INFORMATION & COMMUNICATIONS TECHNOLOGY

STANDARD VIII

PART 2 $\frac{2}{2}$

GOVERNMENT OF KERALA
GENERAL EDUCATION DEPARTMENT

INFORMATION & COMMUNICATIONS TECHNOLOGY

STANDARD

VIII

PART-II

GOVERNMENT OF KERALA
GENERAL EDUCATION DEPARTMENT

State Council of Educational Research and Technology (SCERT), Keralam
2025

INFORMATION & COMMUNICATIONS TECHNOLOGY - VIII

PREFACE

Dear students,

The infinite possibilities of Information and Communication Technology have made many things that seemed impossible, possible. The ICT textbook for Standard 8 has been designed to guide you into the world of technology, facilitating self-learning, doubt clearance and knowledge construction.

Using this book, you can practice word processing, spreadsheet and presentation software and engage in various activities. In addition, by using block coding, you can create computer games and learn the fundamental principles of machine learning. The history and various services of the internet are also explored in this textbook.

The textbook also includes resource creation using multimedia tools, such as digital painting, video editing, and music composing. Let this ICT text-book help you acquire new knowledge and enhance your creative abilities by effectively using digital technology in the learning process.

With regards,

Dr. Jayapralash R.K.
Director
SCERT

Textbook Committee

CONTENTS

Each chapters also contains illustrations

FURTHER READING

LET'S ASSESS

EXTENDED ACTIVITIES

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a [1][SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC] and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the [2][unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

---

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)
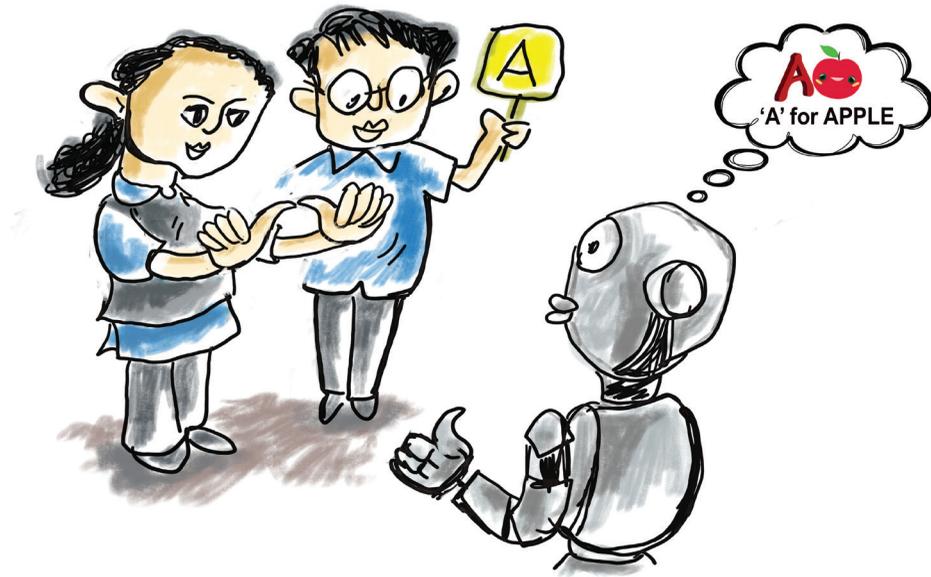
Chapter 6

Machines That Learn

Haven't you seen the picture of friends trying to teach sign language to a robot?

Have you noticed how people with hearing impairments communicate using sign language? If you ever get a chance to meet such individuals, how would you communicate with them? Wouldn't it be easier to interact and exchange ideas if you learned their language?

As members of society, it is our responsibility to include differently abled individuals in the mainstream and to help them overcome their challenges. If we could teach sign language to machines, wouldn't we be able to use technology in a way that helps people with hearing impairments?

Machines that Learn

You have understood that machines can learn and also apply what they have learned in new situations, haven't you?

Let's look at some examples of such situations.

▪ A screen lock that opens by recognizing the owner's face.

- Voice assistant systems that help control devices in homes.

- ....

- ....

Do you know how machines learn?

Let's try an activity to understand this better. Observe the patterns given in both columns of Table 6.1.

Group - A	Group - B

Table 6.1 Various Patterns

Analyse the patterns given in both groups, and identify and note down which group each pattern in Table 6.2 belongs to.

| Group :_____ | Group :_____ | Group :_____ | Group :_____ | Group :_____ |

Table 6.2 – Classification of Patterns

Think about the different steps you went through to classify the patterns.

- Identified the unique features of the patterns given in both groups.

- By comparing the images, identified the specific features that distinguish the patterns in the two groups and remembered them.

- Carefully observed each of the new patterns given in Table 6.2 and identified their distinct features.

- Based on the features that differentiate the patterns in Group A and Group B, classified each new pattern into the appropriate group.

To classify the patterns, there must be one or more distinct features that help differentiate the patterns in each group. Record the similarities and differences you have identified between the patterns in Group A and Group B in Table 6.3 given below.

Similarities	Differences
The patterns are in black and white.	The lines in the patterns of Group-A are mostly curved. In the patterns of Group B, most of the lines are straight.
	The patterns in Group-B have more sharp edges.

Table 6.3 Similarities and Differences Between the Patterns

The conclusions you arrived at by analysing the features of the patterns helped you decide which group the new patterns belonged to. In the same way, the knowledge we gain from our everyday experiences enables us to respond appropriately to different situations.

Machine Learning

Artificial Intelligence is a scientific discipline, and Machine Learning is one of its subfields. It is a technology that enables computers to make decisions in new situations, based on models they build on their own by identifying patterns in data.

It is the network of billions of neurons in the human brain that gives us the special ability to understand, think, and make suitable decisions.

Artificial Intelligence (AI) is the branch of science that enables computers to imitate human intelligence, including intelligent behaviour. By providing appropriate data, we can train a computer to learn new things. This process is called Machine Learning. Through this, computers can analyse information in new situations, make predictions, solve problems, and take decisions.

Teaching Sign Language to a Computer

To use any language fluently, it must be practised and used regularly. To learn sign language, one would normally need help from someone who already knows it. But if we could teach a computer sign language, anyone could learn sign language with the help of a computer. Shall we try to teach the computer the sign language representations of the English alphabet?

In Class 7, through the lesson Computer Vision, we learned how to create a computer programme using PictoBlox that can recognise facial expressions. In that lesson, facial expressions were identified using a pre-trained machine learning model.

In a similar way, we now need to create a machine learning model that can recognise hand gestures representing the letters of the English alphabet. Using the Machine Learning Environment in the PictoBlox software on our computer, we can build machine learning models for different tasks. For this,

- Open PictoBlox, go to the File menu, and select the option **Open ML Environment.**

- In the window that appears, click the Create New Project button. This will open a window as shown in Figure 6.1.
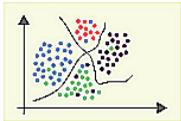
Fig. 6.1 Window for Creating a New Machine Learning Project in Pictoblox.

Which types of machine learning projects can be done using PictoBlox? Examine the window and list them below.

- Image Classification

- Object Detection

- ....

- ....

To create a machine learning model that identifies and classifies hand gestures, the **Image Classifier** feature can be used. For this purpose,

Hand Pose Classifier and Indian Sign Language

The **Hand Pose Classifier** feature in **PictoBlox** can also be used to recognise and classify hand gestures. However, the Hand Pose Classifier is capable of recognising only one hand at a time. We are using **Indian Sign Language (ISL)**, in which both hands are required to represent the signs for alphabets. Therefore, there is a limitation in creating a machine learning model for recognising ISL using the Hand Pose Classifier.

- From the window shown in Figure 6.1, select Image Classifier as the project type, give it an appropriate name (e.g., ISL), and click the Create Project button. Next, a window similar to the one shown in Figure 6.3 will appear.

Indian Sign Language -ISL

Language is essential for communication. There are different forms of language. We communicate through words, movements, and gestures. However, due to limitations in acquiring spoken language, individuals with hearing impairments often face difficulties in communication. As a result, they are frequently excluded from the mainstream of society. The inability to understand the meaning of sounds goes beyond what we commonly imagine. While people with hearing ability communicate using words, those with hearing impairments try to communicate through gestures. In many countries, there are specific forms of sign language designed for the hearing impaired. For example; in India – **Indian Sign Language (ISL)**, in the USA – **American Sign Language (ASL)**, in Britain – **British Sign Language (BSL)**, in Australia – **Australian Sign Language (AUSLAN)**.

Persons with hearing impairments, like all individuals with disabilities, are part of our society. All the laws and rights that exist in our country apply to them as well. These provisions have been implemented through legal measures. However, it is often challenging for people with hearing impairments to acquire multiple spoken languages. Those without hearing or speech impairments can support them by learning sign language. By learning sign language, we can help persons with disabilities overcome barriers and lead better lives. It is our responsibility to support and include them.

Indian Sign Language Research and Training Centre (ISLRTC)
Department of Empowerment of Persons with Disabilities, (Divyangjan)
Ministry of Social Justice & Empowerment (Govt. of India)
English Alphabets in Indian Sign Language

Developed by
ISLRTC
A-91, 1st floor, Nagpal Business Tower, Okhla Phase II, New Delhi - 110020
Tel: 011-26387558/59, Email: islrtcnewdelhi@gmail.com, Website: islrtc.nic.in

Fig. 6.2: ISL – Hand Gestures for English Alphabets

Observe Figure 6.3. This is a window used for the activity of training the computer by providing images to create a machine learning model. Find out how many stages are there in it.
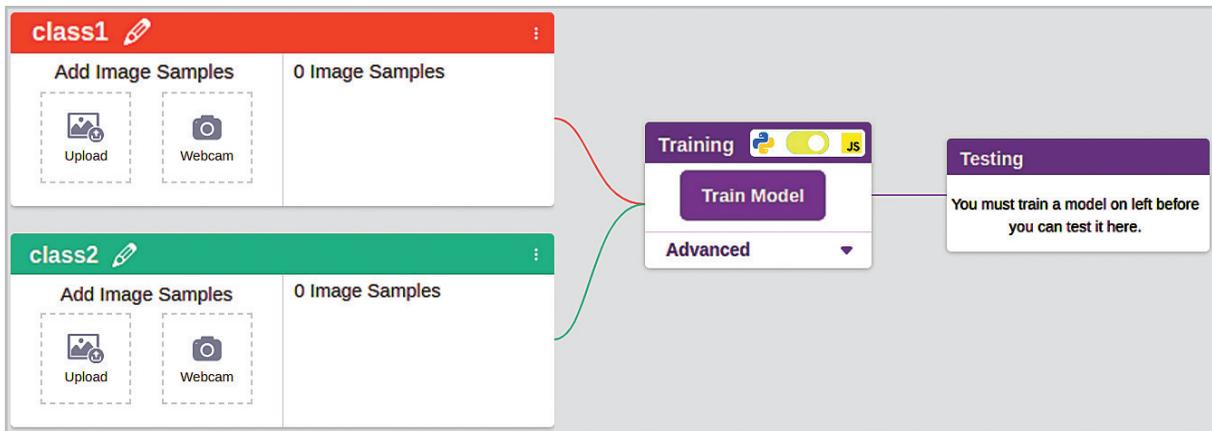
Fig. 6.3 The Window that Appears When the Create Project Button is Clicked

1. Dataset Preparation

Dataset preparation is the process of collecting and accurately organizing the data required for the machine learning model to learn. The quality of the data influences the accuracy of the model. Here, images are to be provided as data.

2. Training

Training is the process of teaching the model using the prepared dataset. In this stage, the model learns to identify patterns from the data and make predictions.

3. Testing

Testing is the process of evaluating the performance of the trained model. As part of this, new data that was not previously given to the model is used to check whether it can make accurate predictions. Through testing, the model's accuracy and efficiency are assessed.

AI Model

An AI model is a program trained using a set of data to learn, recognize patterns, and to make decisions without human intervention. AI models are used to perform various tasks using artificial intelligence.

Categories of Machine Learning

Machine learning can mainly be classified into three types.

1. **Supervised Learning:**
   This is the process of training the computer using labeled data. Both the input and the corresponding output are provided in advance. When new data is received, the computer uses the learned pattern to predict the answer.

2. **Unsupervised Learning:**
   This method aims to discover patterns in unlabeled data. The computer identifies hidden relationships and structures within the data on its own.

3. **Reinforcement Learning:** This is the process of learning by understanding right and wrong actions. For each action, the computer receives either rewards or penalties, which helps it learn to make the correct decisions.

As the first step in creating a model to recognize Indian Sign Language, we can train the computer using only the three letters A, B, and C.

When the Image Classifier training interface in Figure 6.3 is opened, two categories Class 1 and Class 2 will be available. Using this, a dataset can only be prepared to classify images into two categories. However, to recognize the letters A, B, and C, images of their hand signs need to be added under three separate categories. In addition, images that do not show hand signs should be included in a separate category called "None." That means a total of four classes are required. For that purpose,

- Use the **Add Class** button below the window to create new classes.

- Click the button [✎] and name each class accordingly [A ✎], [B ✎], [C ✎], [None ✎]

Now, images can be added to each category.

The hand signs representing the characters A, B, and C in ISL are shown in Figure 6.4. These hand signs should be provided as image data under each corresponding class.

A	B	C
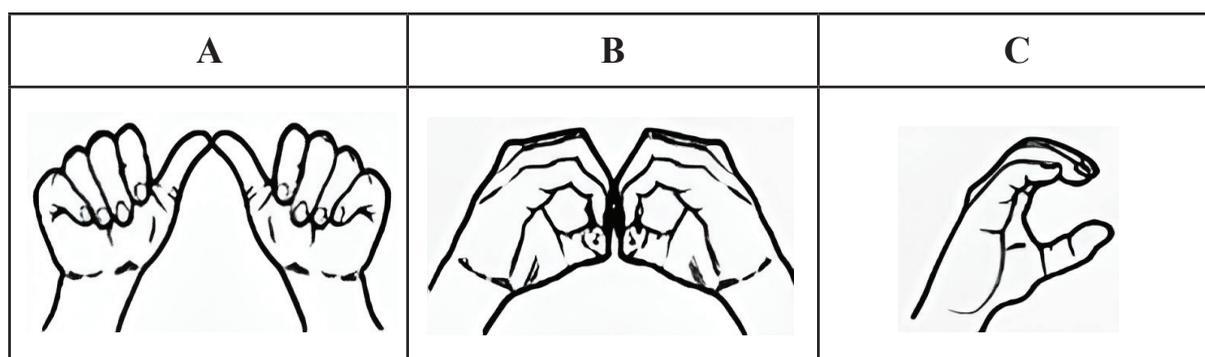
Fig. 6.4: ISL Hand Signs for A, B, and C

- To add images of the hand signs, click the Webcam button in each class and add the required sample images for each class—ranging from 200 to 500 images (see Figure 6.5).

While adding samples, make sure to include only clear and accurate images in each category.

Any image that does not belong to the A, B, or C categories should be added to the None category.

Fig. 6.5: Dataset Preparation – Adding Images

The next step is to train the machine learning model using the dataset we have created.
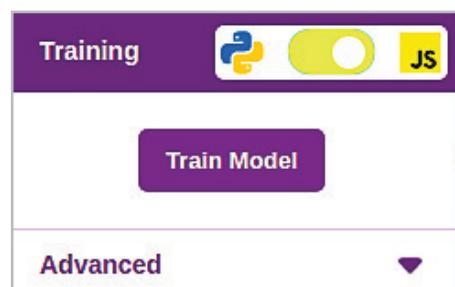
Fig. 6.6: Training System
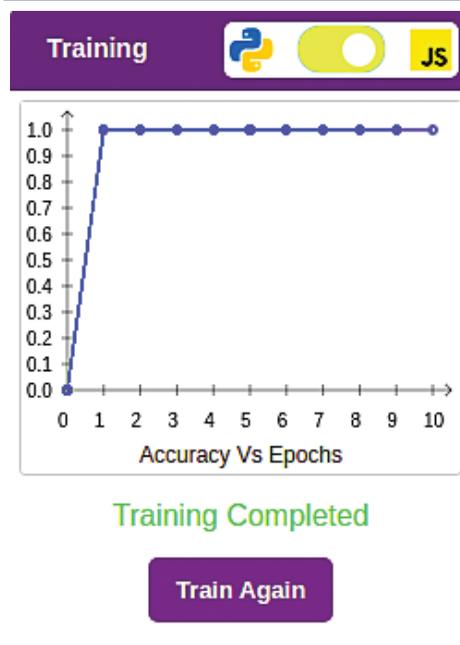
Fig. 6.7: Graph Displayed After Model Training Completion

In Pictoblox, the machine learning model can be trained using programming languages like **Python** and **JavaScript**.

- To train the model using JavaScript, make sure the Training Switch is set to the JavaScript ⬤ JS mode. Then, click on Train Model **Training Model** and wait until the training process is complete (see Figure 6.6).

- Once the training is finished, its status will be displayed in the form of a graph (see Figure 6.7).
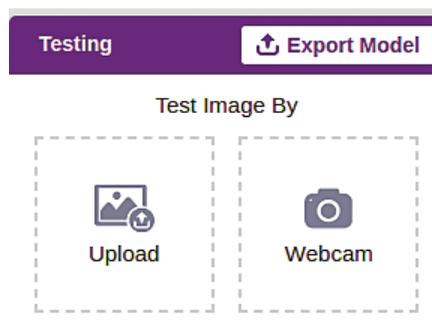
Fig. 6.8: Testing Interface

The next step is testing. To do this,

- Click the Webcam button in the Testing window (Figure 6.8). In the webcam window that appears, show the ISL hand signs for the letters A, B, and C, one by one.

- The performance of the trained machine learning model can be understood from the Output window (Figure 6.9).

If the model's effiency is low, unsuitable images included in the dataset may need to be removed. In some cases, it may also be necessary to add new images. If such changes are made to the dataset, don't forget that the training process must be repeated. This process should be repeated until the model is able to accurately recognize the hand signs.

- After preparing the model, click the 💾 button to save the project.

Let's Create a Sign Language Game

We have successfully trained the computer to recognize the ISL gestures for the letters A, B, and C. Now, using this knowledge acquired by the computer, let's try creating a game to help practice ISL letters. The details of how the game works are given below.

Fig. 6.9: Testing Using Webcam

Game – How It Works

The computer randomly displays a letter. You need to show the ISL hand sign for that letter in front of the webcam. If the hand sign is correct, you win the round.

At this stage, the computer has been trained to recognize only the three letters A, B, and C. To see how the game works, watch the video named ISLGameVideo.mp4 provided in the School_Resources/Class_8 folder.

To create this game, the most essential component is the AI model that recognizes ISL. We have already prepared this model in the previous activity. Now, this model needs to be exported and included in the game we are going to create.

For this:

- Start a new project in **Pictoblox**.

- From the File menu in the main window, open the **ML Environment** (see Figure 6.10).).

Project Details	Type	No. of Classes	Last Updated	Status	
ISL -	Image Classifier	4	Wed Jan 08 2025 10:37:45	Model Trained Successfully	⋮
handimg -	Image Classifier	4	Tue Jan 07 2025 13:17:28	Model Trained Successfully	⋮
patern1 -	Image Classifier	2	Tue Dec 03 2024 16:49:03	Model Trained Successfully	⋮

Fig. 6.10: Pictoblox – ML Environment Window

- Here, you can see the projects that were previously created. From this list, click to open the project that was prepared for ISL.

- Then, in the ML window that appears, click the **Export Model** button (see Figure 6.11).

With this, the ISL model we created earlier will be added to the new Pictoblox project. As a result, various code blocks related to the machine learning model will now be available in the project (see Figure 6.12).

Fig. 6.11 Model Export System

Fig. 6.12: ML Image Classification Code Blocks in Pictoblox

You are already familiar with the code blocks in Pictoblox.

Now, examine the newly displayed code blocks and identify the function of each one. Complete Table 6.4 by writing down the purpose of each code block.
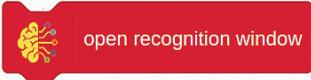
Code	Usage
open recognition window	The image captured by the camera is recognized and categorizeed. The model can be used to test it.
turn on ▼ video on stage with 0 transparency	
analyse image from web camera ▼	
is identified class - A ▼ ?	To determine whether the image captured by the camera belongs to category - A
identified class	To determine which class the image captured by the camera belong to.
get confidence of class A ▼	
when A ▼ is predicted	
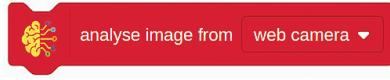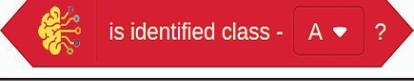
Table 6.4 Codes related to Image Classifier and their Uses

Now that the use of code blocks has been identified and the table has been completed, let's add suitable sprites and costumes for our game. Since the computer only needs to display the letters A, B, and C, to do this,
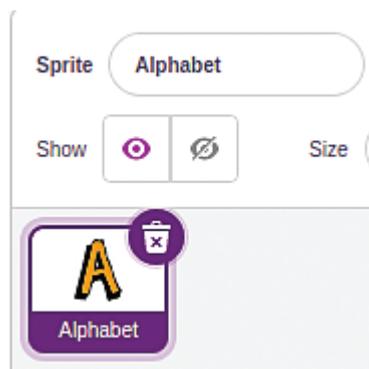
- Click the **Choose a Sprite** 🐻 button and select the sprite named 🅰 Block-A from the Pictoblox sprite library. Rename this sprite to Alphabet (Figure 6.13).

- Next, open the Costumes tab of the Alphabet sprite and add the following costumes: Block-B, Block-C, and Button4-a (Figure 6.14).

In the machine learning model we prepared earlier, the class names were given as A, B, and C. The same names must be given to the costumes as well. Therefore,

Fig. 6.13 Sprite - A

- Rename the costumes accordingly as A, B, and C (Figure 6.15).

We have already seen how the game works in the video. Now, let's look at the steps of its operation:

- When the flag is clicked, the camera turns on.

- One of the letters A, B, or C is displayed randomly.

- The image captured by the camera is analyzed.

- If the hand sign shown matches the displayed letter, the letter on the screen changes to (✔)tick symbol.

- This process is repeated.

Shall we now prepare the code needed for these actions?

We've already learned in earlier classes how to turn on the camera using the `turn on ▼ video on stage with 0 transparency` code.
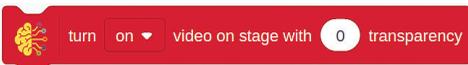
At the start of the game, one of the letters A, B, or C appears randomly on the screen. To make this happen, one of the first three costumes of the Alphabet sprite must appear randomly. For this, using the code `switch costume to pick random 1 to 3` is sufficient.

The names given to the costumes and the class names in the machine learning model are A, B, and C. Therefore, using the code `identified class = costume name ▼` we can check Whether the letter displayed on the screen matches the hand sign shown to the camera. If they match, what should happen?

- The Success costume should be displayed.

- A sound should be played.

- After 3 seconds, another random letter should appear on the screen.

The program required to perform these actions is given in Figure 6.16. With the help of Table 6.4, analyze these code blocks and discuss in class to find out how each block works.
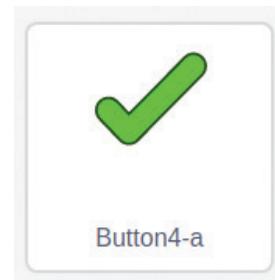
Fig. 6.14 Sprite - Button4-a
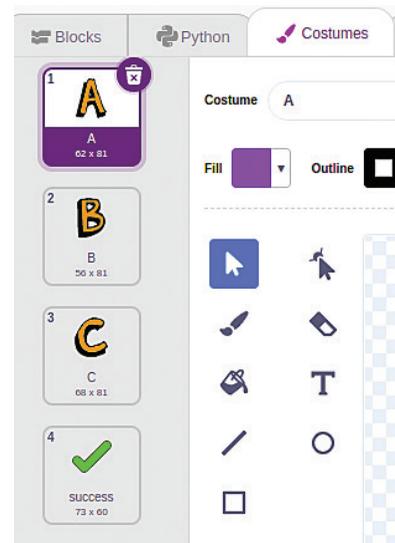
Fig. 6.15 Costumes
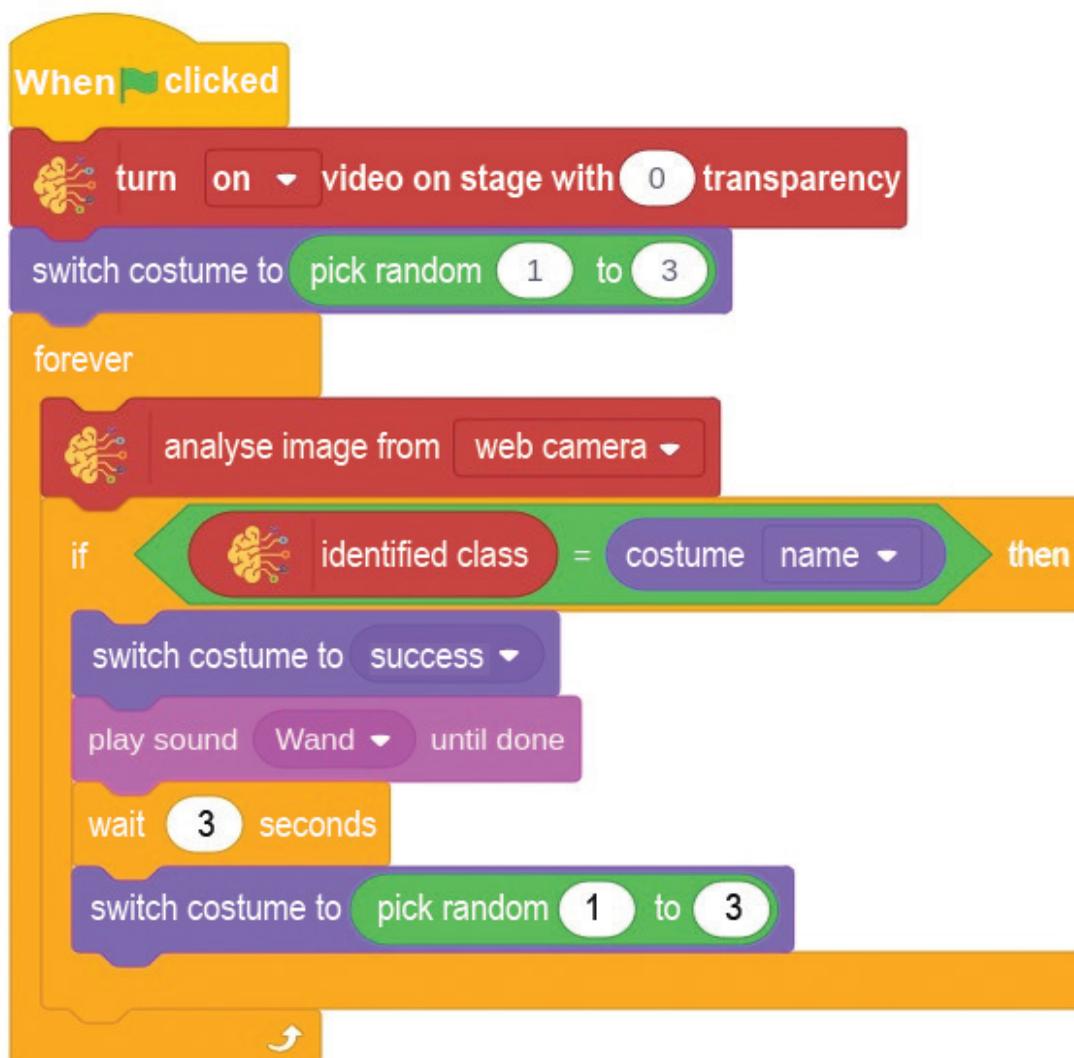
Fig. 6.16: Complete Code of the ISL Game

Wouldn't the game become more interesting if a score is added for every correct answer? You have already learned how to add a scoring system in earlier classes. Try adding the score feature to the game on your own.

After training the model with ISL hand signs for the remaining letters, further develop the game.

Machine Learning and Its Possibilities

Machine learning is a field with vast potential. The method we explored (where machine learning models can identify patterns from images and classify them) can be used to perform useful tasks in our daily lives.

X-ray systems are a very important tool for diagnosing illnesses. By preparing a large dataset of X-ray images, both with and without signs of disease, a machine learning model can be developed for diagnosis. This helps improve the efficiency and accuracy of diagnosis and treatment by reducing human error.

Not only images, but also text, sound, video, computer programmes, and many other types of data can be used to train the machine. Let's explore its possibilities and conduct a seminar in class on the topic of Machine Learning and Its Possibilities.

Let's Assess

♦ "A robot learns to walk by trying out different movements, correcting errors along the way".

   a)   Unsupervised Learning

   b)   Supervised Learning

   c)   Reinforcement Learning

   d)   Deep Learning

♦ In which of the following situations is machine learning being used?

   a) An app recommends songs you might like based on the songs you frequently listen to.

   b) A website collects the information entered by the user and stores it in a database.

   c) Advertisements related to your internet search history are displayed on the websites you visit.

   d) Formulas are used in spreadsheets to simplify calculations.

Extended Activities

1. Suppose you need to build a machine to classify two different types of objects — for example, a machine that can sort ripe and unripe tomatoes. Create a machine learning model in PictoBlox to identify these objects using a webcam.

2. Design a game that operates using hand gestures as input instead of a keyboard or mouse, by using the Hand Pose Classifier feature in PictoBlox.

❖ ❖ ❖

Chapter 7

Data Analysis on a Computer

Take a look at a page from Meenu's account book (Figure 7.1), which contains the recorded income and expenses for the months of June and July.

Fig. 7.1 – A Page Showing Recorded Income and Expenses

Haven't you examined the income and expenses yet? Now, see if you can find the answers to the questions given below.

▪ In which month was the highest amount spent?

▪ On which item was the highest expense incurred?

▪ What is the total amount saved over the two months?

Was it easy to find the answers?

We have just compared the figures for two months. If it were for a whole year instead, the analysis would have been much more difficult, wouldn't it?

Is there a better way to organise and prepare such data systematically? The spreadsheet software Calc, which you were introduced to in earlier classes, is a very effective tool for handling tasks like these.

Spreadsheet Software

Spreadsheet software is used to organise and analyse information. It can be used in various fields such as education, personal finance, and business. Some of the features available in spreadsheet software are:

▪ Data can be tabulated.

▪ Charts and graphs can be created to present the data more clearly.

▪ It enables analysis, comparison, and summarisation of information.

A wide variety of spreadsheet software is available today. LibreOffice Calc is a spreadsheet software available in KITE GNU/Linux. Other examples of spreadsheet software include Microsoft Excel, Apache OpenOffice, Gnumeric, Calligra Sheets, and Apple Numbers.

Let's Get Familiar with Calc

Open LibreOffice Calc on your computer and examine the software window. Then, observe Figure 7.2 and identify the labelled parts.
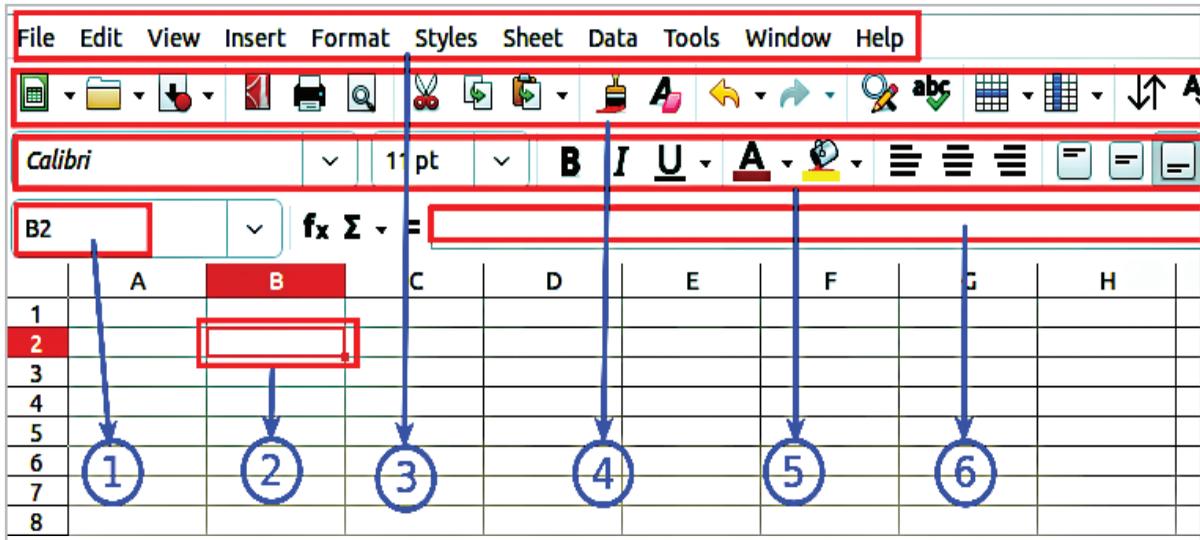
Fig. 7.2 LibreOffice Calc interface

1. Cell Address

2. Active Cell

3. ....

4. ....

5. ....

When Calc is opened, what we get is a worksheet consisting of Columns and Rows. Among these,

▪ The English letters A, B, C…......… represent………………… ………… ……………............

▪ The numbers 1, 2, 3,..…… represent …………………… …………….......................

The small rectangles seen in the columns and rows are called cells. Each cell is identified by combining the names of its column and row (this is called the cell address). Refer to Table 7.1 and try to complete the missing parts.

Column Name	Row Name	Cell Address
A	2	
J		J24
O	60	

Table 7.1 – Cell Address – Table to be Completed

Let's Enter Data in Calc.

The Calc software window and its main tools have already been explored. Now, let us enter the income and expense details from Figure 7.1 as a table in a Calc file.

Take a look at the same table prepared in Calc by a student named Anu (see Figure 7.4).

Income and Expenditure Account

INCOME

NO	ITEM	JUNE	JULY
1	Salary	45000	45000
2	Agriculture	2000	0
	Total income	47000	45000

EXPENDITURE

NO	ITEM	JUNE	JULY
1	Current Charge	1750	0
2	Chitty	1000	1000
3	Mobile recharge	700	430
4	Grocery	860	2238
5	Grocery	728	1800
6	Grocery	382	700
7	Grocery	1260	1438
8	Grocery	1800	0
9	News Paper	280	280
10	Medicines	125	0
11	Medicines	650	0
12	Bank loan	15000	15000
13	Cinema	800	0
14	School Bus	350	350
15	Bakery	1200	1250
16	Books		1430
17	Donation		500
	Total Expenditure		
	Balance		

Fig. 7.4 Table Prepared in LibreOffice Calc

Cell Address

Cells are the squares in which information is entered.
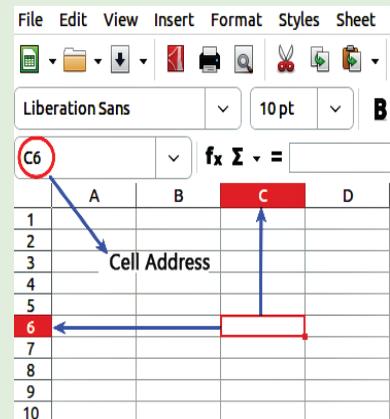
Fig. 7.3 Cell Address

If you click with the mouse on any cell, its address will appear in the column in the left corner.

When the table was prepared as in Figure 7.4, aren't the figures clear and the analysis easy?

You might have noticed that the sizes of some cells were different. Similarly, some cells were merged into a single cell. Colours were also applied to the cells and text.

Now, collect the income and expense details of your family for the past five months and create a table in Calc in the same way.

Adjust the size of the cells as shown in the figure. Merge the required cells and apply colours where necessary.

A table containing Manu's family's five-month income and expenditure accounts has been provided in the School_Resources folder under Home. You may use the data from that file if required.

Once the table is prepared, give it an appropriate name and save the file.

You have already learned how to adjust the size of cells in LibreOffice Calc in Class 7. When cells need to be combined, the Cell Merge feature should be used.

To Merge the Cells

- Select the cells to be merged by dragging across them (Figure 7.5).

- Then, click the Merge and centre or unmerge cells button on the Formatting toolbar.

- With this, the selected cells will be merged, and the data in the first cell will be centred within the merged area.

	A	B	C	D	E	F
	Income ₹					
		June	July	August	September	October
		27500	28000	28500	30000	29000
	Expenditure ₹					
	Groceries	12045	11543	11011	12501	12703
	Utilities	2945	2751	2800	2945	4217
	Education	1011	1245	900	780	750

Fig. 7.5 When Cells are Selected
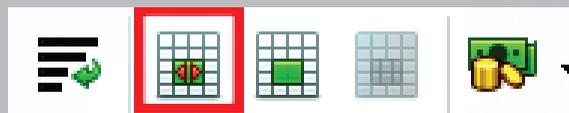
Fig. 7.6 Cell Merge Tool

We have just merged the cells using the Cell Merge tool from the toolbar. Now, explore and check for yourself if there are any other ways to select and merge cells.

Meenu's family's income and expenditure details have already been entered into the Calc sheet. Now, find out the method to calculate the total expenditure under each category for the family.

Finding the Total Family Expenditure

The total monthly expenditure of a family is the total amount spent on various items, isn't it? To calculate this amount, we have learned that the 'Sum' function in Calc can be used.

Try to find out the total expenditure for the month of June alone from this table using the Sum function.

Finding the Sum

- To calculate the total amount for the first month (June), select the cell where the sum should be displayed (as shown in Figure 7.8, B11).

Fig. 7.7 Select Function

- Click the Σ (Select Function) symbol next to the cell address (Figure 7.7).
- Select Sum from the drop-down list. (When you do this, the cells in that row will be selected automatically. In the cell where the total is displayed, you will see the name of the function followed by the cell range in brackets (Figure 7.9).

B11   fx Σ ▾ =

	A	B	Sum	D	E	F
1			Average	₹		
2		June		August	September	October
3		275(	Min	28500	30000	29000
4			Max	re ₹		
5	Groceries	120		11011	12501	12703
6	Utilities	29	Count	2800	2945	4217
7	Education	1011	1245	900	780	750
8	Entertainment	3730	2800	3446	2915	4800
9	Healthcare	1385	1510	980	759	2687
10	Transportation	3330	3200	3415	2999	3670
11						

Fig. 7.8 Select Function Dropdown List

AVERAGE   fx ✕ ✓   =SUM(B5:B10)

	A	B	C	D	E	F
1			Income ₹			
2		June	July	August	September	October
3		27500	28000	28500	30000	29000
4			Expenditure ₹			
5	Groceries	12045	11543	11011	12501	12703
6	Utilities	2945	2751	2800	2945	4217
7	Education	1011	1245	900	780	750
8	Entertainment	3730	2800	3446	2915	4800
9	Healthcare	1385	1510	980	759	2687
10	Transportation	3330	3200	3415	2999	3670
11		=SUM(B5:B10)				

Fig. 7.9 How to Find the Total Amount

- Then, press the Enter key. Now the total expenditure for the month of June has been obtained.
- Save the file by naming the row with the total amount Total.

Also check if there are other ways in LibreOffice Calc to calculate the sum of numbers. The total expenditure for the other months also needs to be calculated in the same way. For this, it is sufficient to repeat the same steps in the other cells. However, instead of repeating the steps each time, is there any other method that can be used?

In spreadsheet software, there is a feature that allows you to copy the function obtained in a cell to other cells after calculating the sum. This method is called the Fill Handle.

Using Fill Handle to Copy a Function

The steps to copy a function using the Fill Handle are given below.

- Select the cell that contains the function.

- Click the Fill Handle icon (Figure 7.10) at the bottom right corner of the selected cell.

- Drag it across the cells where you want to copy the function.

In this way, the function will be copied into all the selected cells. The cell references

will automatically adjust according to their new positions.

Fill Handle

In spreadsheet software, the Fill Handle is a feature that helps you copy functions or data from a cell across a range of cells. The small "+" symbol seen at the bottom right corner of the selected cell is called the Fill Handle (Figure 7.10).
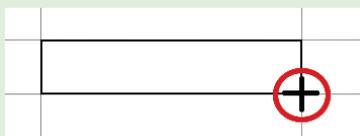
Fig. 7.10 Fill Handle

What would you do if you wanted to find the average of the amounts this family spent in various categories over five months?

Examine the table we are currently using. Is there any method in LibreOffice Calc to do this?

Finding the Average Amount

We have already understood that the average is found by dividing the total of all the numbers by the number of items / numbers. In Calc, there is a way to do this directly using the function.

Using the Average function in LibreOffice Calc, find the average expenditure for each item in each month.

After finding the average for the first item (Groceries), use the fill handle to calculate the averages for the remaining items.

After calculating the averages for the remaining items, calculate the average of the family's income over the five months as well.

Record the steps you used for this process in your notebook.

Finding the Average of Numbers

- Click on the cell where the average should appear (here, G5).
- Click on the cell where the average should appear (here, G5).

A	B	C	D	E	F	G
			Income ₹			
	June	July	August	September	October	Average
	27500	28000	28500	30000	29000	
			Expenditure ₹			
Groceries	12045	11543	11011	12501	12703	=AVERAGE(B5:F5)
Utilities	2945	2751	2800	2945	4217	
Education	1011	1245	900	780	750	
Entertainment	3730	2800	3446	2915	4800	
Healthcare	1385	1510	980	759	2687	
Transportation	3330	3200	3415	2999	3670	
Total	24446	23049	22552	22899	28827	

Fig. 7.11 How to Calculate the aAverage

- Next, press the Enter key. Now, the average of the amounts spent on groceries over the five months has been obtained.

- Use the fill handle to calculate the averages for the remaining items.

- You can give the column where the averages are recorded (Column G) the heading Average.

While calculating the averages, it can be noticed that some of the amounts appeared with decimal places. Next, see how to remove the decimal places and convert the amounts into whole numbers.

Adjusting Decimal Places

To adjust or remove the number of decimal places, we can use the Delete Decimal Place option in the Formatting toolbar (Figure 7.12).

Once the decimal places have been set in the first cell, the same formatting can be copied to the other cells using the fill handle..

Fig. 7.12 Delete Decimal Place Symbol

Find out by trying what the Add Decimal Place option, located right next to Delete Decimal Place, is used for.

Let's Format the Table

To find out which item had the highest expenditure over the five months, it is enough to sort the average expenses for each item shown in the table either in ascending or descending order. Try doing this using the Sort option in Calc.

Sorting the Data

- Select all the data in the table that need to be sorted (Figure 7.13). Do not include the Total row here.
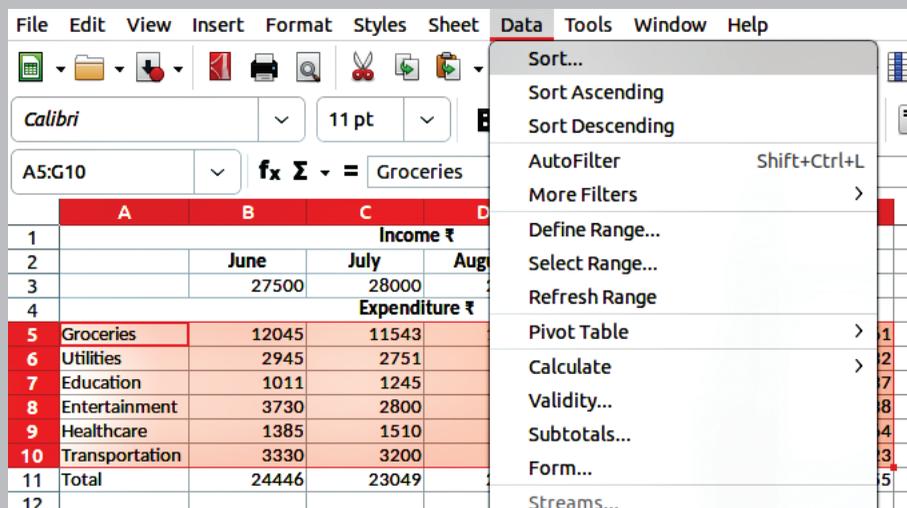

Fig. 7.13 Sort Window

- Select Data → Sort (Figure 7.13).

- In the Sort Key 1 field, select the column name (Figure 7.14) on which you want to sort (Column G since it is based on average cost).

- Select the required option from Ascending / Descending (here, select Descending).
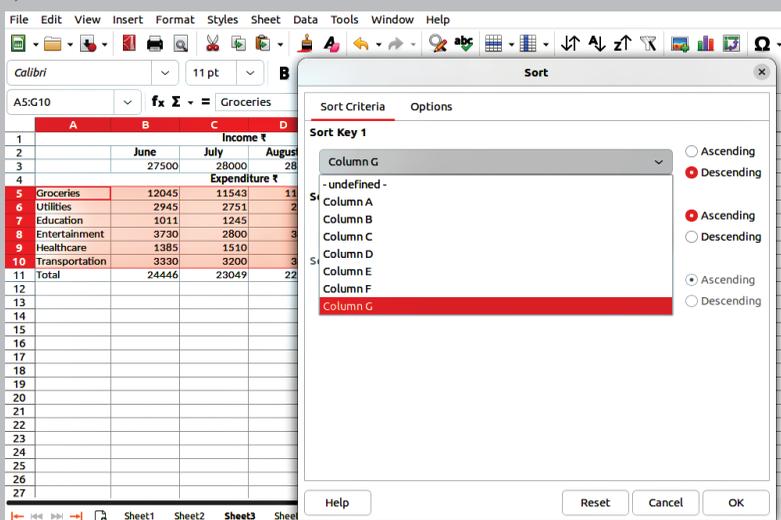
- Click OK.

Fig. 7.14 Sorting the Data

Formatting the Table

A	B	C	D	E	F	G
Income – Expenditure Statement						
Income ₹						
	June	July	August	September	October	Average
	27500	28000	28500	30000	29000	28600
Expenditure ₹						
Category	June	July	August	September	October	Average
Groceries	12045	11543	11011	12501	12703	11961
Entertainment	3730	2800	3446	2915	4800	3538
Transportation	3330	3200	3415	2999	3670	3323
Utilities	2945	2751	2800	2945	4217	3132
Healthcare	1385	1510	980	759	2687	1464
Education	1011	1245	900	780	750	937
Total	24446	23049	22552	22899	28827	24355

Fig. 7.15 Formatted Table

Look at Figure 7.15. What changes can be seen in the table?

▪ A title has been added to the table..

▪ The title has been aligned to the center.

▪ Borders have been applied to the cells in the table.

▪ A new row has been inserted below the heading Expenditure, and subheadings have been added.

▪ ....

▪ ....

Shall we try making similar changes to our table as well?

Using the formatting techniques learnt in earlier classes, format the table in the way shown in Figure 7.15. The tools for this are also available in the Format menu.

Meenu aims to analyse the family expenses and to control any excessive spending. For this, it is necessary to compare and examine the expenses in different categories. Such comparisons can be understood more easily if they are presented using charts and graphs. LibreOffice Calc provides the tools required for this.

Charts/Graphs to Make Data Analysis Easier

Using the data from the table you prepared, try creating a chart as shown below.

Presenting Data in the Form of Charts

- Select the cells containing the information to be included in the chart (Figure 7.16). (Here, the cells under the Expenditure category have been selected, excluding the Average and Total cells.)

	A	B	C	D	E	F	G
	Income – Expenditure Statement						
	Income ₹						
		June	July	August	September	October	Average
		27500	28000	28500	30000	29000	28600
	Expenditure ₹						
	Category	June	July	August	September	October	Average
	Groceries	12045	11543	11011	12501	12703	11961
	Entertainment	3730	2800	3446	2915	4800	3538
	Transportation	3330	3200	3415	2999	3670	3323
	Utilities	2945	2751	2800	2945	4217	3132
	Healthcare	1385	1510	980	759	2687	1464
	Education	1011	1245	900	780	750	937
	Total	24446	23049	22552	22899	28827	24355

Fig. 7.16 Data to be included in the graph

- From the Insert menu, select Chart (Figure 7.17).

- In the window that appears, choose Chart Type → Column (Figure 7.18).

Insert	Format	Styles	Sheet	Data	Tools
Image...					
Chart...					
Pivot Table...					

ചിത്രം **7.17 Insert → Chart**

- Click Chart Elements and enter the required names for the Title, X axis, and Y axis (Figure 7.19).
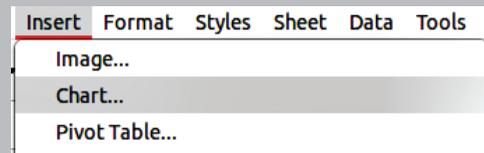
- Press the Finish button.

Chart Type

Chart Type
Data Range
Data Series
Chart Elements

Choose a Chart Type
- Column
- Bar
- Pie
- Area
- Line
- XY (Scatter)

☐ 3D Look   Realisti

Fig. 7.18 Chart Properties Window

Chart Elements   ✕

Chart Type
Data Range
Data Series
Chart Elements

Choose Titles, Legend, and Grid Settings

Title	Expenditure for Five Months
Subtitle	
X axis	Amount
Y axis	Category
Z axis	

☑ Display legend
○ Left
● Right
○ Top
○ Bottom

Display Grids
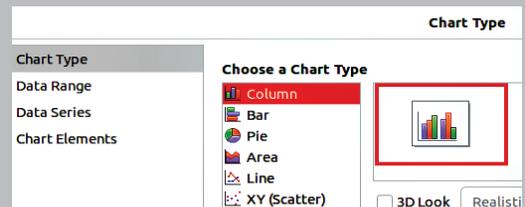☐ X axis   ☐ Y axis   ☐ Z axis
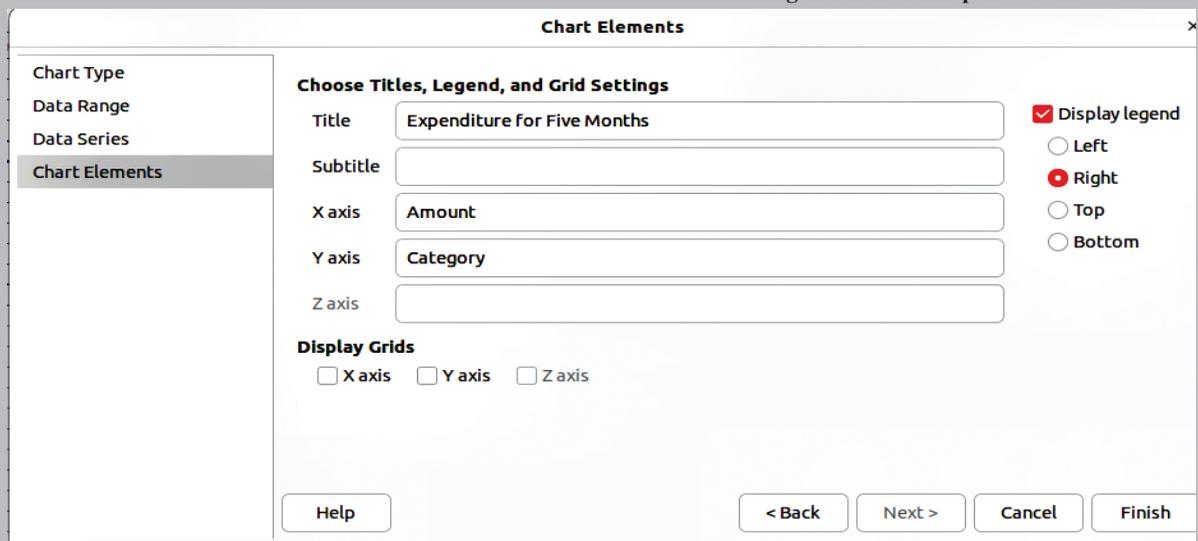
| Help | | < Back | Next > | Cancel | Finish |

Fig. 7.19 Window for Setting Chart Elements

The prepared chart can be moved and placed in the appropriate location in the table.
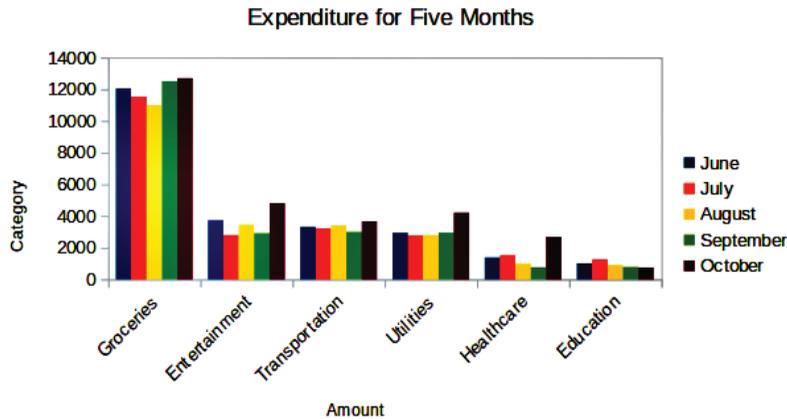
Fig. 7.20 Completed Graph

Have a look at the prepared graph (Figure 7.20). With the help of the graph, it is much easier to analyse the details than by using the table of figures. What conclusions can be drawn?

▪ In the categories of Entertainment, Utilities, and Healthcare, there was a significant increase in spending in the fifth month.

▪ The highest amount was spent on Groceries.

▪ The Healthcare category had the lowest expenditure in September.

▪ ....

▪ ....

Find out which of these expenses can be controlled.

So far, we have created a chart using data from adjacent columns.

However, it is also possible to create a chart that includes only the information from the required columns and rows.

Create a chart that includes only the rows showing the total expenditure (Total) and the names of the newly added months in the table you have prepared. To select only the required rows, hold down the Control (Ctrl) key while selecting.

Spreadsheets help us analyse data, reach conclusions, and make appropriate decisions.

Graphs and charts make it easier to analyse data.

Let's Assess

- Which of the following functions is used to find the sum of numbers in Calc?

    a) =ADD(A1, B1)   b) =SUM(A1, B1)

    c) =PLUS(A1, B1)   d) =SUM(A1:B1)

- Which function is not available in the Select Function (Σ) menu in LibreOffice Calc?

    a) SUM   b) AVERAGE

    c) SUBTRACT   d) MAX

- Why is the symbol .00 in the formatting toolbar used in LibreOffice Calc?

    a) To remove decimal places   b) To add decimal places

    c) To find the average   d) None of these

Extended Activities

1. The sales data for a day in the school store are provided below. Using this data, find out the total sales amount for that day with the help of LibreOffice Calc.

| Product Name	Units Sold	Price Per Unit (₹)	Total Sales (₹)
Pen	120	10	
Notebook	50	50	
Eraser	200	5	
Pencil	150	8	
Water Bottle	80	150	
Coffee Mug	40	200	
Backpack	25	500	
Lunch Box	60	250	
Geometry Box	100	100	
Diary	70	200	

Hint: To find the total sales of each item for that day, simply multiply the quantity sold by the unit price.

2. Collect the height (in metres) and weight (in kilograms) of all the students in your class and create a table in LibreOffice Calc. Using the table, calculate the BMI (Body Mass Index) of each student. Sort the table so that the student with the highest BMI appears first.

   (Hint:BMI = Weight in kilograms / (Height in metres)²)

3. Collect information about how your classmates travel to school—whether by bicycle, by other vehicles, or on foot. Create a table in LibreOffice Calc with this data. Then, prepare a pie chart to show the number of students in each category.

❖ ❖ ❖
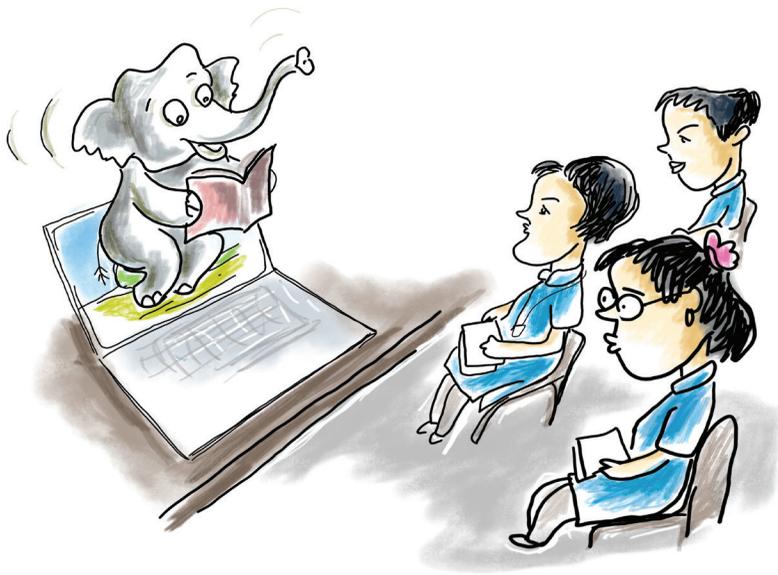
Chapter 8

Fun with Learning Science

The progress and development of science are fundamentally based on experiments and observations. In ancient times, the foundation of science was built upon knowledge that humans acquired directly from nature. Today, the rapid advancement of information technology is bringing revolutionary changes to scientific studies and research.

Every discovery and breakthrough serves as a stepping stone to the next phase of scientific progress. In today's digital age, information and communication technology has influenced every field. In scientific research, Virtual Labs which assist in conducting everything from simple experiments to highly complex ones are now widely used.

Today, numerous technologies are available to make science learning easier and more interesting. Virtual labs, simulation software, digital maps, and 3D modelling software help us understand molecular structures and chemical reactions, interactive geometry software and similar tools are now widely used in educational activities. Let's explore some operations using such software.

8.1 The Marvels of Time

Did you know that the first place on Earth to welcome the New Year is New Zealand? When it's December 31 midnight (12 AM) in New Zealand and they celebrate New Year, do you know what time we in Kerala would be watching its live broadcast?

How can we find this out?

You're probably aware that different countries follow different times. Similarly, you may have heard about time zone maps that accurately show time differences across regions. The 'Sunclock' software on our computers also includes a time zone map.

SUNCLOCK

Sunclock is a free digital map software that visually distinguishes between countries experiencing day and night by displaying them in shaded and lit areas. It provides various time zones, distances between regions, as well as geographical coordinates (latitude and longitude) of each location.

The Sunclock software was developed by French mathematician Jean-Pierre Demailly.

Time Zones

Greenwich is a line that is defined by considering Greenwich, London, as 0° longitude and defining its two sides as east and west.

The world is divided into 24 time zones, each with a time difference of one hour, based on the Greenwich Mean Time. These are known as time zones.

Why not use Sunclock software to check the time difference between New Zealand and India?

Fig. 8.1 Sunclock Window

As you've learned in social science class, time across the world is determined based on the Greenwich Meridian.

Let's see how to use Sunclock software to view the time difference between two locations in different time zones. The Sunclock software has specific tools configured for each of its functions.

Solar Time and Legal Time

The time determined based on the sun's highest position (zenith) at any particular location is called Local Time. In Sunclock software, you can view a place's local time by using the Solar Time Mode (the 'S' tool in the toolbar).

If time is calculated based solely on local time, even within a single country there would be different times. To overcome this problem, countries typically adopt the local time of the longitude passing through their central region as the common time for the entire nation. This commonly calculated time is called Standard Time.

In Sunclock software, you can determine a location's standard time by using the Legal Time Mode (the 'L' tool in the toolbar).

To check the time difference between two countries using Sunclock software, follow these steps:

▪ Open the Sunclock software and display the world map with marked time zones.

▪ Enable the latitude/longitude grid lines and their corresponding values for reference.

- Find the legal time in both locations and find the difference between them.

Fig. 8.2 Sunclock Menubar

- If you click on the map in SunClock, the toolbar will appear.

- Open the time zone map by clicking on the Clock & Map Window (!) tool in the menu bar.

- Click once on the Draw/Erase Meridian Tool (M) to display the longitudinal lines. Clicking it again will display the values along with the longitudinal lines..

- You can convert the time to standard time by clicking on the legal time mode (L).

- Click on the location where you want to see the time (e.g. Calcutta) and the software will display the time and date of the selected location in the lower left part of the window (the time for each location should be displayed only after converting to standard time).

Calculate the time difference between Auckland in New Zealand and Kolkata in India, and complete the table given below.

City (Country)	Date	Time (24 hr.)	The time difference between Kolkata and Auckland
Kolkata (India)			.... hour .... minute
Aukland(New Zealand)			

Table 8.1 Time Difference between Two Places

Similarly, the time in other cities may be different.

Using the map given in Figure 8.3, identify the marked cities and calculate how many hours their local time differs from Greenwich Mean Time (GMT). Then, complete Table 8.2 accordingly. Note that the time difference from the Greenwich Meridian is also indicated at the bottom of the time zone map.
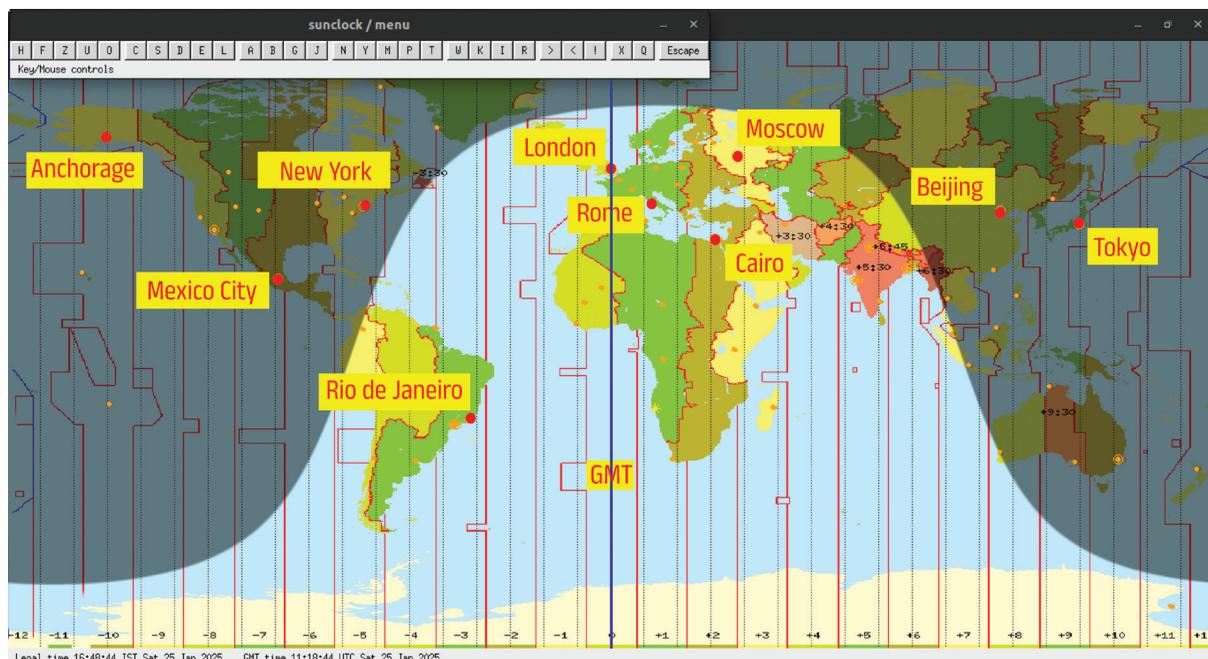
Fig. 8.3 Time Zone Map in Sunclock

City	Date	Time	Difference from Greenwich Mean Time (GMT) (in hours -more/less)
Anchorage			
Mexico City			
Rio de Janeiro			
London			0 hour
Rome			
Cairo			
Moscow			
Tehran			
Beijing			
Tokyo			

Table 8.2 Time Differences at Various Places

As you've observed from the table, time increases when moving eastward from the Greenwich Meridian, and decreases when moving westward. Haven't you wondered why this happens?

Time from Sunrise to Sunset

As you know, the Earth rotates from west to east, which is why the sun rises earlier in eastern countries and sets there first. But does the sun rise at the exact same point on the eastern horizon every day of the year?

Actually, the position of sunrise changes throughout the year. During some months, the sun rises slightly north-east of its usual position, while in other months, it shifts slightly south-east.

Have you noticed how this affects the length of day and night during these months?

Using Sunclock , determine the sunrise and sunset times for Mumbai across different months. Record any variations in day length (duration of daylight) in Table 8.3.

To find sunrise/sunset times, follow these steps in Sunclock. Adjust the settings as specified below. Tool names are indicated in brackets.

▪ Display day/night division (N).

▪ Show the sun (Y).

▪ Display standard time (L)

▪ Adjust time and date:

  ➢ G - Change time increment rate

  ➢ A - Move time forward

  ➢ B - Move time backward

▪ Select location (here Mumbai city) for sunrise/sunset times
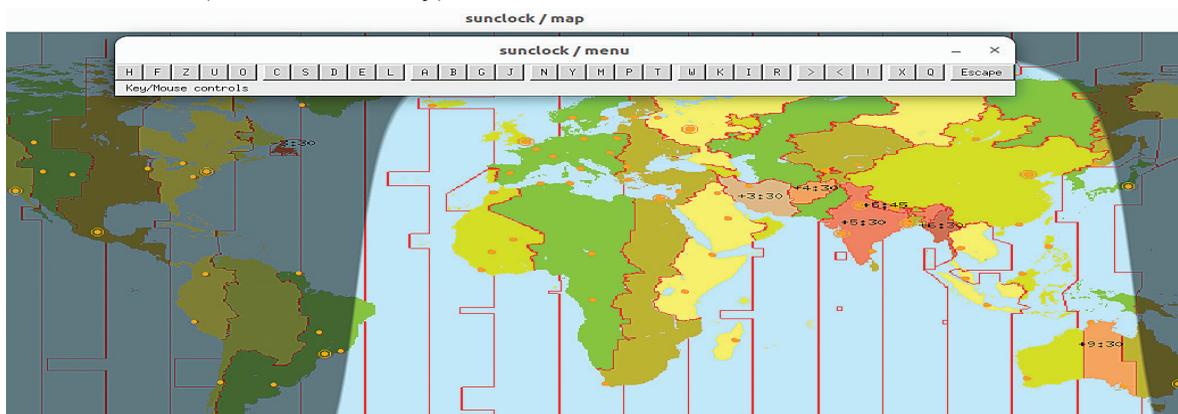

Fig. 8.4 Night and Day in Sunclock

- Run the animation to identify when daylight first appears over the marked city location. This time is the city's sunrise time.

- Stop the animation when daylight fully disappears over the marked city. Note the time displayed at the bottom of the window—this is the city's sunset time.

- Press the single quotation mark (') key on your keyboard to start/stop the animation.

Date	Sunrise	Sunset	Duration of Day (Hour, Minute)
December 22			
March 21			
June 21			
September 23			

Table 8.3 Duration of Day in Mumbai at Different Times

Have you noticed how the length of day and night changes according to the dates? Why do you think this happens?

Using Sunclock, identify which latitude lines the Sun is directly overhead on the given dates below. Record your findings in the table given.

Date	Position of Sun (Latitudinal line)
December 22	
March 21	
June 21	
Septermber 23	

Table 8.4 The Days when the Sun is Directly Overhead (Vertical) on the Latitude Lines

On December 22nd, the Sun is directly overhead the Tropic of Capricorn (Southern Hemisphere). It then moves northward and reaches the Tropic of Cancer (Northern Hemisphere) by June 21st. After this, it reverses its path.

This apparent north-south movement of the Sun between the two tropics is known as the Solar Declination or Ayana (Solstice Shift).

The Sun's Apparent Movement (Ayana)

The Sun's position shifts between the Tropic of Cancer (Uttarayanam) and the Tropic of Capricorn (Dakshinayanam) due to the constant tilt of Earth's axis during its revolution. This apparent movement of the Sun is called Solar Declination or Ayana.

The Sun's northward journey from the Tropic of Capricorn to the Tropic of Cancer is called Uttarayanam (Northern Solstice), while its southward journey from the Tropic of Cancer to the Tropic of Capricorn is called Dakshinayanam (Southern Solstice)
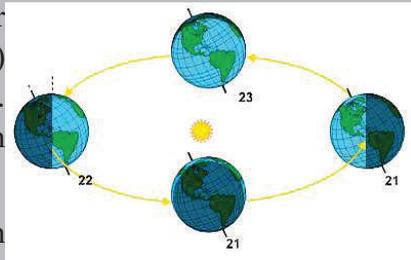
The Relationship Between the Sun's Apparent Movement (Ayana) and Day Length

Now let's see how the Sun's apparent movement (Ayana) and the length of daytime at different locations are related?

- On March 21 and September 23, the Sun's position is directly above the Equator.

- From March 22 to September 22, the Sun's position is above the Northern Hemisphere.

- From September 24 to March 20, the Sun's position is above the Southern Hemisphere.

To understand the relationship between the Sun's apparent movement and daytime duration, one can compare the length of daytime in various cities during different seasons.

That is, it's sufficient to observe the day length during days when the Sun is positioned above the Tropic of Cancer, Tropic of Capricorn, and the Equator at different times of the year.

To examine the Sun's Apparent Movement (Ayana) in Sunclock Software:

Open the Sunclock software and maximize the window, then enable the menu bar. Afterwards, make necessary adjustments using the tools listed below:

- Use the Draw/Erase parallel [P] tool to display latitude lines and measurements.

- Use the Draw/Erase Tropics/Equator/Arctic circle [T] tool to make visible Tropic of Cancer and Tropic of Capricorn (Northern and Southern solstice lines),The Equator, The Arctic and Antarctic circles

- Toggle Night [N]- Display the separation between night and day.

- Toggle Sun/Moon [Y] - Make the Sun visible.

- Use the Adjust Program Value tool (G) to change the rate of time change. [Set the progress value to 1 day]

- Then activate the animation tool. You will be able to observe the Sun's apparent movement (Ayana) caused by Earth's revolution.
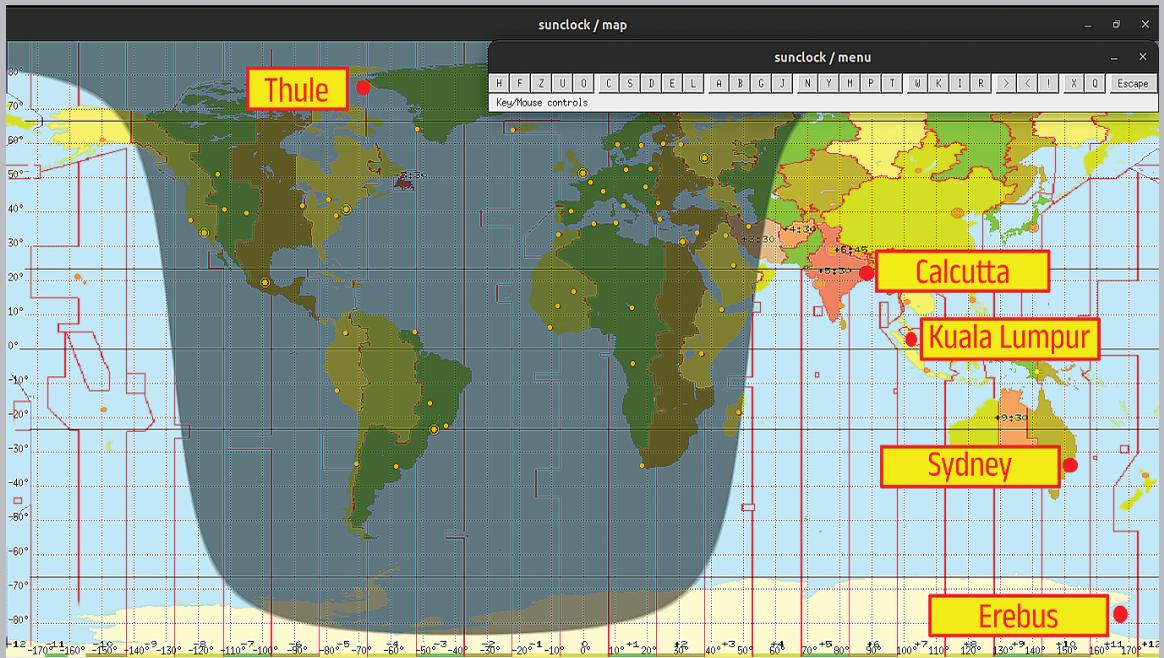

Fig 8.5 Sunclock Window

Now, find the duration of day and night at the locations marked in Figure 8.5 and complete Table 8.5.

Location	Country	Latitudinal position	When the Sun's position is in the Northern Hemisphere, the duration of day	When the Sun's position is in the Southern Hemisphere, the duration of day
Thule	Greenland	Artic Circle		
Kolkata	India	Near Tropic of Cancer	Increases	Decreases
Kuala Lumpur	Malaysia	Near Equator		
Sydney	Australia	Near Tropic of Capricorn		
Erebus	Antartica	Antartic Circle		

Table 8.5 The Changes in Daytime Duration across Various Regions According to the Sun's Position.

From the table, you've now understood how day-night duration varies across different locations, haven't you?

▪ During Uttarayana (Northern Solstice): At Thule daytime duration increases while night-time duration decreases.

▪ During Southern Solstice: At Thule: daytime duration

....
....

▪ During Northern Solstice: At Erebus daytime duration

....
....

▪ During Southern Solstice: At Erebus daytime duration

....
....

Let'd Evaluate

♦ What is the time difference between Anchorage and Tokyo?

    a) 18 hours   b) 19 hours   c) 20 hours   d) 21 hours

♦ In the Sunclock software, which setting is NOT required to find the sunrise time in Mumbai?

  a) Click on the Toggle Night (N)tool.

  b) Click on the Toggle Sun/Moon (Y)tool.

  c) Click on the Switch Clock & Map Window (!)tool to adjust the map view.

  d) Activate the Animation (') tool.

♦ Which tool should be clicked to open the time zone map in Sunclock software?

    a) N   b) Y   c) I   d) !

Extended Activities

1. Using the Sunclock animation, identify and write down the dates when the Sun is directly overhead (at zenith) along the 100°E longitude line that passes through Kerala.

2. Using Sunclock, determine the duration of daylight on June 21 and December 22 in Anchorage, Alaska.

8.2 Chemistry of sweets

Everyone loves ice cream, right? There's a special desire for sweet things.

Sweet foods are also energizing. Have you ever seen children who are tired after participating in sports events being given sweet glucose supplements?

A spoonful of glucose and a pinch of glucose are both sweet. Even the smallest particle we can see, and even the smallest particle that is ground to the smallest, will still have the properties of glucose. We have learned from science classes that the smallest unit that contains the properties of a substance can be described as its molecule.

Avogadro

Avogadro is a molecular editing software that helps create three-dimensional models of molecules. It is maintained and distributed under the leadership of the Open Chemistry Project.

The study of the molecular structure of each substance and the particles involved in it is an important activity in science classes. There are many ways to study molecules, one of which is the study based on molecular models. This helps a lot in understanding the basic concepts related to molecular structure. Avogadro, Chemsketch, PyMOL, PhET software are used for studies in this field. Here, with the help of simulation software such as Avogadro and PhET we discuss how to understand molecular structure .

Let's Build Molecular Models

Have you ever wondered what the shape of molecules would be? Do the molecules of all substances have the same shape? Let's try making molecular models using Avogadro software.

First, let's make a model of a water molecule.

How much hydrogen and oxygen are there in a water molecule?

The chemical formula of a water molecule is H_2O. It contains two hydrogen atoms and one oxygen atom. Let's see how we can model this with the hydrogen atoms bonded to the oxygen atom.

> The water molecule is formed by the combination of hydrogen and oxygen.

How to Draw Molecular Structure in Avogadro Software

- Open Avogadro software.
- Select the Draw tool from the toolbar.
- Select the element to be included first (here Oxygen) from Element.
- Remove the tick mark from Adjust Hydrogen.
- Then click on Canvas and include oxygen.

Fig. 8.6 Avogadro - Toolbar

- Select the second element (here hydrogen) from Element.
- Click and drag the first oxygen you added to the Canvas to connect it to the hydrogen. Add one more hydrogen.
- To equalize the bonding and spacing between elements, select Extensions → Open Babel → Optimise Geometry from the menu bar.
- Tick Labels in Display Types to make labels visible.
- Save the prepared model (File → Save).
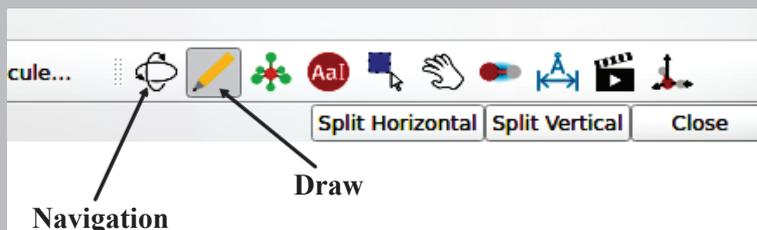
The structure of a water molecule is shown in Figure 8.7, prepared in Avogadro software. Zoom in on the molecule using the navigation tools and mouse, and view it from the sides. Is the structure of the water molecule not clear?
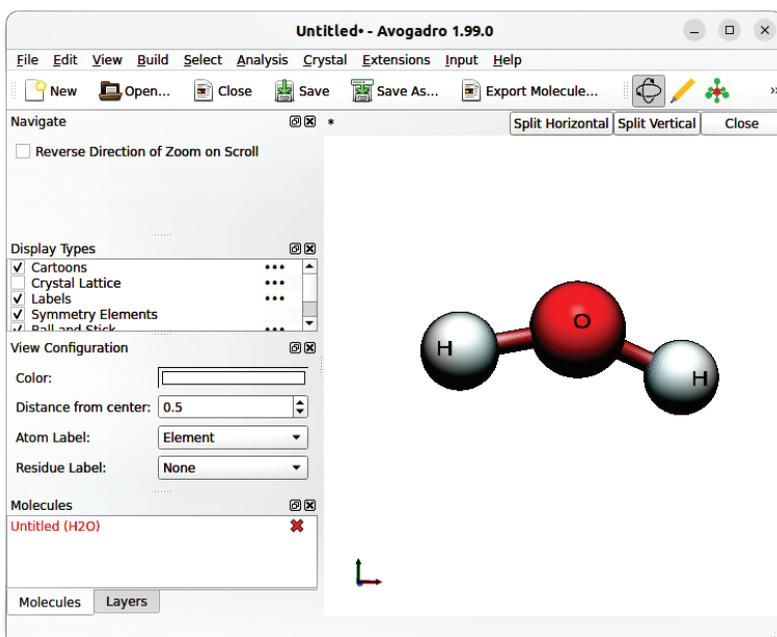
Fig. 8.7 Structure of Water Molecule in Avogadro Software

Now, try preparing carbon dioxide (CO_2) molecule in the same way you prepared water molecule.

Navigation in Avogadro

The molecules in the Avogadro software are arranged in a way that gives a three-dimensional view. The molecules arranged in this way can be viewed from many directions. To do this,

- elect the Navigation tool..

- ou can rotate by pressing the left mouse button and moving the mouse.

- You can adjust the view in the direction you move the mouse by pressing the right mouse button..

- You can zoom in and out by moving the mouse scroll wheel back and forth.

The Recipe Glucose

We initially discussed the glucose molecule. Let's look at the structure of the glucose molecule using Avogadro.

To prepare molecular models in Avogadro, you need to know what elements are present, how many of each element are present, and how they are related to each other. Instead, you can use pre-prepared models to understand molecular

structure. Let's examine how to use such models provided in the Avogadro software.

Let's look at a model of a glucose molecule.

To Obtain the Molecular Structure of Glucose in Avogadro

- Select Build → Insert → Molecule In the Insert Fragment window that opens (Figure 8.8), type Glucose in the Filter field.

- Select d-glucose.cjson under carbohydrates and press the Insert button..

- This gives the structure of the glucose molecule (Figure 8.9).
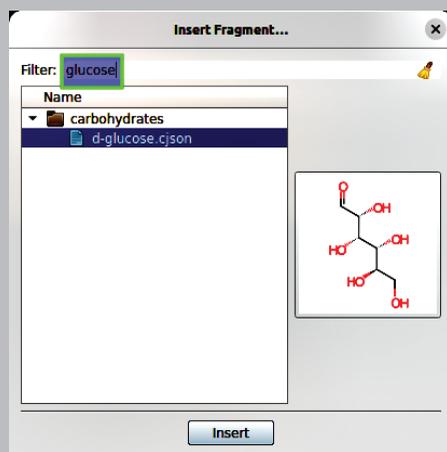
Fig. 8.8 The Model File of Glucose Molecule Selected in Avogadro
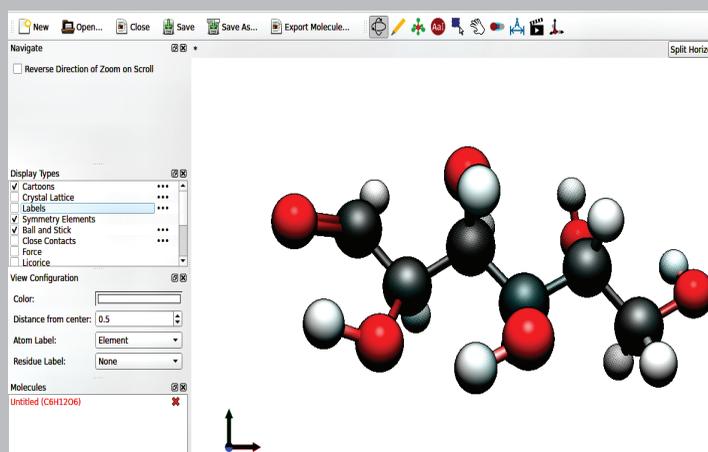
Fig 8.9 The Structure of Glucose Molecule in Avogadro Software

Haven't you observed the structure of the glucose molecule?

What elements make up the glucose molecule?

To do this, after displaying the labels of the elements, look at the label (Figure 8.10) and find the name of the elements and write it below.

- Hydrogen

- ....

- ....

- ....

Then complete Table 8.6 given below.
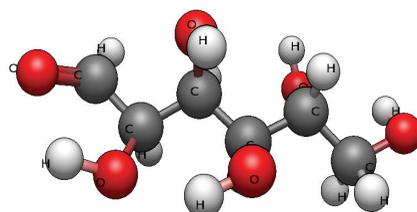
Fig 8.10 Structure of Glucose molecule- Label shown

Molecule	No of atoms		
	Hydrogen	Oxygen	Carbon
Glucose			

Table 8.6 Details of Glucose Molecule

Avogadro's Periodic Table

If you cannot identify an element by looking at the label, you can use the periodic table provided in the Avogadro software. It contains the names of the elements along with their symbols.

To get the periodic table, simply select Extensions → Periodic Table from the menu bar.

Different Aspects of Water

You've seen the molecular structure of water and glucose. Have you ever thought about the size of their molecules? Think about how many molecules there are in a glass of water. How would these molecules be arranged?

Simulation software such as PhET can be used to understand molecular arrangements. The simulation States of Matter: Basics available on PhET can be used to understand the molecular arrangement in water. To do this,

- Open PhET.

- Search for States of Matter.

- Select States of Matter: Basics. Open.

- Select Water from Atoms & Molecules (Figure 8.11).

First, select Liquid and understand the distance between molecules in water and their movement.

PhET is a collection of science and math simulations. The project was designed by Colorado Border University under the leadership of Nobel Prize winner Carl Wieman.
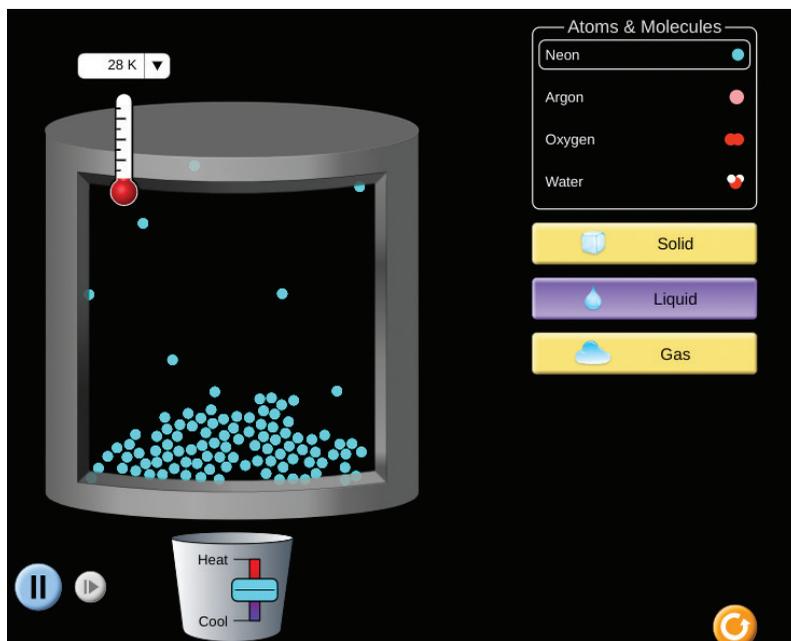
Fig. 8.11 States of Matter: Basics window

Is there any change in the nature or arrangement of these molecules in the solid state of water, ice, and the gaseous state, steam?

Replace Liquid with Solid and Gas one by one, observe the molecules and complete Table 8.7 below.

Matter	Distance between Molecules	Movement of Molecules
Ice(solid state)		
Water (Liquid state)		
Vapour(Gaseous state)		

Tabel 8.7 Behaviour of Water in Various States

Does the arrangement of molecules change with temperature?

Changing the temperature changes the state of matter. Consider the case of water.

What is to do to turn water into ice?

To make steam?

To understand the changes in the arrangement of molecules as the temperature of water changes, select the Liquid state

in States of Matter: Basics . Prepare note after observing the changes in the water molecules when temperature is increased.

Let's Evaluate

♦ The molecular structure shown in the image was created using Avogadro software. What substance is this structure of?

a) ZnCl   b) Zn   c) Cl   d) $ZnCl_2$

♦ Organize the activity of preparing the molecular structure of ammonia (NH) using Avogadro software.

A) Click and drag on the nitrogen atom to insert hydrogen atoms.

B) Select Element- Hydrogen.

C) Select Element- Nitrogen. Add it to the canvas.

a) A, B, C   b) B, C, A   c) C, B, A   d) A, C, B

Extended Activities

1. Prepare the molecular structures of oxygen (O_2), fluorine (F_2), sodium chloride (NaCl), and ammonia (NH_3) using Avogadro software.

2. Display the molecular model of methanol in Avogadro software and understand which elements are included in it and how many atoms of each element there are.

8.3 Making Geometry Learning Fun

Since ancient times, geometry has been an integral part of human thought. From measuring distances—such as those between stars or the size of Earth—to modern space exploration, geometry has been a vital tool. Even today, it remains essential in scientific fields like astronomy, design, architecture, and urban planning. With advancements in information technology, the practical applications of geometry have expanded significantly.

Software like GeoGebra is widely used for teaching and presenting geometric concepts in geometry studies, as you know. Such applications make learning geometry easier and more interesting.

You have already learned how to construct geometric shapes using GeoGebra software in previous classes.

Look at the shape given in Figure 8.12. How can we draw such a shape?

In the given design, three circles of equal size are arranged inside another circle.

Let's examine how this can be constructed. For this:

▪ Draw a circle.

▪ Draw three circles of equal distance passing through the centre of the first circle.

Fig. 8.12: Design Using Circles.

What is the method to draw circles at equal distances in this way?

▪ The vertices of an equilateral triangle are at equal distances, right? We can draw a larger circle passing through the vertices of the equilateral triangle.

▪ This design can be completed by drawing three smaller circles that pass through the centre of the larger circle and each vertex of the equilateral triangle.

Let's see how to construct this using GeoGebra.

Three Points and Circle

The first step in constructing the design is to draw a circle passing through the vertices of an equilateral triangle.

How can you draw an equilateral triangle?

Recall the Regular Polygon tool you learned in previous classes and use it to draw an equilateral triangle (Figure 8.14) in GeoGebra.

Using the Regular Polygon Tool to Draw Polygons

To draw a polygon using GeoGebra's Regular Polygon tool:

- Select the Regular Polygon tool from the fifth toolbar set.

- Click on the workspace and drag to create one side. This will open the window shown in Figure 8.13.

- In the Vertices field, enter the number of sides for the regular polygon (here, "3" is entered for triangle).
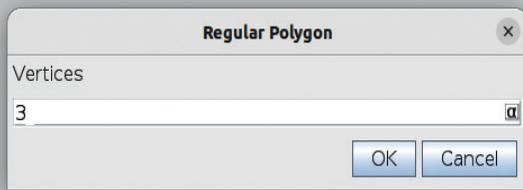
Fig 8.13 Window to Enter the Number of Sides while Using the Regular Polygon Tool
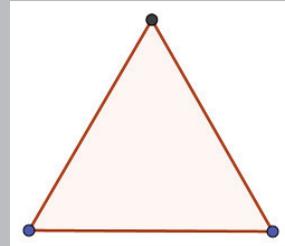
Fig 8.14 The Equilateral Triangle Drawn Using Regular Polygon Tool

How can you draw a circle passing through the vertices of this triangle?

- Find a point equidistant from all three vertices of the triangle. Using this point as the centre, you can draw the required circle.

As you may know, this can be achieved by drawing perpendicular bisectors of the triangle's sides.

Which tool can be used for this purpose? Investigate.

Labels Can Be Removed

In GeoGebra, if you start drawing after closing the Algebra View, you can exclude labels for the included objects.
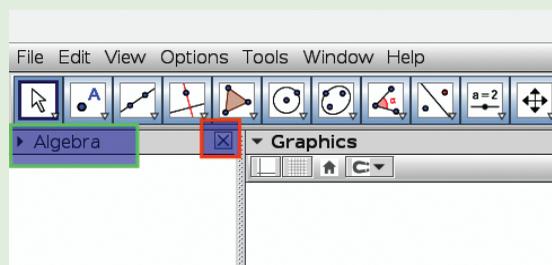
Fig 8.15 Geogebra – Algebra View

To draw Perpendicular Bisectors in GeoGebra

- To draw a perpendicular bisector in GeoGebra, select the Perpendicular Bisector tool from the fourth toolbar set, then choose the sides of the triangle for which you want to draw the bisectors.

- To mark their intersection point, use the Intersect tool from the second toolbar set and sequentially select the perpendicular bisectors (Figure 8.16).
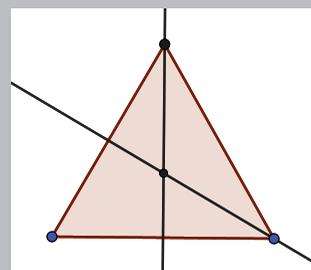
Fig. 8.16 The intersection point of the perpendicular bisectors of the sides of the trangle

Haven't we already drawn the perpendicular bisectors of the sides?

Now, construct a circle passing through all three vertices of the triangle. Which tool should be used for this?

Try drawing the circle using the Circle with centre through Point tool that we learned in 7th grade.
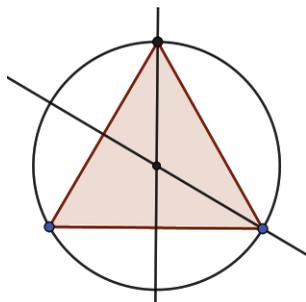
Fig 8.17 Circle Passing through the Vertices of the Triangle

Circumcircle

A circle while passes through three vertices of a triangle is called circumcircle.

You have now understood how to draw the circle passing through all three vertices of the triangle (Figure 8.17).

Now we can temporarily hide the perpendicular bisectors we drew.To do this, right-click on the construction you want to hide and examine the menu that appears.

GeoGebra also has a tool to draw circumcircles without constructing perpendicular bisectors. Check the tools in the sixth group and identify the appropriate tool, then write its name below.

Hiding Objects

To hide an object in GeoGebra: Right-click on the object Remove the tick mark from → Show Object.

....

The first stage of our construction is now complete. Next, let's examine how to arrange the smaller circles to be included within the main circle.
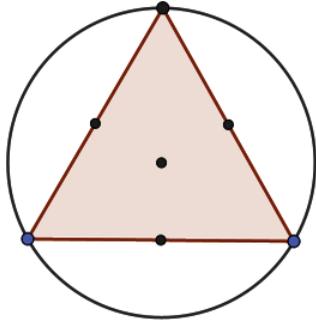
Fig. 8.18 Midpoints of the Sides of the Triangle

- If we find the midpoints of the triangle's sides inside the circle, we can easily draw the smaller circles (Figure 8.18).

To Find the Midpoint

To locate the midpoint of a side: Use the Midpoint or centre tool from the second toolbar set. Click on the side of the triangle.

Using the Midpoint or centre tool, haven't you already marked the midpoints of all sides of the triangle?

Now, let's draw the smaller circles.

We need to draw a circle (Figure 8.19) that passes through one vertex of the triangle and the midpoints of the two sides connected to that vertex.

Fig. 8.19 Circle that Passes through One Vertex of the Triangle and the Midpoints of its Sides.

Examine the set of tools for drawing circles. Using the 'Circle through 3 Points' tool, as shown in Figure 8.19, try drawing a circle that passes through one vertex of the triangle and the midpoints of its sides.

Now you can easily add the other two circles (Figure 8.20).

Now complete the design by colouring the circles in the image (Figure 8.21). Then, you need to hide the unwanted shapes as shown in the image.
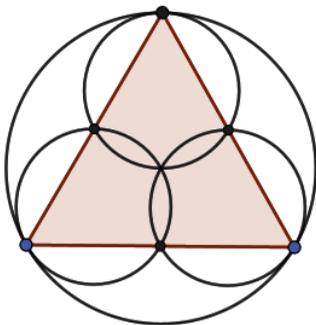
Fig. 8.20 Circles that Pass through Vertices of the Triangle and the Midpoints of its Sides.
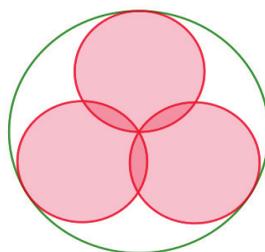
Fig. 8.21 The Design when completed

Circles and Triangles

You have now learned how to draw the circle passing through the vertices of an equilateral triangle , that is its circumcircle.

Adding Colour

To apply colour to an object: Select the object,Right-click → Choose Properties. In the window that appears, select the desired colour from the Color tab, Adjust the Opacity as needed.

What if we draw circumcircles of scalene triangles? We can also examine the relationship between the triangle and the position of its circumcentre.

In GeoGebra, what methods exist to draw triangles?

▪ Using the Polygon Tool

▪ Using the Regular Polygon Tool

▪ ....

▪ ....

But how can you draw a triangle with specific angle measures?

For example, let's see how to draw a triangle with one angle of 40°.

Try the method shown below.

To Draw a Triangle with Specific Angle Measures

▪ Using the Angle with Given Size tool from the eighth toolbar set, mark two points (figure 8.22).

▪ Enter the angle measure in the window that appears.

▪ Then, use the Polygon tool to connect the three points and complete the triangle (Figure 8.23).
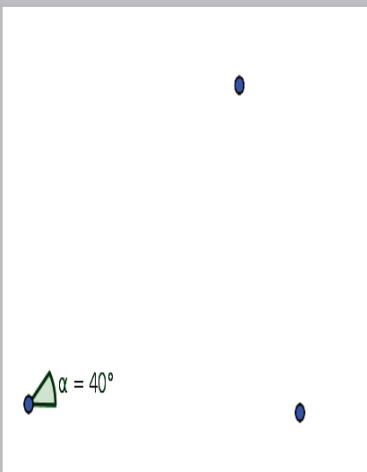
Fig. 8.22 To Draw an Angle with Given Size
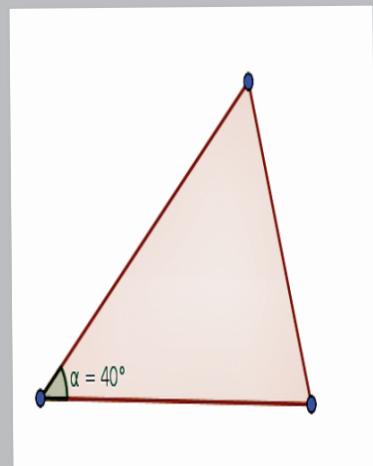
Fig. 8.23 angle with given size

Dynamic Triangle

In 7th grade, we learned to use the Slider tool to draw multiple concentric circles around a centre point. Can we use the Slider tool to control the angle measures of the triangle?

After creating an Angle Slider, use its assigned variable to draw a triangle.

Save the file, ok

To Control the Angles of a Triangle Using a Slider in GeoGebra

Step 1: Creating an Angle Slider

▪ Click on the Slider Tool (10th tool in the toolbar) and then click on the desired location in the workspace to place the slider.

▪ In the slider window that appears, select the Angle option.

▪ Set the minimum value to 50, maximum value to 1750, and increment to 50, then click OK (Figure 8.24).
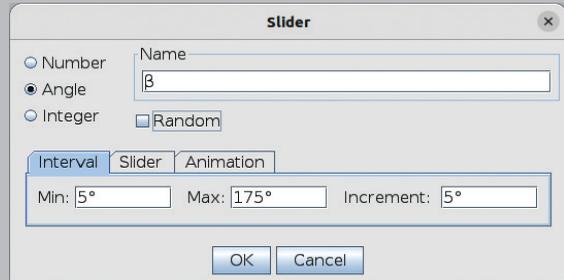

Fig. 8.24 Slider Window

Step 2: Constructing the Triangle

▪ From the 8th toolset, select Angle with Given Size (Figure 8.25).

▪ Enter the variable name assigned to the slider as the angle.

▪ Press the OK button to confirm.
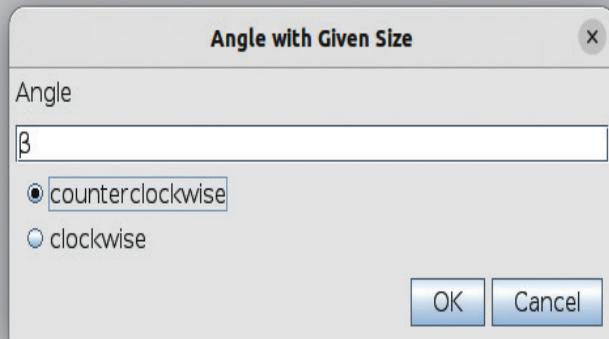
Fig. 8.25 Angle with Given Size- Window to Give Angle Measurement
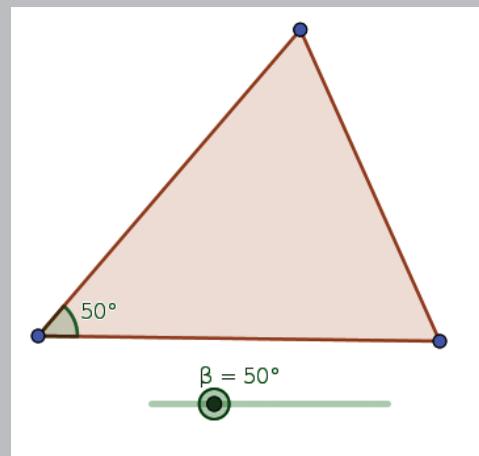
Fig. 8.26 Triangle that Changes According to the Slider Measurement

▪ Plot the angle and use the Polygon Tool to complete the triangle (Figure 8.26).

Using the slider, we've now created an adjustable triangle, right?

As you move the slider, triangles with different angle measures appear, correct?

Now let's see how we can mark and display the measurements of the other two angles in these triangles.

Measuring Angles

- To measure an angle, use the Angle Tool from the eighth toolset. Select three points in clockwise order, and the interior angle measurement will appear.

- To get all interior angles of a polygon at once, simply click inside the shape using the Angle Tool (Figure 8.27).
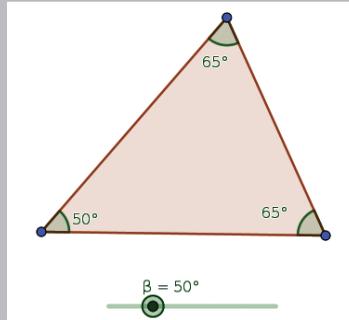
Fig. 8.27 When Angles are Recorded

Circumcircle and Its Centre

Now that we've created the triangle, we can easily draw a circumcircle (a circle passing through all three vertices) using the Circle through 3 Points tool.

Finding the Centre of an Object

- To find the centre of a shape prepared using the Polygon tool: Select the Midpoint or centre tool. After selecting, click inside the shape.

- To find the centre of a circle: Click on the circumference of the circle (Figure 8.28).
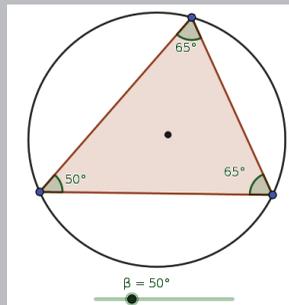
Fig. 8.28 When Angles are Recorded

After finding the centre of the circle, adjust the value in the slider to create triangles of different sizes. Observe how the position of the circle's centre changes as you modify it. Then, fill in the given Table 8.8 accordingly.

Measurements of Triangle	Position of the Centre of Circle
All three angles are less than 90°.	Inside the triangle
One angle 90°	
One angle more than 90°	

Table 8.8 The Features of Circumcircle

Let's Mark the Movement of the Chords

In the construction we've just prepared, the sides of the triangle act as chords of the circumcircle. Here, try moving one angle and observe its path using the trace function.

You can create beautiful patterns this way.

Creating Pattern

The pattern is created by moving chords within the circumcircle. For this purpose:

- Include an additional Angle Slider (minimum value 0°, maximum value 360°, increment 5°).

- Using the Rotate around Point tool from the ninth toolset: First click on the circle's centre. Then click on one chord

- In the window that appears, select the variable corresponding to your configured Angle Slider

As you adjust the slider value, observe how the chord's position changes

- Right-click on the movable chord and enable "Trace On"

- Now move the slider - this will generate the pattern shown in Figure 8.29
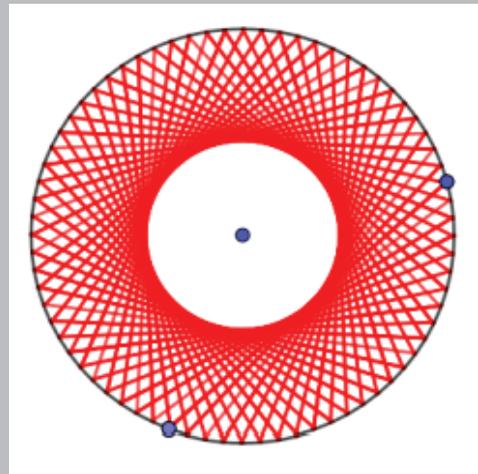
Fig 8.29 Pattern Obtained when Moving the Chords

Let's Evaluate

♦ In the construction shown in the figure, which sequence should be followed to obtain the marked angle measurement?

a) V, T, U   b) U, T, V

c) S, T, V   d) V, T, S

☐ Which step is NOT part of the process to draw a circumcircle passing through both endpoints of a line segment in GeoGebra?

A) Draw a small segment using the Segment tool

B) Find the midpoint using the Midpoint or centre tool
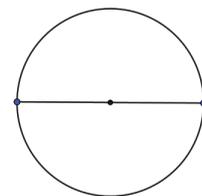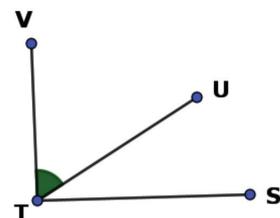
C) Mark intersection points using the Intersect tool

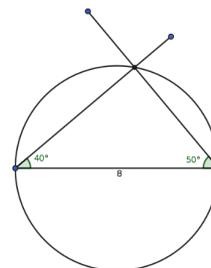D) Draw the circle using "Circle with centre through Point" tool   a) A
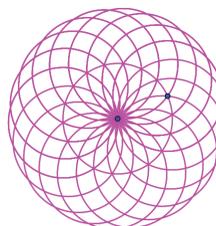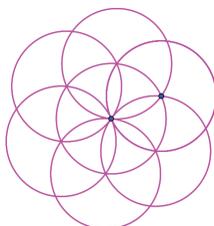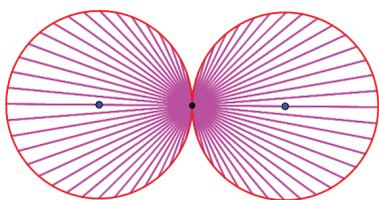
 b) B   c) C   d) D

![icon] **Extended Activities**

1. In GeoGebra, construct a triangle with one side length of 8 units and angles at its two endpoints as 40° and 50°, then draw a circumcircle passing through all its vertices.

2. Create the patterns given below in GeoGebra.

❖ ❖ ❖

Chapter 9

Let's Frame the Shots

'*With the rise of social media platforms, anyone can now become a publisher. The gap between content creators and viewers has significantly narrowed. Through this medium, content covering all aspects of life—entertainment, music, technology, education, health, food, and more—has reached the masses. At the same time, it has also become a future career path, helping many achieve financial independence. According to 2025 estimates, India has approximately 80 million video content creators and 265 million viewers, with over 60% of them coming from rural areas. Even news channels have now transitioned into social media users. The biggest advantage is that any creative individual can rise to the position of a 'Social Media Influencer' and drive major social changes through the videos they publish on these platforms*'

The next episode's content for the school YouTube channel has been assigned to Hima and her team. After a detailed discussion on creating diverse video content, they decided to produce and publish an awareness video against the dumping of plastic waste in public spaces.

What all needs to be done to prepare such a video for publishing on social media? Let's examine:

▪ The required script for the video must be prepared.

▪ The video must be shot according to the script.

▪ Necessary edits should be made using editing software.

▪ ....

▪ ....

Each of the above steps will have various sub-steps, right? Through the process of video production, let's analyse each one in detail.

Let's Prepare the Script

Just as any task requires precise preparation and planning to make subsequent steps easier, scriptwriting is an important preparatory step in video production. A script essentially means documenting all the details related to the video being planned in advance.

Video Script
The script or screenplay holds great importance in video production. Whether it's a documentary, television program, YouTube video, or advertisement, the script forms one of the foundational elements of their excellence. This blueprint includes the scenes involved in video production , dialogues, visual descriptions, instructions on how to arrange visual elements etc. A good video script creates a good video.

We are preparing this video to raise public awareness about the issue of plastic waste being dumped in public areas.

For the content video we're about to create, prepare a script following the given template format (Table 9.1) after discussing with your friends.

Content Video Production Script - Template					
Scene details	**Camera Shot**	**Sound/ Dialogue**	**Background music**	**Time**	**Remarks**
Scene 1 The host looks into the camera and introduces themselves.	Close up shot	Hi, My name is Hima	No	8-15 seconds	
Scene 2 Shots of plastic waste scattered across public places	Mid-shot	Attention-grabbing message about plastic waste crisis	Background Music	40-60 seconds	
Scene 3					
Scene 4					

Table 9.1 Script -Model

Isn't the script ready? The script template provided in Table 9.1 includes some camera-related details, right? Let's examine what these are.

Camera Usage Guidelines:

High-quality video clips are essential for producing premium content. Best cameras can significantly improve video clip quality. Make use of DSLR cameras made available in schools to high-end smartphone cameras – for this purpose.

Mobile Phone Camera and DSLR Camera

While DSLR cameras were previously dominant for shooting visuals, the rise in content creation has led to increased mobile phone usage as well. Both mobile cameras and DSLRs come with their own advantages and limitations.

Portability, ease of use, quick data transfer, and multiple lens options in a single device are key advantages of mobile phones whereas superior image quality, interchangeable lenses for specific needs, manual control settings, high-quality audio capture, expandable storage options are the benefits of using DSLR camera.

Camera resolution is a key factor affecting the clarity of captured visuals. With the teacher's guidance, let's identify the video camera with the highest available resolution for shooting. The school's existing camera can also be used for this purpose.

Camera Resolution

Pixel is the smallest unit of digital image information. Multiple pixels combine to form a complete image. Camera Resolution refers to either the number of pixels on a camera's sensor, or the total pixels in a digital image . This is related to the image clarity. Image clarity increases as the number of pixels increases. The term 'megapixel' is the unit used to specify resolution in either photos or videos.

Shooting

For high-quality video recording, careful attention must be paid during shooting. Go through some important points given below before shooting your video.

Mobile Video Recording

By paying attention to a few key factors, we can produce high-quality videos using just a mobile phone.

- Keep Lenses Clean. Before shooting, gently wipe the lens with a microfiber/cotton cloth

- Ensure Camera stability. Use a mobile stabilizer or tripod to prevent shaky videos.

- To optimize Audio Quality, shoot in a quiet environment to minimize background noise. Use an external microphone (if available) for clearer sound.

- Understand camera settings: Exposure, White Balance, Focus, etc.

Gimbal

Mobile Stabiliser

- Exposure: The amount of light entering the camera sensor to create an image. Exposure can be controlled by adjusting aperture or shutter speed.

- Artificial lights can be used to ensure proper lighting on the subject.

- White Balance: Adjust this to ensure accurate colour tones in the visuals.

- Focus: Adjust this to ensure clarity in the captured visuals.

Ring Light

Artificial Light
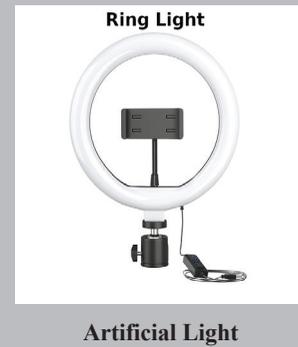
In videography and photography, various camera techniques are used to make content impactful.

For example, to effectively convey the severity of plastic pollution, we can use close-up shots of the affected areas. Similarly, to clearly show the amount of waste, we may use slightly wider shots that include both the garbage and its surrounding area.

These types of shots are captured through different camera angles. Read the caption below to know more about camera shots (Figure 9.1).

Camera Shots

The scenes captured between the camera being turned on and off are generally called a shot. Shots come in different types.

BASIC CAMERA SHOTS

Extreme Wide Shot   Wide Shot   Medium Shot

Medium Close up   Close up   Extreme Close up

Close-up Shot
Medium Shot
Long Shot
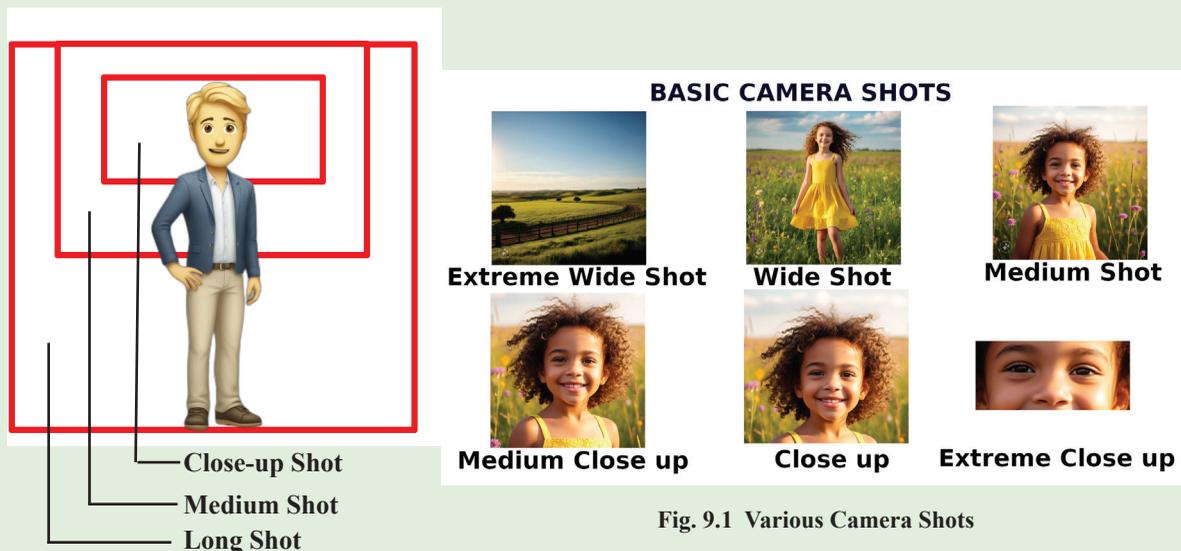
Fig. 9.1 Various Camera Shots

We've discussed many important aspects to consider while shooting videos. Now, let's film the video according to the script and save it in a folder on the computer. Remember, the shooting process should be completed as a group activity...

Finished shooting? The next step is to edit the video clips stored on the computer and prepare the final content video.

What kind of modifications might we need to make to the footage we've shot for this purpose?

- Cut and remove unwanted sections

- Add appropriate background music

- ....

- ....

On to the Editing

Video editing is just as important as shooting and creating video clips. You can make your video more interesting by cutting out unwanted parts of the video, arranging the clips in an attractive way, and adding background music, transitions, and effects.

Let's take a look at how to edit video clips that we have shot and stored on our computer, using the video editing software **Kdenlive.**

Video Editing

Video editing is the process of cutting out unwanted parts from video clips and adding dialogue, background music, transitions, effects, and title clips to create a single video. Kdenlive, OpenShot Video Editor, Pitivi Video Editor, Final Cut Pro, and Adobe Premiere Pro are some of the popular video editing software.

Kdenlive

Kdenlive is an excellent video editing application available under free software licenses. The first version of Kdenlive was released in 2002 by Jason Wood, an English software engineer. Kdenlive allows you to edit video and audio clips, add background music, create title clips, and export to various video formats.

Let's Get Familiar with Kdenlive

Open the Kdenlive video editing software on your computer and examine its various features with the help of Figure 9.2.
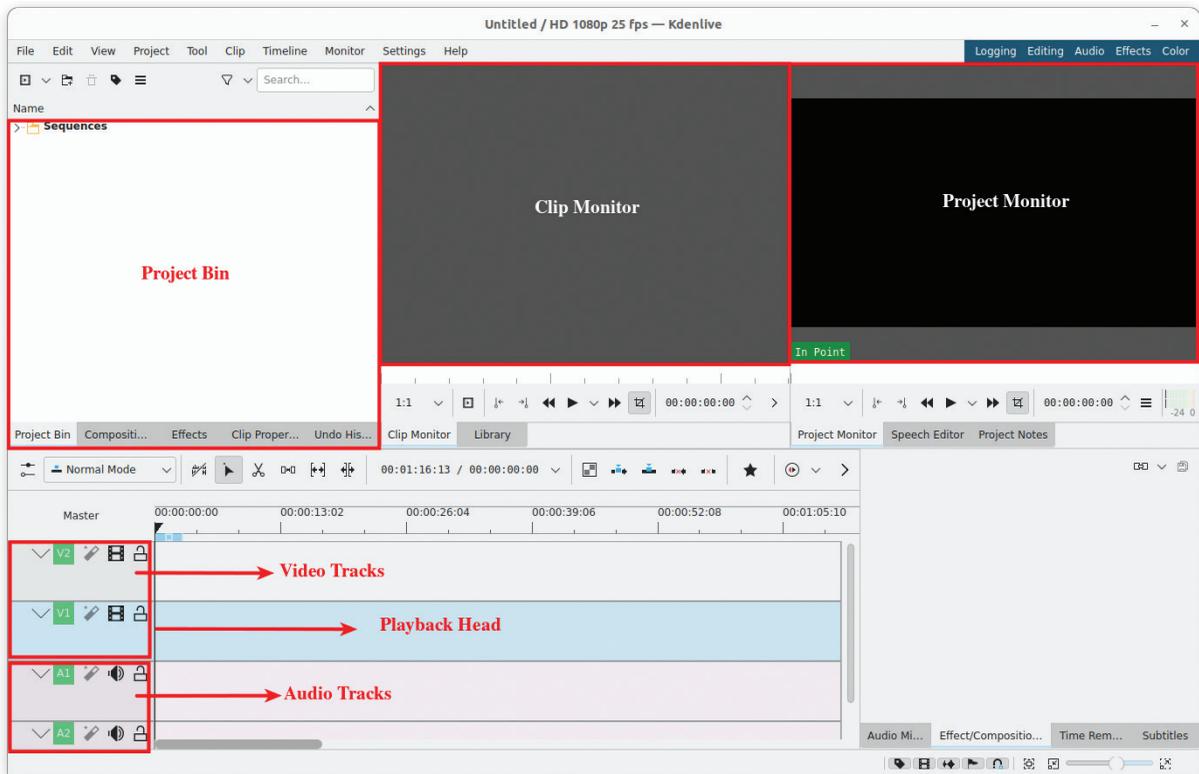
Fig. 9.2 Kdenlive Video Editor Window

Let's Start the Video Project

Now that you're familiar with the Kdenlive software interface, let's see how to edit videos using it.

For this, the first thing to do is to start a project file. Videos prepared for different purposes require different quality. Therefore, while preparing a video project, we should configure the video resolution and frame rate matching our requirements. In the image (Figure 9.3), see the profile HD 720p 25 fps configured. In this way, you can select a video profile for your video and start the project.

Starting a Project in Kdenlive
▪ Open Kdenlive software
▪ Go to Project Menu → Open Project Settings window.

- Select appropriate video settings preset (Example: HD 720p 25 fps)

- Choose your project folder from Custom Project Folder

- Click OK

- Save your project giving a name: Use File → Save As
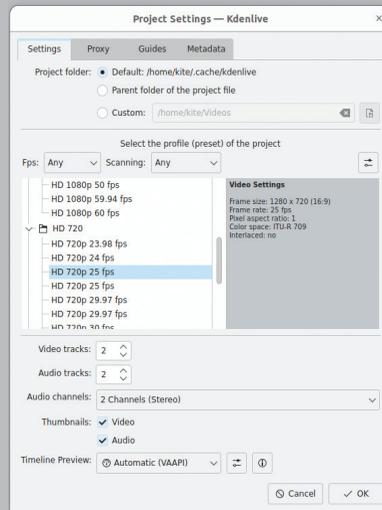
Fig. 9.3 Project Setting Window

Now that the video project is prepared and saved, let's import video files for editing into the software's Project Bin. Locate your collected video files and import them into the Project Bin (see Figure 9.4 for guidance)

The settings to be used are according to the video format, right?

To Add Video Files to the Project Bin
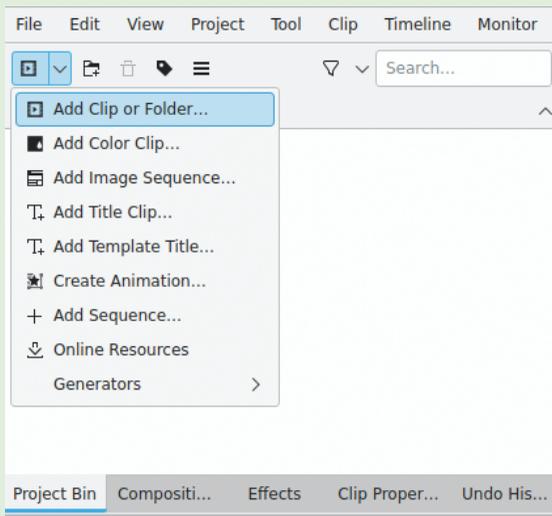
Fig. 9.4 Window to Add Video to Project Bin

- Click Add Clip or Folder in the Project Bin area.

- Select the first video to be included from the folder where the video clips are stored and click OK.

Haven't the imported video clips appeared in the Project Bin (Figure 9.5)?
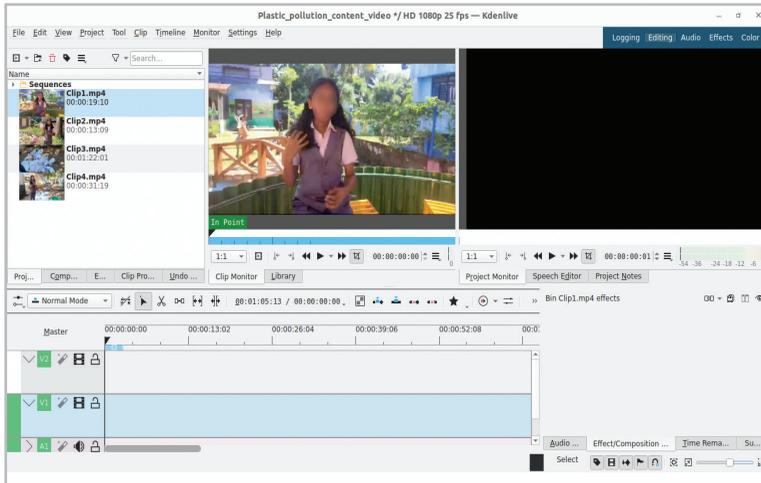
Fig. 9.5 When Video is Added to the Project Bin

Now add other required video files and audio files in the same way.

To the Timeline for Editing

Add files added to the project bin to the Timeline for editing. Editing process involves arranging each file in the audio/video track in the timeline according to their priority (time order).

If you need to make changes to the included clips, you can do that in the timeline.

To add files to the timeline, simply select the required ones from the Project Bin and drag them to the track (Figure 9.6).

Timeline

The timeline is the workspace where you arrange video clips, images, and title clips in chronological order. Typically, timelines contain separate video tracks and audio tracks for organization. Editing is completed by placing video clips, images, and title clips on the video track and audio clips on the audio track.
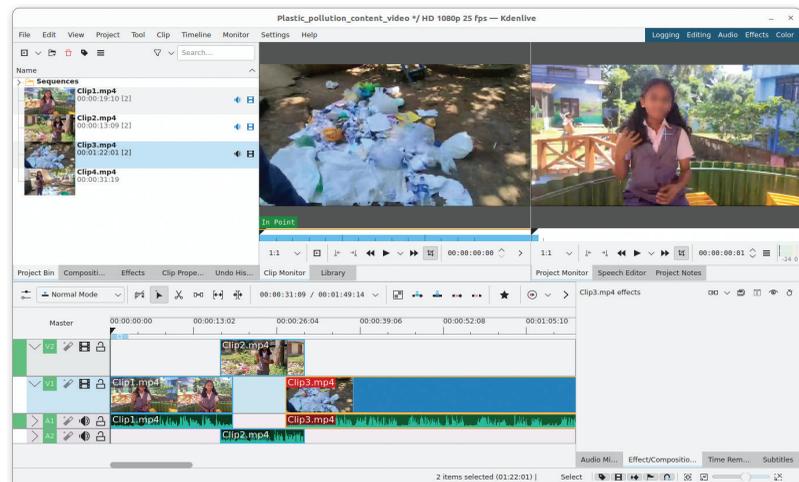
Fig. 9.6 Video Clips when Included in the Track

When imported video clips contain embedded audio the audio automatically appears in a corresponding audio track, below the video track .

You can play and stop the video/audio files included in the track by clicking the Play/Pause button in the Clip Monitor or pressing the Space Bar.

Let's Remove Unwanted Clips

You've now previewed your video clips. See if every part of your recorded clips needs to be included in the final video.

Certain sections likely require trimming.

Locate the Razor Tool in the timeline's toolbar . Click on video clips at points needing separation , select unnecessary portions and delete them.

How to Remove Unwanted Parts from Video Clips

- Move the Playback Head along the timeline to identify parts to remove.

- Select the Razor Tool .Click at the start point of the unwanted section. Click again at the end point. This isolates the unwanted portion as a separate clip.

- To delete unwanted Clip, switch to the Selection Tool , Right-click → Delete Selected Item(press Delete Key on keyboard)
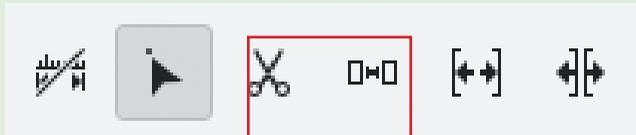
Fig. 9.7 Razor, Selection Tools

Unwanted portions of dialogues and background music can also be removed using this same method in the video.

Let's Arrange the Clips Properly

Since we need to organize the visuals in the timeline according to our script, after removing unwanted portions from each clip, we must now properly arrange them in the tracks.

If we don't need the existing audio in the video, we can remove just the audio separately. Do the steps given below.

To Add more Tracks

In some cases, you may need to add new tracks to your project. To do this, right-click on the header of an existing track, click Insert Track, specify which track (Audio/Video) and where (Above/Under), give the track a name, and click OK.
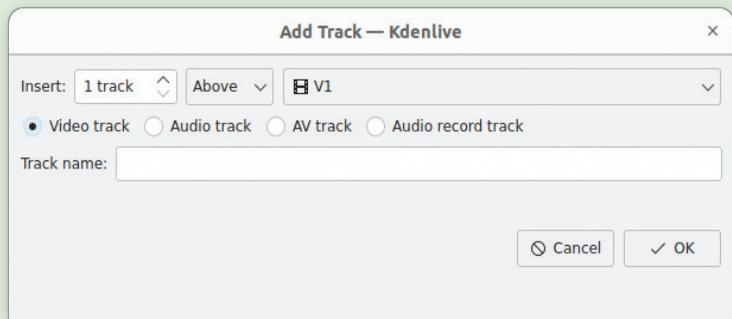
Fig. 9.8 Add Track window

To Remove Audio from Video Clips

- Right-click the video clip

- Select "Ungroup Clips" from the menu (This separates the linked audio

- The audio will appear in the corresponding audio track below.Select and delete this audio track.

- To disable entire Track Audio , locate the Audio Icon in the video track header and disable audio for all clips in that track

Now, arrange each visual in the timeline according to their priority order. Use the Selection Tool, select clips one by one and drag them to desired positions. Same Selection Tool can be used to join audio files.

Transitions between Scenes

When arranging video clips one by one on a track, transition effects are often added between scenes to make the transition between different scenes more natural. Let's take a look at how to add transition effects in Kdenlive.

How to Give a Transition Effect between Scenes

Transition effects are known as Compositions in Kdenlive. To provide a transition when scenes are added,

- Arrange video clips into two adjacent tracks, top and bottom.

- Click on the Compositions tab.

- Select an effect that suits the scene from the effects in the window and drag it to the area where the video clips meet.

- To increase the duration, right-click on the effect and click Edit Duration. You can increase or decrease the Duration in the window that appears..

- Compositions can also be created by arranging video files on tracks. However, not all Compositions may work correctly in the current version of Kdenlive.
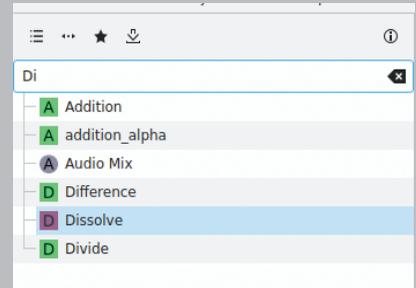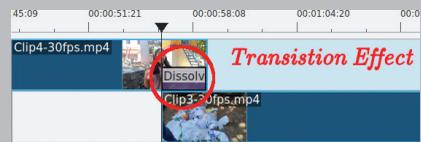

Fig. 9.9 various effects

Fig. 9.10 When Effect Added to the Video

Now, apply suitable transition effects between your video clips and preview how they work.

Let's Add Effects

You understand how compositions are added between scenes, right? Similarly, to make videos more attractive and give them varied moods, we can add effects. With the help of the Effects tab, you can find and apply effects that suit your video.

Let's Include Audio Clips

Scenes come to life through the sound elements included in them, right? Finding the right background music for our video is very important. We can find background music with the help of the internet.

When Giving Composition/Effect

When it comes to adding compositions or effects to visuals, their selection is very important. Each composition or effect can create different levels of meaning/emotion.

How to Add Effects

- Click on the Effects tab.

- Select the desired effect from the effects displayed in the Effects window and drag it over the video clips to insert it.

Alternatively, we can create our own using LMMS software, which we're already familiar with.

For voiceovers needed in scenes, we can record them using any sound recording software or even a mobile phone. To ensure good sound quality, using an external microphone while recording is enough.

Fig. 9.11 External Microphones

You know Audacity is an application that helps record audio on our computer, right?

We'll arrange the recorded audio files in the track as shown below.

To Add Audio to a Video

- Just like adding video files to tracks, you can also arrange audio files in tracks.

- To add background music or narration to a scene, place the audio in the Audio Track at the same time position as the corresponding video clip.

- To remove unwanted parts of an audio file, use the Razor Tool (just like in video editing) to cut and delete unnecessary sections.

Using AI for Music and Voiceovers

AI advancements have made it easier to create background music and voice-overs. Several tools are now available to assist with this. For voice-overs, you can use AI tools like Anuvadini AI, which converts text into audio. Simply provide the narration as text, and it will generate the audio for you.

Let's Add Titles

Haven't you noticed how movies and documentaries include title sequences at the beginning and end? These display the film's title along with the names of cast and crew members.

We can add title sequences to our videos too.

Discuss and decide which titles to include in the prepared video. Then, using the "Add Title Clip" option, we can insert them into the video (see Figure 9.12).

To Create Title

- Open the Title Editor window by going to Project → Add Title Clip.

- Use the Text Tool to type and add the required information in the title clip.

- From the Properties window, select the text colour, size, font style, and other formatting options.
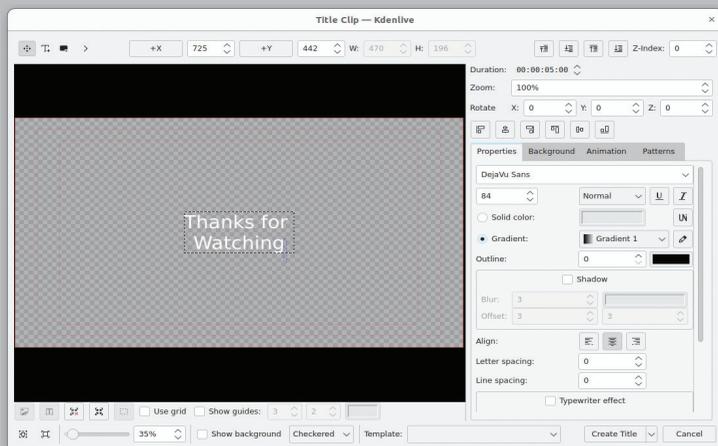

Fig. 9.12Add Title Window

- Select a desired background color from the Background window to enhance the title's appearance.
- Use the Selection Tool to adjust the text position as needed.
- Click the Create Title button to save the title.
- The title clip will now appear in the Project Bin. Drag and drop it from there into your video timeline.

Let's Export the Video

Currently, all the edited clips and titles are saved as a Kdenlive project file. However, to share the video on social media platforms, we need to convert it into a video file format.

To do this, we must render the project file into a single video file.

Use the Render option in Kdenlive software.Process your project to convert it into a standalone video file (see Figure 9.13)

To Render the File

- Save the project.

- In the Project menu, select Render.

- In the Rendering window, select the folder where you want to export the video and enter the file name

- Select the video format to export. (Eg:- MP4 H264/ AAC)

- Then click Render to File.
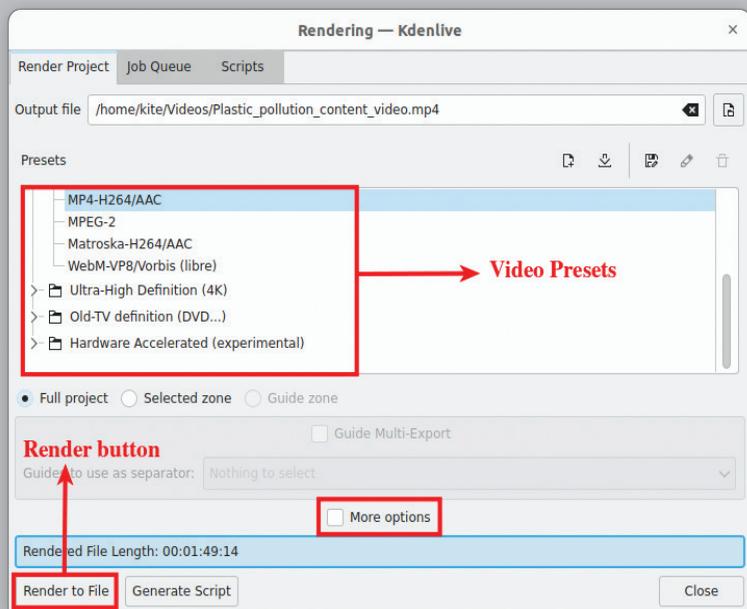
Fig. 9.13 Rendering Window

Isn't the video ready?Play the video using a video player to preview it. If you feel any further changes are needed, open the saved Kdenlive project file and make the necessary edits.

Online Video Editors and Mobile Apps

Several online video editors and mobile apps are now available for video editing. Mobile apps like InShot, PowerDirector, VN, Filmora, and Canva can be used for video editing. Online video editors such as Canva, InVideo AI, and Clideo are accessible on the internet. Many of these tools also utilize AI capabilities to enhaOnline Video Editors and Mobile Appsnce functionality.

Let's Evaluate

◆ Can you identify which shot type is shown in the given image?

    a) Wide Shot   b) Close-up Shot

    c) Medium Close-up   d) Extreme Wide Shot

◆ As you already know, a video created in Kdenlive with HD720p 25fps project settings will have a resolution of 1280×720. What would be the video size of a project created in HD1080p 25fps profile?

    a) 1280x720   b) 720 x 576

    c) 1920 x 1080   d) 3840 x 2160

Extended Activities

1. Record and edit video footage of cultural performances during the school anniversary celebrations using Kdenlive editing software.

2. Produce a video message from the principal for distribution across school groups on December 10 (Human Rights Day).

3. Create an educational Instagram-style reel video to raise student awareness about the dangers of drug abuse.

❖ ❖ ❖
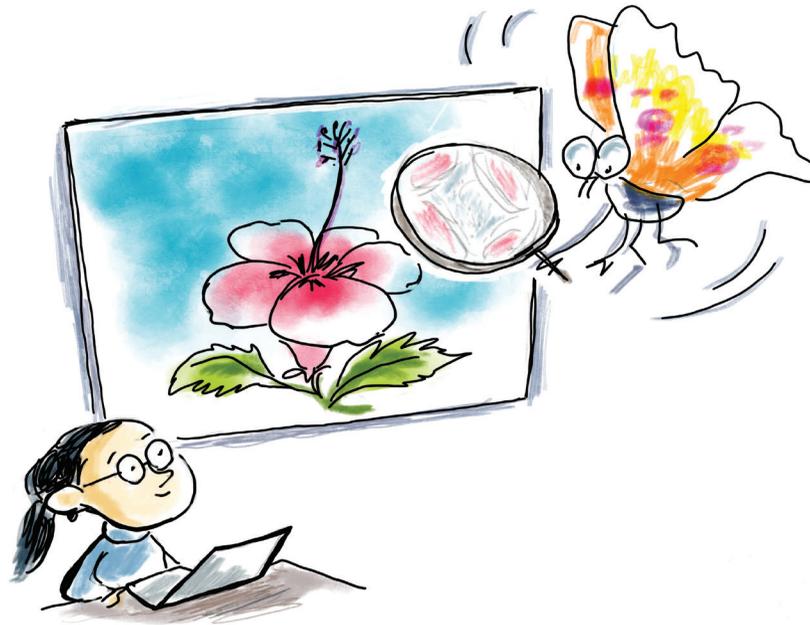
Chapter 10

Smooth Presentation

Observe the image given below. This is the visualization of the content included in a presentation prepared by Aleena and her team as part of a science project. What concepts about plant cells and animal cells are being exchanged in this presentation?
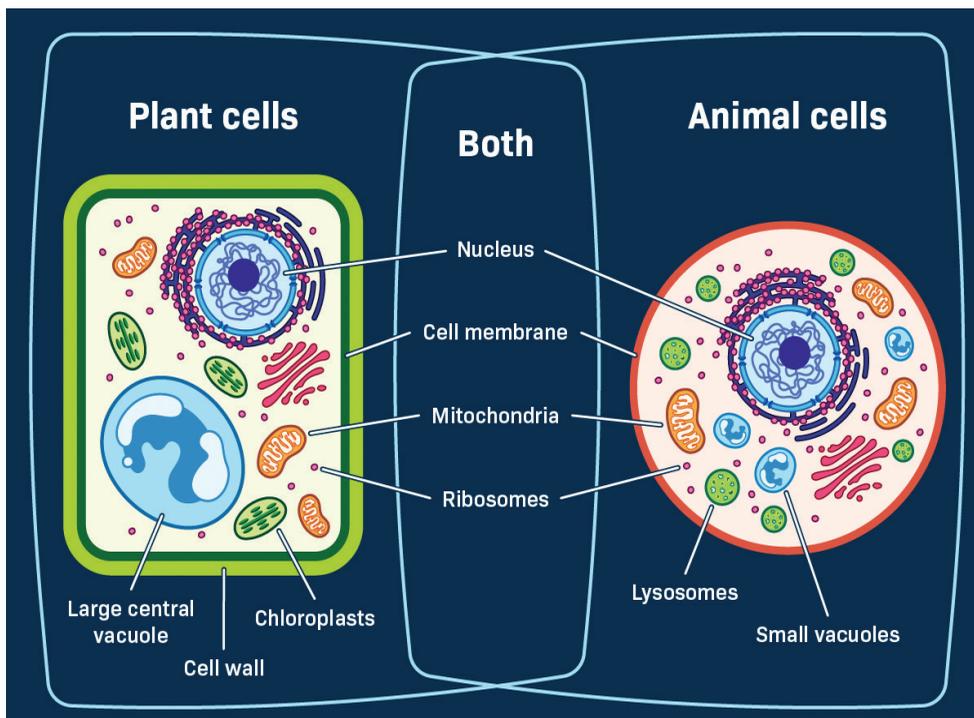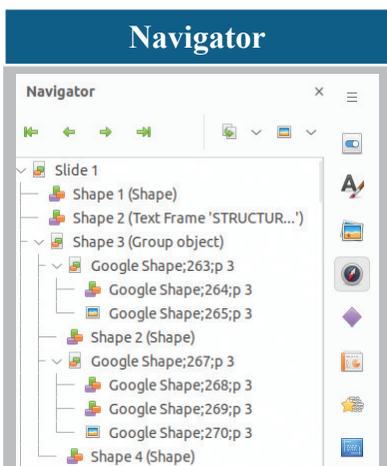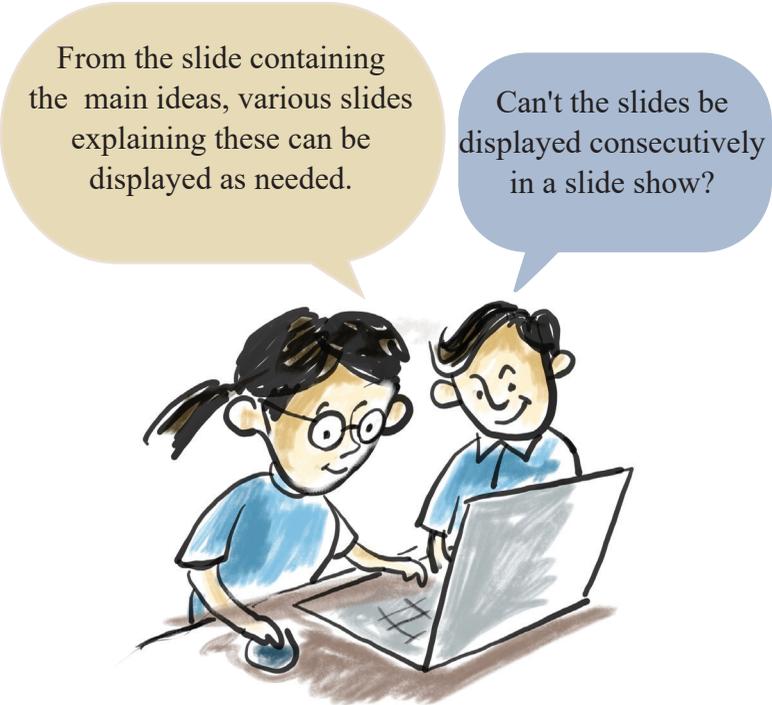

Plant Cells and Animal Cells -Model Image

Navigation between Slides

In presentations prepared using LibreOffice Impress, we can examine how to create links that allow moving from one slide to any other slide (and back again), enabling comprehensive topic delivery.

A presentation file about cell parts has been provided in your School_Resources folder under the name Cell_Structure.otp. Open the Home folder on your computer and examine this file.

Test the presentation file using slide show mode. As shown earlier, you can see the main slide (Slide No. 2) that should contain comprehensive concepts is incomplete.

On this slide, mark and include images of both animal and plant cells along with their similarities and differences, then complete it as shown in the model shown in Figure 10.1.

Linear and Non-Linear Presentation Methods

By default, presentations follow a linear method where slides are displayed one after another in sequential order. This represents a straightforward, linear narrative style. However, presentations can also be delivered non-linearly. This is a method of reaching any specific slide directly from another slide. The interaction techniques available in presentation software can be used for this purpose. The variety in narration, ease of navigation, and comprehensive exchange of ideas are some special features of the non-linear narrative method.
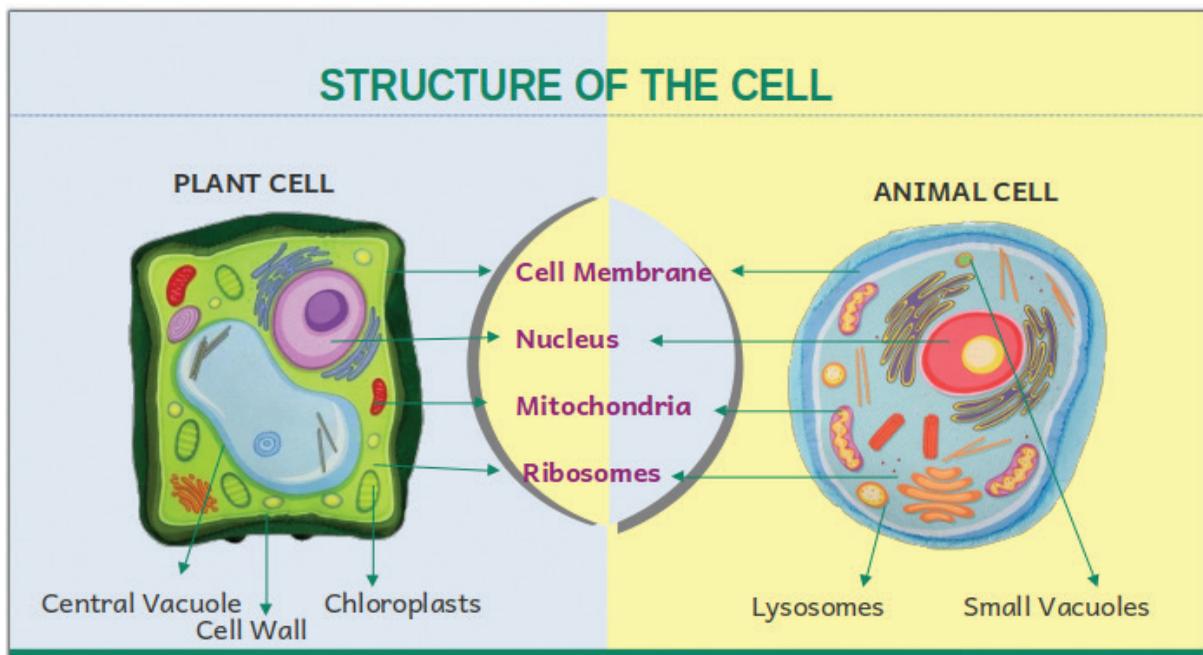

Fig. 10.1 Model of the Slide to Complete

Completing the Slide Content

- Open the Cell_Structure.otp file and select the second slide. Insert images either through the menu bar (Insert→Image) or by clicking the Insert Image icon on the toolbar. From the School_Resources folder, add the Plant_Cell.png and Animal_Cell.png image files.

- Adjust the size of the images as shown in Figure 10.2.

- Use Insert→Textbox to type and add necessary text (Figure 10.3).

- To label cell components, click on Lines and Arrows in the toolbar and include Line Ends with Arrow where needed (Figure 10.3).
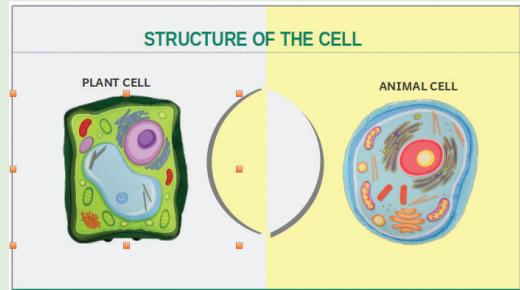
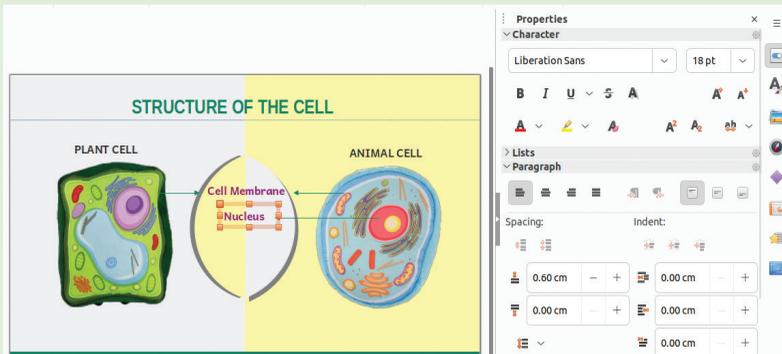Fig. 10.2 When Images are Added to the Slide

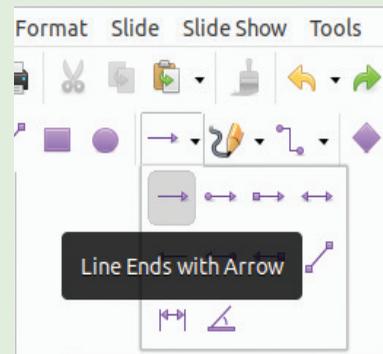Fig 10.3 When Texts, Arrows are Added to the Slide.

Fig 10.4 Lines and Arrows

Adjusting the Slide Background

To set a background for slides, first select the slide. From the Sidebar Settings on the right side, choose Properties→Slide. Various background customization options will be available including

Pattern, Color, Bitmap, and Gradient. Select and apply the most suitable option.

Are Cell wall and cell membrane the same?

No. Separate slides are to be prepared, to explain each

While displaying the prepared slide, it should be possible to present details about each cellular component as needed. For this, when clicking on images or text of cell parts in the slide, the presentation should navigate to other slides containing their detailed explanations.

To implement this, the Interaction feature available in LibreOffice Impress can be used. Similar to how navigation works from one webpage to another in a website, the Interaction facility helps connect slides together.

For example, let's try linking the text "Cell Membrane" in the second slide to the sixth slide using the interaction method as shown below:

To Add Interaction

- Select the text "Cell Membrane" and right-click. From the options menu, choose "Interaction" (see Figure 10.5)

- In the window that appears, under "Action at mouse click", select "Go to page or object". In the "Target" section, choose the relevant slide (e.g., Slide No. 6) that contains detailed explanation of the concept.
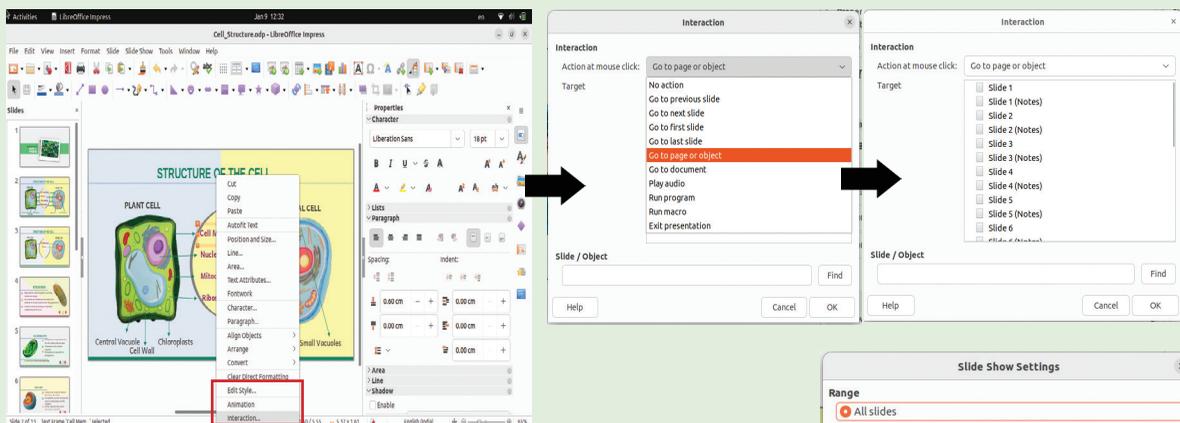

Fig. 10.5 Steps to Give Interaction to a Slide

- When setting up interactions this way, be careful not to preserve the presentation's default behaviour where clicking anywhere advances to the next slide. To maintain this: go to the menu bar Select Slideshow → Settings under "Change slides by clicking on background" and remove the checkmark (see Figure 10.6)
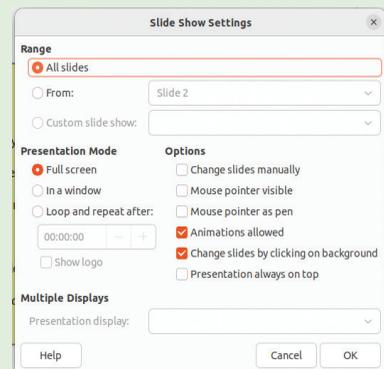

Fig. 10.6 To Avoid Transition on Mouse Click

In the manner given above, the activity can be completed by providing interaction to the related explanation slides from the other sentences in the second slide. Then, run the slide show and click on the interaction link. Is navigation to the specified slides not possible?

How do I get back to the main slide after the interactive slide?

You just need to give an interaction on that slide.

Buttons and Icons

Buttons and icons are available in the Gallery in LibreOffice Impress software. The Gallery is located in the Sidebar Settings on the right. It includes Arrows, Bullets, Diagrams, and Icons.

To make navigation between slides easier in interactive presentations, you can provide buttons like Home/Previous/Next and link them together with interaction. A Home icon for the main slide and arrow buttons for moving forward and backward (Figure 10.7) can be included.
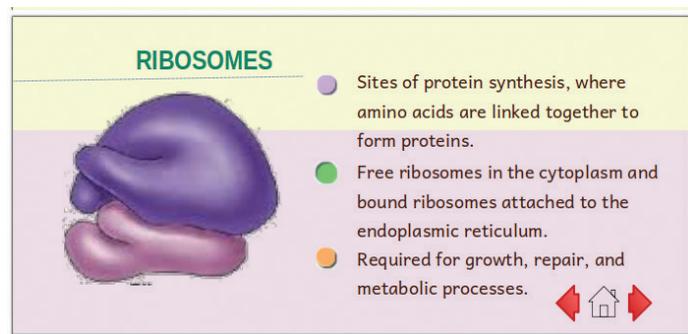
Fig. 10.7 Slide in which Interaction Buttons are Included

In this way, all the slides in the presentation can be completed by providing interaction as needed. We can provide interaction to any object on a slide, starting with pictures and shapes. The Interaction option is available not only through the right-click method but also through the main menu. Let's explore and find out where it is.

We know that the main function of Chloroplasts, which is explained in the fourth slide of the presentation file we are using, is photosynthesis, which is a massive process. If a video about this is added to the presentation, it will be more helpful for the presentation. The concept of interaction can be useful for this.

Interaction with Video

When inserting a video via the Insert→Video menu, we have limitations in how we can position the video and explain the content where needed. The solution to this is to add the video via Interaction. When adding video/document resources available on our computer, it is best to save them in the same folder as the presentation. If their location changes, they may not work correctly in the presentation. To include a video/document through interaction, simply click Go to Document and browse to the file in question.

What if we want to include information from a web page on the Internet in our presentation instead of a video saved on our computer? For that, we can introduce another concept available in presentation software.

Resources from Outside

You can link web pages on the Internet to your presentation using the Hyperlink concept. Using this concept, link the word Photosynthesis on the sixth slide to its Wikipedia page with its details.

To Hyperlink a Web Page

- To include a hyperlink to information about Photosynthesis, first add an Icon/Button/Text to the slide.
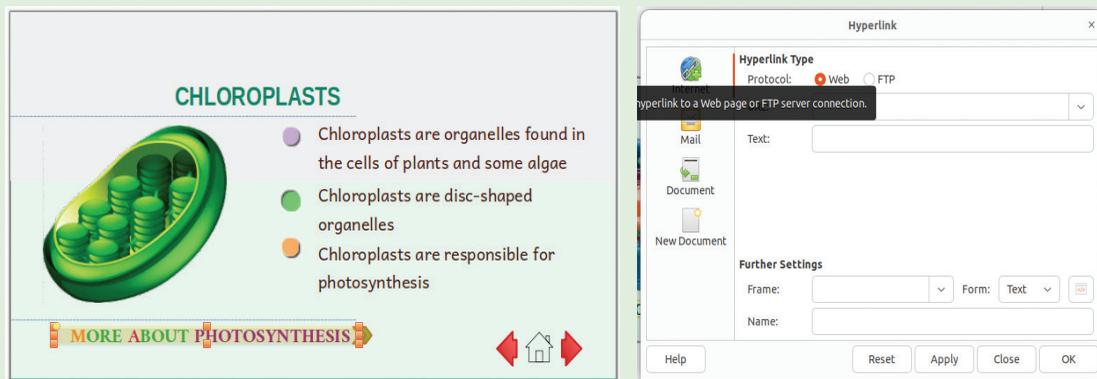
Fig. 10.8 The Steps to Include Hyperlink

- Then, select the reference/button (here text) and click Insert → Hyperlink.

- n the Hyperlink pane that appears, select Internet from the left side

- Type the address of the Wikipedia page in the text box next to URL and click OK.

MORE ABOUT...
When I see this button, it's the first thing you want to click.

What if the button appears after the Chloroplast have been explained?

The webpage is hyperlinked. Hyperlink can also include video/documents via the Document→ Path method available on the web.

During a presentation, it would be more efficient to present the ideas in a slide in context rather than presenting them all at once.

The Content can be Displayed as Needed

You can use the Animation technique available in LibreOffice Impress to make the content on the slide more visual. Watch the animation in a way that lists the main facts about Chloroplasts one after the other.

How to Apply Animation

- Select the text you want to apply animation and select the Animation method from the Sidebar Settings on the right.

- Click the button next to Effect <image> in the Animation window that appears.
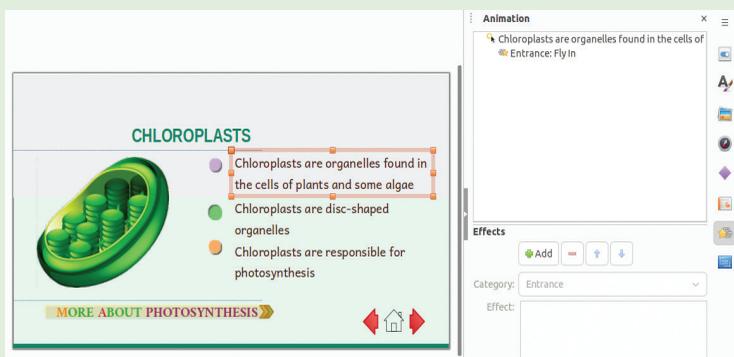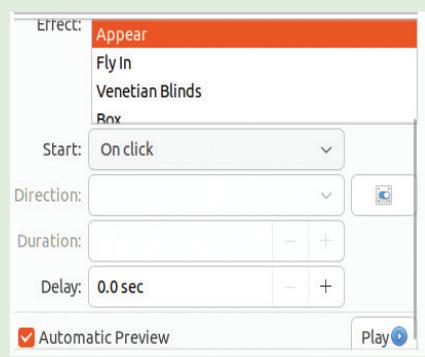
Fig. 10.9 Let's Provide Animation

Fig. 10.10 Animation Settings

- Under Effects, you can also adjust the Duration, Delay, and Direction settings as needed (Figure 10.10).

- You can preview the animation by clicking Play next to Automatic Preview (Figure 10.10).

We display slides during presentations using the Slideshow technique.Just as animation makes the content appear more attractive, what if each slide appeared more attractive during the presentation?

When the Slides are Changing

You can make the slides appear visually appealing by giving them a transition effect. Try giving your presentation a Slide Transition in the manner given below.

How to Apply a Slide Transition

- Select the desired slide and choose Slide → Slide Transition from the menu bar or Slide Transition ⬚ from the Sidebar Settings.

- Then review the listed transition effects and select the one that suits you.

- Make the necessary changes to the Variant, Transition, and Sound transition settings (Figure 10.11).

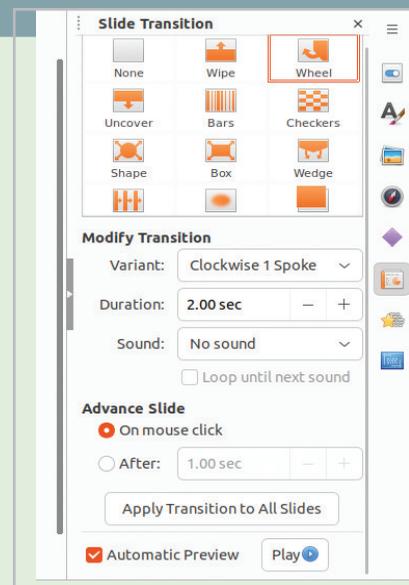- To apply the same effect to all slides, simply click the Apply Transition to All Slides button.

Fig 10.11 Slide Transition Settings

Apply slide transitions, save the presentation file, and then present it to the class.

Let's Evaluate

♦ What could be the reason why a video embedded in LibreOffice Impress via Hyperlink/Interaction is not working?

    a) The video does not have sound

    b) The video was moved from the saved folder while preparing the presentation

    c) The video file size is 15 MB

    d) The video content is not supported

♦ Select the incorrect statement from the following regarding Interaction in LibreOffice Impress.

    a) Navigation between slides can be customized as per the requirement.

    b) Presentation can be shown in a customized manner by providing interaction.

    c) Resources can be included in the presentation through interaction.

    d) Navigation of slides is possible only by providing interaction.

Extended Activities

1. Prepare a presentation using LibreOffice Impress software to be presented in class, including details of endangered wildlife species and ways to conserve them, in connection with National Wildlife Day.

2. You have been introduced to the unlimited possibilities of using the Internet in the previous chapter. Prepare a presentation in LibreOffice Impress for conducting an awareness class on the things that we should pay attention to while using the Internet. Use the techniques Hyperlink and Interaction in the presentation.

❖❖❖

CONSTITUTION OF INDIA

Part IV A
FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A
Fundamental Duties - It shall be the duty of every citizen of India

a) to abide by the Constitution and respect its ideals and institutions,the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements;

(k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between age of six and fourteen years.

CHILDREN'S RIGHTS

Dear Children,

Wouldn't you like to know about your rights? Awareness about your rights will inspire and motivate you to ensure your protection and participation, thereby making social justice a reality. You may know that a commission for child rights is functioning in our state called the Kerala State Commission for Protection of Child Rights.

Let's see what your rights are:

- Right to freedom of speech and expression.

- Right to life and liberty.

- Right to maximum survival and development.

- Right to be respected and accepted regardless of caste, creed and colour.

- Right to protection and care against physical, mental and sexual abuse.

- Right to participation.

- Protection from child labour and hazardous work.

- Protection against child marriage.

- Right to know one's culture and live accordingly.

- Protection against neglect.

- Right to free and compulsory education.

- Right to learn, rest and leisure.

- Right to parental and societal care, and protection.

Major Responsibilities

- Protect school and public facilities.

- Observe punctuality in learning and activities of the school.

- Accept and respect school authorities, teachers, parents and fellow students.

- Readiness to accept and respect others regardless of caste, creed or colour.

Contact Address

Kerala State Commission for Protection of Child Rights
'Sree Ganesh', T.C.14/2036, Vanross Junction
Kerala University P.O., Thiruvananthapuram-34, Phone : 0471 - 2326603
E-mail : childrights.cpcr@kerala.gov.in, rte.cpcr@kerala.gov.in
Website : www.kescpcr.kerala.gov.in

**Child Helpline - 1098, Crime Stopper - 1090, Nirbhaya - 1800 425 1400
Kerala Police Helpline - 0471 – 3243000/44000/45000**

*online **R.T.E Monitoring :** www.nireekshana.org.in*