



Step-wise Thinking

aim!

In this lesson you will learn:

A step-by-step planning of any activity.

To identify the main and detailed sequence of steps of any activity.

To follow step-wise instructions for any activity.

Sir : Let us plan a picnic to the water park. What should we do?

Jyoti: Book tickets and go.

Sir : Is it possible to book tickets before collecting the names of those who would like to go?

Student : No, because we do not know how many tickets to buy.

Mouse: Right. So what should be the steps for the activity

Steps to go for a water park picnic.

1. Make an announcement about the picnic.
2. Ask students to give their names.
3. Book tickets.
4. Travel to the water park.



Concepts

Every activity has a sequence of steps that need to be followed.

In this chapter we are going to understand the concept of step-wise thinking.

Let us now look at example.

You all are participating in a play. Shall we look at the steps of this activity?

Yes. Let us list them.

Teacher writes the steps as students list them.

Teacher tells us about the play.

In the play there are fifteen types of animals.

Step 1: Narration of the play.

The student who wanted to act in the play gave their names to the teacher.

Step 2: Collect the names of student who want to act in the play.

The teacher assigned each student the role that they will play.

Step 3: Assign roles to the student.

Students went to practice for the play. The teacher made us act out one scene after the other. Teacher also helped us in doing our actions correctly. Students practiced everyday for half an hour.



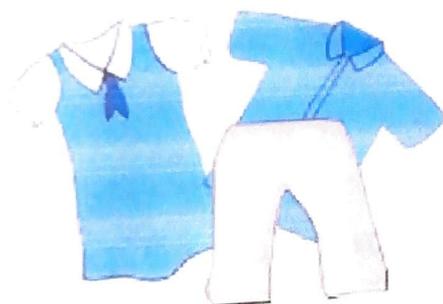
Step 4: Practice the play with the teacher's help regularly.

The teacher gave a list of names of students and their roles to the costume supplier. The costume supplier took our measurements.

Step 5: Prepare a list with names of students and their roles, to be given to the costume supplier.

Step 6: Costume supplier takes measurements for the costumes of student.

Two days before the play you will get your costumes. Then you will be told to wear and check the costumes.



Step 7: Wear and check the costumes received, prior to the performance of the play.

Your final rehearsal is a dress rehearsal which is today!

Step 8: Do a dress rehearsal.

That was a good example. But you missed the last step! The last step is performing the play on stage, before your parents, teachers and friends.

Step 9: Perform the play.

Suppose you have to describe the activity in 3 steps. What are they?

Students discuss and write the following three steps.



Step 1 - Preparing for the play.
Step 2 - Practice the play.
Step 3 - Perform the play.

Now list the previous 9 steps under each of these 3 steps. Students take each detailed step and list it under the appropriate step.

Preparing for the play

- Step 1: Narration of the play.
- Step 2: Collect the names of student who want to act in the play.
- Step 3: Assign roles to the student.
- Step 4: Prepare a list with names of student and their roles, to be given to the costume supplier.
- Step 5: Costume supplier takes measurements for the costumes of student.

Practice the play

- Step 6: Practice the play with the teacher's help regularly.
- Step 7: Wear and check the costumes, a few days prior to the performance of the play.
- Step 8: Do a dress rehearsal.

Perform the play

- Step 9: Perform the play on stage, before parents, teachers and friends.

Now, can you give more details for "Perform the play". Jyoti: First, reach the hall on time.

Then, wear the costumes and put on the makeup. Finally, perform the play as practiced.

What you have done is:

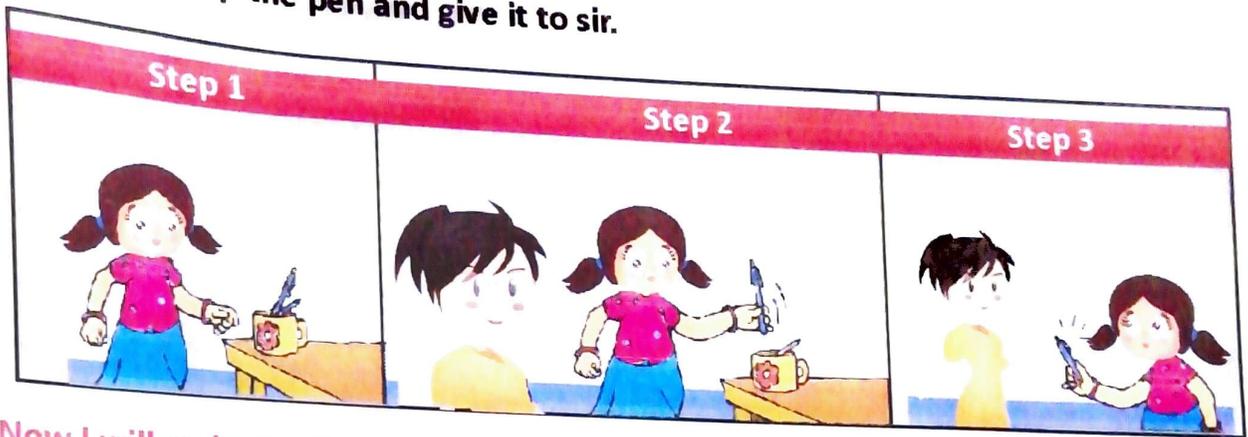
1. Listed the various steps of an activity.
2. Identified the main steps of the activity.
3. Listed the detailed steps under each main step of the activity.



Now let us take another task and first list the main steps. The task is to get the pen that is on the table and give it to me. Give the three main steps for this task.

Students please demonstrate your understanding of the main steps that are required for the task.

Steps to pick up the pen and give it to sir.



Now I will make it a little bit more difficult. Give more detailed steps for each of these three steps.

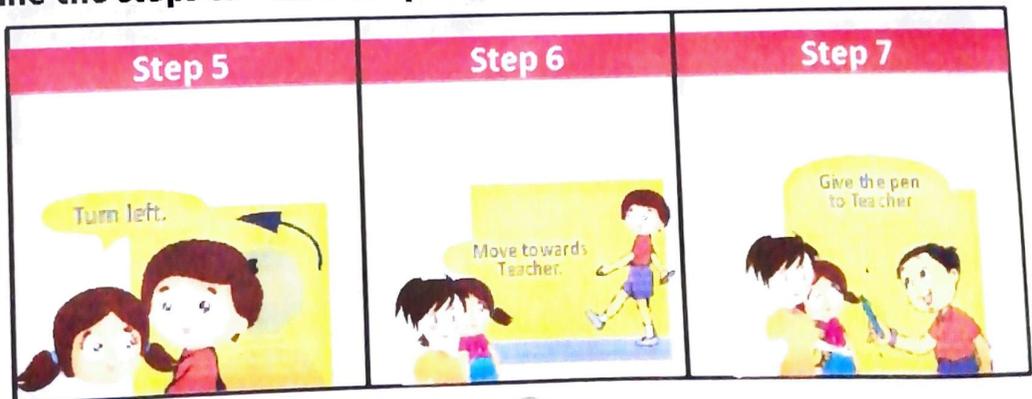
Students now you will give the steps for "Move to the table".



Here are the steps to "Pick up the pen".



Now outline the steps to "Give the pen to sir".



Concepts

- Any activity has a sequence of steps.
- First list the main steps of the activity.
- Then, for each main step, list the detailed steps.
- Listing the steps helps in carrying out the activity easily.

Can you change the sequence of steps in this activity?

No, you cannot. Unless you walk to the table you cannot pick up the pen. Only after picking the pen can you give it to Sir.

Concepts

In some activities the sequence or order of the steps cannot be changed.

Correct. Now let us look at another activity.

Brings out an aeroplane making kit.

Will you please join the different parts to make an aeroplane for you?

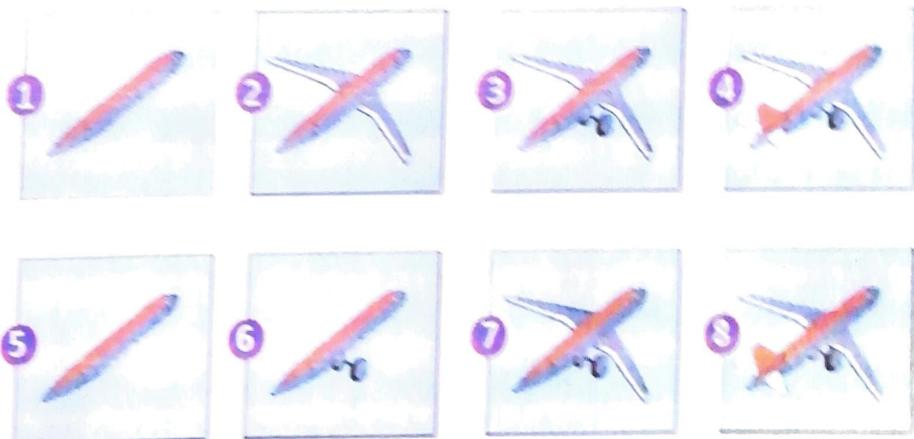


Students take the parts and the instruction sheet from the box. They read the instructions and make the aeroplane using the various parts in the kit.

The wings, wheels and tail have to be attached to the body of the aeroplane. These parts can be assembled in any order. You can attach the wheels first, or you can attach the wings first.

Concepts

In some activities the sequence of some of the steps can be interchanged.



Now, let us look at a toy which can do some tasks. Here is a robot.
You pick up the robot and examine it.

It has a remote controll and an instruction sheet.

Student reads the sheet which has step-wise instructions to start the robot and the instructions on "How to play with the robot?".

The remote controll has buttons to start, stop and also move the robot in any of four directions.

Now try the action of each button. When you press the "walk" button it keeps it walking and does not stop even if there is a wall. We have to press "stop" and only then it stops.

The robot understands only a limited number of actions.

That means the robot cannot do anything on its own. You have to give it the detailed steps.

Using the limited number of instructions you can make the robot do some tasks.

Can a computer do an activity on its own?

No, it cannot. Similar to a robot, a computer needs detailed step-by-step instructions from that. Yes if you want to build a game of your own on the computer then we have to give all the detailed steps.



Concepts

A computer can only work using step-by-step instructions from us.

You are right. Giving these step-by-step instructions is called Programming. You will learn more about it as we go along.

Learning Outcome

After you have completed this lesson, you will be able to:

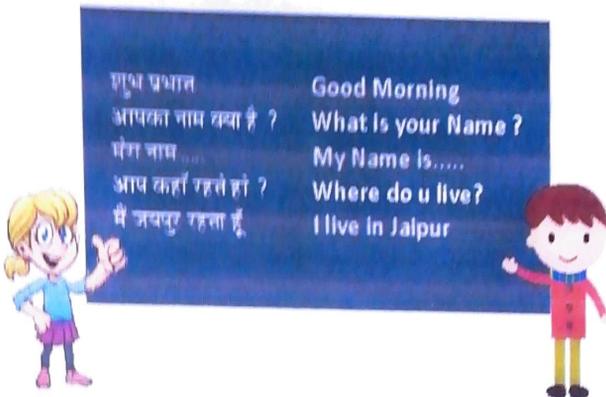
- XXXX
- XXXXX



Introduction to Scratch

aim!

In this lesson you will learn: How to program using Scratch. Usage of commands in Scratch under 'motion', 'pen' and 'sound' blocks.



Hindi and English. Good to see that you are learning more languages.

Student, does the computer understand the languages that you speak?

No. It understands only a few special languages of its own. These are called programming languages. Also, the number of words and the sentences that it understands are limited.

Can you explain how?

Suppose student understands only the following 5 statements.

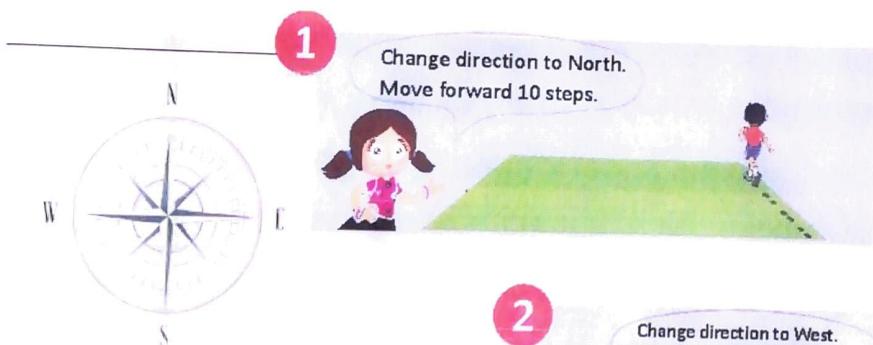
1. Move forward N steps, (N can be any number from 1 to 100).
2. Change direction to North.
3. Change direction to South.
4. Change direction to East.
5. Change direction to West.

Use these instructions to make students do an activity.

Students first discuss the limited instructions that you have. Then you decide on an activity - "Drawing a square". You write a sequence of step-by-step instructions, for the activity.

1. Turn to your left.
2. Take 10 steps from where you are in a straight line.
3. Turn to your left.
4. Take 10 steps from where you are in a straight line.
5. Turn to your left.
6. Take 10 steps from where you are in a straight line.
7. Turn to your left.
8. Take 10 steps from where you are in a straight line.

Then you convert these movements into limited instructions. Students look at the instructions. Student then holds a chalk piece and draws on board to see what happens with the limited instructions.



Look at the square which shows student's trail!

So for any activity that you want the computer to do, you have to give instructions, step-by-step.

Just like you have done now. First plan the activity step-by-step and convert it to a computer program using the limited instructions.

Concepts

A programming language has a set of instructions. Using these limited instructions you can make the computer do an activity that you plan.

Which activity do you use to give the instructions?

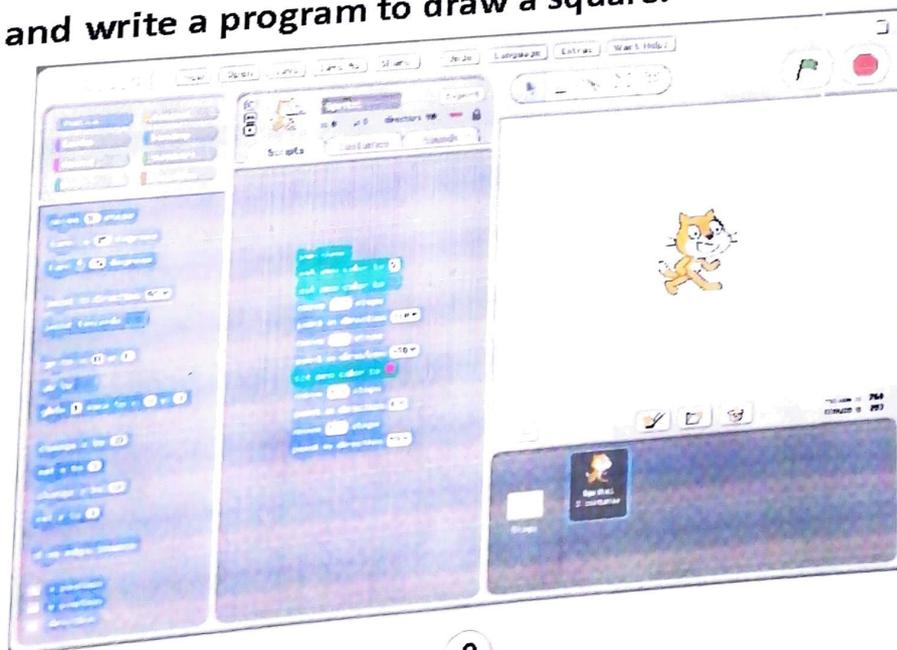


Scratch is an activity which you can use to give instructions that the computer understands. You will see that these instructions are similar to those above, given to students. Such a sequence of instructions is called a Program.

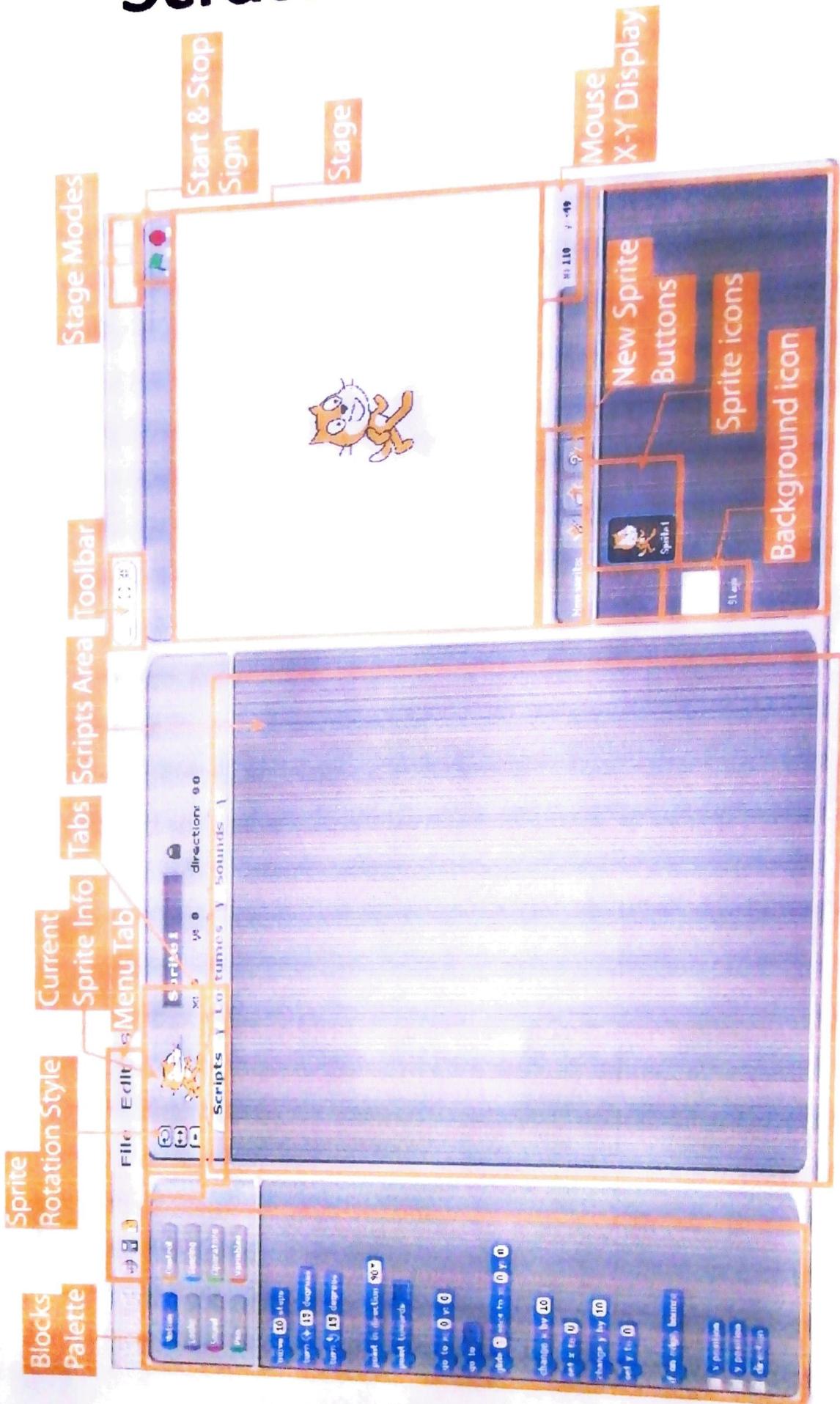
Concepts

Sequence of instructions given to computer is called a Program.
In Scratch, a program is saved as a Project.

Open Scratch and write a program to draw a square.

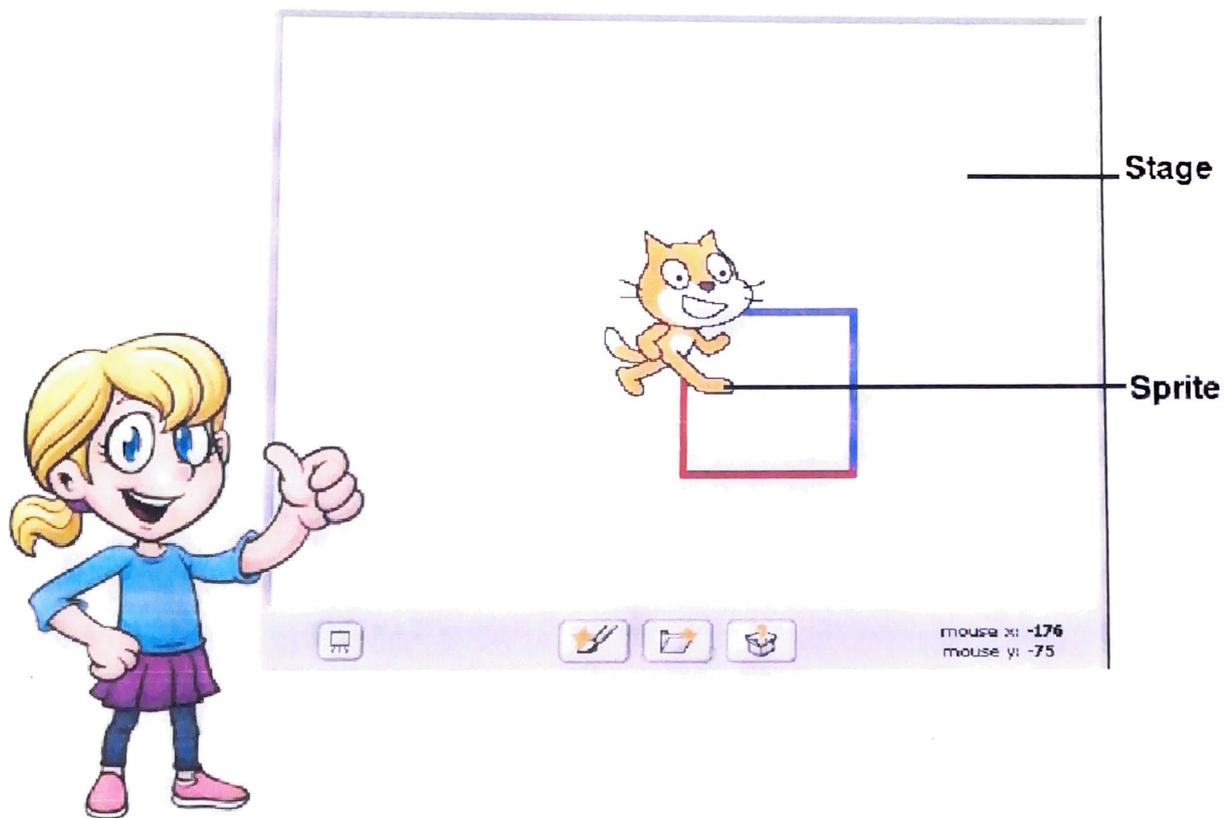


Scratch Interface



How do you make the computer follow these instructions? Double click on block of instructions. The cat moves and a square is drawn.

Look the cat is moving and a trail of the cat is shown.



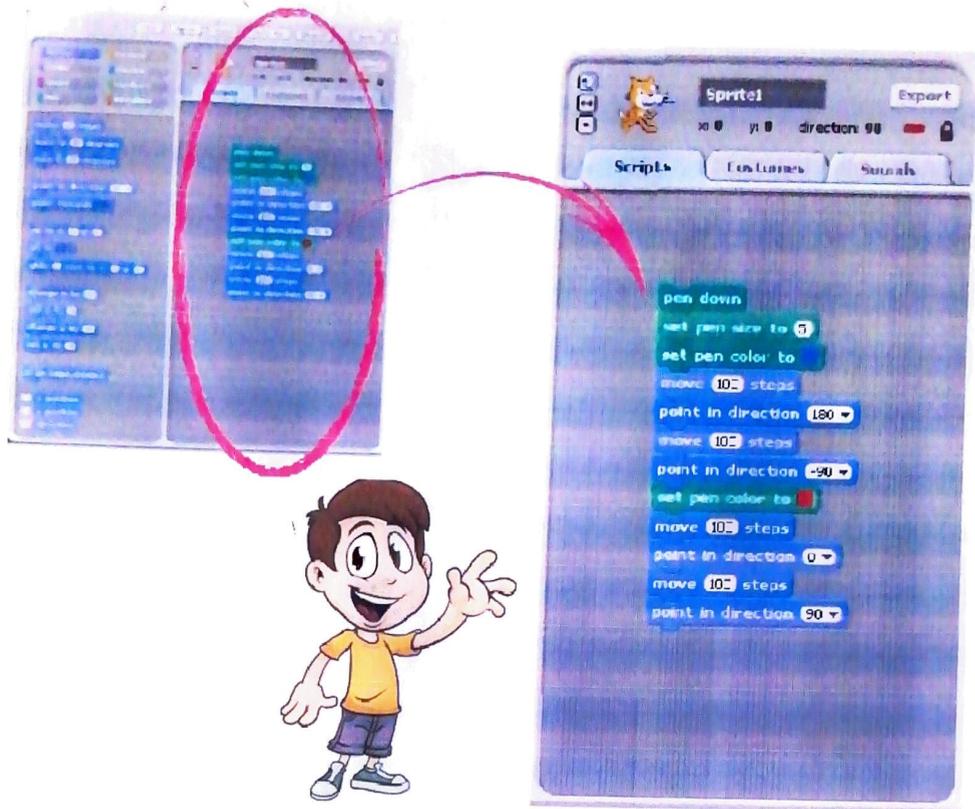
Yes. In Scratch, each picture like this cat is called a **Sprite**.

This area where the **Sprite** moves is called the **stage**.

The computer follows **step-by-step** instructions given to provide output.

Stage

The **Stage** is where you see your stories, games, and animations come to life.



Is this screen where will you write the instructions?

This is called Scripts area. The sequence of step-by-step instructions are given here and the Sprite performs all the instructions step-by-step on the Stage!

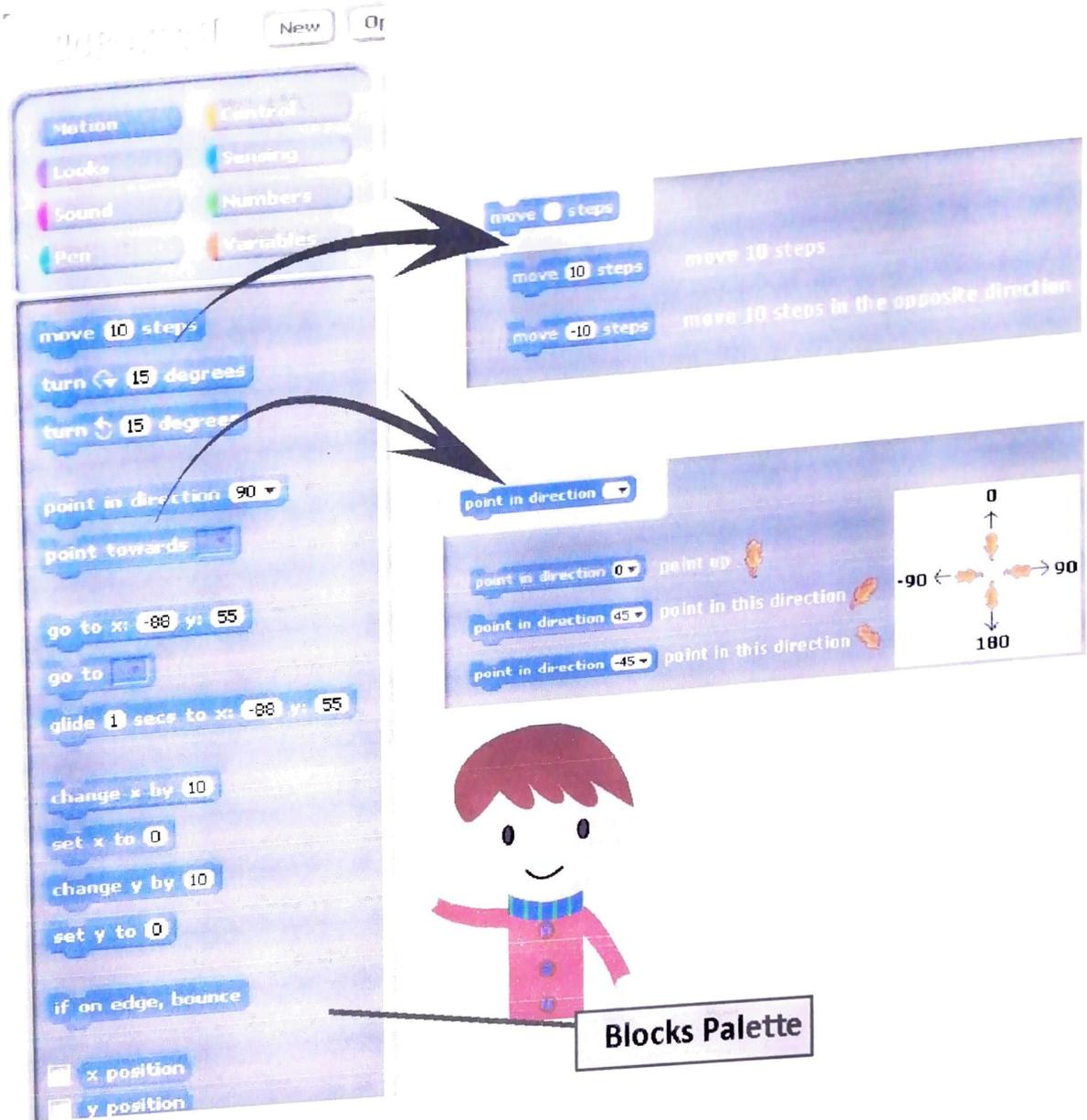
This is called running the program.

Concepts

A computer carries out the instructions of a program, one by one in the given sequence. This is called running or executing a program.

Scripts area

Script is the set of step-wise instructions that you give to the Sprite to do a particular task. Scripts area is the place where you write the Script for the Sprite. Script is also called a program. Each instruction is also called a command.



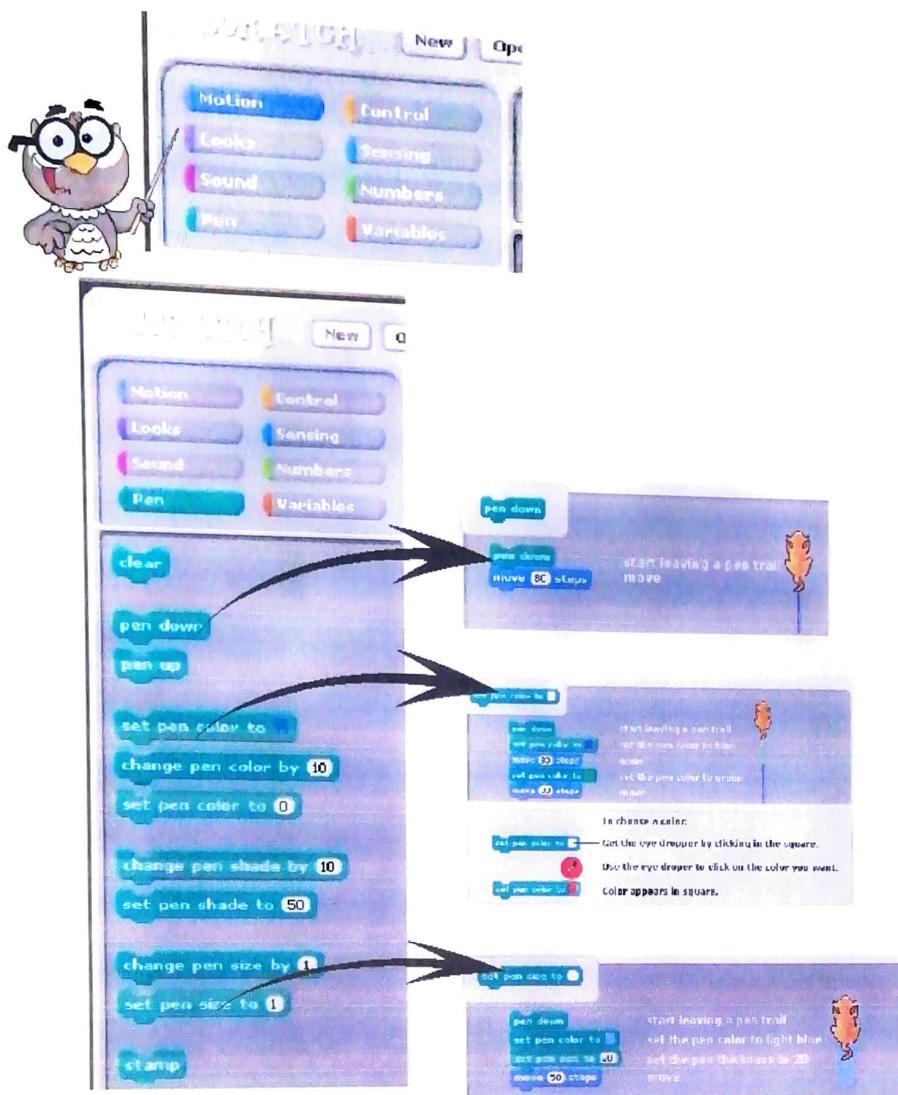
Are these the instructions that the computer understands?

Yes. Notice that there are many ways to make the Sprite move and turn.

All the movement related instructions are listed when you select the Motion Block. Related instructions are grouped together in a Block. You can find the various types of instructions in the Blocks Palette.

Motion block has instructions to make the Sprite move, such as number of steps to take, direction of motion, etc.

There is no "pen down" instruction here. Click on pen and see what happens.



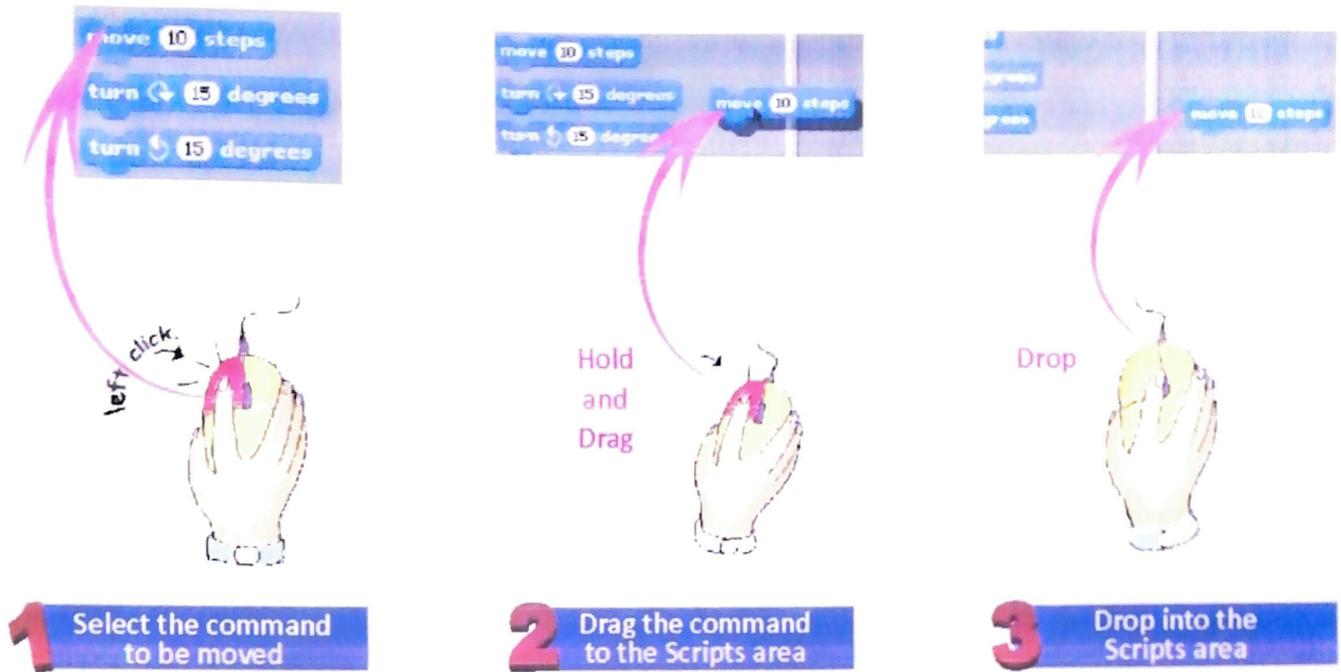
This is just like Paint. Each option gives a different set of instructions. All the pen related instructions are grouped together here.

Pen Block has instructions to provide the trail of Sprite, change the colour of trail etc.

You can drag the instructions from the Blocks Palette and drop it in the Scripts area, to write a program in Scratch.

Drag the instructions from Blocks Palette and drop it in the Scripts area to write a program.

Let us now try 'drag and drop' to put the instructions in the Scripts area.



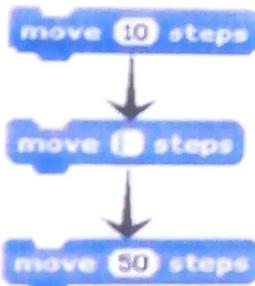
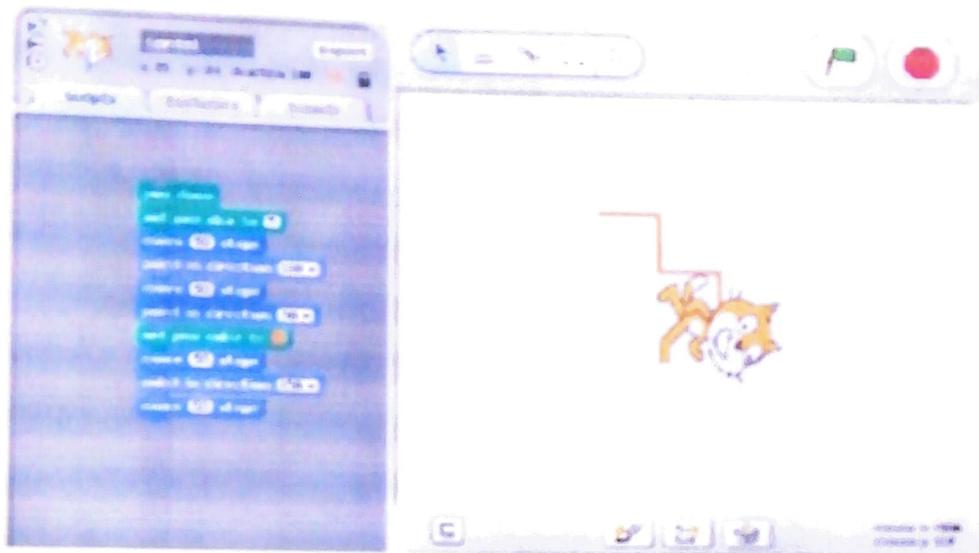
This is good. And when you bring one instruction below another, it pastes itself to form a block.

When you put all the instructions together it is called a block of the program. Explore the instructions in the options Motion, Pen and others. grouped together here.

To write a Scratch program (the Script of detailed instructions for the Sprite)

1. We have to drag the instructions blocks such as Motion, Sound from the Blocks Palette area and drop them into the Scripts Area.
2. These blocks are pasted one after the other, to create the Script. (The blocks should fit into each other as jig-saw puzzle blocks.)
3. When you double-click on a Script, Scratch runs the program. It carries out the instructions in the blocks, one by one, from the top to the bottom of the Script.

Students try out the following instructions using 'motion' and 'pen' Blocks and run the program.



You can change the number of steps the Sprite moves, by clicking inside the number area and typing the new number.

You can change the direction by clicking on the arrow and selecting the direction.

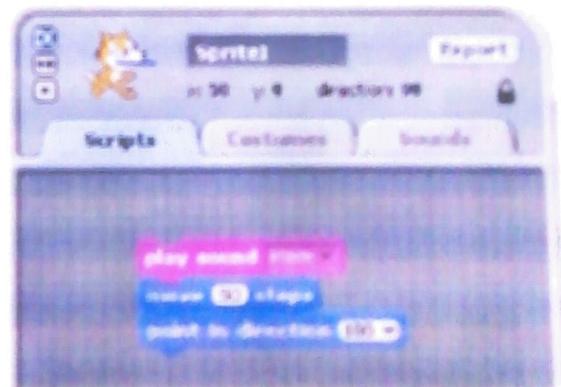


- (90) right
- (-90) left
- (0) up
- (180) down

Let us try the sound block instructions now.

You write the following instructions using motion and sound blocks and run it.

The cat makes the sound and then it moves.

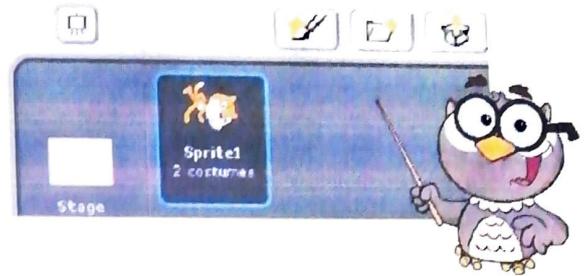


Sound block has instructions to make the Sprite speak, add musical notes, etc.

Do we always have to use the cat as the Sprite?

There are several Sprites that are already available. You can use these or you can even draw your own Sprite and use it.

Click on this button to get a list of available Sprites, and then we can select a new Sprite.



To add a new Sprite

Click on  to paint a new Sprite.

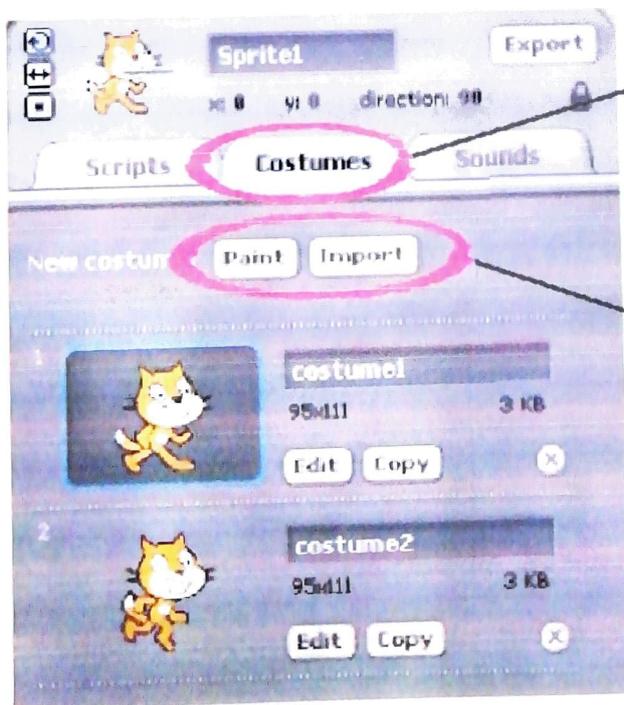
Click on  to select a Sprite from the existing list of Sprites and select one.

Click on  to get a surprise Sprite.

To delete a Sprite, select the 'scissors' button on the Tool bar and click on the Sprite. You can also change the size of the Sprite and the direction it faces.

To change the Sprite's looks, you can use Costumes. Can you use more than one Costume for a Sprite? Yes, You can.

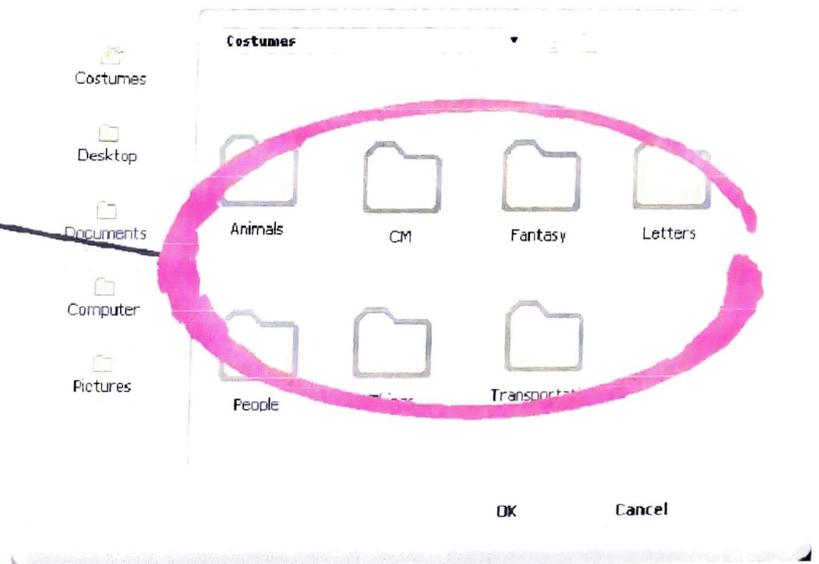
Steps to change the Costumes of the Sprite:



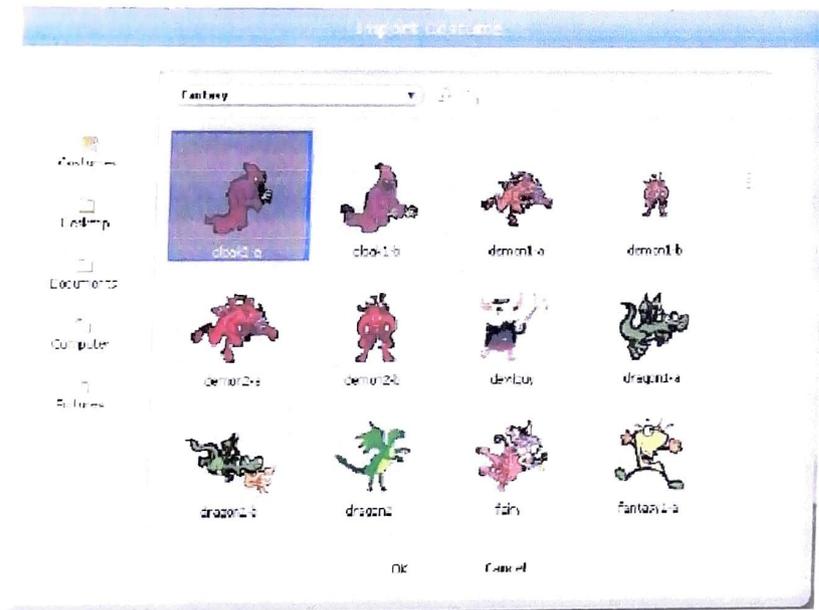
Step 1: Click Costumes, to display the list of Costumes of the selected Sprite.

Step 2: Click Paint, to paint a new Costume in Paint editor or click on Import to select a Costume from the available list.

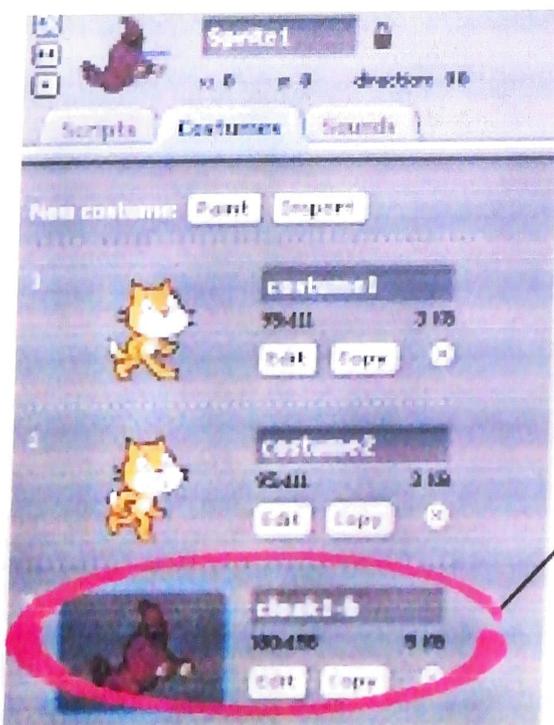
Step 3: Open a folder to select a Costume of your choice.



Step 4: Costumes inside the selected folder are displayed. Select the required Costume.



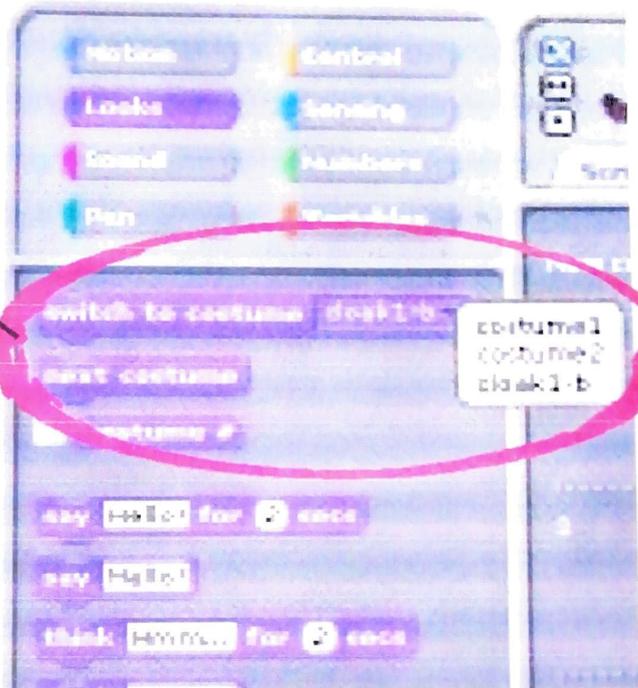
The selected Costume will be added to the existing Costume list. quired Costume.



How can you use these costumes in your program?

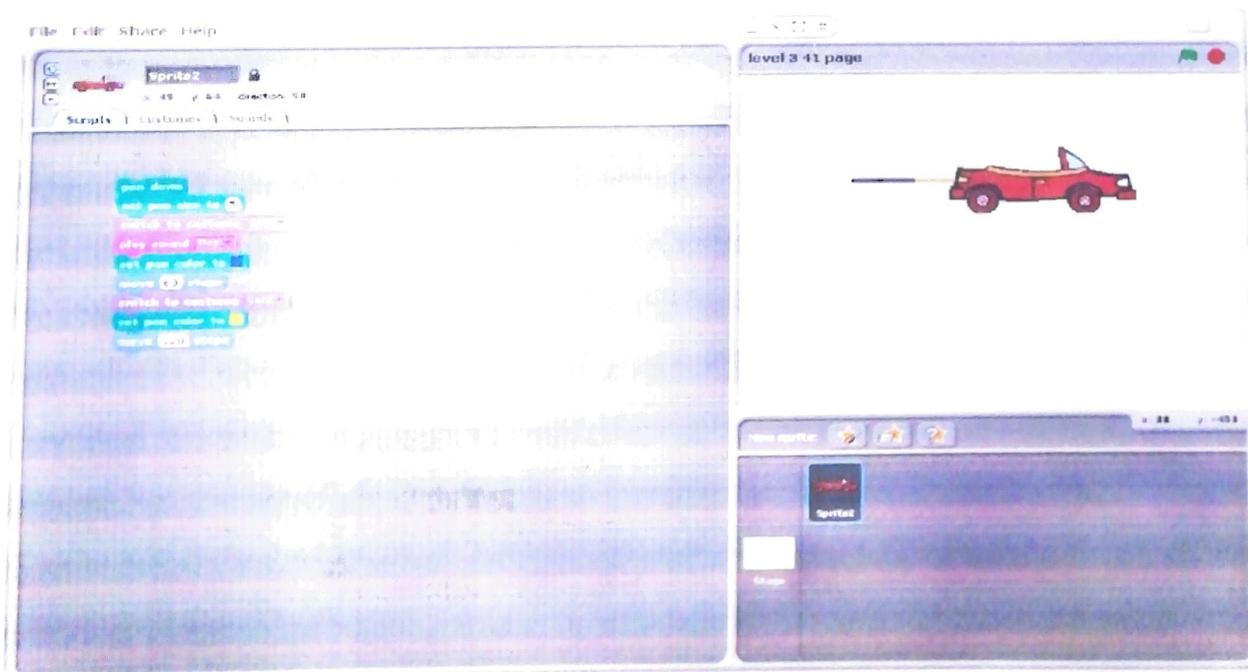
Go to the 'looks' block. Here you can find the instructions to change the Costumes.

To change the Costume, you can use "Switch to Costume" (select the Costume from the drop down list) or the Next Costume commands.

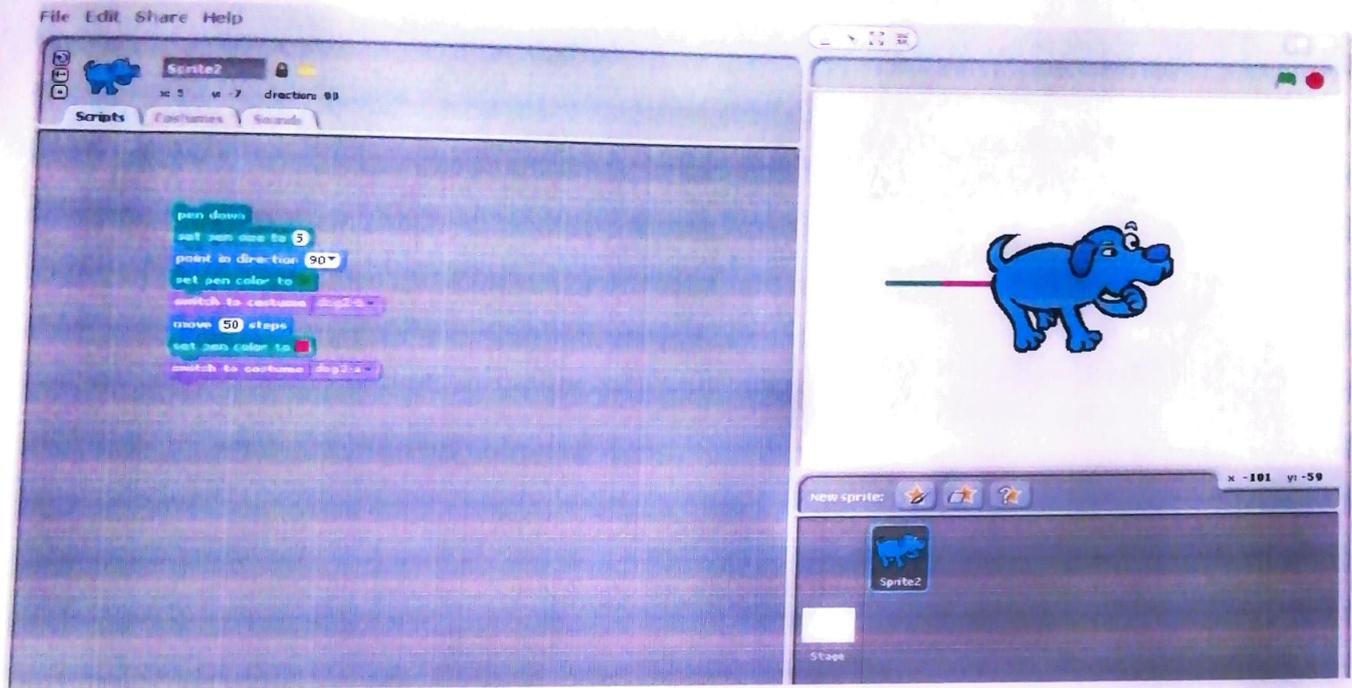


This is fun!

Let us use the instructions in Motion, Pen, Costume and Sound and make some programs. You write the instructions and run the program.



Looks block has instructions to change the appearance of the Sprite.



You can also make the Sprite speak. It appears as a call out across the Costume.

Can you make the Sprite repeat the actions?
You can also control the way the script is executed.
Next time we will explore these features of Scratch.

Learning Outcome

After you have completed this lesson, you will be able to:

- XXXXX
- XXXXXXXX