CL-1002
# Programming Fundamentals

LAB – 02
Problem solving with decision and iterative structures using Scratch

Introduction to Decision and Iterative Structures

Decision Structure: A statement or a set of statements that is executed when a particular condition is "True" and ignored when the condition is "False".

In scratch, we use the following control diagrams for decision structure.
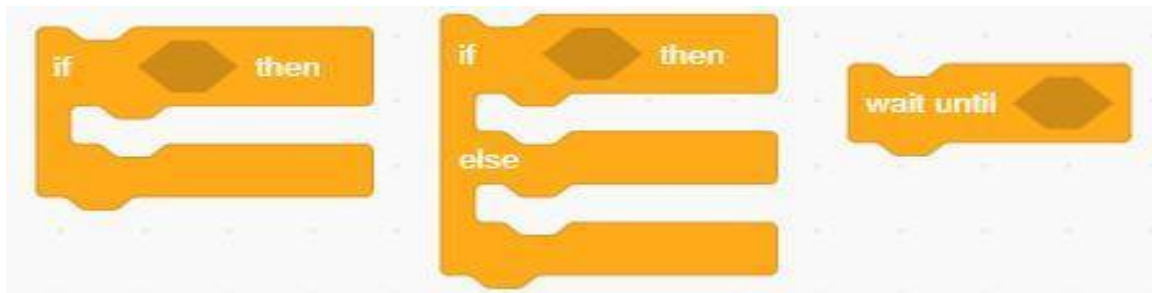
Example 01: Given a number as an input by a user, check if the number is a negative number or a positive number.

Flowchart of Decision Structure	Scratch Diagram	Output

Iterative Structure: The statements that cause a set of statements to be executed repeatedly either for a specific number of times or until some condition is satisfied are known as iteration statements.

In scratch, we use the following control diagrams for iterative structures:
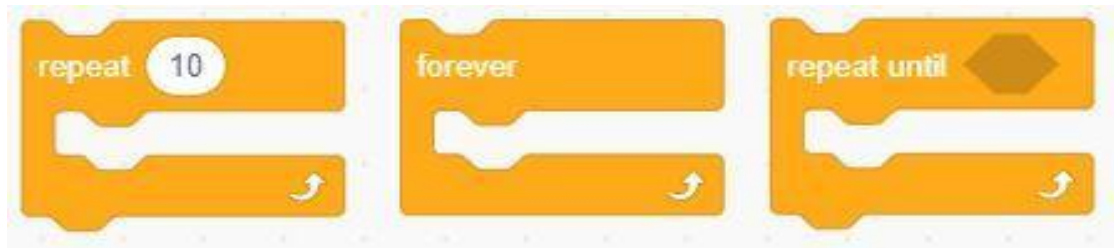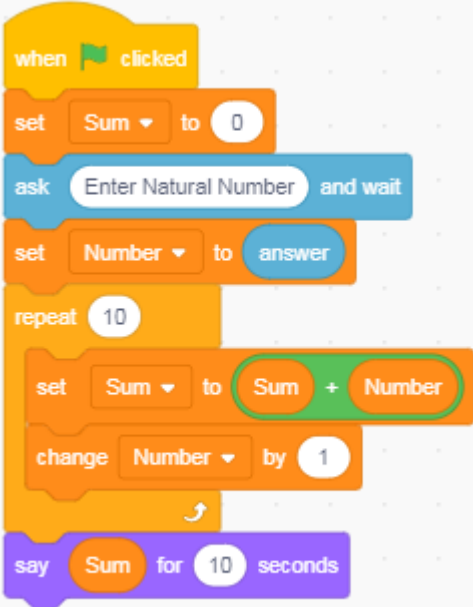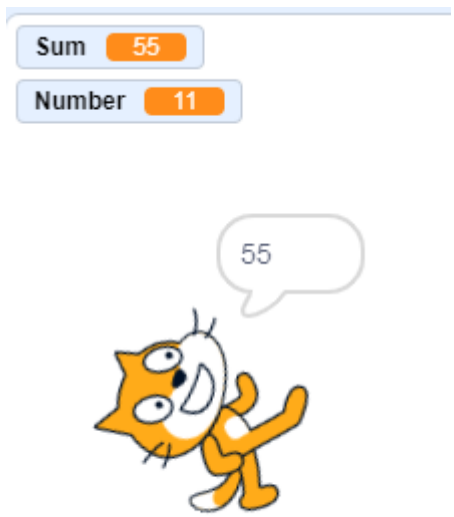
Example 02: Set a counter to 1 and repeat until the given condition is satisfied. In this case, the given condition is counter =10.
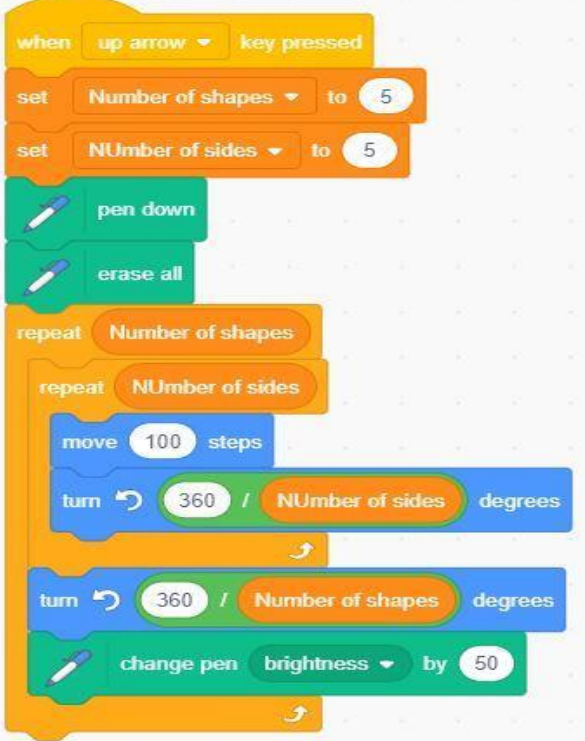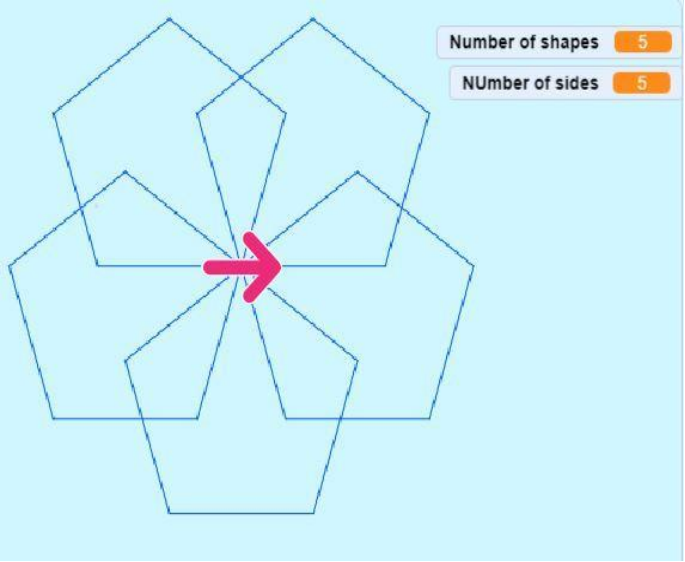
Flowchart of Iterative Structure	Scratch Diagram	Output

Example 03: Find the sum of first 10 Natural Numbers using repetitive block.

Scratch Diagram	Output

Example 04: Draw a pentagon with the help of repeat and pen diagrams. Repeat the shape for five times.

Scratch Diagram	Output

Exercise Questions

TASK # 1: Take a number as an input from a user. Check if the number is an even number or an odd number.

TASK # 2: Complete the number sequence for 20 terms total: 1, 4, 9, 16….

TASK # 3: Kolachi restaurant has started charging for wallet parking. For parking, they have announced the following rules.
Normal charges=50 Rps.
For cars which stay for 60 minutes or less than 60 minutes, owner has to pay normal charges.
For cars which stay for more 60 minutes but less than 120 minutes, owner has to pay double of normal charges along with normal charges.
For cars which stay for more than 120 minutes, owner has to pay the triple of the normal charges along with normal charges. You should calculate the charges of wallet parking on the basis of input hour.

TASK # 4: Draw a hexagon that has six sides. Repeat the hexagon for the same number of times as of its size.

TASK # 5: You are supposed to create a mark sheet. There are total 4 subjects. Each subject has maximum marks 100, therefore total maximum marks are 400. Take marks of 4 subjects as an input from the user. Calculate the average percentage, and output the final overall letter grade using table below. Note: There should only be ONE grade in output (if marks are 87 then only A should be output, not A, B, C, D, and F).

Letter Grade	Percentage
A	86+
B	74+
C	62+
D	50+
F	<50

TASK # 6: Given below is a flow chart. Identify the decision and iterative structures in it. Convert the flow chart in to scratch diagram.
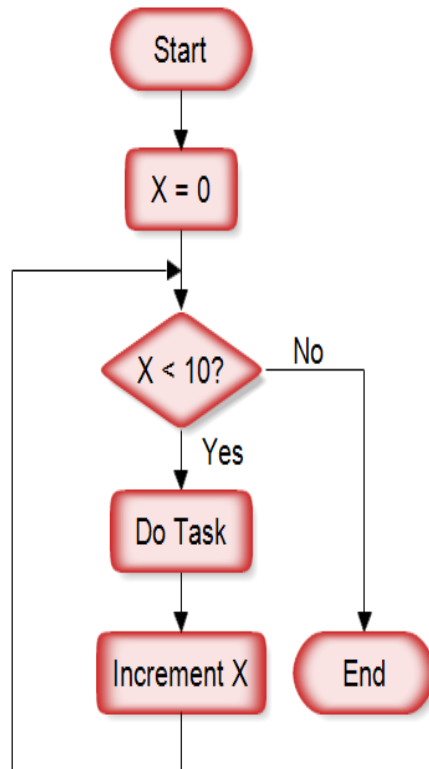
TASK # 7: A temperature monitoring system is used to monitor the appropriate level of the temperature. A temperature greater than 40 °C is categorized as HIGH, and below 15 °C is categorized as LOW. Anything in between is considered MEDIUM. Additionally, as soon as a temperature below 0 °C is monitored, the whole system shuts down after displaying ERROR for 5 seconds. Write a scratch program for the above case, taking continuous inputs of the temperature, and output the appropriate message regarding temperature level.

Good Luck ☺