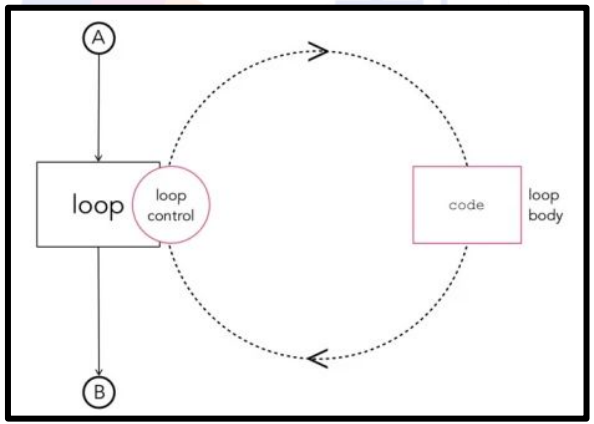
Lesson 15 – Loops & Looping of Codes



What will we Learn

In our daily life we see or undertake so many actions that are repetitive in nature.

Ex, sunrise & sunset happens daily for ever.

In this lesson we shall learn how repetitive actions can be coded for daily life projects.

What is Looping in Coding

In coding, a loop is a ‘Sequence of instructions’
that is continually monitored & repeated
until a specified condition is reached
that triggers its exit from the loop
to execute the outcome of the condition.

Typical Example of Looping

World of automation is full & offers a typical ex.
Say we want to automate our AC. There could be many ways of doing so. Coding offers the simplest way.

Our code story for this task could be – "If room temp goes above 27 degree, switch on the AC".

Let us now examine its execution.

Once written, this code will be uploaded in the brain of the AC.
Now:

1. A temp sensor in the AC will keep on checking the condition (If temp > 27) to be true or false. This is called ITERATION.

2. Moment the condition becomes True (temp is > 27), iteration or checking of the loop will stop. The code will Exit the Loop & proceed to execute the instruction we have specified in the next line of the sequence (switch on the AC).

3. Coding is all about understanding this simple logic.

mBlock 5 offers three types of Loops

1. For Loop.
2. Forever or Infinite Loop.
3. While Loop.

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Say our project involves Mr Panda gliding to a random location once & returning back.

Its simple code will be:

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Now say we want him to move to two random locations before returning back.

It will also be every simple.

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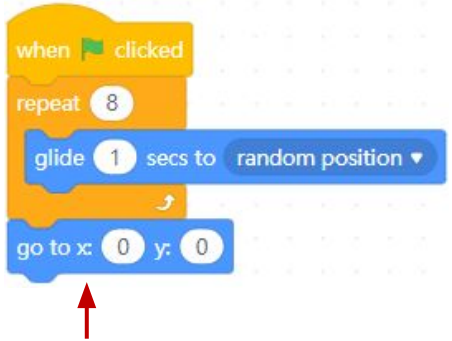
But what if we want him to move to random location for say 8 times, before returning back.

Our first option is to:
Stack the lines 8 times

This would be messy
& would increase the total number of lines in the final code.

Second Option.

A better way is to put just one block in a repeat loop.



In this we must specify the number of times
For which the loop must repeat the block (8).

We must also specify the action to be take
on completion of the specified repeats (return to original location).

This is called the For Loop.

Infinite Loop

In case the above was put in a forever block
It would repeat the code forever

In programming this is called an Infinite Loop.

Note: Since this is going to repeat itself for ever, no other stack block will be placed below it.
It has thus been made as a cap block that would run the code and also end it.

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This demonstrates the Infinite Loop.

It uses the Forever block & is used where code must run forever.

A typical ex could be a game of Bouncing Ball.

Try making one yourself (use a ball as the sprite).

While Loop or a Conditional Loop.

This repeats the code while a condition is true & exits the moment the condition becomes false.

A typical ex is "While the teacher in class (condition), maintain silence (effect of condition being True).

As & when the condition becomes false (teacher not in class), take action as per block immediately following it.

In this Loop:

The condition 

is placed inside this block. 

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This demonstrates the While Loop.

This repeats a code (glide to random position)
While or until the specified condition
(until space key pressed) holds good.

Moment the condition fails (space key is pressed)
Repeating or iteration stops
& the code moves to the line immediately below it, which needs to be specified.

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This demonstrates the control for Triggering of a Loop within a code.

Many times we come across situations where we need to pause the code temporarily & specify a condition
This condition will trigger the loop ahead of it.
This is done using wait until block.

This loop ahead could be any.

We have other methods to trigger actions within a code.

Project 40 - Consolidation Project – Boy Catching Balloon

“A boy wants to catch a balloon but it is not easy.
How will you depict this in code?

Analysis of the Project.

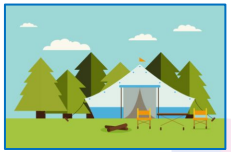
We need the following:

- We require two sprites. A boy & a balloon.

- Both will require to be coded separately.
- Balloon is leader & boy the follower

so the balloon must be coded first.

- We need a picnic type of background.



Coding the Boy

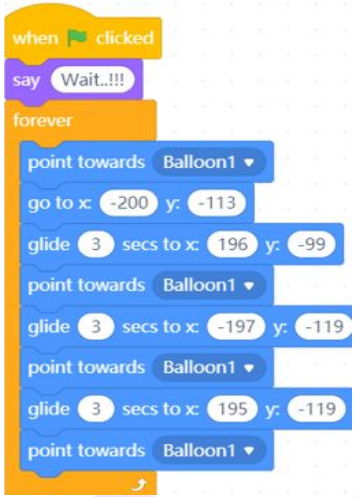
The boy has to perform two tasks.

- Follow the balloon on the stage.
- Secondly, catch the balloon.

It would have one code for each task.

Code to move on the stage.

Code to catch the balloon.



Since the boy has to make Multiple attempts, the forever loop block has been used in both of them.

Coding the Balloon

Consider the following:

- **The balloon moves 10 steps at a time.**
- **It bounces back if at the edge.**
- **Does this till caught.**

As a next step you could make it change direction & think of more creativity in the code.

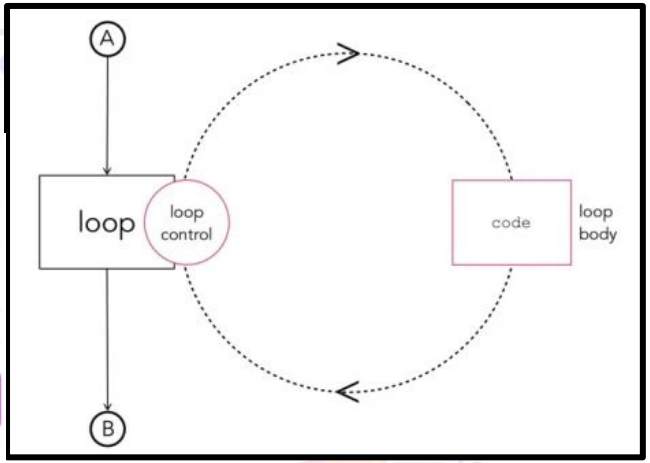
Loop Control, Loop Counter & Loop Body

Before we end this lesson, let us make note of three important terms:

1. **Loop Control. The control rests with the Control block.**

2. **Loop counter. This exists on the Control block**

2. **Loop body. This is made of code lines placed inside the loop. There is no limit to the num of lines.**



In scratch the loop counter is always on top of the loop.

Take Aways…

- Loops help us repeat a set of code lines.
- This repeat could be:
  - ✔ For a specified number of times – For loop.
  - ✔ While a condition is true – While loop.
  - ✔ Forever – Infinite loop.

Key Note:

- *Terminologies used in Scratch are the same as used in professional languages like Python.*
- *Learning of these terms now has been done so very easily.*
- *This ease, will later make your learning of Python so much more easier.*

End of Lesson 15

Code Karega India Badhega