Project 4

Animation and Games

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This project will help you learn how to create animations and games on your own using a visual programming language.

As part of the project, you will be able to:

- Learn how we communicate with devices
- Make a model of an offline game
- Learn to use Scratch
- Design, try out and improve an online game
- Make your own animation and game

Figure 4.1: *Learn to communicate with computer*

You may have played games on a smartphone or a computer (Figure 4.1), with figures that move and respond to your inputs. You may also have seen 'animation' films and 'animojis' (animated emojis) on your smartphone. You might have wondered how these games, animojis or videos of moving figures (both humans and animals) and objects are made. People called 'programmers' use something called 'coding' to do this. This project will help you create your own online games and animations.

Designing games and animations require a blend of creativity and technology. It all begins with an idea. Designers then develop and refine their ideas before they actually start the work. This is made possible by artists who create visual elements, and programmers who do the coding.

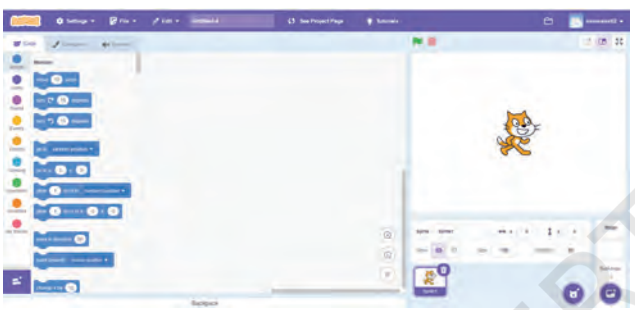

Figure 4.2: *Scratch interface*

You can create your own animations and games using 'Scratch' (Figure 4.2). Just as we use different languages to communicate, programmers use programming languages to communicate with devices like smartphones, computers, tablets, smartwatches, satellite and driverless cars.

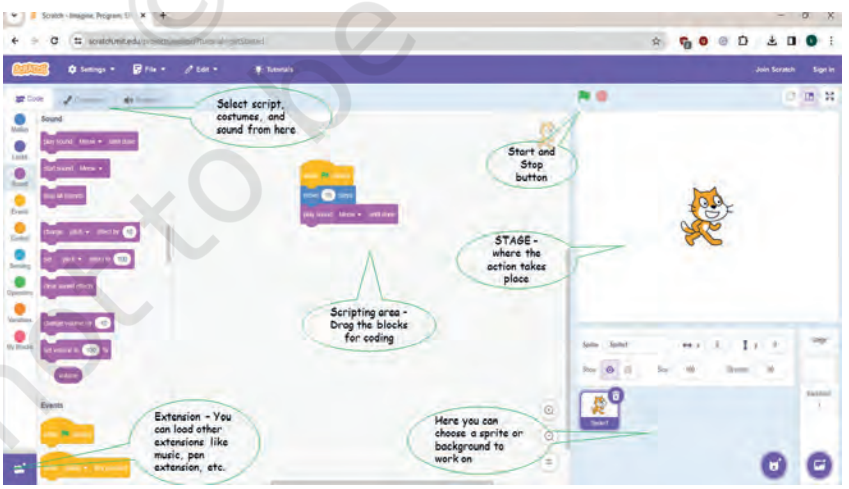

Figure 4.3: *Default Scratch window*

Scratch is easy to use. It is called a 'visual programming language' since you can move around 'blocks' instead of writing complicated programmes in languages that take time to learn. These blocks allow you 'write' programmes to create animated figures, design games, and create your own wallpaper (Figure 4.3).

Coding allows us to communicate with computers and smartphones. When you click on a button and the computer or smartphone responds, your click is translated into instructions in a language the machine understands. A series of instructions to computers or smartphones are called a programme.

There are many languages with which you can communicate with computers, like Javascript, Python and C++. Among these languages, there are visual programming languages in which a series of programming instructions are clubbed into 'blocks'. It allows us to combine different blocks and create sets of instructions.

What will I be able to do?

At the end of the project, you will be able to:

1. Create a simple Scratch project with block programming; and
2. Design games and animations using Scratch.

What will I need?

To carry out this project, you will need:

- Computer or laptop with Internet connection.
- 'Scratch' downloaded in the computer or laptop
- Notebook
- Pen or pencil
- Loose papers
- Markers
- Cardboards

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How do I keep myself and others safe?

Discuss the safety precautions, which should be taken while accessing the Internet with the teacher and your peers. Make a list of 'to do' and 'not to do'. Make sure you follow this list while working. If in doubt, ask your teacher.

Using computers for playing video games or searching for some information on the Internet is fun. As anything done in excess is not good, excess screen time is not good for your mental and physical health. Playing outside and including physical sports are good for your body and mind, so make sure you get enough of that in addition to the fun you have with smartphones and computers. So, limit your screen time as advised by your teacher and/or family members.

What do I need to know before I start?

You should be able to perform basic functions on a computer, like using the Mouse and Keyboard, checking for Internet connectivity, browsing or searching on a browser, and downloading and installing software.

What do I have to do?

Activity 1: Game design

We play many games. These games include outdoor games (e.g., Cricket, Blind Man's Buff, etc.) and indoor games (e.g., Chess, Ludo, Card Games, etc.).

The following questions are meant to help you think about the games:

1. Why do we play games?

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2. Which is your favourite game?

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3. What do you like in your favourite game?

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4. How many members can play in your favourite game?

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5. What rules are to be followed in your favourite game?

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6. Is there anything else interesting about your favourite game?

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Activity 2: Model your favourite game

Make a model of your favourite game using craft materials. For example, if you like Ludo or Snakes and Ladder, use cardboard and buttons to make the board. If you like cricket, make a model of the cricket pitch. If you like Blind Man's Buff, make a model of the field or playground where you will play Blind Man's Buff, marking boundaries clearly (Figure 4.4).

Figure 4.4: *Making a model of a game helps you think about the details of a game*

Draw a sketch or paste a photograph of the model of a game in the space given below:

Activity 3: Trying out online games

You have done some activities related to games you play offline or online. Now try some online games.

Play a few games on the smartphone or computer or laptop, and try out different kinds of games.

On the basis of your try outs of the online games, respond to the following questions:

1. Do all the games have rules? Yes ☐ No ☐
2. Did they all have characters, such as cartoons, Micky Mouse, etc.? Yes ☐ No ☐
3. Did the characters interact with each other in all the games? Yes ☐ No ☐
4. Was there a colour background in all the games? Yes ☐ No ☐
5. Was there music in the games? Yes ☐ No ☐
6. Did you find any game interesting and challenging? If yes, why? If not, how could it be made more interesting and challenging? Yes ☐ No ☐

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Activity 4: Preparing to make your own game with animation

You have thought about your favourite games; both offline and online. You have identified the rules, players, the interaction between these players and challenges in both online and offline games you played. Online games and a few offline games,

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include music and a background that make them attractive and interesting. Now look for some interesting online games and animations created using Scratch. You can look for match the pair game (Figure 4.5).

Figure 4.5: *The figure shows a game to identify and match the layer of soil correctly.*

You can use the following prompts (keywords for search) to find games and animations:

1. Play animations using Scratch
2. Educational Scratch games for school students
3. Scratch games for practising math skills
4. Creative Scratch games with music and sound effects
5. Scratch games for teaching history or geography
6. Adventure games made in Scratch

Creating an account on Scratch

1. You will have to login to the Scratch website to create an account.
2. Open your Scratch account using an email address. You can use the email address of your teacher or a family member.
3. To start creating, click on the 'Create' button.

You can find tutorials for making animations and games using Scratch. Type the following keywords:

- Scratch game tutorials for beginners
- How to make a maze game on Scratch
- Interactive storytelling on Scratch
- Creating multiplayer games on Scratch

1. Did you face any difficulty in creating your account on Scratch? Yes/No. If yes, how was it solved?

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You can now begin using Scratch.

Activity 5: Build characters, objects and a backdrop of your game

Try out a few things with Scratch. Figures 4.6 to 4.10 show some of the things you will see on the screen.

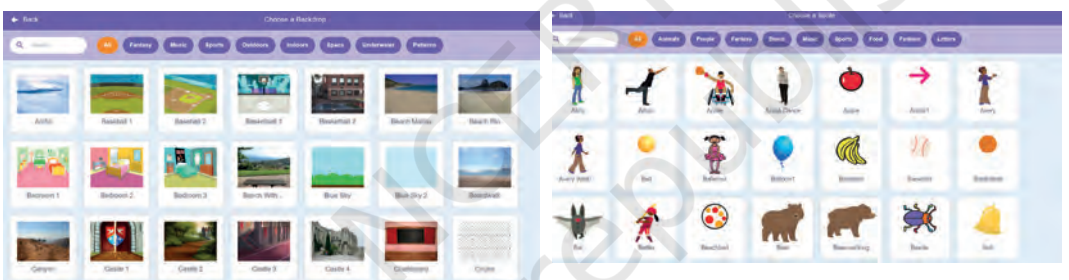

Figure 4.6: *Backgrounds and Sprite on Scratch*

As you begin using Scratch, keep responding to the questions given below. They will help you think about things you can do. You can look at your responses the next time you plan to create something using Scratch.

1. Were you able to select and import Sprite? Yes ☐ No ☐
2. Were you able to use the in-built Sprite or did you use some image from the Internet or a photo you had taken? Or did you use both?

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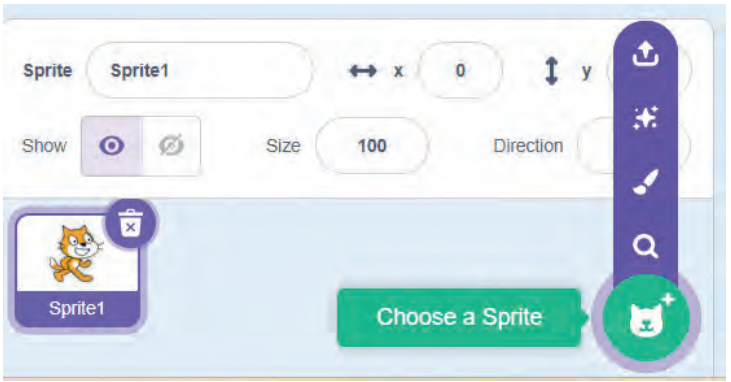

Figure 4.7*: Choosing the Sprite to be loaded on to your game*

3. Did you attempt creating your own Sprite by drawing?
   Yes ☐ No ☐
4. Were you able to change the costumes of the chosen Sprite?
   Yes ☐ No ☐
5. Were you able to identify and import objects?
   Yes ☐ No ☐
6. Were you able to identify and use appropriate backdrops for the chosen Sprite? Yes ☐ No ☐

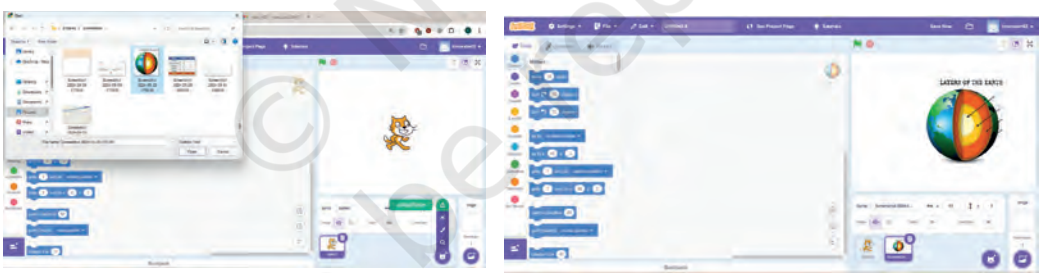

Figure 4.8: *Uploading Sprite on a computer*

Creating your own images using AI!

You can create your own images using an AI image generator. An AI image generator that takes a keyword, also called as 'text prompt', processes it and creates an image that best matches the description given in the text prompt.

You can do the following to generate AI images for this project:

1. **Choose an AI image generator:** You can ask your teacher and others for help.
2. **Input your ideas:** Describe what you want in simple words. For example, if you are thinking of a flying cat, say, "A cat flying in the sky."
3. **Explore options:** Apply different styles and see how the tool reworks the images.
4. **Refine and Experiment:** If you want changes, describe them. For instance, "Make the cat smaller" or "Change the background to a forest."
5. **Download or Save:** Download or save the image to your device.
6. You can now use it for whichever purpose you want.

Activity 6: Programming your characters and objects

Now you need to animate your Sprite (Figure 4.9).

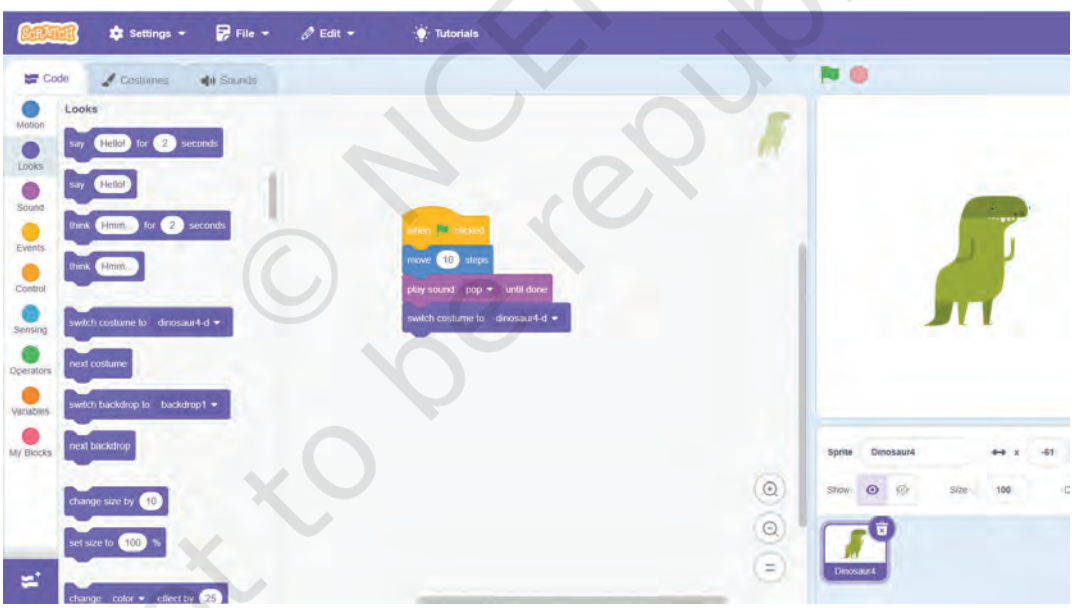

Figure 4.9: *Select your Sprite, and drag the code blocks on to your window to have it follow your instructions*

The following questions will help you think of what you can do and also help you maintain a record you can refer to later:

1. Were you able to use a combination of 'Motion' and 'Looks' blocks to animate your Sprite? Yes ☐ No ☐
2. Were you able to animate Sprite using 'Control' and 'Events' blocks? Yes ☐ No ☐
3. Were you able to include music in your animated block? Yes ☐ No ☐
4. Were you able to select multiple Sprite? Yes ☐ No ☐
5. Were you able to change their costume? Yes ☐ No ☐

Activity 7: Create an animated birthday card for your friend

Now make an animated birthday card for a friend, using his/her name and/or image (Figure 4.10).

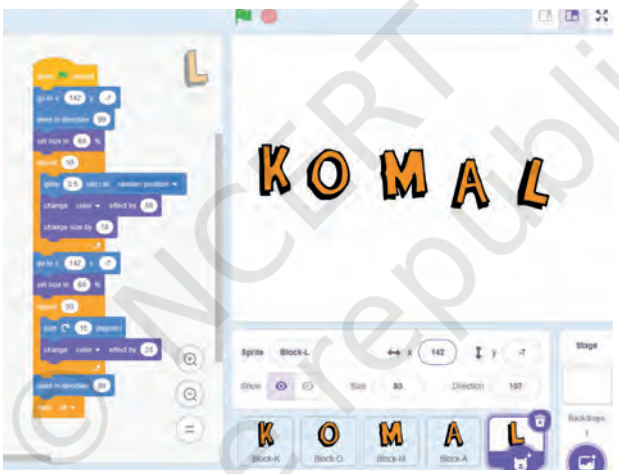

Figure 4.10: *You can do animation on Scratch too; the letters are animated in this window*

The set of questions given below will both guide you and help you keep a record of what you are doing.

1. Were you able to import and use your friend's picture as a Sprite? Yes ☐ No ☐
2. Were you able to use a combination of 'Motion', 'Looks', 'Control' and 'Events' blocks to create an animated birthday message using your friend's Sprite? Yes ☐ No ☐
3. Were you able to use your friend's favourite song as background music for the animated card? Yes ☐ No ☐

4. Were you able to save the card and share it with your friend? Yes ☐ No ☐

5. Did you face any challenge in designing this animated birthday card? Yes ☐ No ☐
   If yes, how did you resolve them?

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6. Did you try creating something else using Scratch?
   Yes ☐ No ☐

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Activity 8: Designing your game

You are now ready to design your own game.

The first thing you need to do is plan the details of your game. This is known as making a 'storyboard' (Figure 4.11).

Storyboard

A storyboard helps in planning what will be shown on the screen during a game or animation. It is like a roadmap. You can make it on paper or use the computer to create a document with the details of your plan. You can sketch your characters, detail how they will respond to commands, and show the sequence of actions, in short. Everything that is in your head can go into the storyboard.

Making a storyboard is important to ensure a detailed plan so that you do not have to stop and think as you start making your game or animation.

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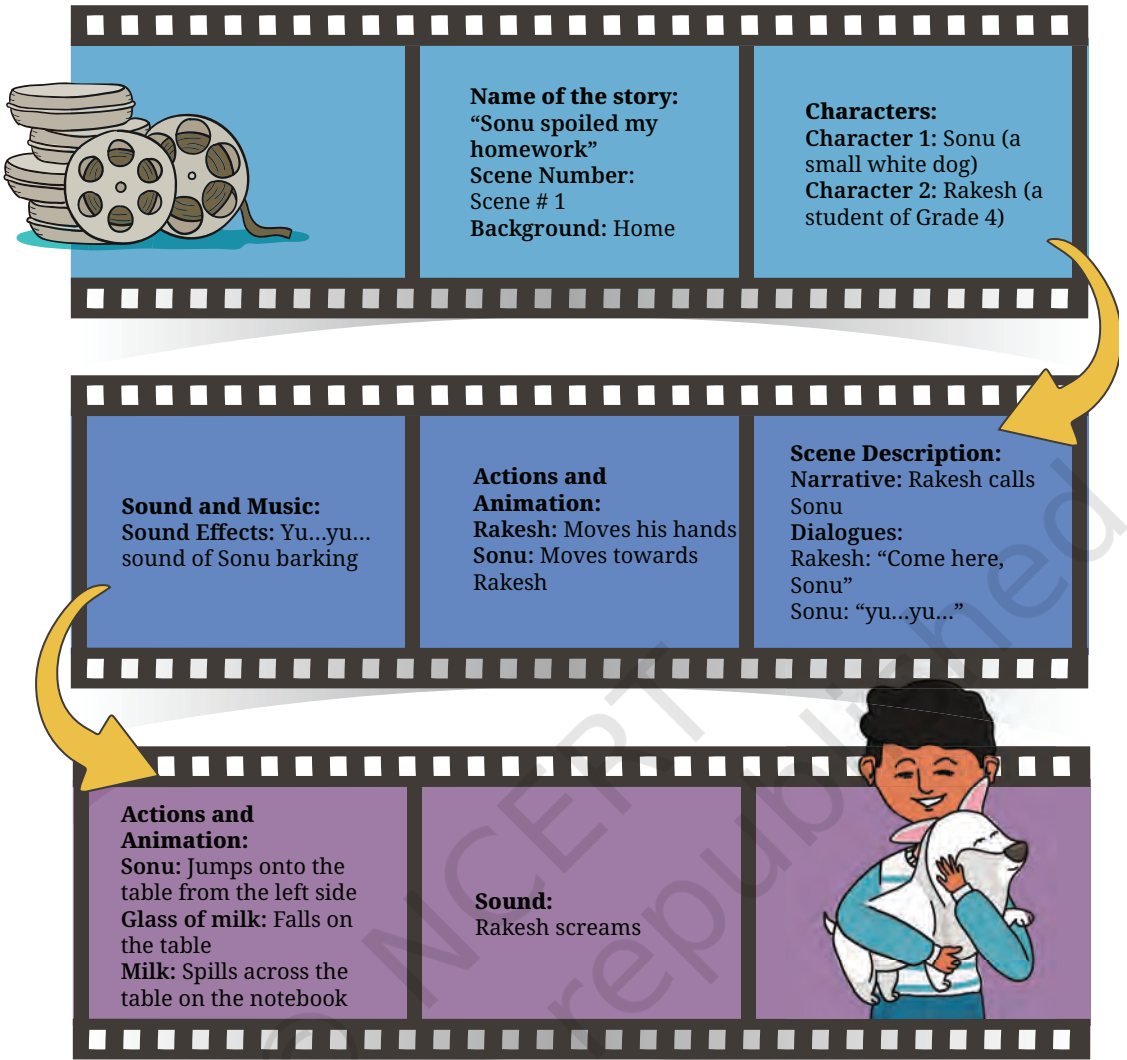

Figure 4.11: *An example of a storyboard for an animation*

Notes:

Special Instructions: Make sure Rakesh is sitting on a study table and a glass of milk is placed on his table.

Finally, you can show that Sonu jumps towards Rakesh, causing the glass to fall, spilling milk on table.

Present the game idea to your peers; did you receive any suggestion? Yes/No. If yes, how did you use them?

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Activity 9: Coding your game

With the help of your teachers or any other person, write the code (Figure 4.12) for the designed game by:

- Creating characters and scenes
- Animating characters
- Using dialogue and text
- Using event blocks to trigger different events in the story
- Using sound blocks to add background music

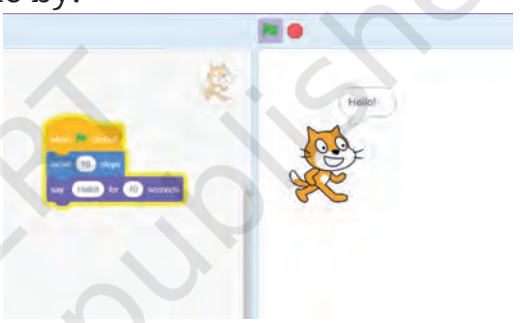

Figure 4.12: *In this code, the Cat will move 10 steps ahead and say "Hello" once you press start*

1. Write a script for the game you designed in Activity 5 using in-built blocks, such as motion, looks, sound, events, control, sensing, operators, variables, etc. and control structures that include loops and conditional statements.

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2. Prepare a logo with the name of your game and paste the photograph of the same in the space given below.

3. Were you able to do the following?

a. Setting the stage

- Choose or create a backdrop for the game's stage by importing image. Yes ☐ No ☐
- Design or import Sprite Yes ☐ No ☐
- Design or import object Yes ☐ No ☐

b. Code your Sprite

- Use a combination of 'Motion' and 'Looks' blocks to programme the movements of your Sprite. Yes ☐ No ☐
- Experiment with different code blocks to control movement, interactions, animations and game logic. Yes ☐ No ☐

c. Implement game mechanics

- Define the rules of game using 'Control' blocks. Yes ☐ No ☐
- Use conditional (if else statements), loops, variables and sensing blocks to create interactive gameplay elements. Yes ☐ No ☐

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- Use ‘Event’ blocks to trigger actions in response to specific events. Yes ☐ No ☐
- Enhance the gaming experience by adding background music using ‘Sound’ effects. Yes ☐ No ☐

4. Did you face any challenge in designing the game? If yes, how did you resolve them? Yes ☐ No ☐

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Activity 10: Trying it out

Check if your game is working.

1. Publish your game by clicking on the ‘Share’ button in Scratch.
2. Request other group members to play the game.
3. Are there any issues or ‘bugs’ that need to be removed for smooth working? Yes ☐ No ☐

Activity 11: Sharing your game

Now imagine if someone you have not worked with were to play the game. You would have to introduce the game to them and give basic instructions. You can do that by either making an audio or video clip or creating a document.

The questions below will help you develop these instructions.

1. What is the name of your game?

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2. What are the different components of the game?

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3. What are the rules of the game or instructions to play?

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What did I learn from others and how did I use it?

You saw videos on Scratch and discussed with others how to create the games.

1. Did you watch any tutorial or observe how others coded their projects?

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2. Did you work on any project with classmates? What did you learn from them?

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3. Did you ask for help or advice from your teacher or peers? What was the most helpful piece of advice you received?

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4. What new techniques or blocks did you discover with the help of peers?

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5. Did learning from others inspire any new idea or feature in your projects?

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6. Have you had the opportunity to teach or help others with Scratch? What did you teach them, and how did it help you reinforce your own understanding?

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What did I do and how long did it take?

It is important to understand how much time is required for an activity to be completed.

Calculate the approximate number of periods you spent on each activity. Mark them on the timeline below. If you did more than the activities suggested in the book, please add the number and time taken.

Activity	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Time taken (Periods)	---	---	---	---	---	---	---	---

What else can I do?

1. You can create a game/animated story related to your daily life, using photographs of people and objects around you. Please remember to take permission first. Discuss your favourite folk story with your family members and elders in the community. Prepare a storyboard detailing the characters, plots, important scenes, etc. Translate this story into Scratch by creating characters and scenes; animating characters; using dialogue and text; using event blocks to trigger different events in the story; and using sound blocks to add background music.
2. You can use the Scratch extensions to make different games. For example, you can use the Pen extension to create your own shapes and figures (Figure 4.13).

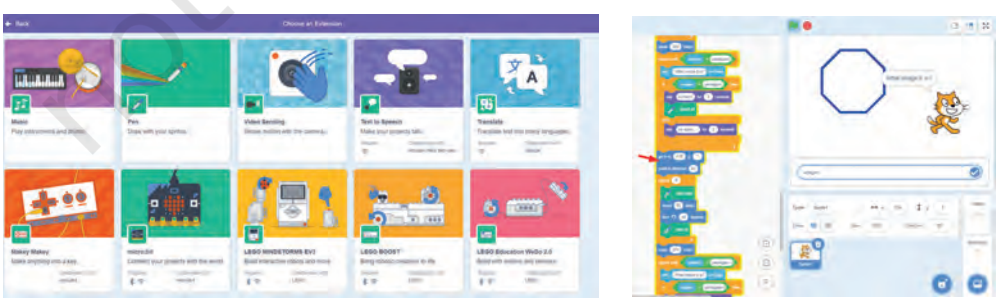

Figure 4.13: *Scratch extensions and use of Pen extension*

Think and Answer

1. What did you enjoy doing?
2. What were the challenges you faced?
3. What will you do differently next time?
4. Compare online and offline games. State three things you like about each.
5. What jobs are related to the project? Look around, speak to people and write your answer. A few examples of jobs related to the activities you just did, are programmer, software developer, game developer and 3D animator.

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Take Care of Your Mental and Physical Health

TALK ABOUT YOUR FEELINGS	STAY FIT AND ACTIVE	EAT HEALTHY FOOD	GET ENOUGH SLEEP
			
DO THINGS YOU ENJOY	**TAKE BREAKS AT WORK**	**STAY CONNECTED WITH FRIENDS**	**PRACTICE BEING KIND**