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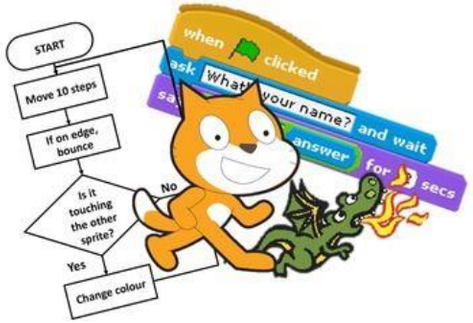
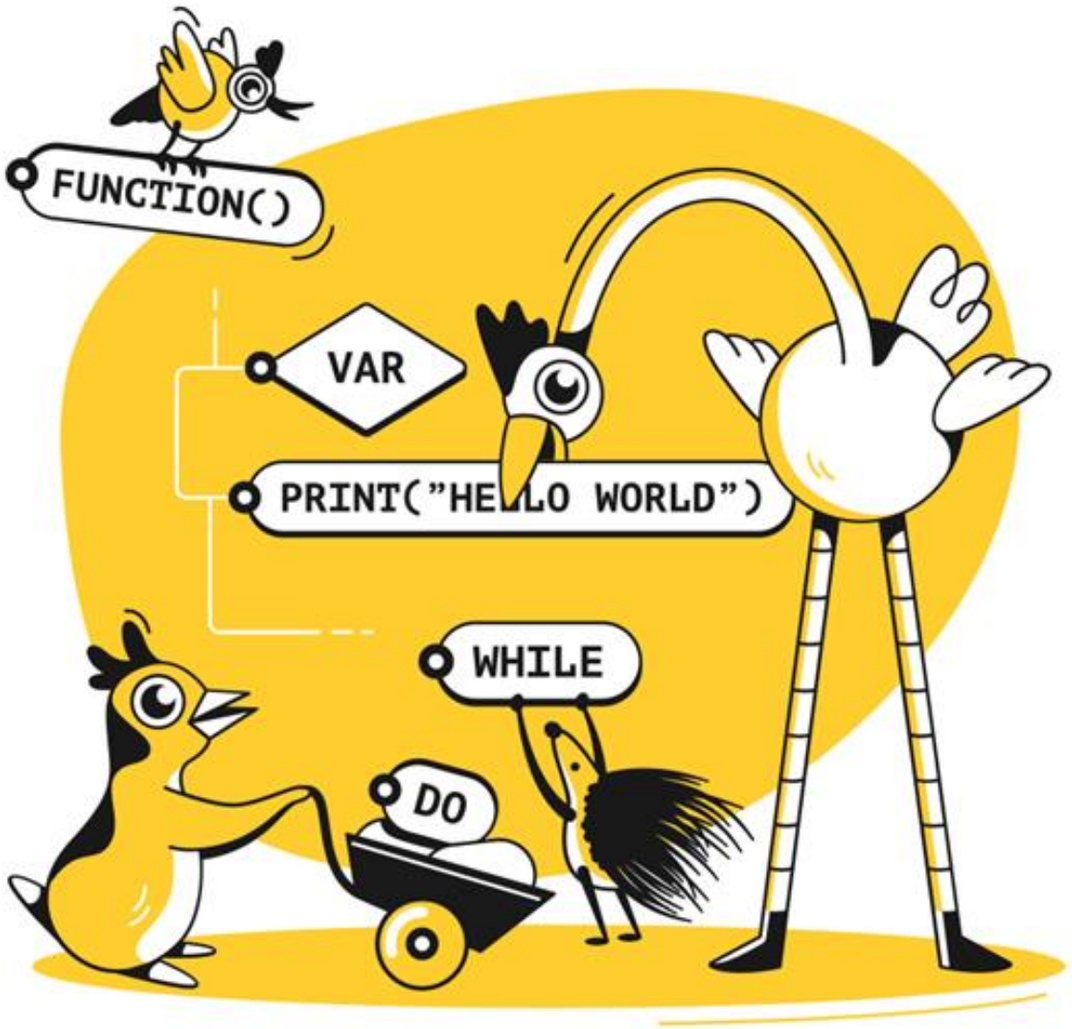
flow charting recap





Unit 3-Programming

Grade 9

ICT

13th November 2020

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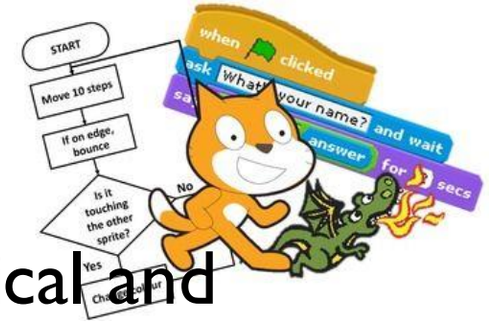
Programming Logic using Algorithms



- An **algorithm** is a step by step procedure to solve logical and mathematical problems.
- A recipe is a good example of an algorithm because it says what must be done, step by step. It takes inputs (ingredients) and produces an output (the completed dish).
- The word 'algorithm' come from the name of a Persian mathematician called Al-Khwārizmī (780–850).
- An algorithm can be called a "list of steps". Algorithms can be written in ordinary language, and that may be all a person needs.
- In computing, an algorithm is a precise list of operations that could be understand by the a computer programmer.
- Algorithms are written in pseudocode or flow charts

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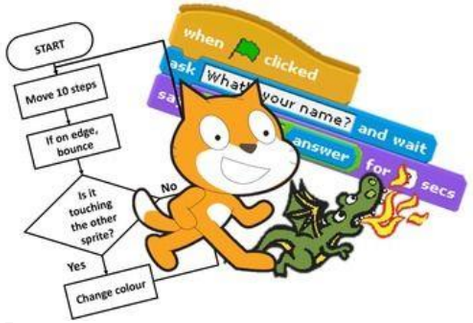
Flowchart



- A flow chart is a series of stages in time where the last stage is the product / result / goal.

Or in other words

- A planned stages of some task.
- The flow chart uses boxes, arrows and other elements such as diamonds, parallelograms etc.:
- Arrows show the order of the steps.

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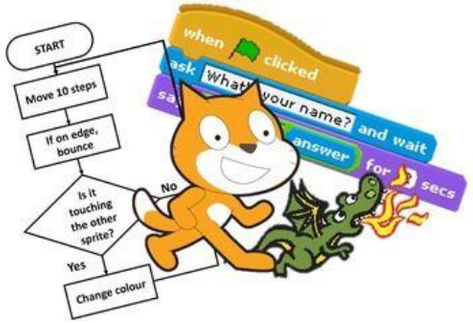
Control Structures



- Computer programs are made up of the three basic structures

- Sequence,
- Selection, and
- Repetition.

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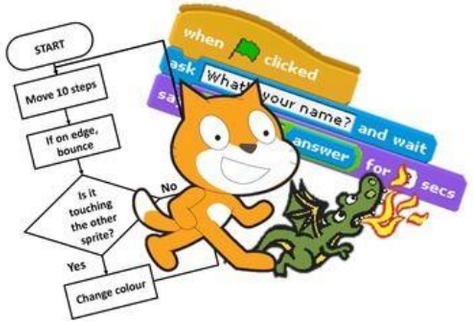
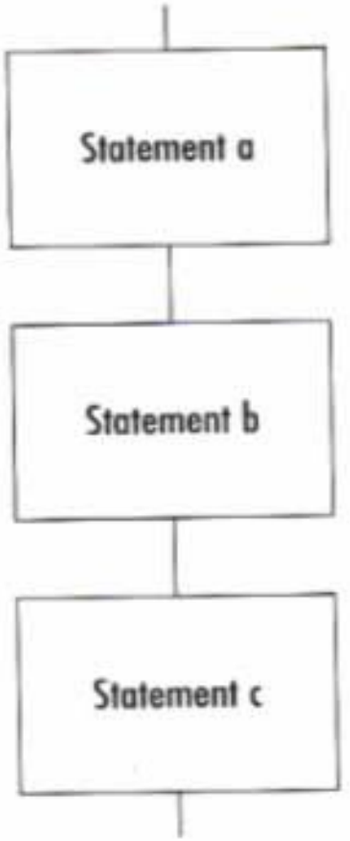
Sequence



- The sequence control structure is defined as the straight forward execution of one processing step after another. Here is the general form of a sequence.



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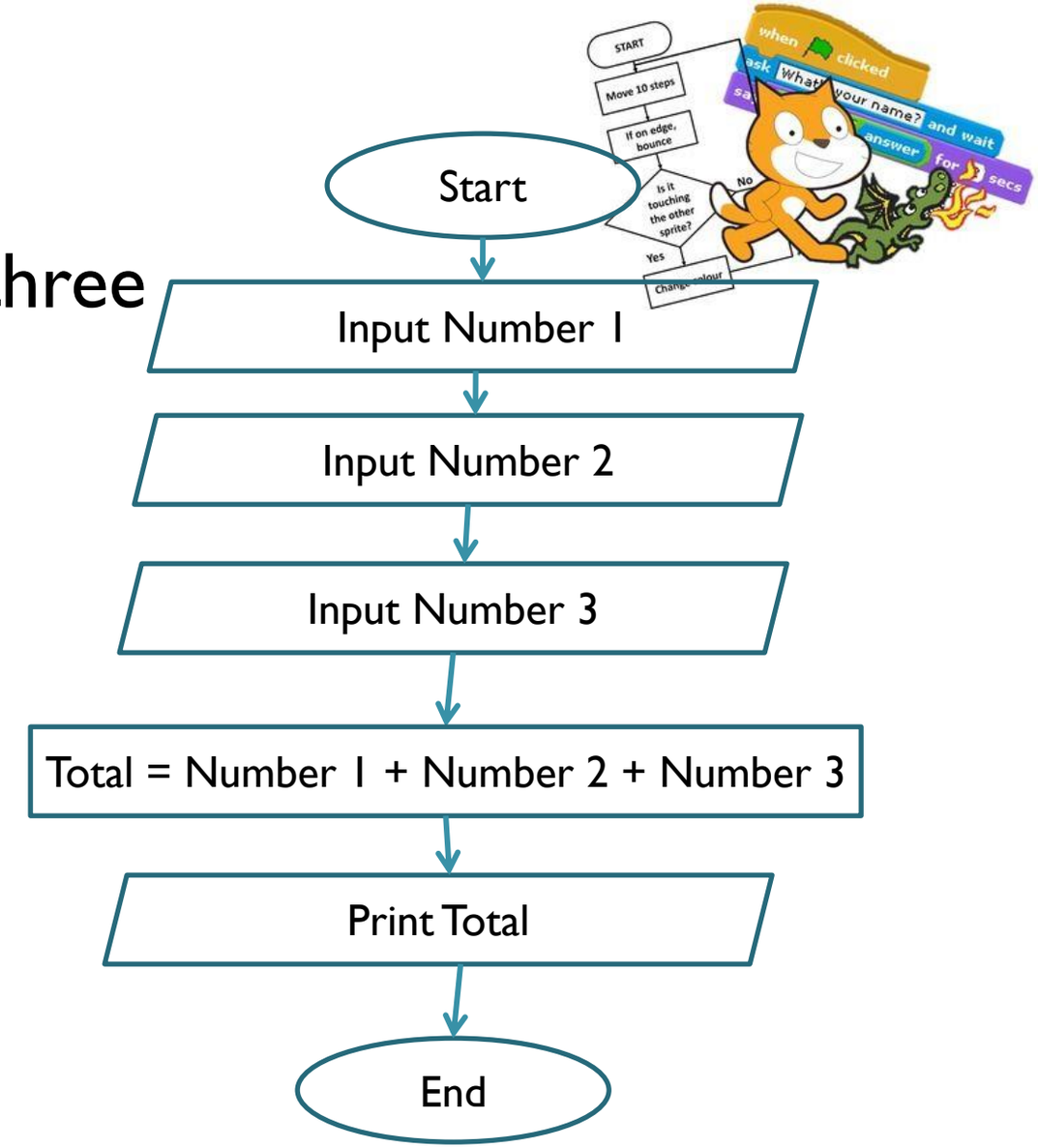
Example 1

- A flow chart is required to read three numbers, add them together and print their total.



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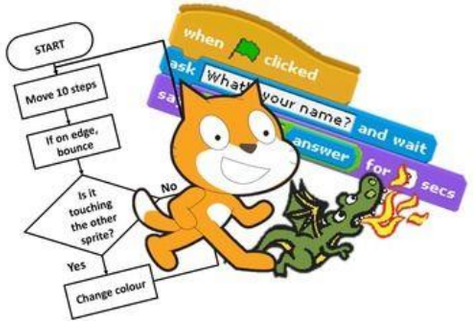
Try this ….



- Draw a flow chart to input three subject marks, calculate the total and average marks and print both total and average marks.

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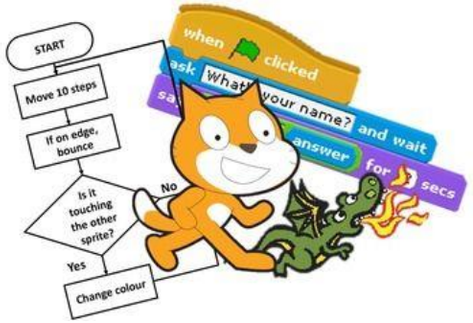
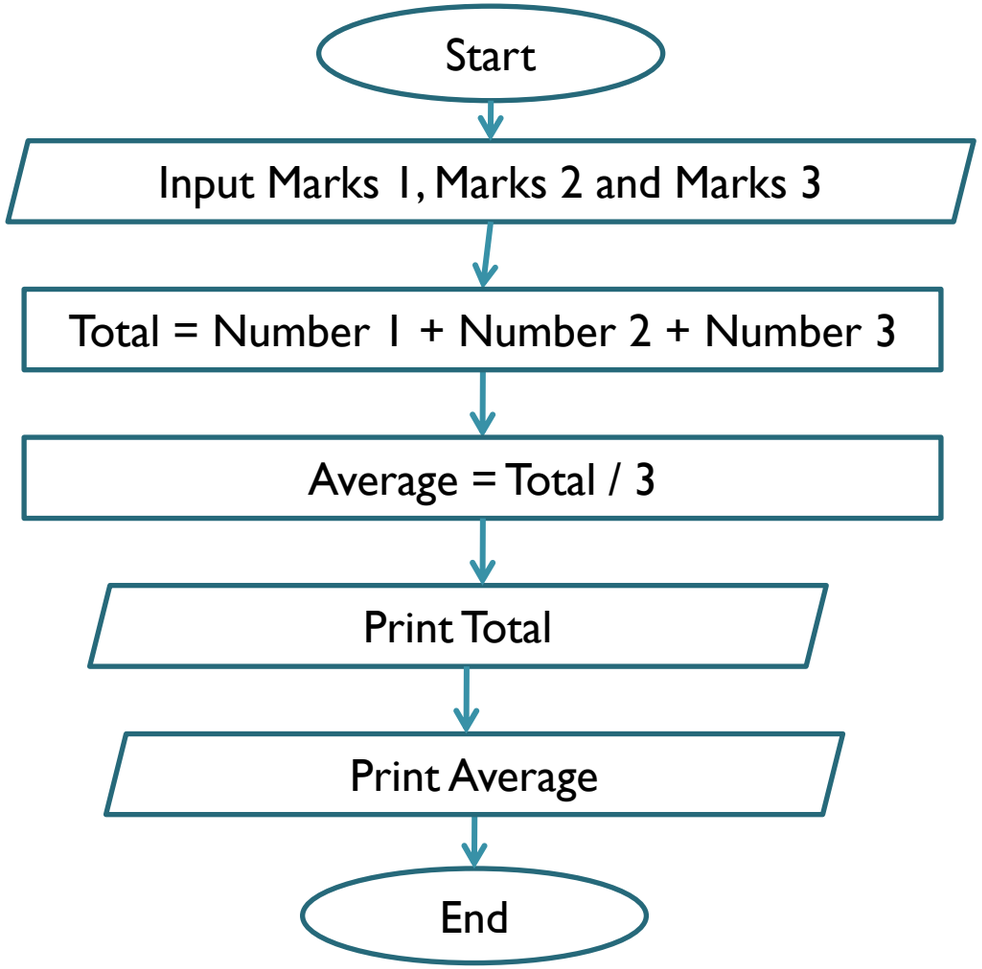
Answer





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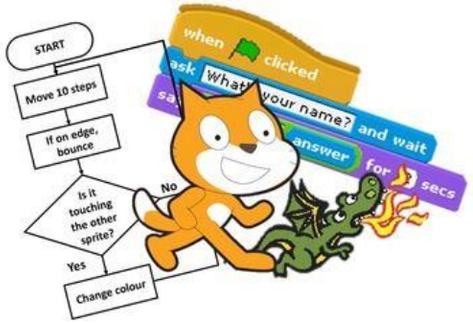
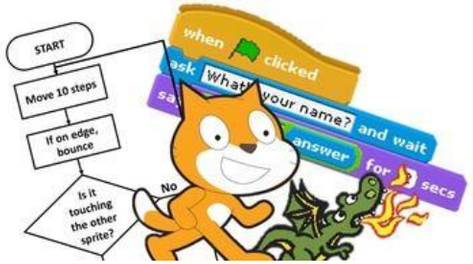
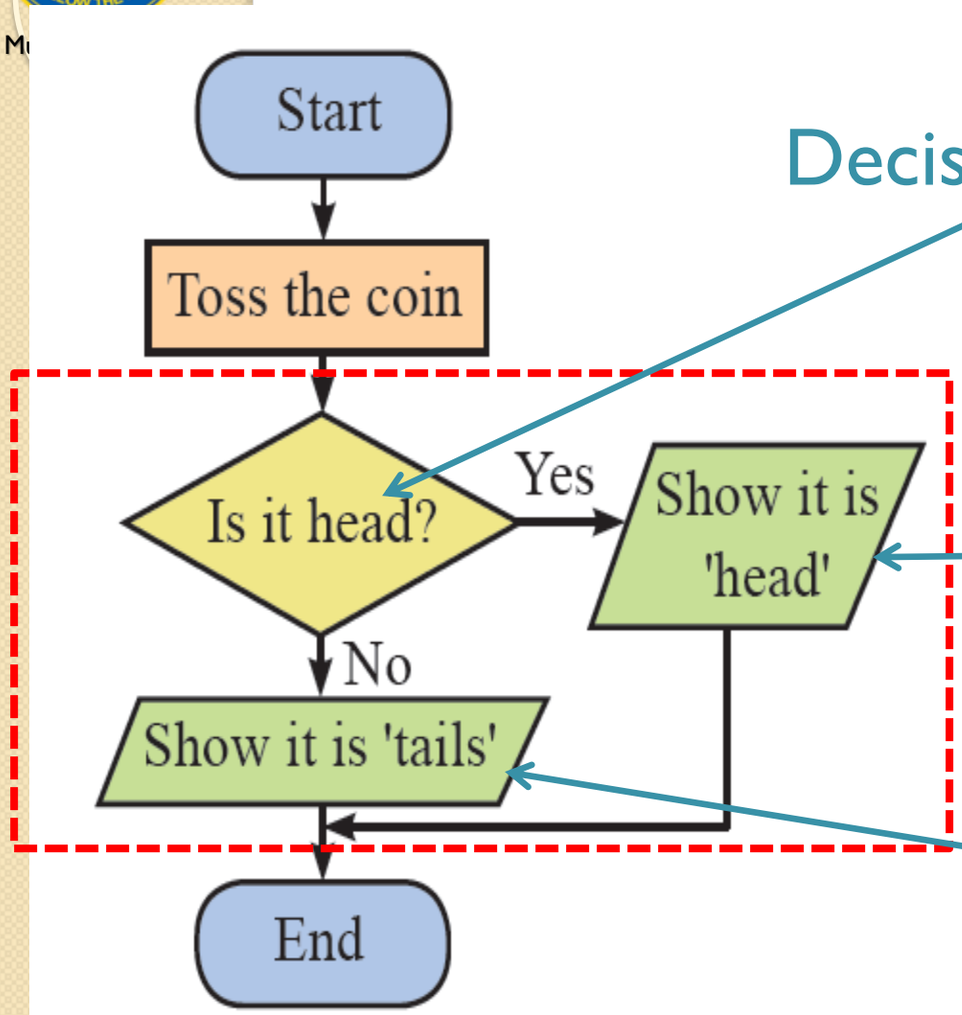
Simple Selection

- Simple selection is selecting one option out of two given options under a certain condition.
- Simple selection has one condition with two options. A selection is made out of the two options. If the condition is true, one option is selected and if not, the other option gets selected.
- We use 'if-else' block in scratch to represent simple selection



Text Book Example :

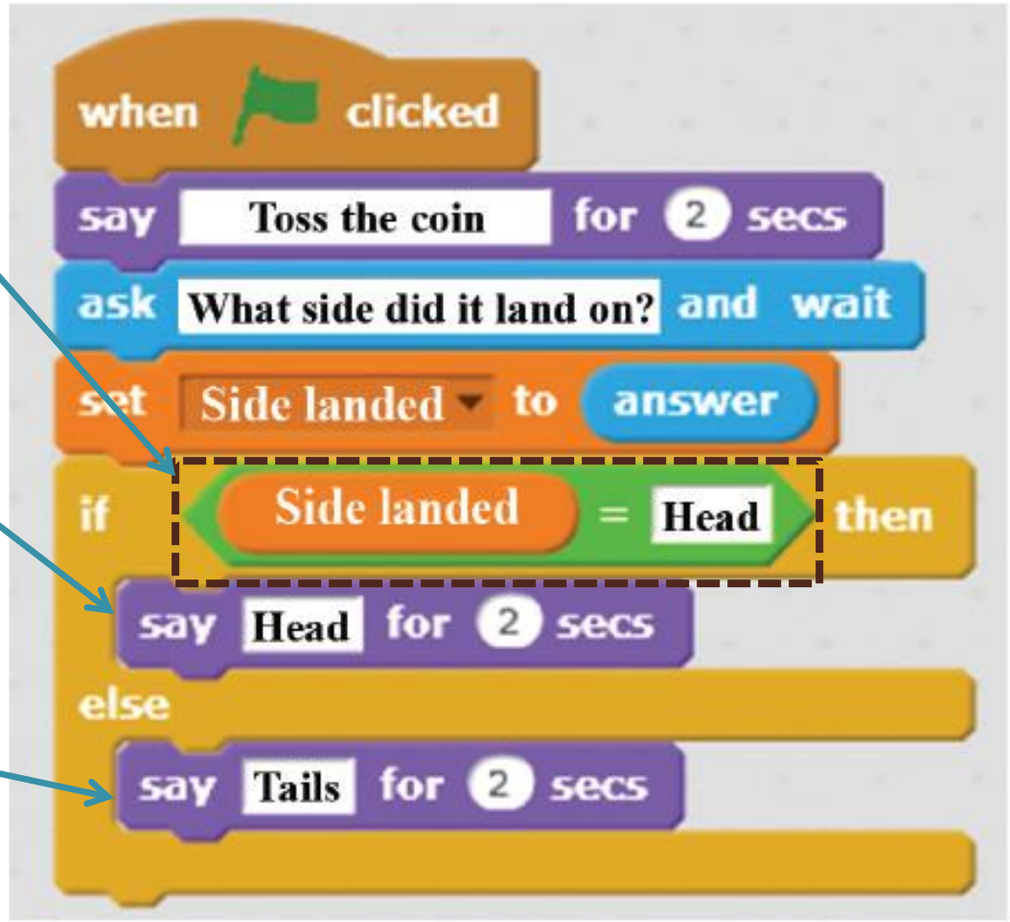




Decision/Condition

Option 1

Option 2



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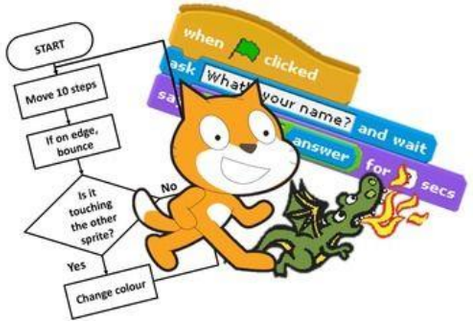
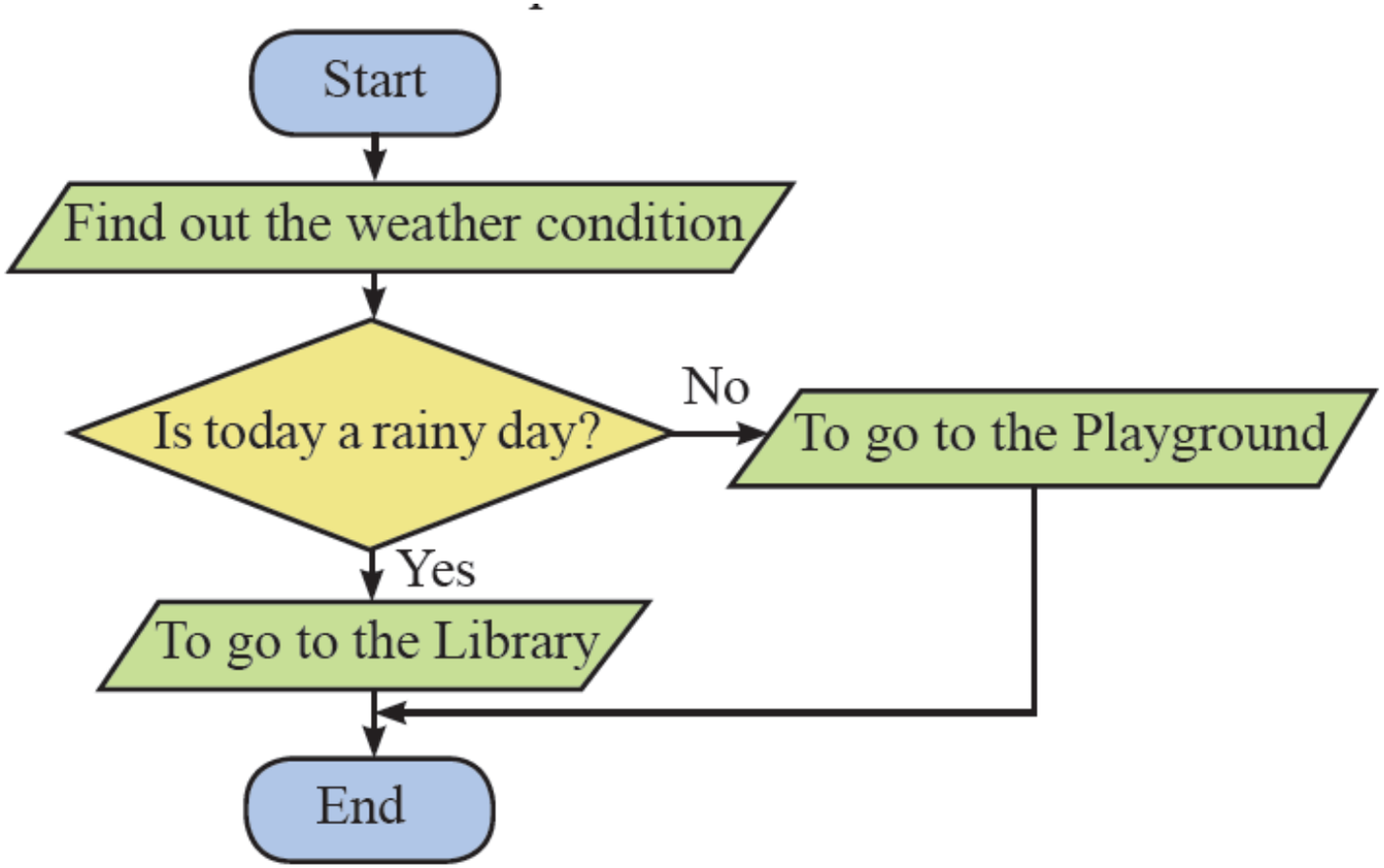
Example 1 :



Going to the Play ground or the Library according to the weather condition



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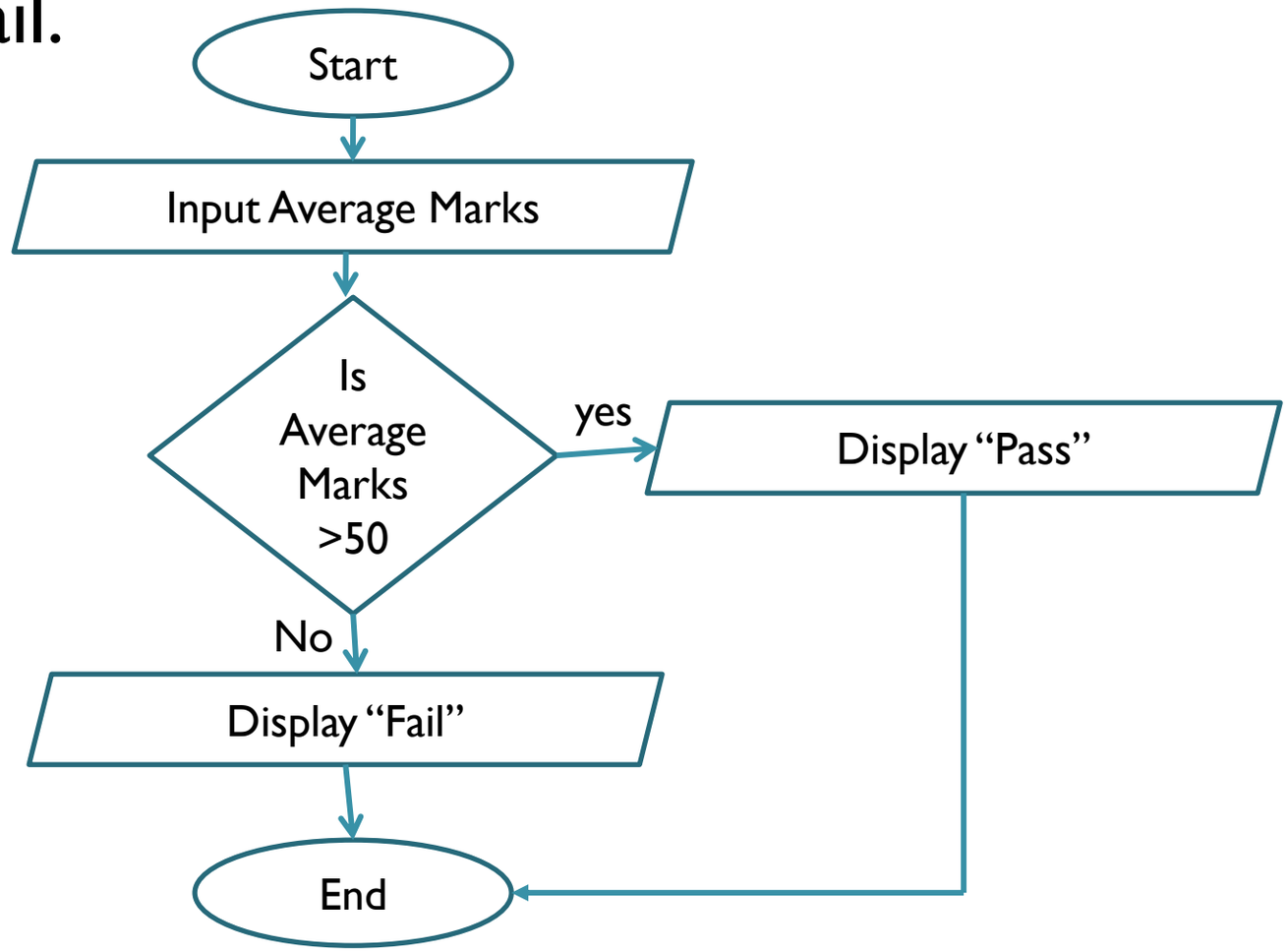
Example 2:

- Draw a flow chart to input average marks of a student and find the either pass or fail.



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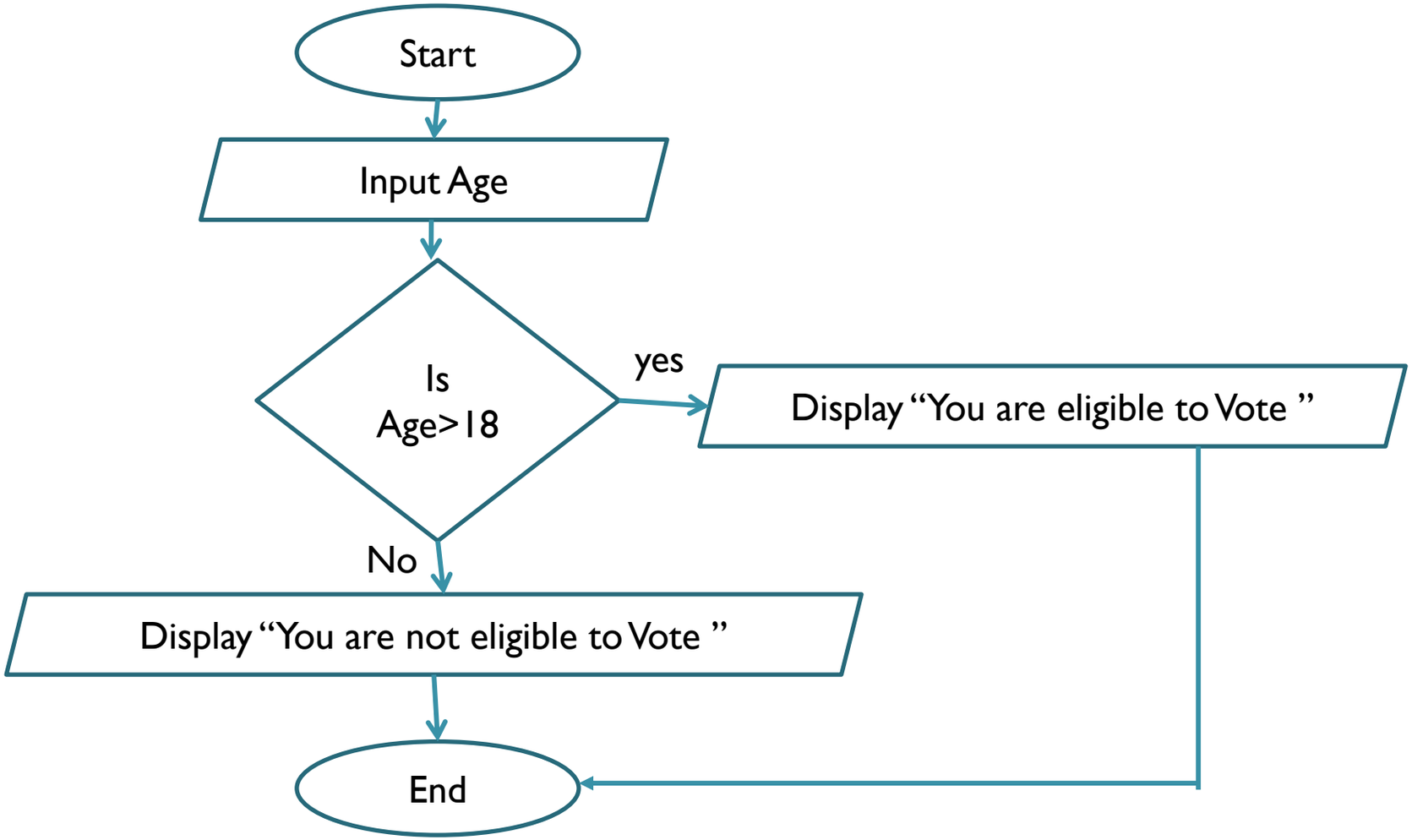
Example 3:

- Draw a flow chart to find the eligibility for voting in an election.



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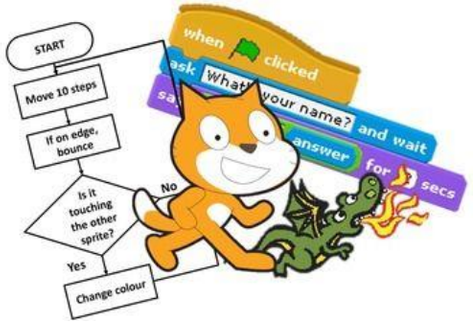
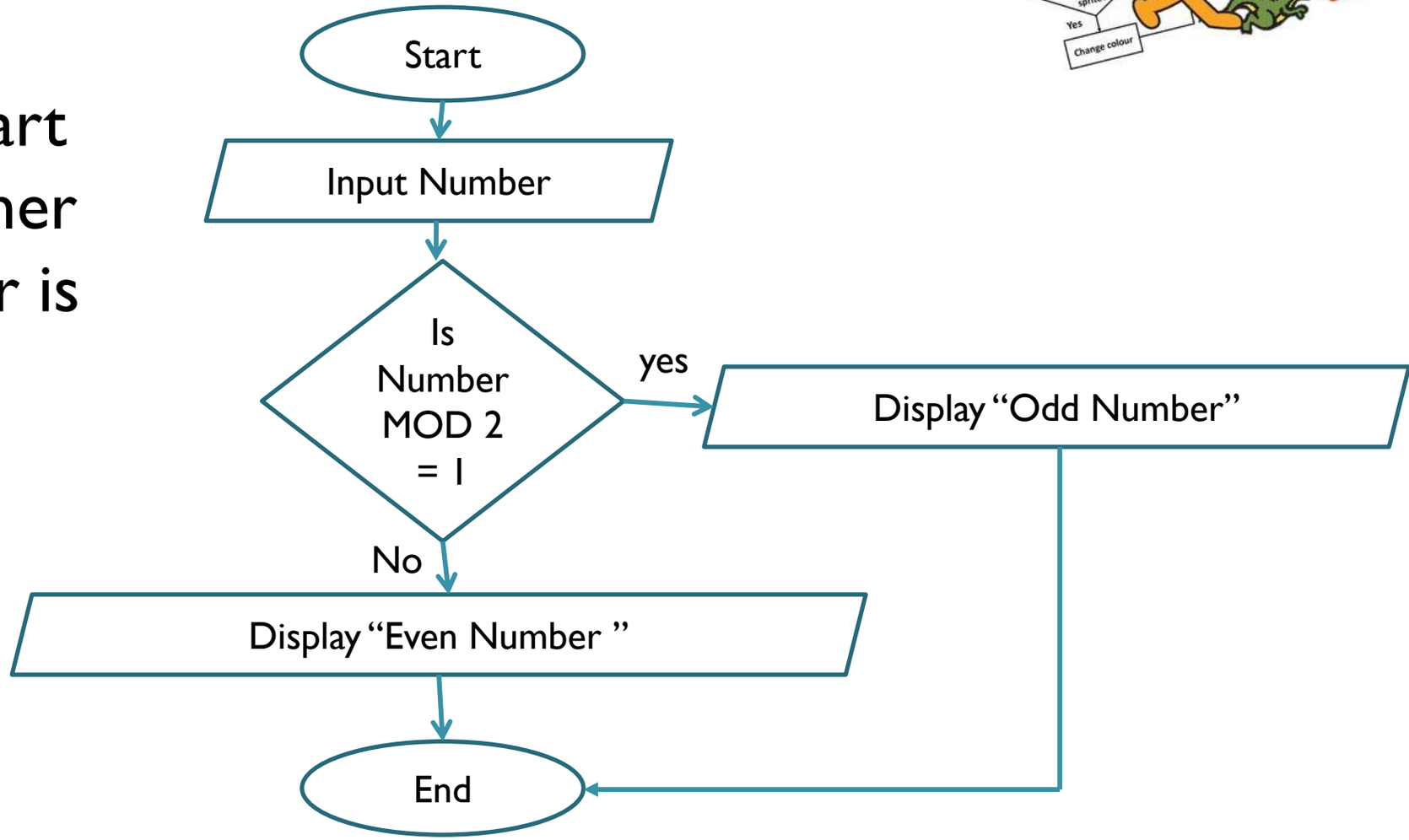
Home work

- Draw a flow chart to display whether an input number is ‘odd’ or ‘even’.





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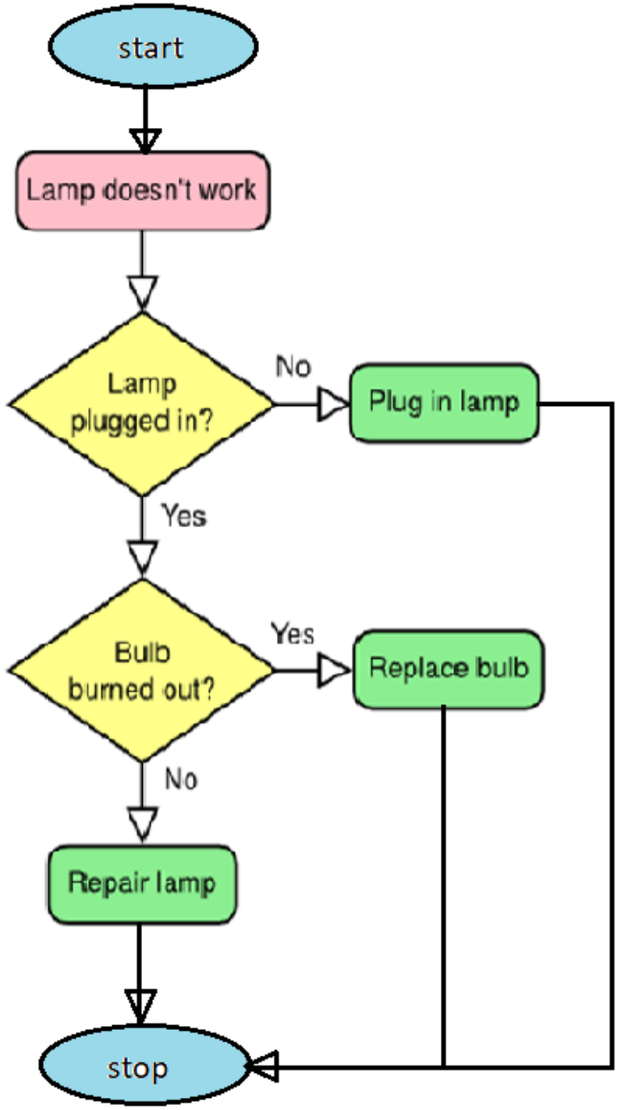
Selection out of many option (Multiple Selection)

Example 1

- A simple flow chart which shows what to do when a lamp does not work



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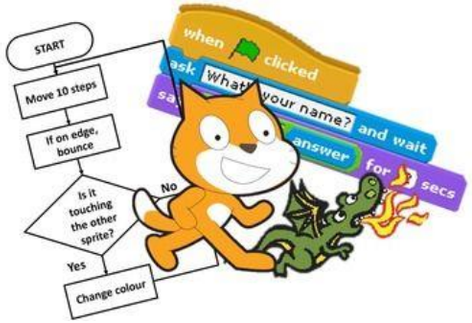
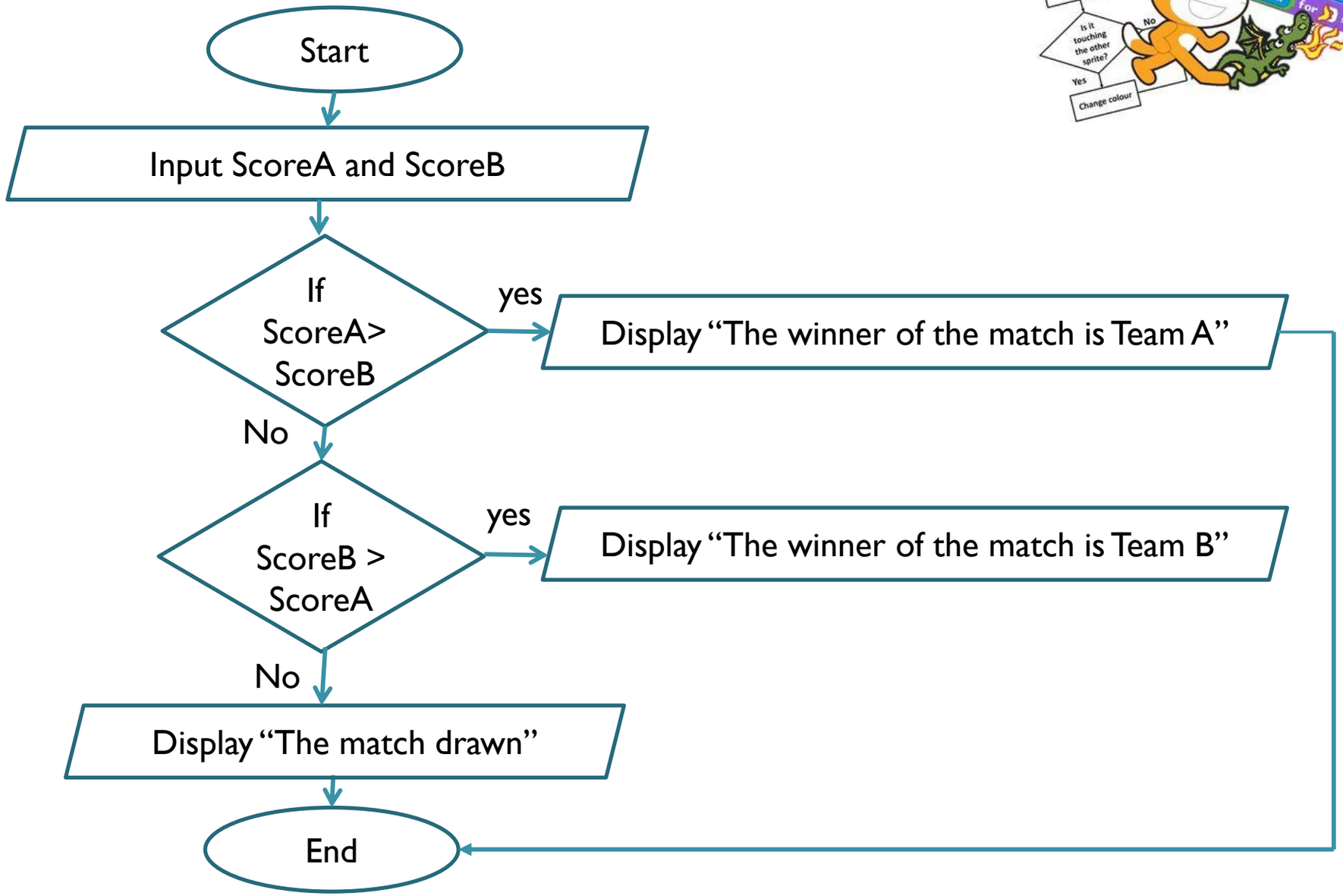
Example 2

- Here the flow chart displays the way of giving final result of a cricket match





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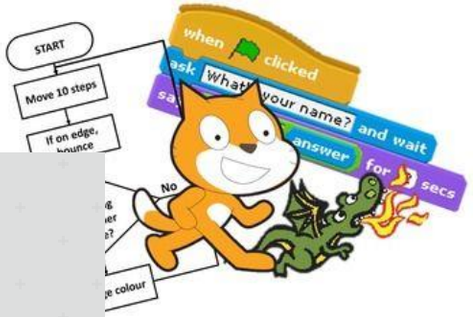
Scratch program :




```
when clicked
say [Input marks] for (2) secs
ask [input Team A Marks] and wait
set [ScoreA] to (answer)
ask [input Team B Marks] and wait
set [ScoreB] to (answer)
if <(ScoreA) > (ScoreB)> then
    say [The Winner of the Match is Team A] for (2) secs
else
    if <(ScoreA) < (ScoreB)> then
        say [The Winner of the Match is Team B] for (2) secs
    else
        say [The Match drawn] for (2) secs
```

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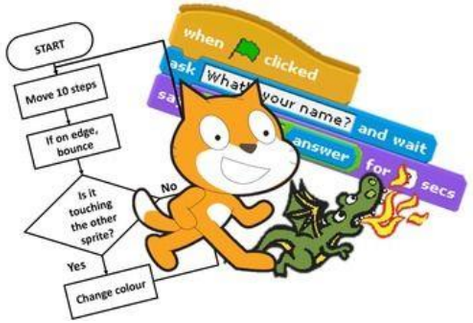


Activity 3.1

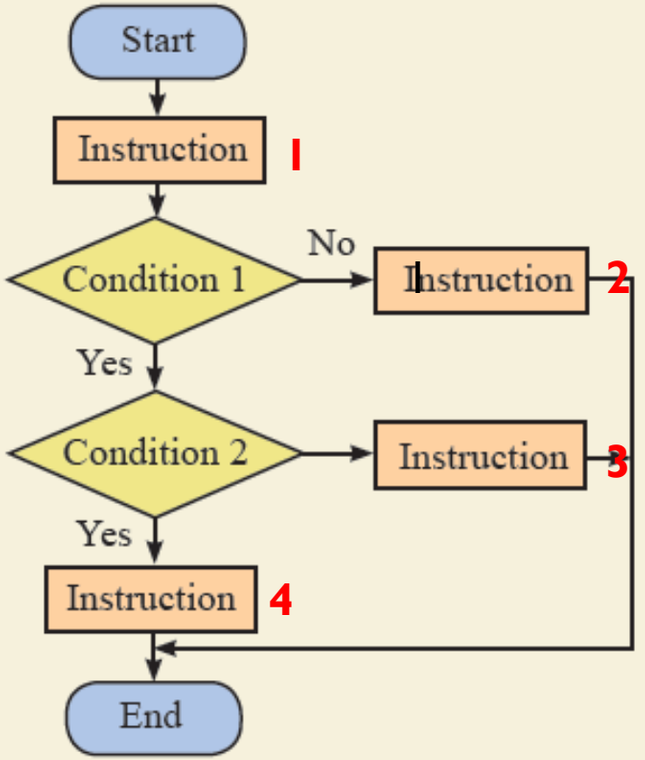
By referring to the flowchart, indicate whether the given statements are 'true' or 'false'.

a) Condition 1 in the flowchart is executed first. (True/ False)

b) Instruction 1 does not execute under any condition. (True/ False)

c) Condition 1 is executed after Instruction 1. (True/ False)

d) Execution of Instruction 3 depends only on condition 2. (True/ False)



e) For Instruction 4 to be executed, both condition 1 and condition 2 must be true. (True/ False)

f) Whatever the outcomes of the conditions may be, Instruction 1 and one another instruction will be executed. (True/ False)

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Answers

a) False
b) True
c) True
d) False
e) True
f) True

Activity 3.1

By referring to the flowchart, indicate whether the given statements are 'true' or 'false'.

a) Condition 1 in the flowchart is executed first. (True/ False)

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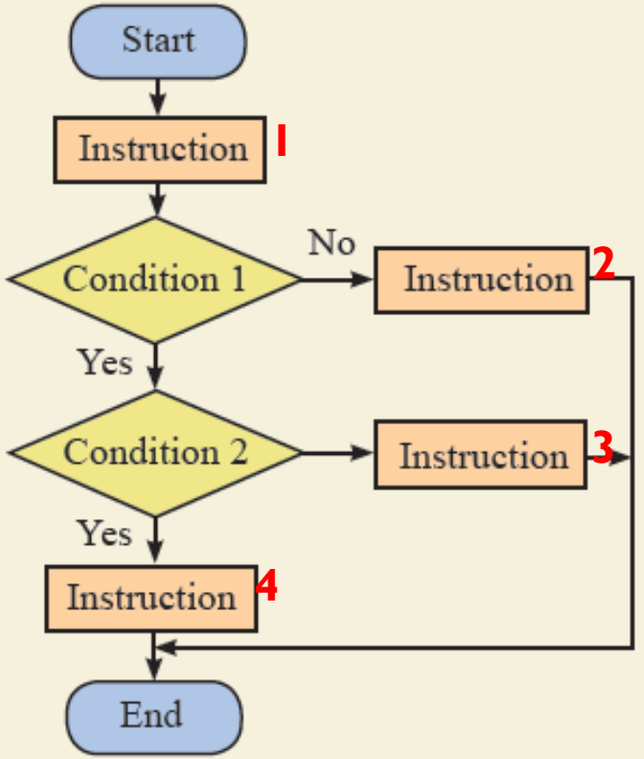

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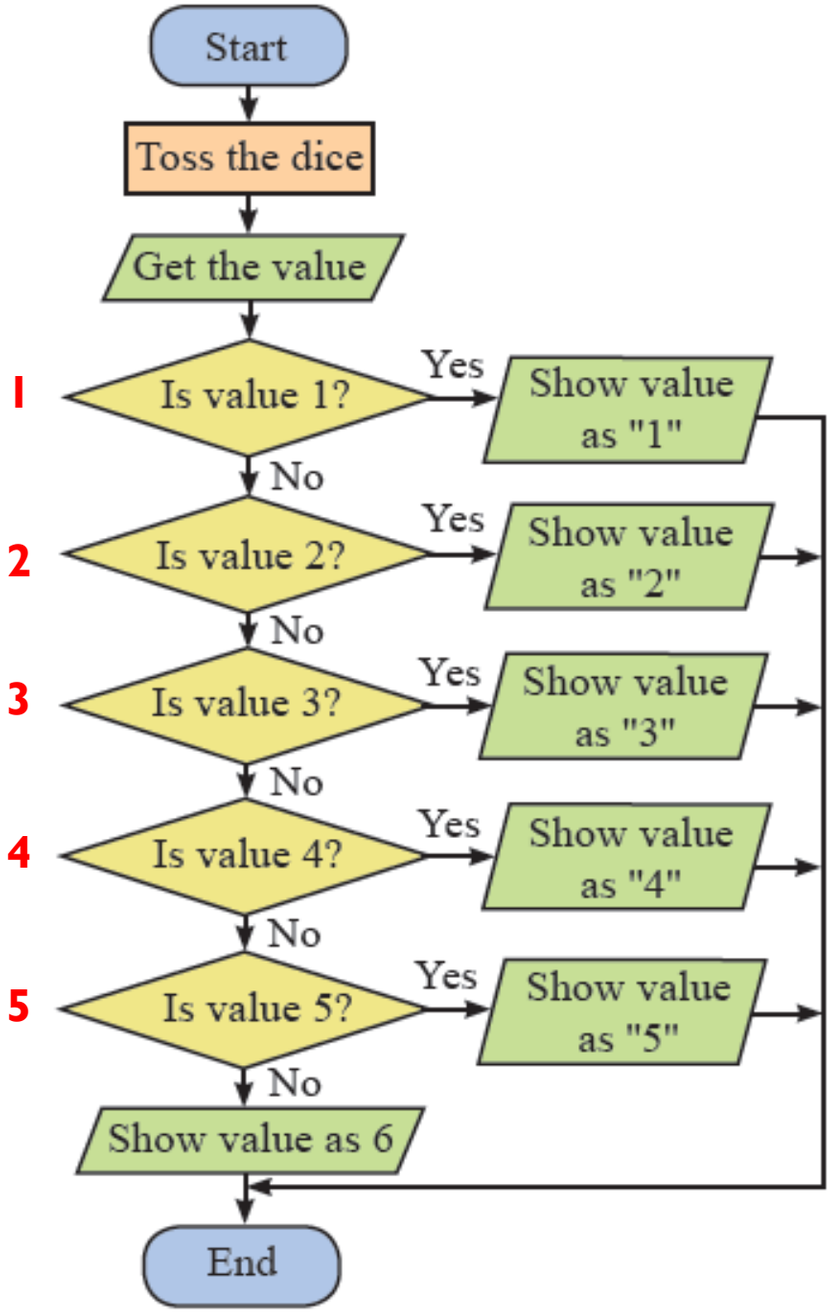
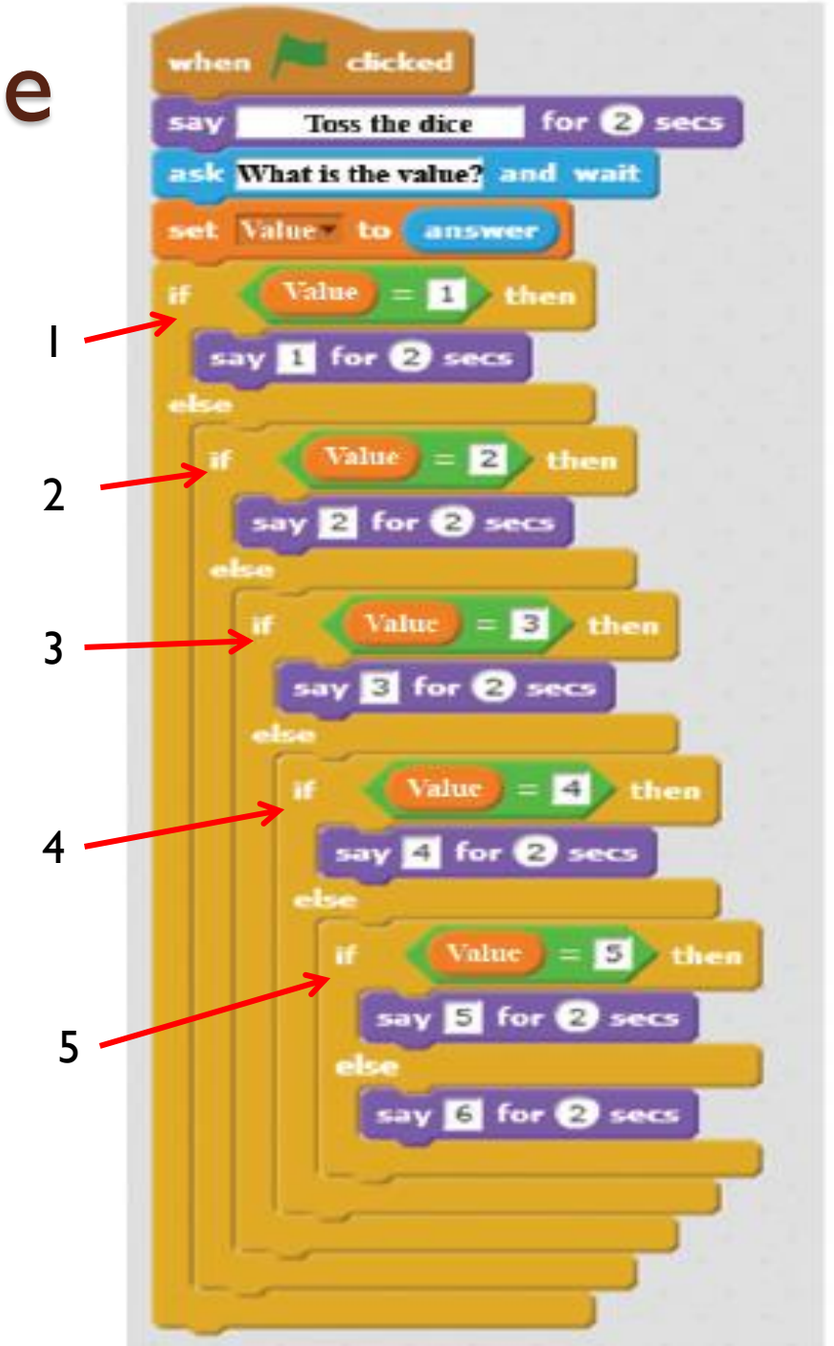
Text book example



In the scratch program we use 5 if-else blocks to represent 5 Decisions/conditions of the flow chart



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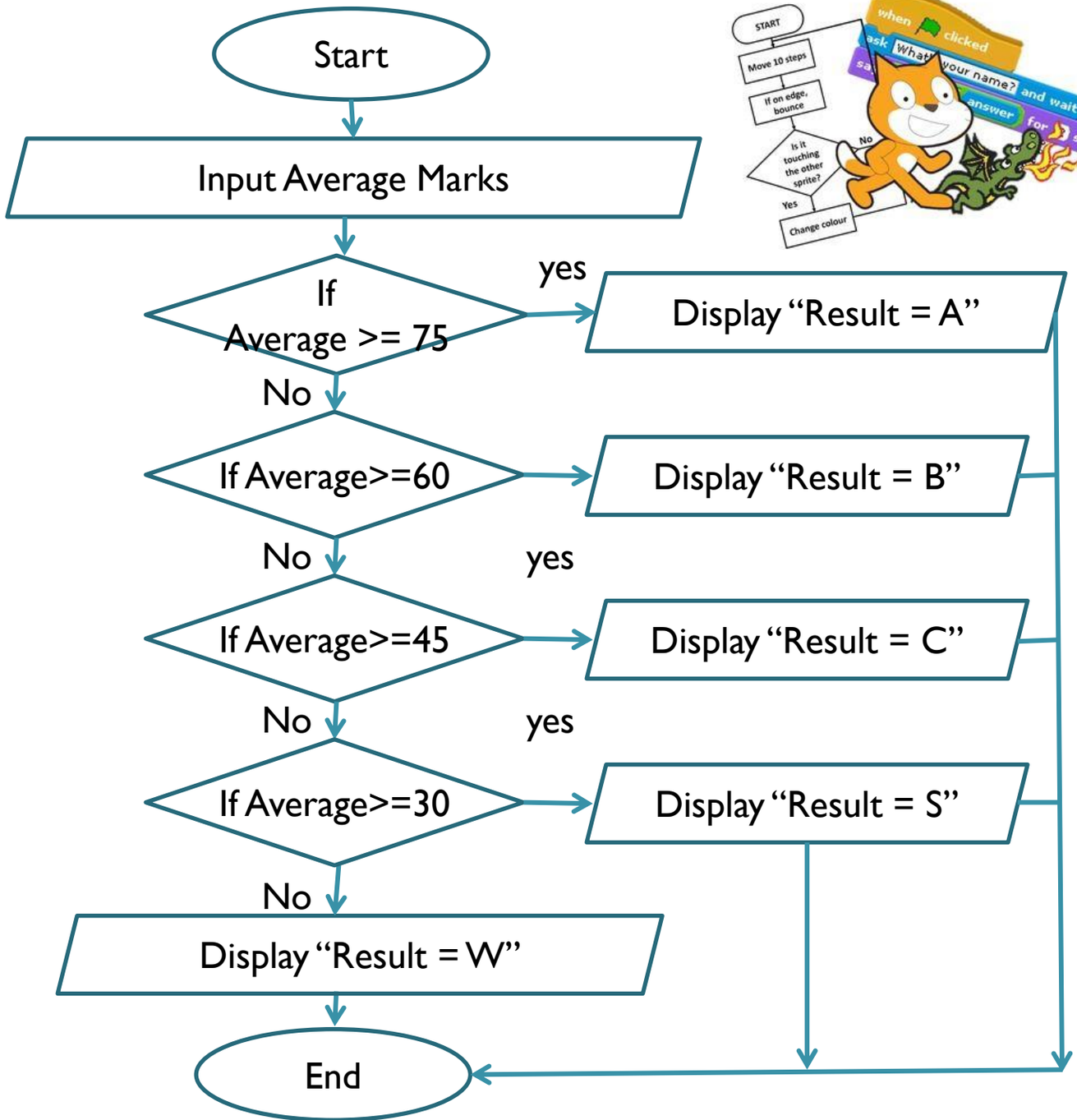
Example 1

- Draw a flow chart to display the results for given average marks



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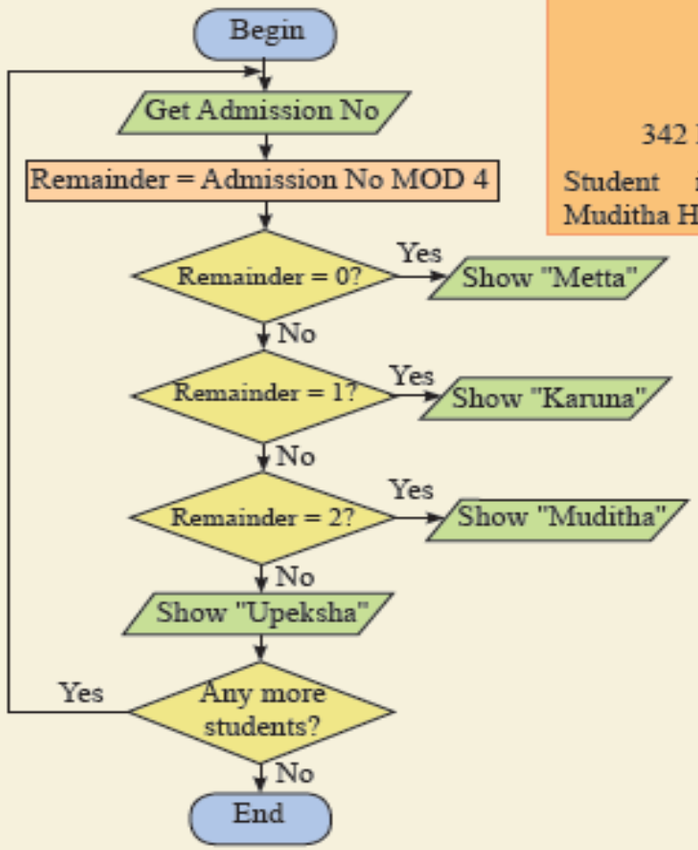
Activity 3.2

Consider that, a school has four houses namely Metta, Karuna, Muditha and Upeksha. A flowchart to assign students to their houses is given below. Houses are assigned based on the remainder after dividing the admission number by 4.

Remainder	House
0	Metta
1	Karuna
2	Muditha
3	Upeksha



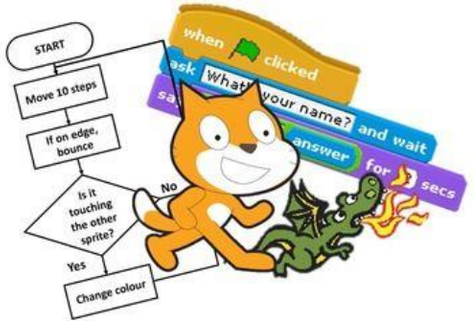
Here, the remainder is obtained by dividing the Admission No. by 4.

e.g. - Admission No. = 342

$$
\begin{array}{r}
85 \\
4 \overline{)\,342} \\
32 \\
\hline
22 \\
20 \\
\hline
2
\end{array}
$$

342 MOD 4 = 2

Student is assigned to Muditha House.



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Answer the following questions.

1. A number that cannot exists as a remainder

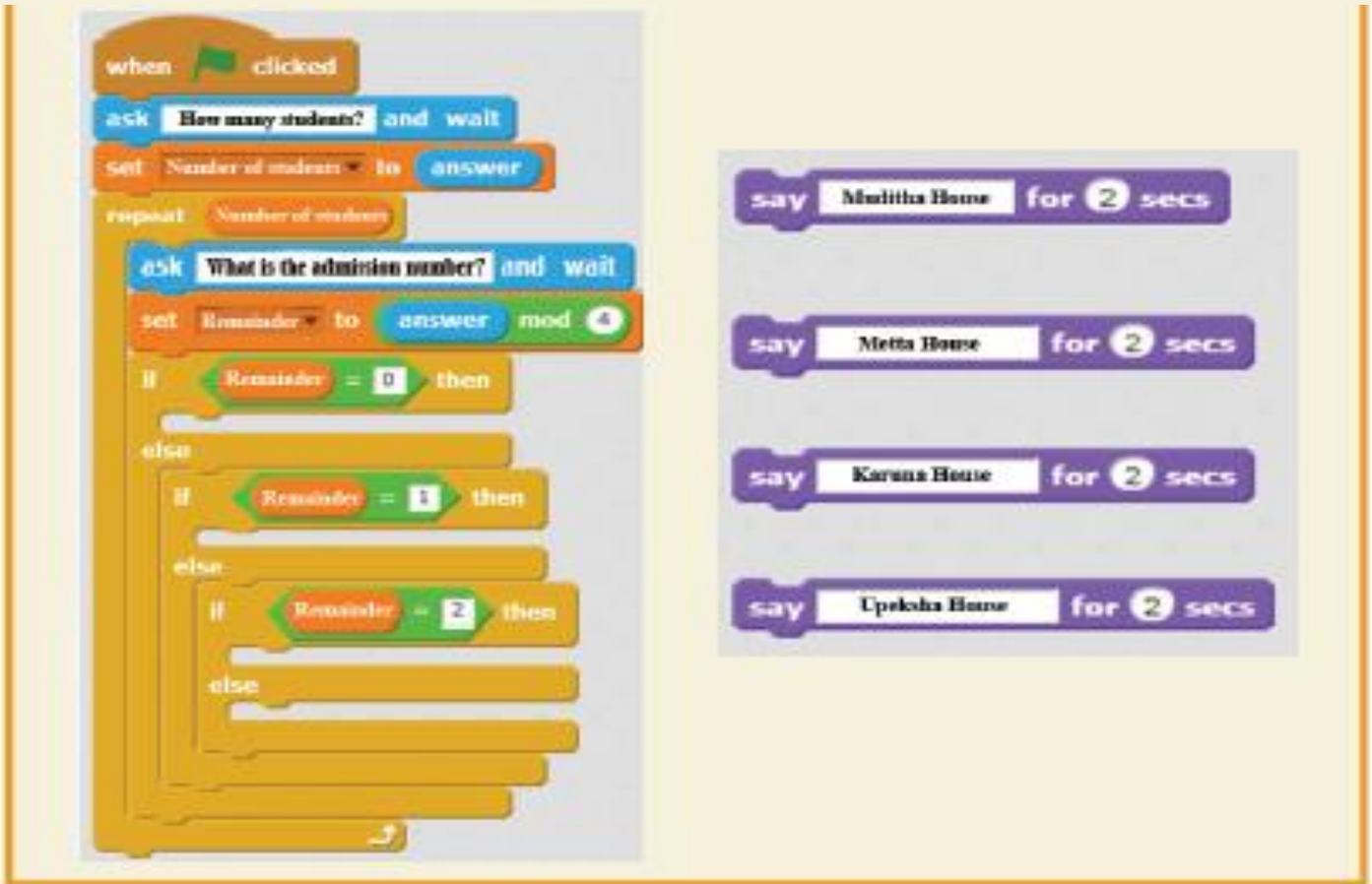
1) 0 2) 2 3) 3 4) 4

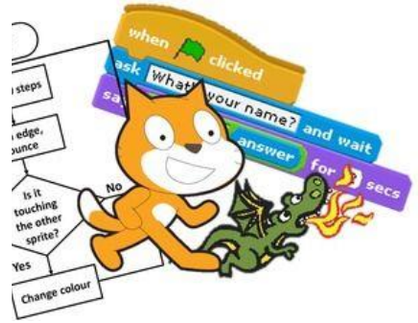
2. A suitable remainder for a student assigned to Upeksha House is:

1) 3 2) 2 3) 1 4) 0

3. How many conditions are there in this flowchart?

1) 1 2) 2 3) 3 4) 4





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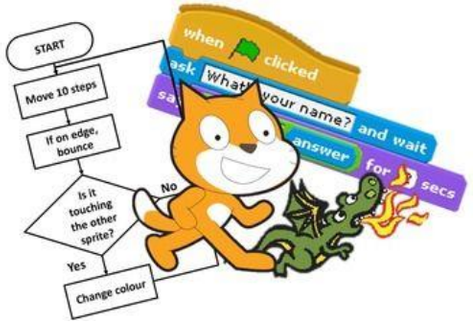
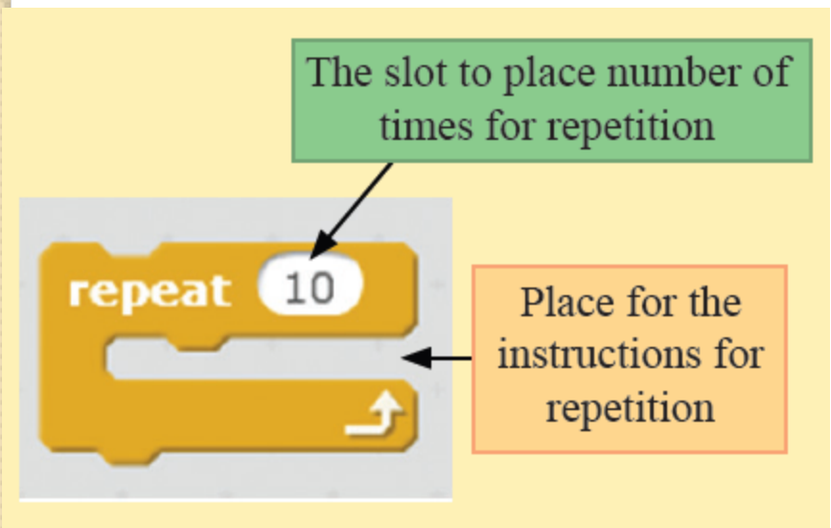
Control Structure with Repetition

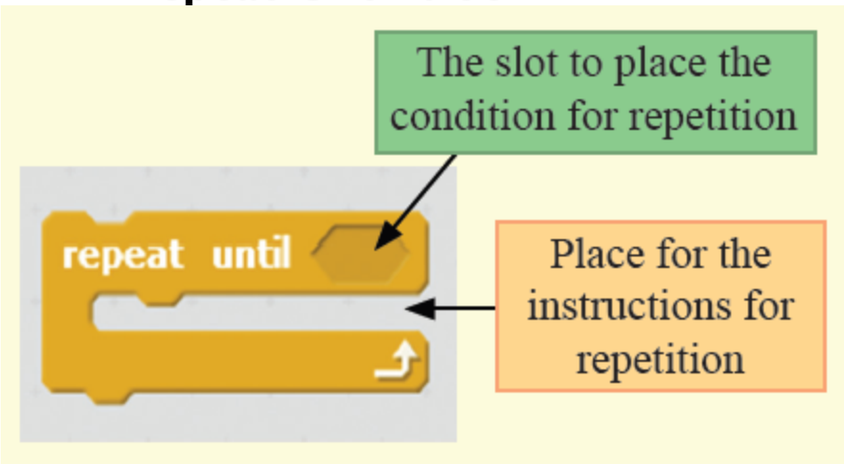


- There are 3 Repetition Blocks in Scratch

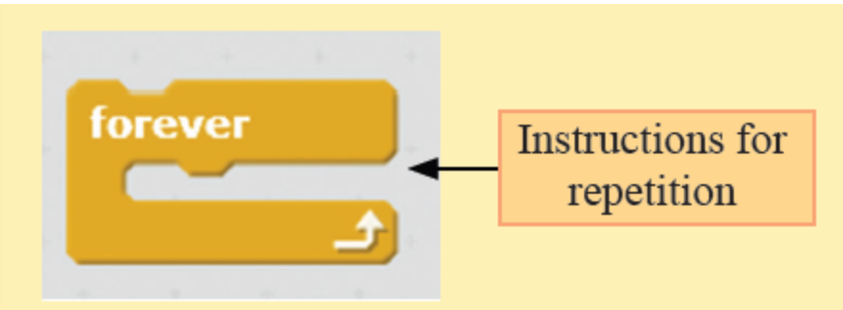
Repeat block



Repeat-Until block



Forever block



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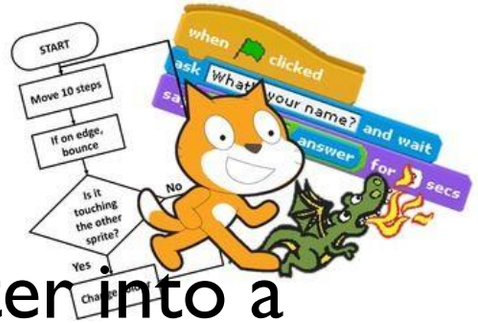
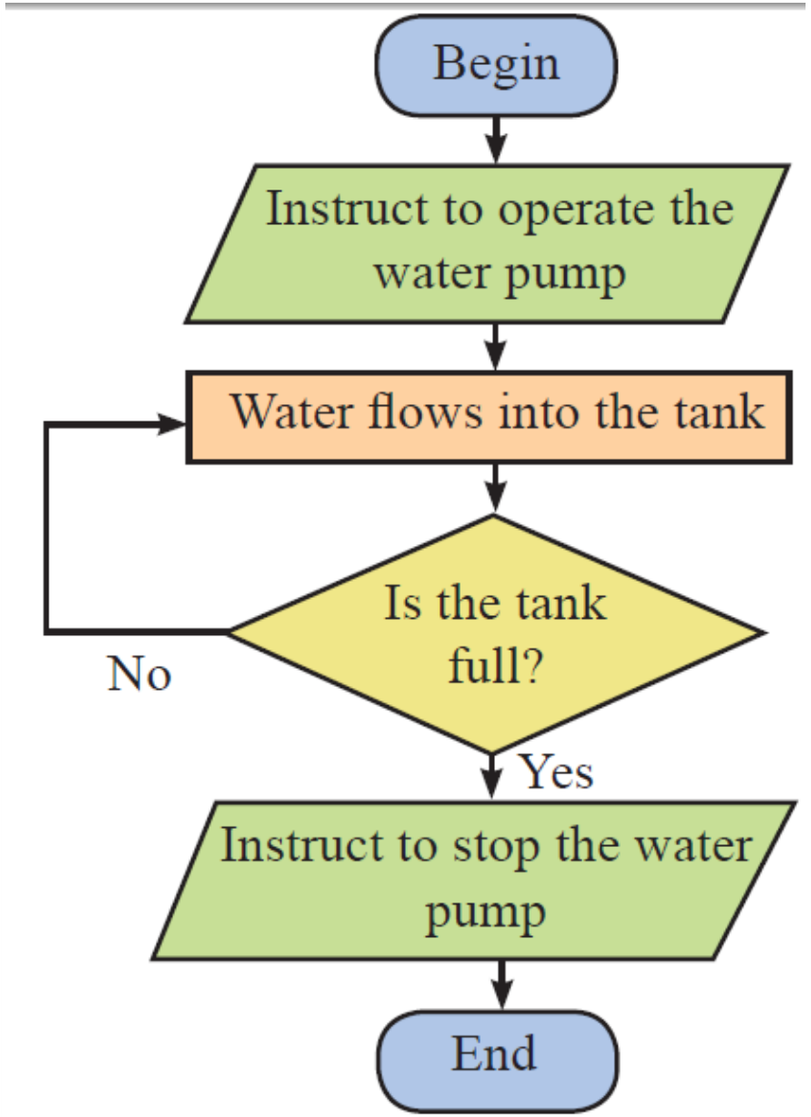
Text Book Example 1





- A water pump filling water into a tank. The pump is operated until the tank becomes fill.

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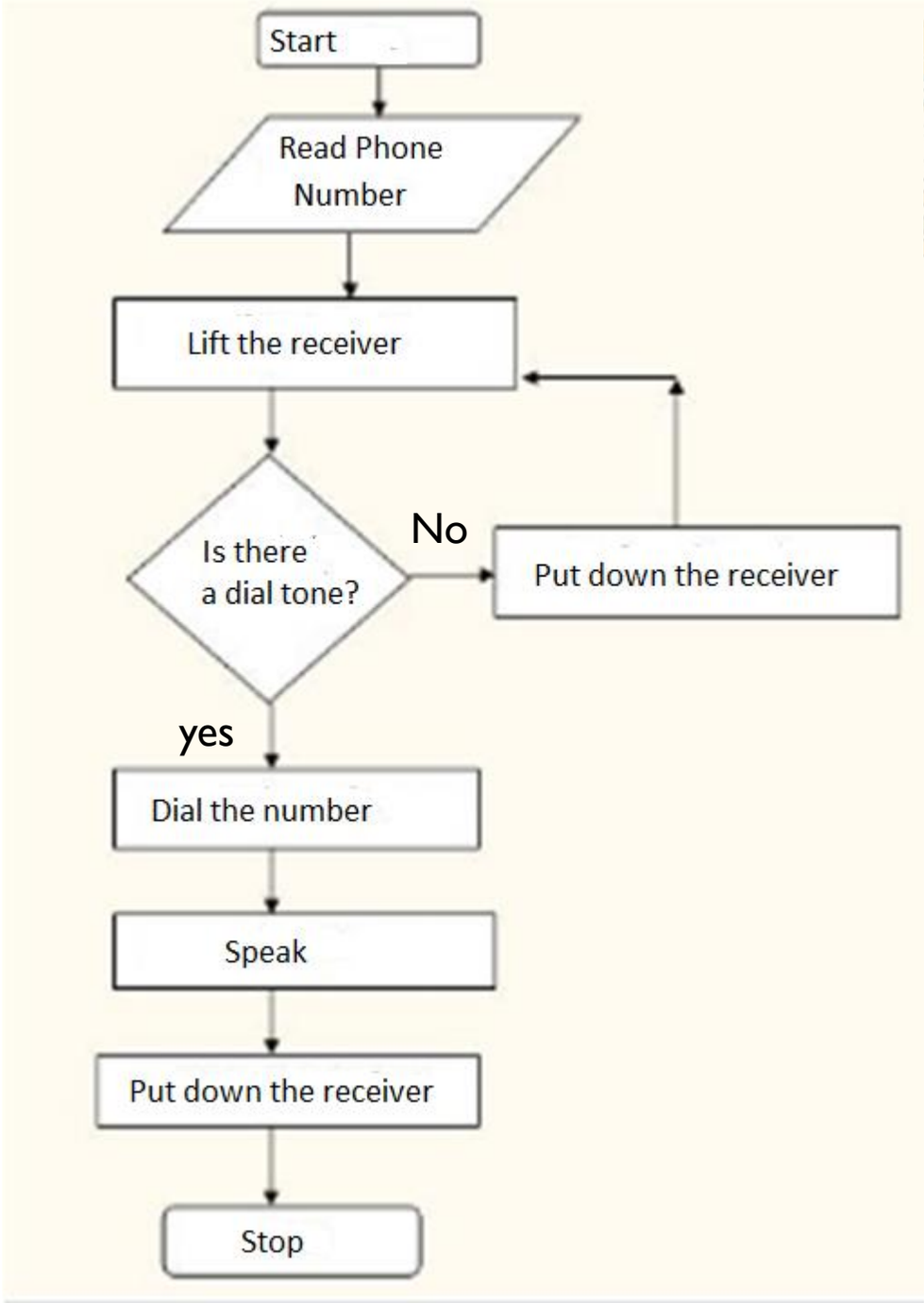
Example 1

- Flow chart displaying the way of using a telephone to dial a number



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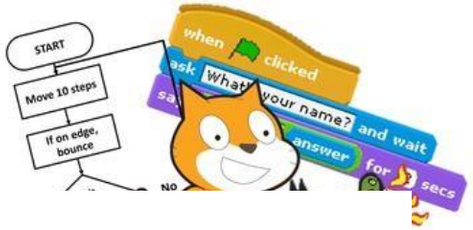
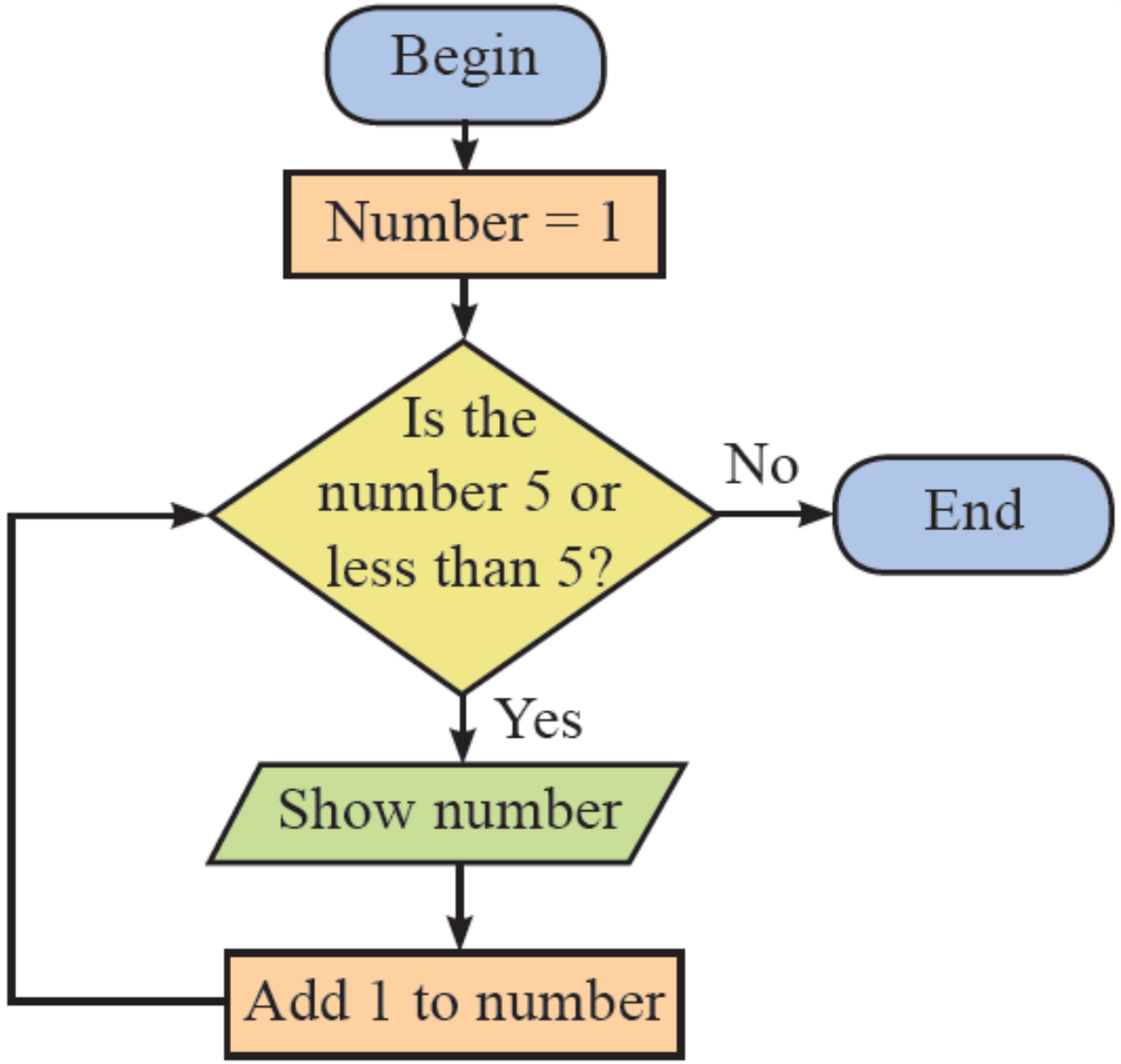
Text Book Example 2



- – Displaying numbers from 1 to 5

Number	Output
1	1
2	2
3	3
4	4
5	5
6	



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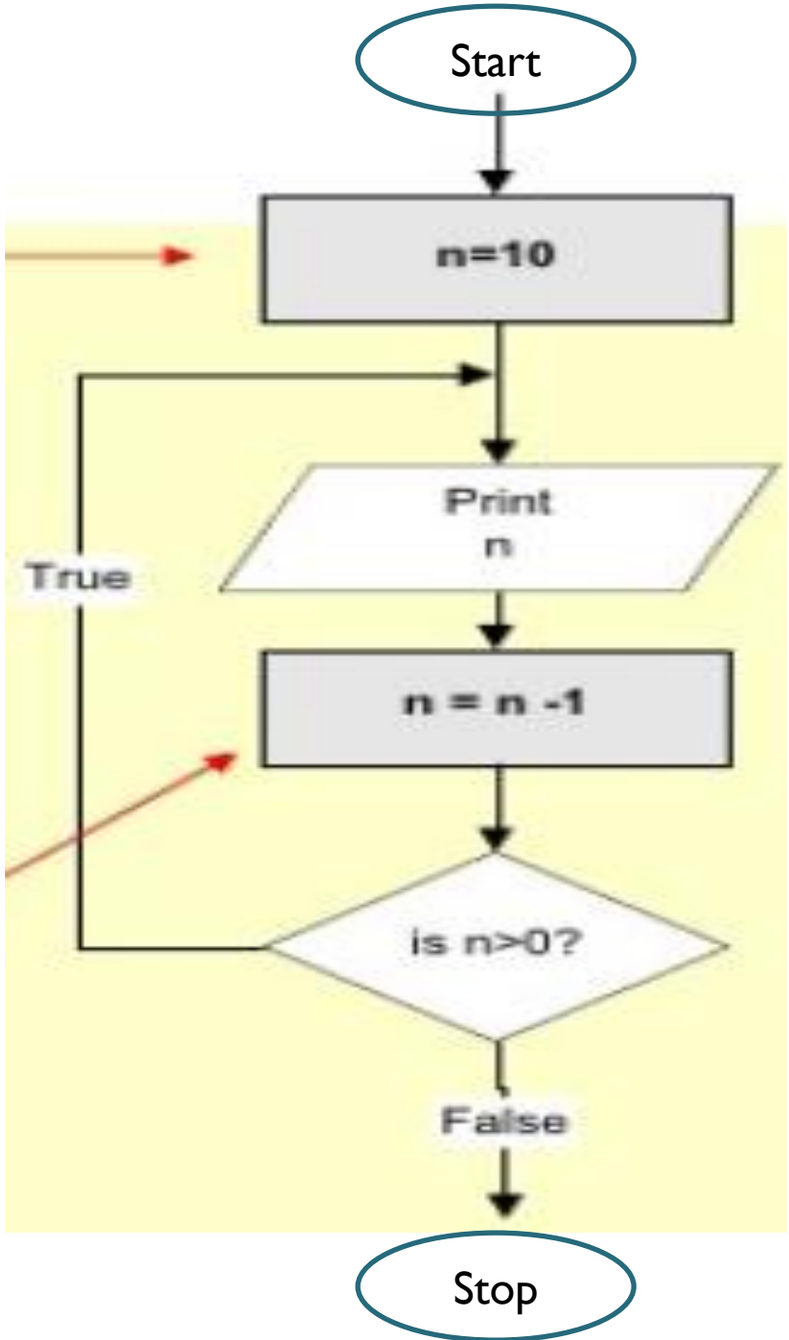
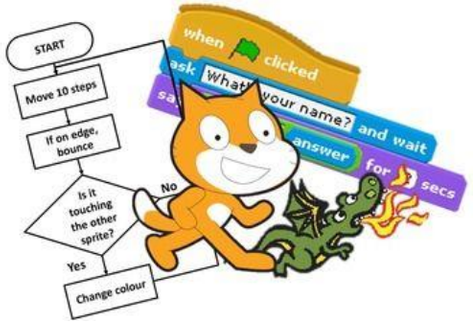
Example 2

Flow chart to print numbers 10 to 1





n	Output
10	10
9	9
8	8
7	7
6	6
5	5
4	4
3	3
2	2
1	1
0	

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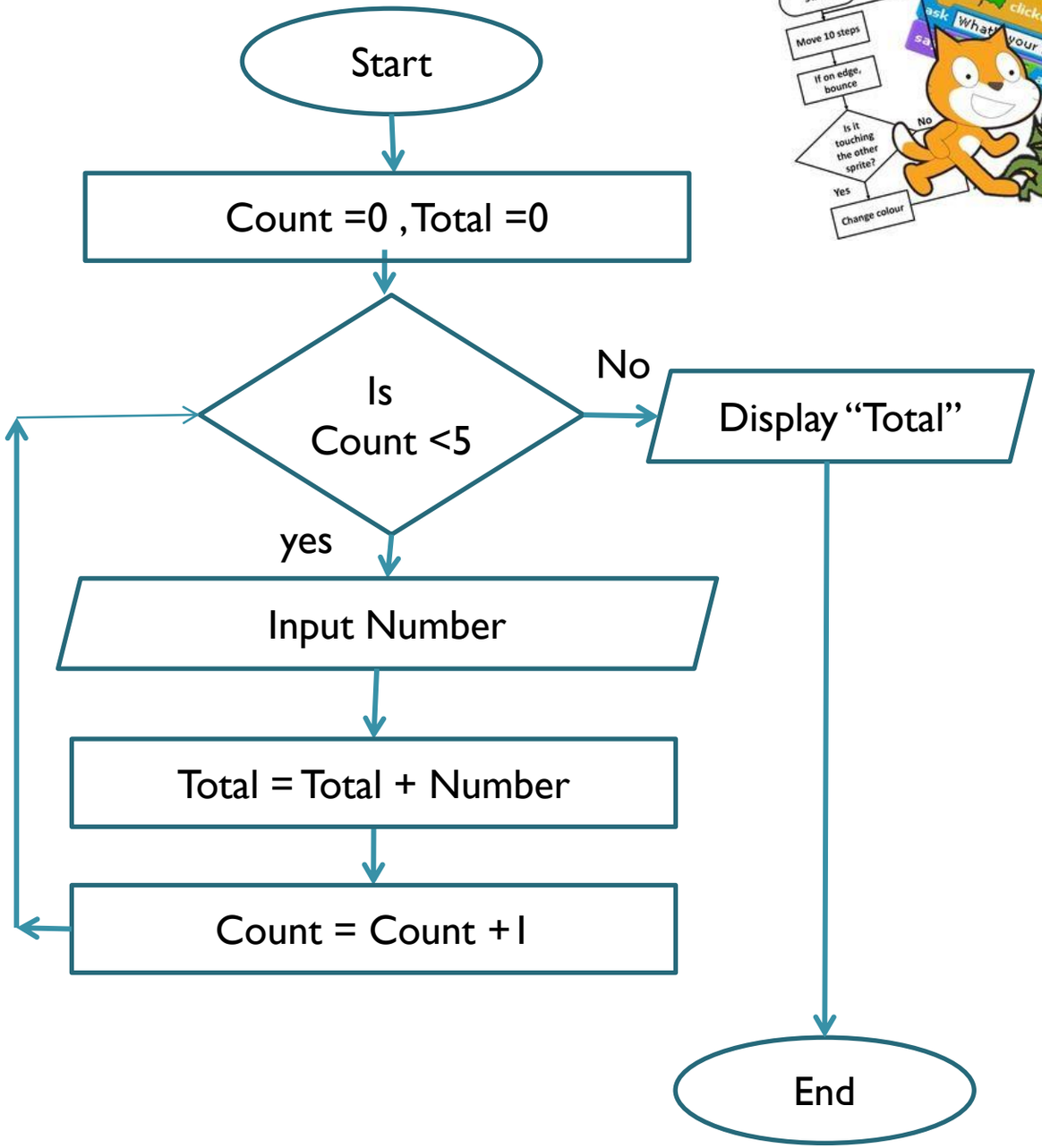
Example 3

- Flow chart to input 5 numbers and display the total

Count	Total	Number	Output
0	0	5	20
1	5	2	
2	7	4	
3	11	6	
4	17	3	
5	20		



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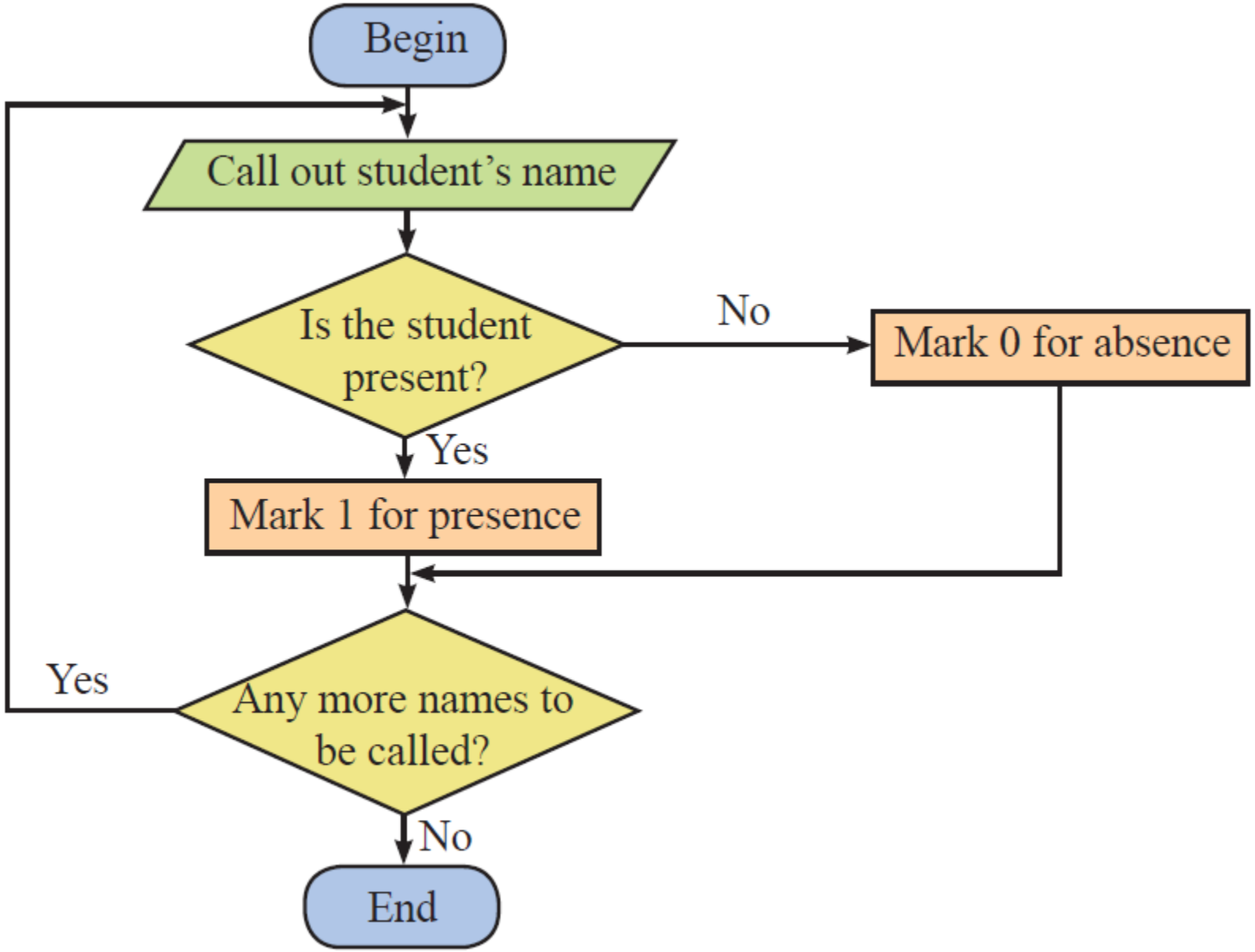
Text Book Example 3

- Consider marking attendance of students. If the student is present, the register is marked with 1. If student is absent it is marked with 0



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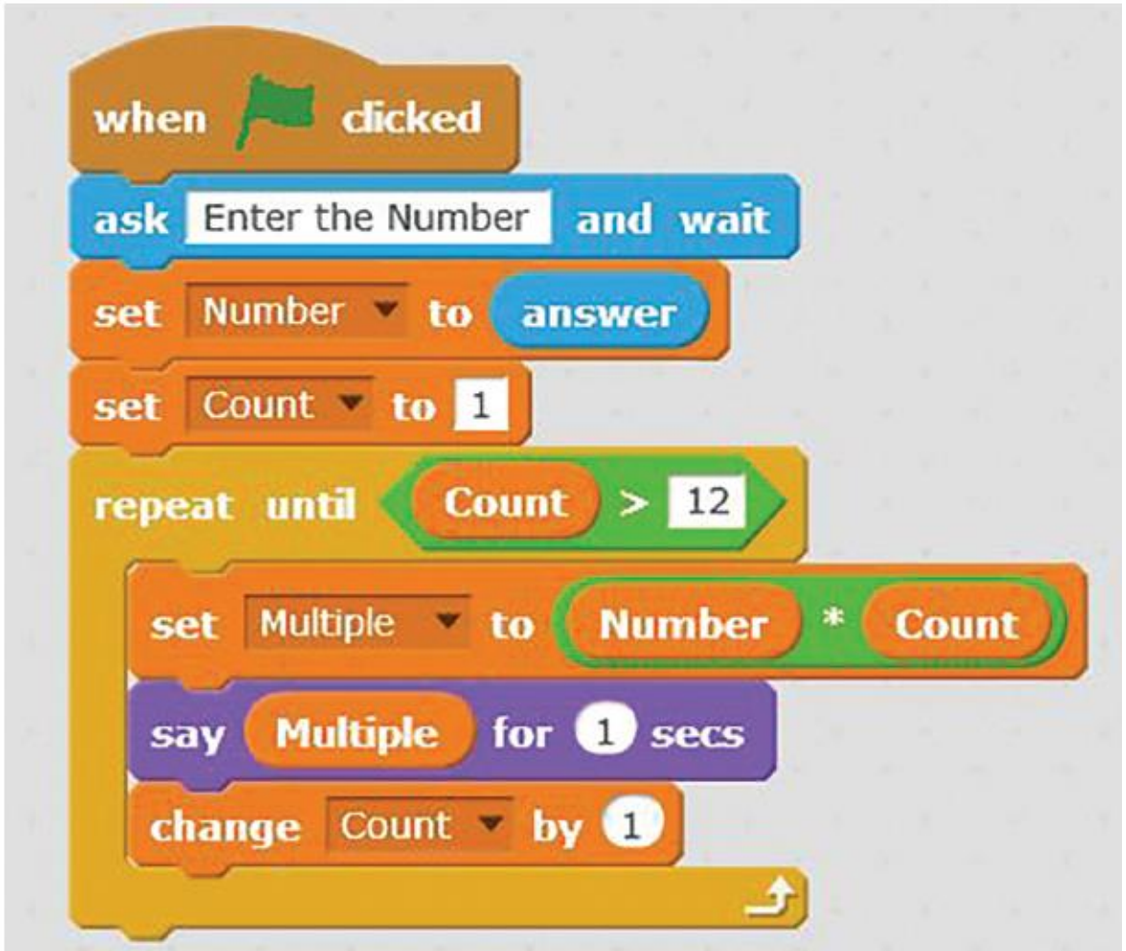
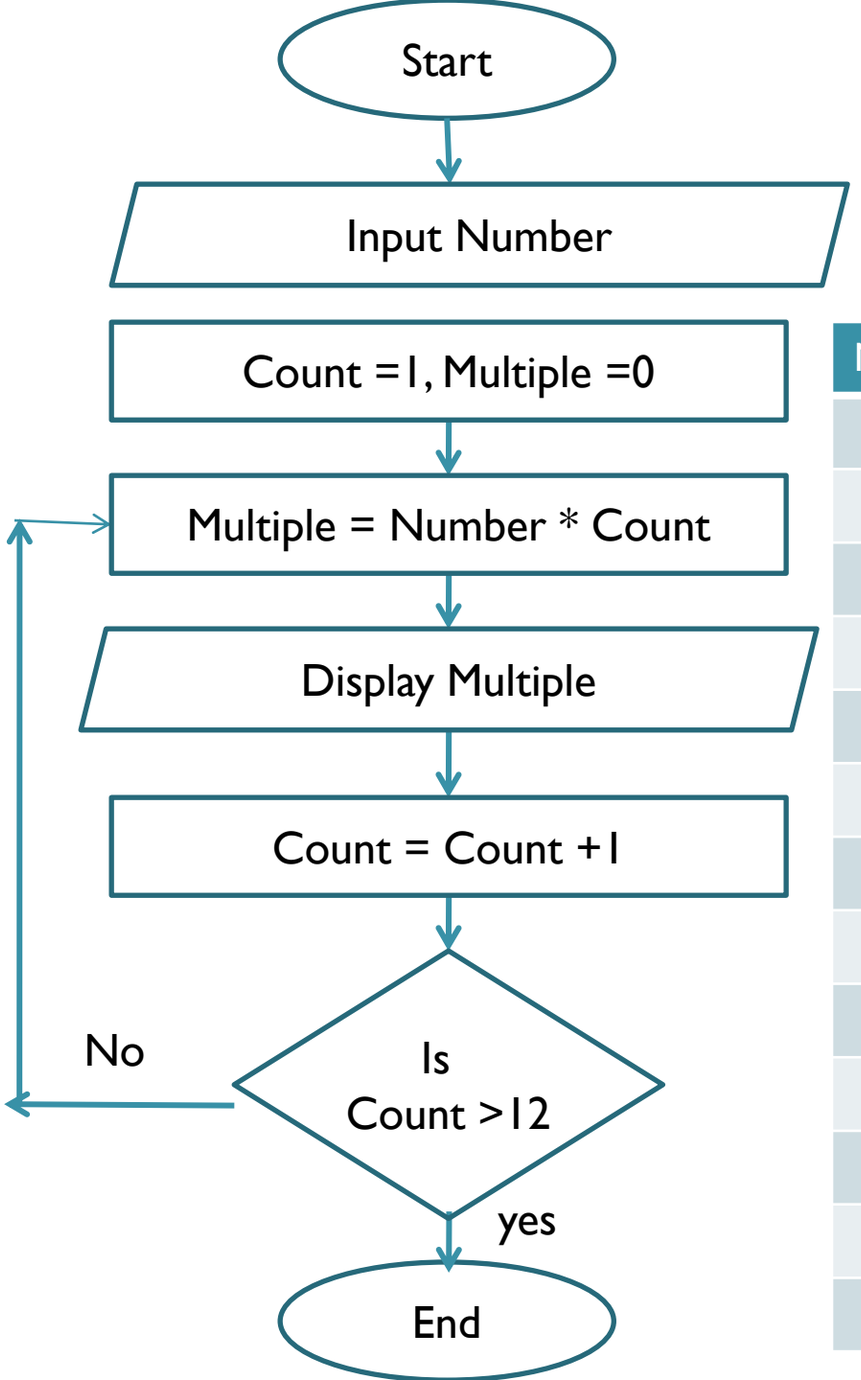
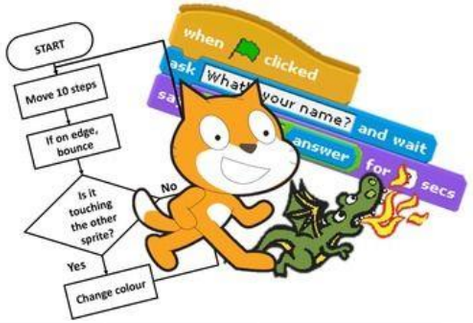
Display the first multiples up to 12 of given number.







Number	count	Multiple
5	1	0
	2	5
	3	10
	4	15
	5	20
	6	25
	7	30
	8	35
	9	40
	10	45
	11	50
	12	55
	13	60

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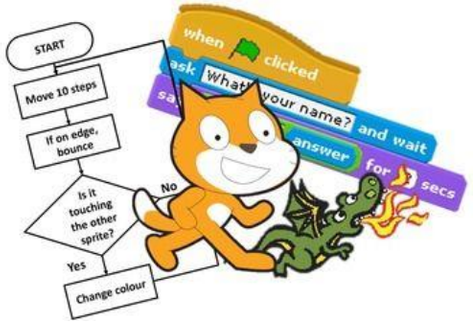
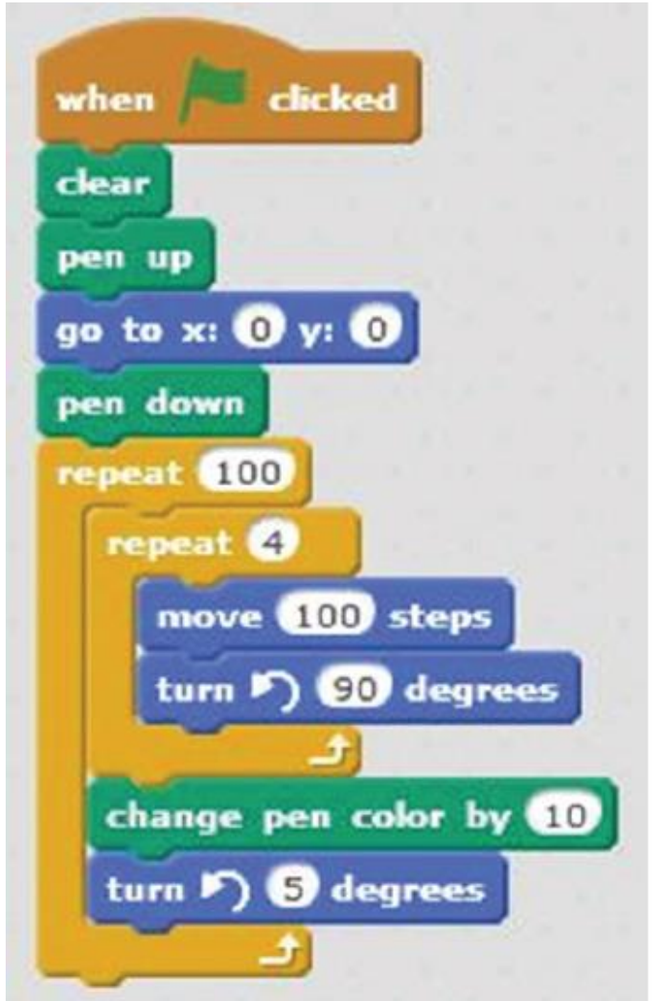
Programming with Nested Repatition



- Example 1



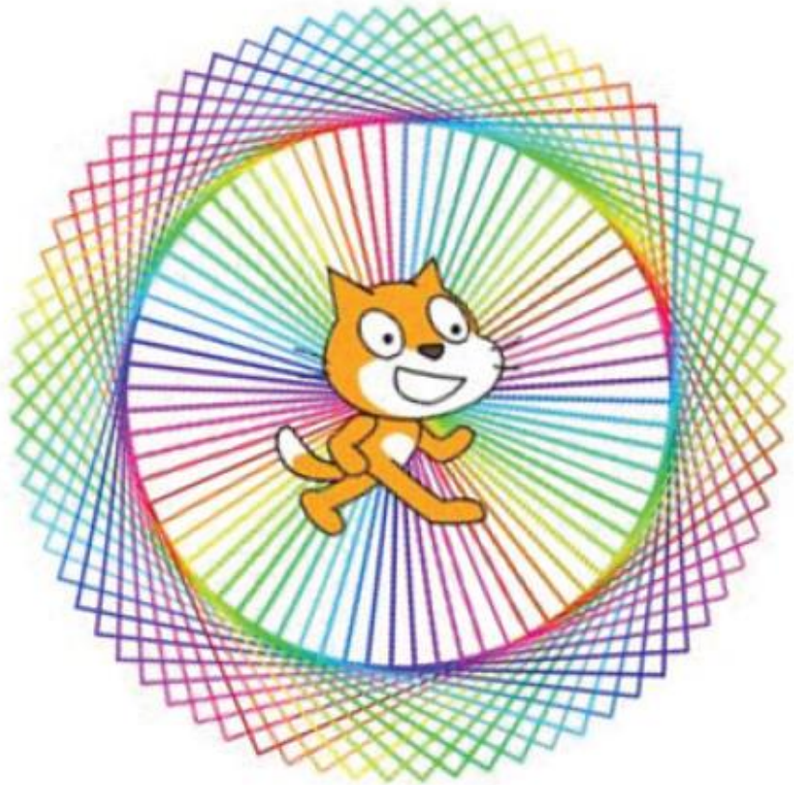


Figure 3.3

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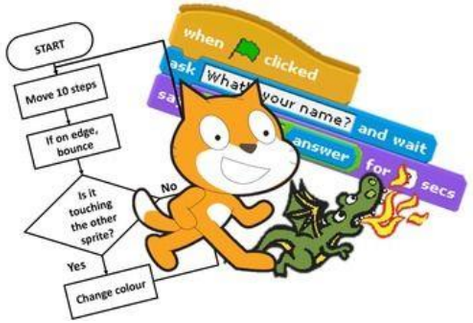
Thank you



- Have a nice day……..

Prepared by Kinkini Kumarage