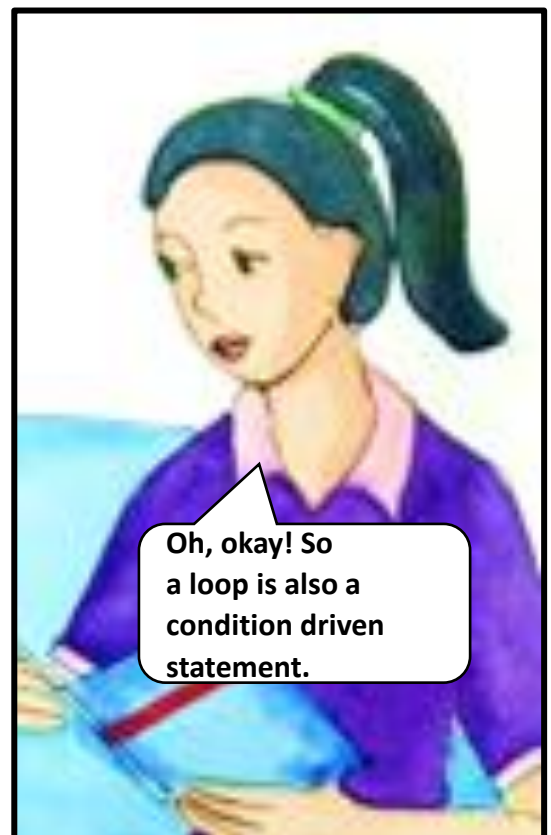
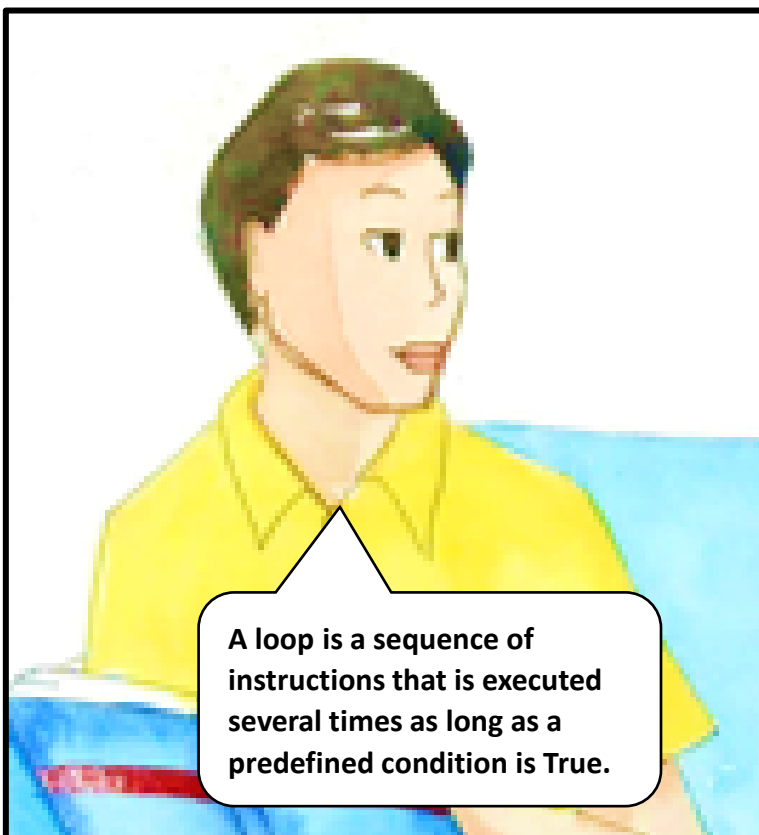
Aisha's mother enters the room

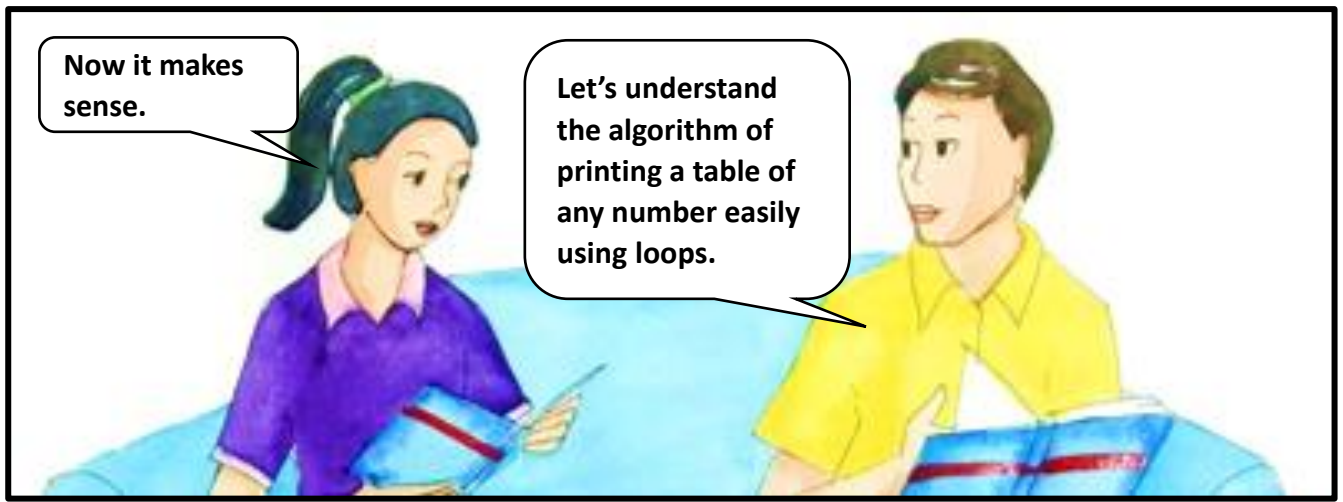


Mohit and Aisha enjoy snack time.



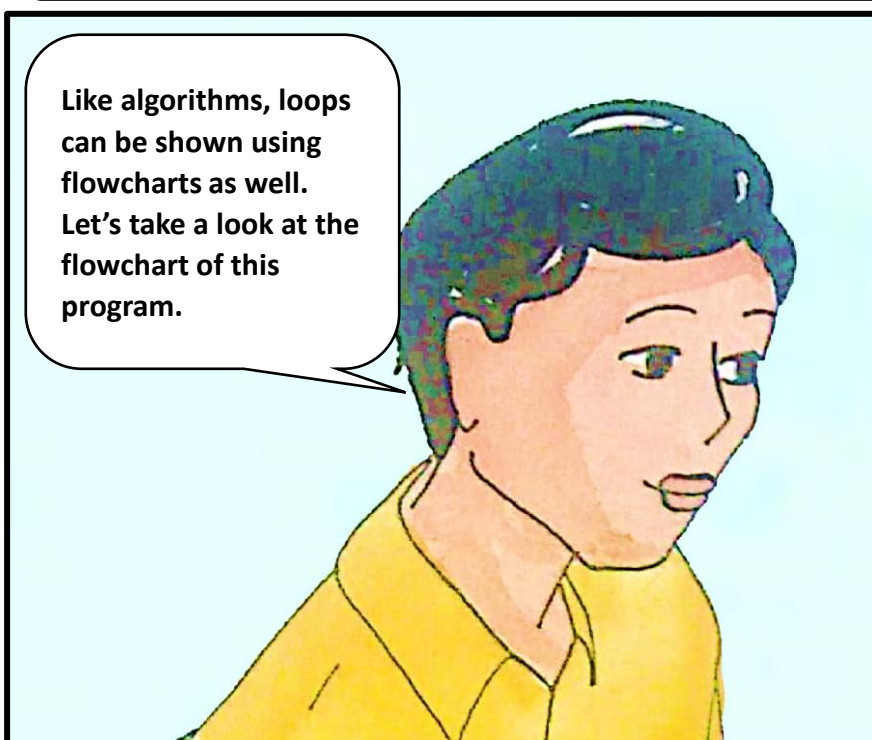
Later, Aisha and Mohit continue with their studies.

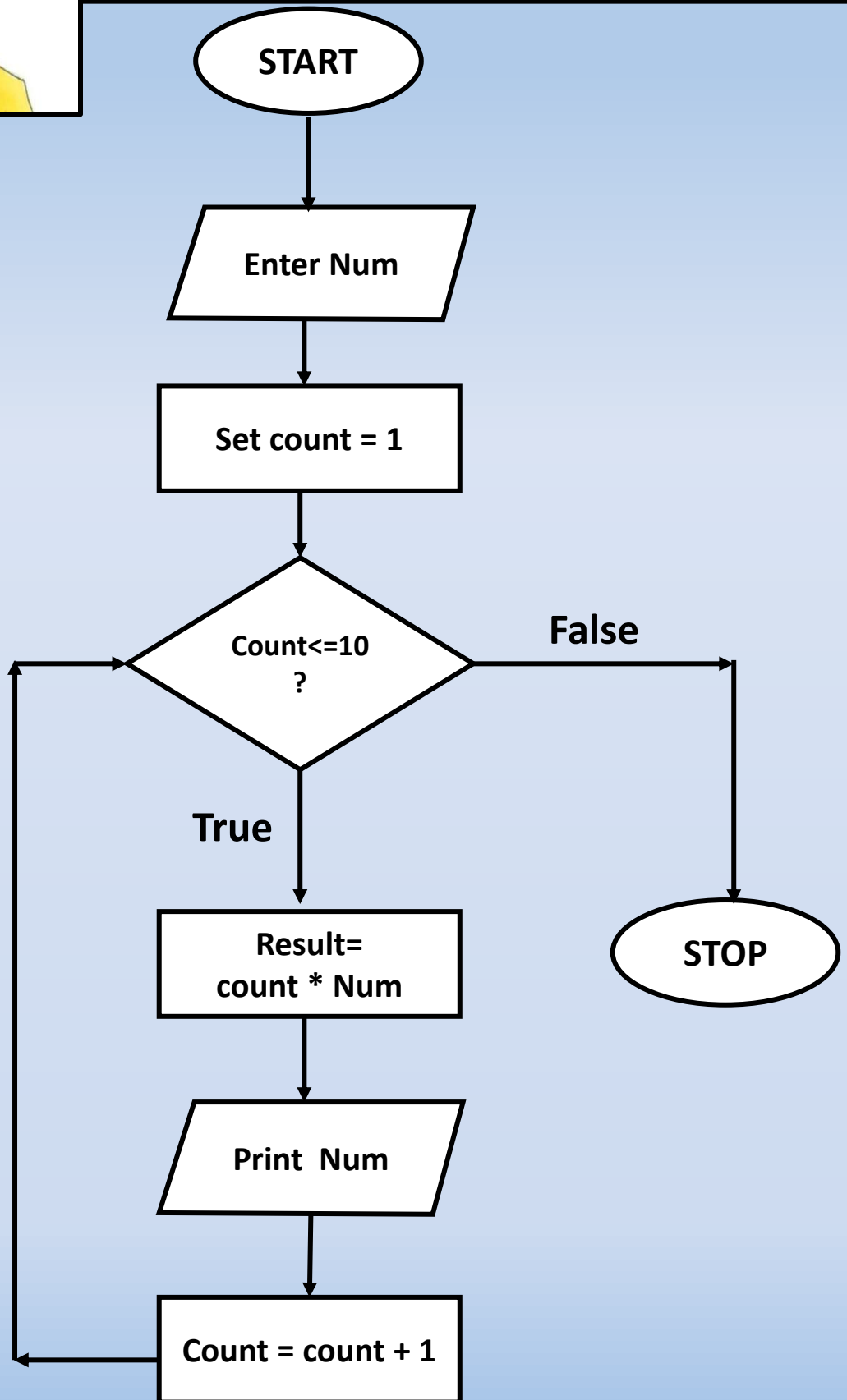
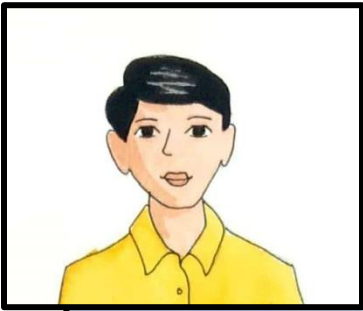




- 1) Start
- 2) Input N, the number for which multiplication table is to be printed.
- 3) For T = 1 to 10
- 4) Print $M = N * T$
- 5) End For
- 6) Stop

In this example, the number 10 given in the loop is working as a loop breaker, which terminates the loop when the value of 'T' reaches to 10.





Assignment 3

Write the algorithm to find the sum of 5 numbers,

Algorithm

1. Initialize sum = 0 and count = 0 (PROCESS)

2. _____

3. _____

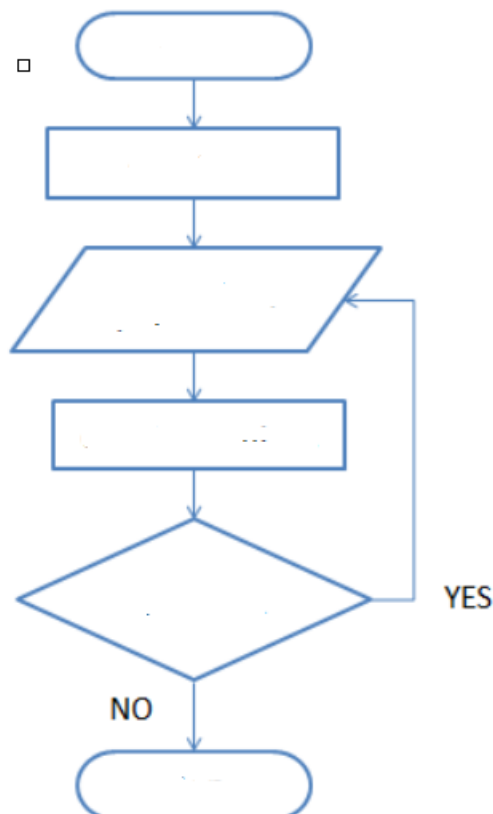
4. _____

5. _____

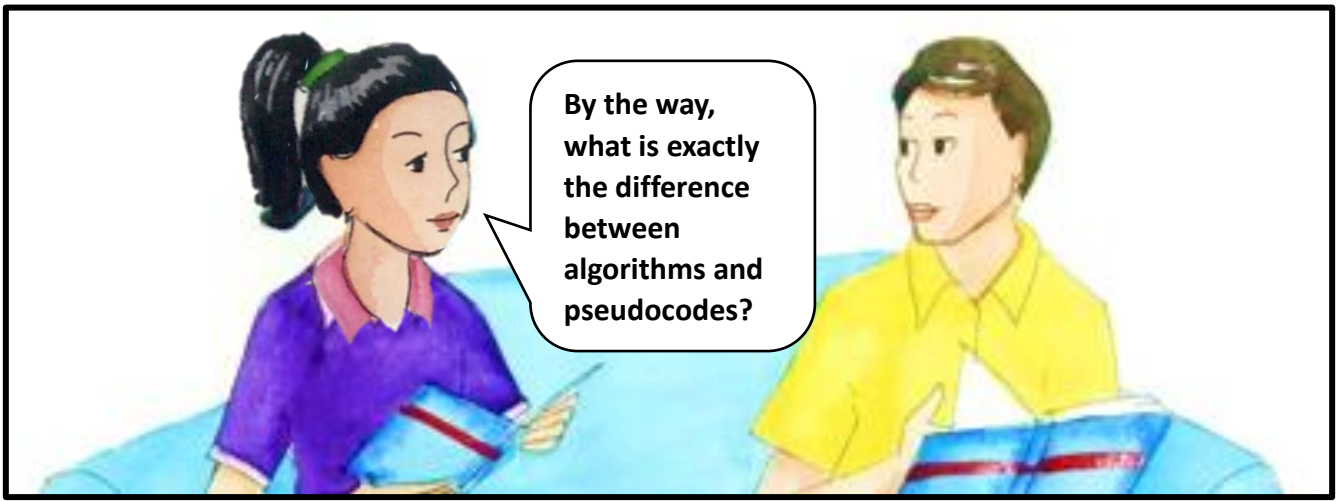
6. _____

7. _____

Given below is a flow chart to print “Hello World” 10 times. Use the correct statements to fill the blocks.



PART 3 - PSEUDOCODE



Pseudocode for adding two numbers

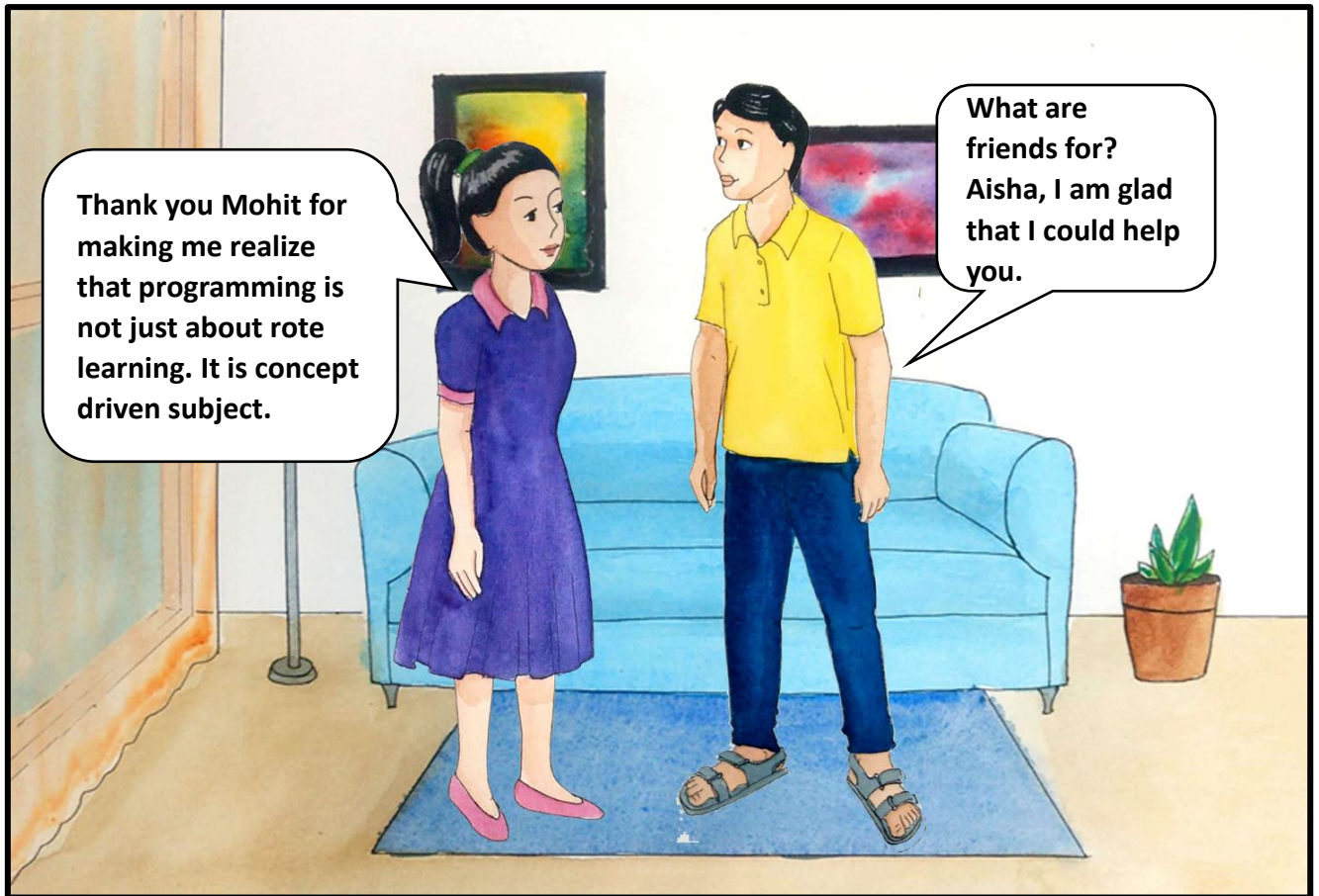
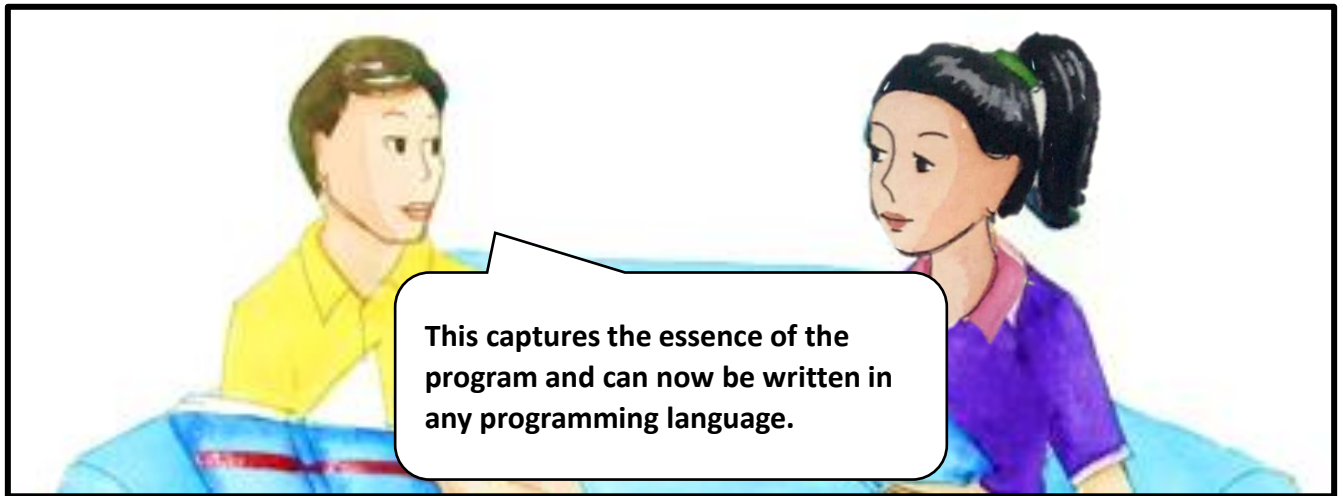
```
X= INPUT "enter number 1"  
Y= INPUT "enter number 1"  
Z = X +Y  
PRINT Z
```

Pseudocode for checking voting eligibility

```
Age = INPUT "Enter Age"  
If age is greater than or equal to 18  
    display "Eligible to vote"  
else  
    display "Not Eligible to vote"
```

Pseudocode for displaying the multiples of given number

```
Num=INPUT "Enter Number"  
WHILE the count<=10  
    result=count * num  
    PRINT result
```



Assignment -4

Find the words given below in the word search puzzle. The words can be placed vertically, horizontally or diagonally.

direction of flow	connector	decision	start or stop
process	algorithm	programming language	flowchart
computational thinking	psuedocode	output	input
variables	instructions	syntax	program
abstraction	decomposition		

U	P	L	O	X	I	K	V	A	F	V	U	Q	P	B	H	B	S	G	P	Q	D	U	Y
W	Z	T	Q	X	N	L	C	K	J	T	F	U	R	H	F	D	M	O	E	X	J	R	V
O	O	R	F	S	S	G	O	H	X	O	X	J	O	T	A	L	H	D	O	P	Y	C	U
K	S	A	I	B	T	Q	M	B	R	I	Z	X	G	O	Y	N	P	R	O	G	R	A	M
P	T	H	Z	A	R	I	P	E	H	A	I	T	R	H	L	F	T	Z	S	E	R	C	U
R	A	C	A	X	U	F	U	Z	O	B	A	D	A	L	M	G	U	N	T	X	T	V	T
E	R	W	I	V	C	S	T	T	E	D	L	W	M	Q	D	E	C	I	S	I	O	N	U
W	T	O	O	L	T	R	A	O	W	E	G	O	M	L	A	S	G	R	X	P	R	U	P
J	O	L	O	V	I	P	T	V	X	C	O	L	I	U	S	G	B	B	K	A	K	R	T
E	R	F	U	M	O	W	I	C	R	O	R	F	N	N	H	D	V	E	L	D	R	J	U
U	S	S	U	N	N	J	O	D	A	M	I	F	G	V	A	R	I	A	B	L	E	S	O
W	T	F	X	K	S	W	N	C	P	P	T	O	L	H	N	T	Z	Y	B	R	A	V	X
N	O	W	W	F	O	M	A	U	L	O	H	N	A	R	E	G	L	B	X	O	M	H	W
O	P	X	P	L	U	D	L	X	J	S	M	O	N	N	X	A	U	G	D	B	C	I	F
I	X	Z	Y	R	G	H	T	A	B	I	I	I	G	M	A	Z	V	V	L	B	D	H	P
T	Z	P	L	A	E	I	H	T	N	T	B	T	U	C	Z	Y	B	J	U	E	L	T	N
C	R	R	R	S	Q	G	I	N	T	I	S	C	A	R	U	B	D	C	T	I	F	Q	K
A	D	N	X	F	V	F	N	Y	Z	O	S	E	G	X	I	C	X	Q	C	C	D	Q	V
R	L	U	Q	A	B	G	K	S	W	N	L	R	E	R	B	E	S	G	S	E	J	U	J
T	B	C	R	T	W	Q	I	C	W	O	M	I	N	T	U	P	N	I	U	U	N	F	F
S	X	C	H	O	K	T	N	K	Z	H	G	D	G	A	K	K	S	I	B	A	S	Z	C
B	J	V	W	L	J	V	G	K	P	G	W	F	I	R	S	S	E	C	O	R	P	X	F
A	E	A	A	D	C	O	N	N	E	C	T	O	R	B	Z	Z	L	Z	Q	M	B	M	F
K	X	P	S	U	E	D	O	C	O	D	E	J	H	L	K	S	H	D	T	K	E	E	D

Assignment -5

1) INPUT Number

IF ($0 \leq \text{Number}$) AND ($\text{Number} \leq 100$)

ACCEPT

Else

REJECT

- a) On what values will this algorithm fail?
- b) Can you improve the algorithm?

2) Write a pseudocode that will perform the following tasks:

- a) Read the marks of three subjects: Computer Science, Mathematics and Physics, out of 100

- b) Calculate the aggregate marks
- c) Calculate the percentage of marks

BIBLIOGRAPHY

- Computer Science – CBSE Textbook
- Python with Computer Science by Dhanpat Rai & Co.

Principal's Message



Art integration approach in education helps learners construct and demonstrate understanding through an art form. It is engaging and augments creativity in students. Besides acquiring knowledge, integrating art further develops psychomotor, language, social, and decision-making skills and leads them to invest in scientific enquiry. This approach receives an enthusiastic welcome in the learning process as it improves self-confidence and entrusts a better understanding of culture and values in students.

Graphic novels are a perfect blend of expressing creative impulse and defining knowledge.

In an innovative initiative, graphic novels have become an integral part of the prescribed CBSE curriculum. Incorporating graphic novels in the regular teaching-learning process, we take a giant leap to progressive education and help students manage the VUCA world.

Surender Pal Sachdeva

Principal

Delhi Public School – Bopal, Ahmedabad

Disclaimer

This story is an original creation by the author. All the characters in this novel are fictional. All the images used are hand-made illustrations made by Art department. The concepts of this novel has been explained through fictional characters. All the technical terms are verified and are as per the curriculum.



DELHI PUBLIC SCHOOL-BOPAL, AHMEDABAD
(Affiliated to CBSE)

Bopal Square
Near Bopal Railway Crossing,
Ahmedabad - 380 058.
Email: dpsbopal@kalorex.org
URL: <https://dpsbopal-ahd.edu.in>