

CL-1002
Programming
Fundamentals

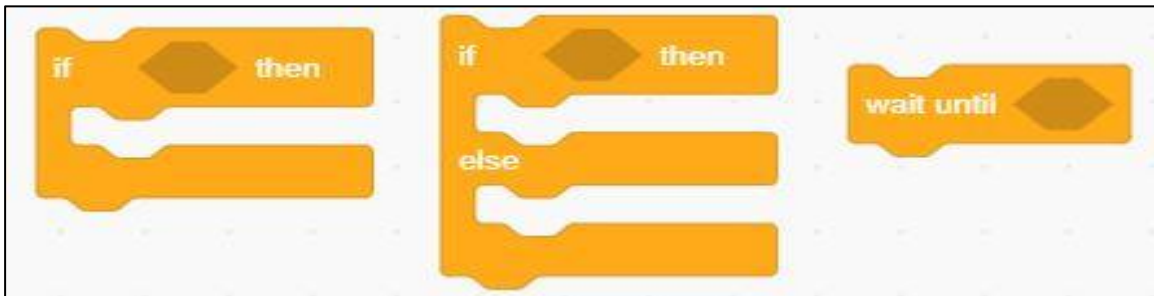
LAB – 02
Problem solving with decision and
iterative structures using Scratch

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES
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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.

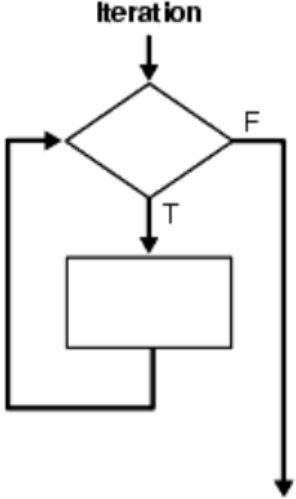
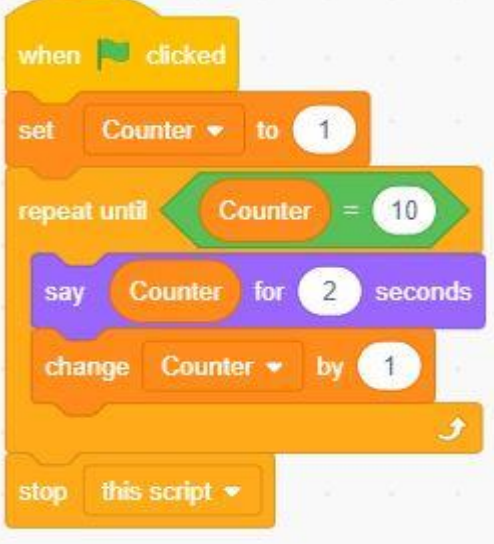

<u>Flowchart of Decision Structure</u>	<u>Scratch Diagram</u>	<u>Output</u>
<pre> graph TD Start(()) --> Selection{ } Selection -- T --> Action1[] Selection -- F --> Action2[] Action1 --> Merge(()) Action2 --> Merge Merge --> End(()) </pre>	<pre> when green flag clicked ask Any Number and wait set Number to answer if answer < 0 then say It's a negative number for 2 seconds else think It's a positive number for 2 seconds </pre>	<p>The screenshot shows a Scratch stage with a character. A speech bubble says "It's a positive number". Above the character, a variable monitor shows "Number" with the value "15".</p>

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.

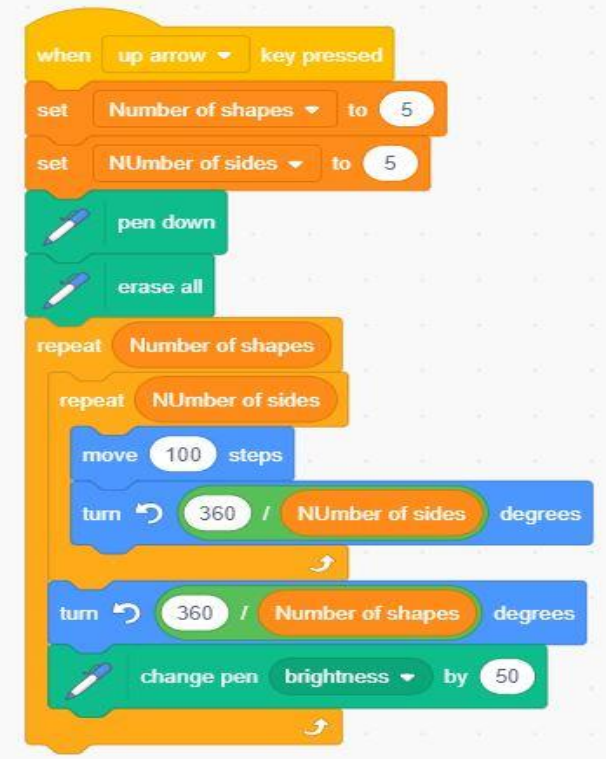
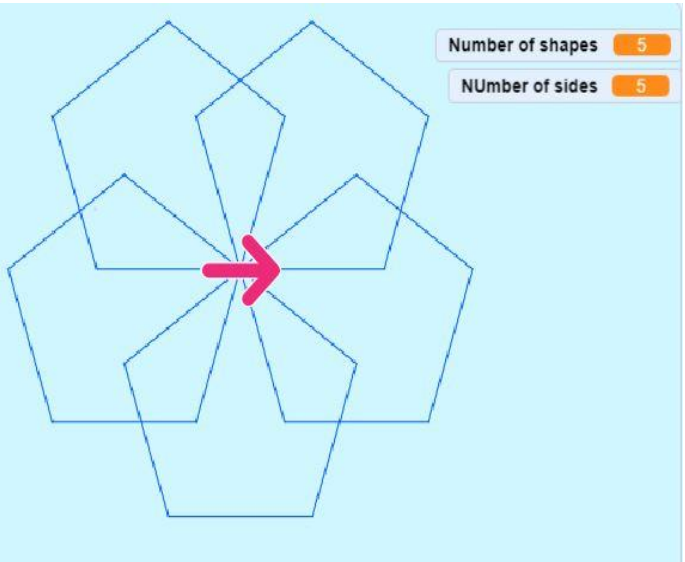
In scratch, we use the following control diagrams for iterative structures:



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
 <pre> graph TD Start([Iteration]) --> Decision{ } Decision -- T --> Loop[] Loop --> Decision Decision -- F --> End([]) </pre>	 <pre> when green flag clicked set Counter to 1 repeat until Counter = 10 say Counter for 2 seconds change Counter by 1 stop this script </pre>	 <p>The output shows a Scratch stage with a blackboard and a character. A variable monitor at the top left displays 'Counter' with a value of 10.</p>

Example 03: Draw a pentagon with the help of repeat and pen diagrams. Repeat the shape for five times.

Scratch Diagram	Output
 <pre> when up arrow key pressed set Number of shapes to 5 set Number of sides to 5 pen down erase all repeat Number of shapes repeat Number of sides move 100 steps turn 360 / Number of sides degrees turn 360 / Number of shapes degrees change pen brightness by 50 </pre>	 <p>The output shows a Scratch stage with a light blue background. Five blue pentagons are drawn, each rotated 72 degrees from the previous one, creating a star-like pattern. A red arrow points to the center of the pattern. Variable monitors at the top right show 'Number of shapes' as 5 and 'Number of sides' as 5.</p>

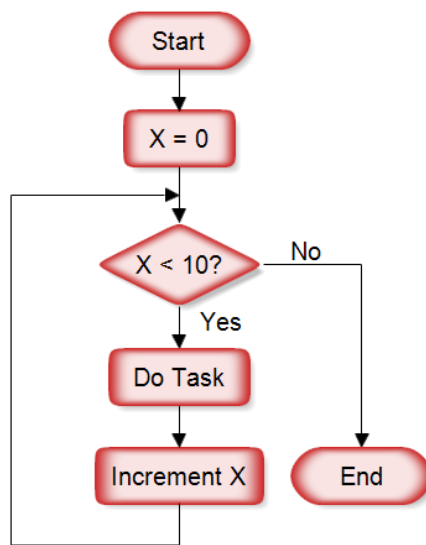
Exercise Questions

QUESTION # 1: Take a number as an input from a user. Check if the number is an even number or an odd number. Draw a flowchart on your notebook. Convert the flowchart into scratch diagram.

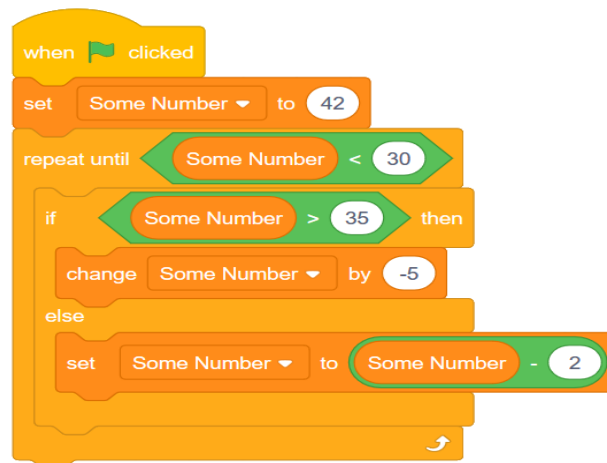
QUESTION # 2: You are supposed to create a mark sheet. There are total five subjects. Each subject has equal marks i.e., 100, therefore total marks are 500. Take marks of five subjects as an input from the user. Calculate the percentage. If the percentage is below 50, he/she is fail else he/she is pass. Draw a flowchart on your notebook. Convert the flowchart into scratch diagram.

QUESTION # 3: Draw a hexagon that has six sides. Repeat the hexagon for the same number of times as of its size.

QUESTION # 4: Given below is a flow chart. Identify the decision and iterative structures in it. Convert the flow chart in to scratch diagram.



QUESTION # 5: Given below is a scratch diagram. Write a description of the diagram as well as draw it's flowchart on your notebook.



Good Luck ☺