INFORMATION & COMMUNICATIONS TECHNOLOGY

STANDARD

X

Activity Book

GOVERNMENT OF KERALA
GENERAL EDUCATION DEPARTMENT

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING (SCERT), KERALAM

2025

NATIONAL ANTHEM

Jana-gana-mana adhinayaka jaya he
Bharatha-bhagya-vidhata,
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga
Tava subha name jage,
Tava subha asisa mage,
Gahe tava jaya gatha.
Jana-gana-mangala-dayaka jaya he
Bharatha-bhagya-vidhata,
Jaya he, jaya he, jaya he,
Jaya jaya jaya jaya he!

PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage.
I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders respect, and treat everyone with courtesy.

To my country and my people, I pledge my devotion. In their well-being and prosperity alone lies my happiness.

INFORMATION & COMMUNICATIONS TECHNOLOGY - X

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PREFACE

Dear students,

The advancements in Information and communications technology have impacted every walk of life. The new age gives us the message that we need to stay updated throughout our lives. This book has been prepared to cover the latest domains in information communications technology, helping us stay in tune with these developments.

The chapters in this book, such as Graphic Designing, Desktop Publishing, Webpage Designing, Python Programming, Robotics, Animation, Database Management, and Cyber Space, are designed to help you think creatively, experience new concepts, and present novel ideas.

This book includes interesting activities involving Stellarium, the desktop planetarium software; PhET, the virtual lab; GeoGebra, the interactive geometry software; and similar tools. These tools would help you apply your learning to other subjects easily.

It is expected that the ICT tools you are familiar with will enable you to acquire knowledge through innovative methods. It will help you become a creative individual who can use technology in your own life and for the advancement of society.

With regards,

Dr. Jayaprakash R.K
Director
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Each chapter 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 1

Design Factory

Several people were trying to load a few massive boards wrapped in vibrant colours onto a vehicle. Some of the boards feature smiling faces, while others display tightly packed lines resembling dancing figures. A few are entirely filled with words. Scattered around, both big and small boards seem to be waiting for someone to pick them up.

As we stepped into the long veranda, lined on both sides with canvases covered in vivid drawings and writings, a man emerged. Wiping his hands on a piece of cotton waste and holding a brush that seemed ready to drip ink into one of the paint cups, he looked every bit the artist. He and his friends had beautifully written the name of the school on the top of our new school building.

He invited us into a large, beautifully decorated room. Inside, several people were working on computers with large screens, alongside printing machines unlike any we had seen before. In this room, letters, lines, shapes, and colours come together to create paintings that speak volumes.

Even the simplest line in their work can bring joy to anyone who sees it.

"This is where graphic designing happens," he said.

After visiting a design studio near the school and becoming quite familiar with graphic design, Sitara and her friends started preparing a description of it, as directed by their teacher.

Graphic Designing: The World of Lines and Colours

Have you ever seen posters, banners, and boards used to promote ideas and products, and noticed their content and design?

Making posters and banners is a form of creative work. Many artists involved in designing posters and banners for various events in our region often use graphic editing software to assist in their work.

We have become familiar with various graphic design software in previous years. Free software such as GIMP, Krita, Inkscape, Scribus, and LibreOffice Draw, which are available on our school laptops, can be used for graphic editing tasks. Inkscape and LibreOffice Draw belong to the category of vector graphic editing software. The products created with these tools offer numerous advantages.

Inkscape is a free graphic designing software that both artists and web developers use to create high-quality vector designs. How about using Inkscape to design a digital poster to commemorate Hiroshima Day?

You have already created notices, wall magazines, and posters. What are the steps to design a poster on a computer?

- Creating canvas as per the requirement.
- Adding text in the right way to effectively share the message of the poster.
- Arrangement of drawings, images, and shapes to make the poster attractive.
- .....
- .....
- .....

Inkscape, a Design Factory

Inkscape is a Free vector graphic designing software. Inkscape is widely used to design logos, illustrations, posters, brochures, and typography with accuracy and creativity. This software has many tools that are easy to use for tasks like drawing, shape creation, and editing.

Inkscape's default file format is Scalable Vector Graphics (SVG). Inkscape supports file formats such as SVG, AI, EPS, PDF, PS, and PNG.

Let's see how these elements can be put together in the poster to create a design that stands out and grabs the viewer's attention.

Open the Inkscape software on your computer to create a poster. Let's explore the window that opens up. (Fig 1.1)

On the left side of the screen, you can see the Inkscape tools and the **colour palette** below. Place the mouse on each tool to see its name.

Now, let's begin creating the poster.

First, we need to set up the canvas.

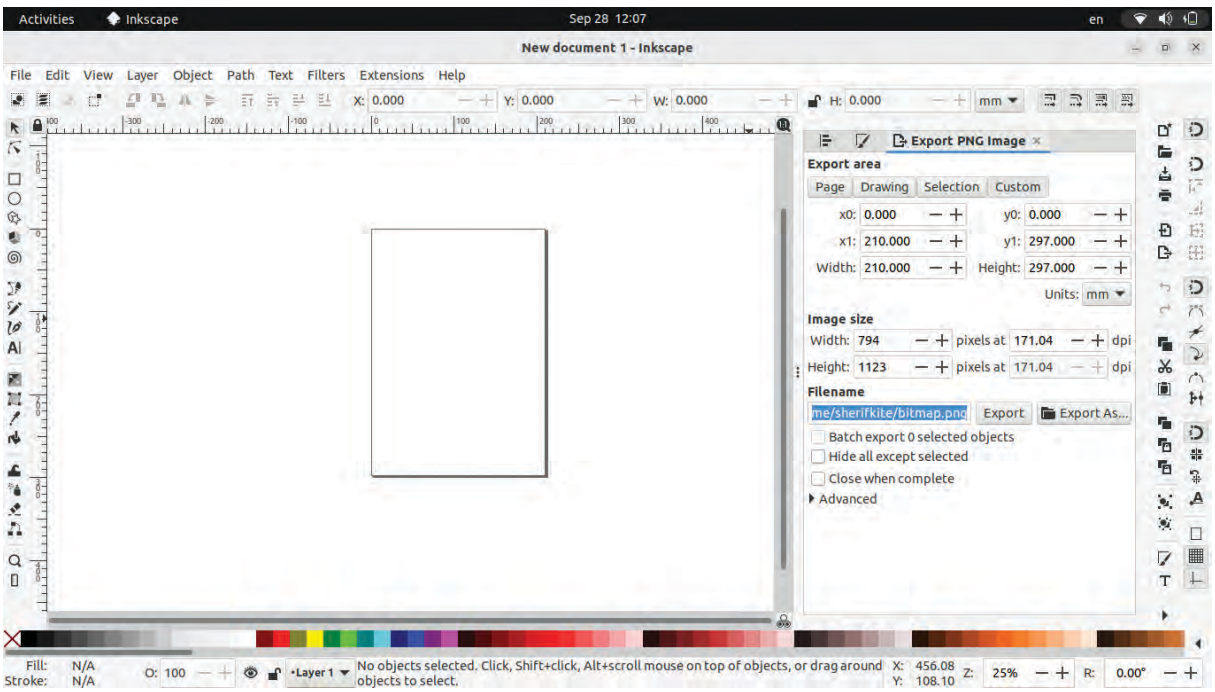


Fig 1.1 Inkscape Window

Let's prepare the canvas

You can't create a picture without a canvas. The canvas serves as the foundation for the ideas on a poster to grow and develop. Inkscape allows you to choose a page size that best suits your design. You can change the page size, units, and orientation at any time while creating your poster.

The workspace in Inkscape includes the empty area outside the page as well. This area can also be used to create design elements.

We have to create a poster with dimensions of 300 mm x 350 mm. Open the **Document Properties** window in Inkscape and adjust the page size to match the dimensions of our poster.

To Adjust the Page Size

- Open in the order of **File → Document Properties** (you can also use the shortcut key Shift + Ctrl + D).
- In the window that opens, you can either choose an existing page size or type the width and height in the units you want to create the page.
- Here, you can also select the page orientation. (Fig 1.3)

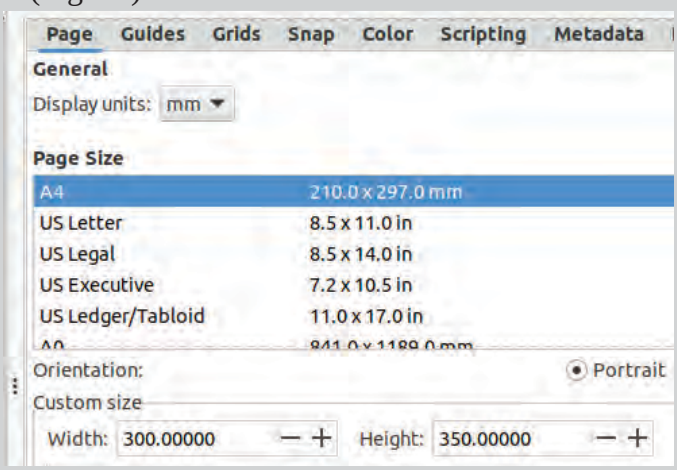


Fig 1.3 Document Properties Window

Let's Draw, Write, and Explore Tools

Inkscape offers a wide range of tools for both simple and complex graphic design tasks. Select tools from the toolbar on the left side of the canvas, draw various shapes in the workspace, and explore their uses. Then complete Table 1.1.

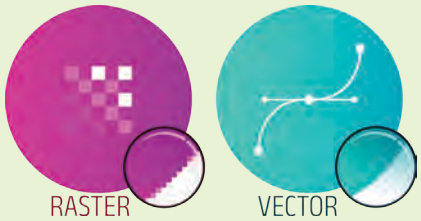


Fig 1.2 Raster and Vector

Vector Images
Raster Images

The software GIMP and Krita, which you have learned about in previous classes, are Raster image editing tools. Since Raster images are made up of pixels, they may become pixelated or lose quality when scaled. JPEG and PNG are examples of Raster file formats.

Vector images are those that can be resized without losing quality. They are created using mathematical equations that define the lines and shapes. Their features include ease of editing, the ability to scale without loss of quality, and small file size. SVG and EPS are vector file formats.

Tools in Inkscape

- Select **Create Rectangle & Squares** (R) from the toolbar to draw a square.
- Clicking on this square a second time will allow you to rotate it, converting it into a Parallelogram (Fig 1.4).
- You can select objects using the **Select and Transform Objects** (S) tool to change their size.
- Resizing the object by pressing the Ctrl key, will resize the object's length and width proportionally.

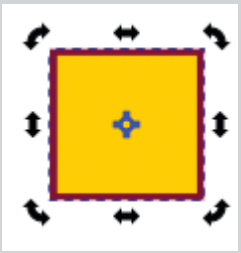


Fig 1.4 On clicking the object a second time

- By clicking on the **colour palette** and selecting **Fill Color**, a colour can be applied to objects. Holding Shift while selecting a colour will add the color to the object's border (Stroke).
- Formatting can be done by taking the **Create & edit text objects** (T) tool from the toolbar and typing the text (text format options appear in the **Tool Controls bar** at the top of the window when text is selected - Fig 1.5).

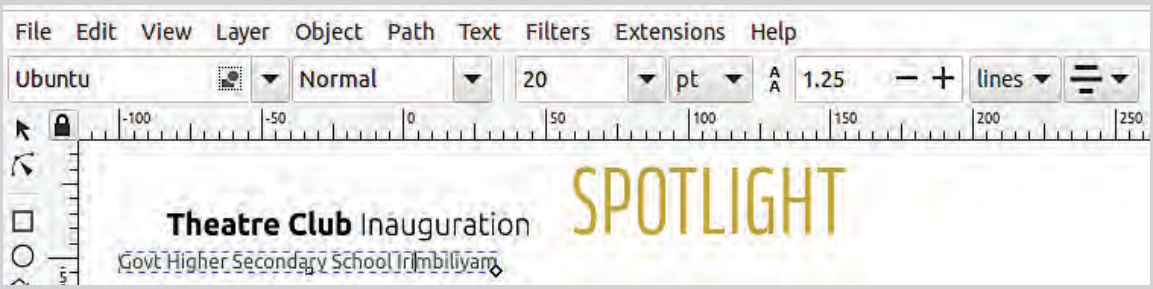


Fig 1.5 Text Format options

Tools	Use
Create circles, ellipses, and arcs (E)	To draw circle
Draw Bezier curves and straight lines (B)	
Draw free hand lines (P)	
Edit Path by nodes (N)	
Create and edit Gradients (G)	

Table 1.1 Some tools in Inkscape and their uses

A Background for the Poster

The background of a poster gives it life. The background plays a significant role in the overall appeal and effectiveness of the product.

The background colour of the poster can be chosen based on the type of content that will be added later. Let's see how we can create a background for our poster.

You can use a single color (solid color), a blend of multiple colours (gradient colour), or an image, either individually or combined, for the background. Let's follow these steps to give our poster a solid colour background.

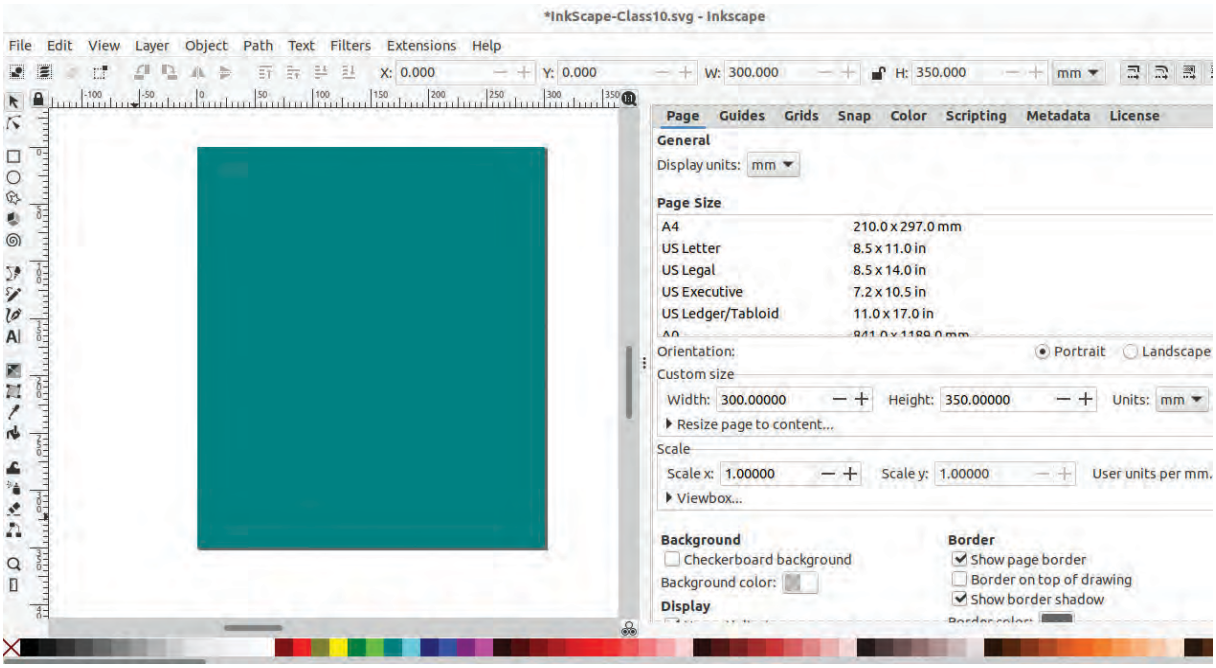


Fig 1.6 After Completing the Poster Background

To Remove Colour

To remove the colour assigned to objects, simply use the X at the left end of the colour palette. Holding Shift while performing this action will remove the stroke colour.

To make background for poster

- Select the **Create Rectangles & Squares** (R) tool from the toolbar and draw a square on the page as shown in Fig. 1.6.

- To adjust the size of the rectangle precisely, select the rectangle using the **Select Tool**, and then type Width & Height (the same values as previously entered for the page) in the **Tools Controls bar**.
- To position this square exactly on the page, set the X, Y values to 0 (zero) in the formatting toolbar.
- Select an appropriate colour from the palette below (the selected colour can be changed later if needed).

Be Clear and Loud

The message on a poster is an important part of communicating its idea clearly. The style, size, colour, and arrangement of the text should be designed in an attractive way. Designers often focus on delivering the message using as few words as possible but in the most powerful way.

We are creating a poster for Hiroshima Day. Before you start designing, it's important to decide what message you want to share with people and how the design should look. Use the text tool to add an anti-war message to your poster, similar to the one in Fig. 1.7.

Adding Text to the Poster

- Using the **Create and edit text objects** (T) tool, add the text to the poster. (Example: SAY NO TO WAR, AUG 06, HIROSHIMA DAY)
- It is better to type words that require different formatting in separate text boxes.
- Select the *Font Type*, *Size*, *Colour* and *Position* to make the text attractive. (Here, Font: Ubuntu Condensed, Size: 125 pt, Stroke Line Width: 2.5 mm are given.)
- To access the stroke settings, select **Fill and Stroke** from the **Object** menu.

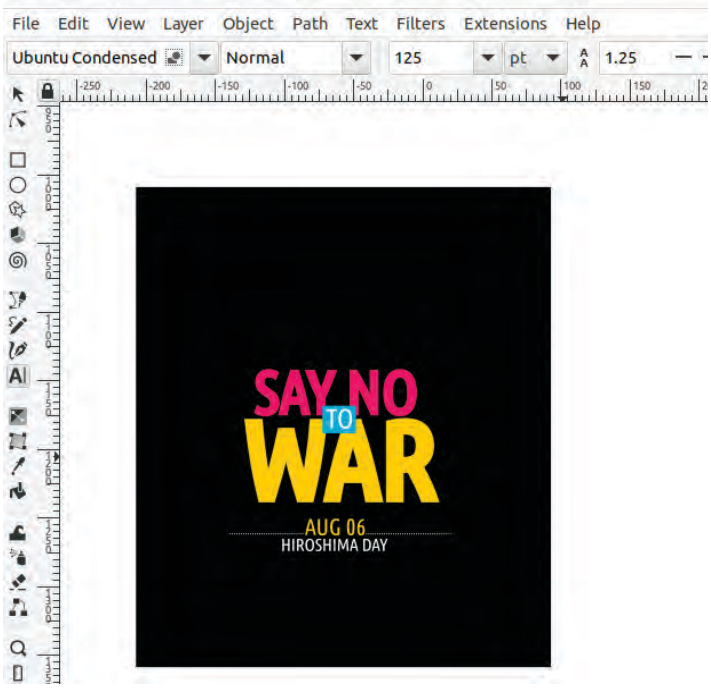


Fig 1.7 Text Formatting

Try arranging the typed message in the background as shown in Fig 1.7. Change the background colour according to the texts.

Image Design and Editing

Including a picture or design that represents the idea in a poster helps to communicate easily with viewers. Inkscape provides facilities to draw simple images, add photos, and edit them as needed.

The message of Hiroshima Day is against war. White colour, olive branches, and doves are often used as symbols of peace.

Including an image of a dove flying with olive leaves in the poster would make this idea clearer. Shall we try it?

A drawing of a dove (dove.svg) created in Inkscape is available in the **School_Resources** folder.

Open this file in Inkscape through **File → Open**, then copy the image and paste it onto the canvas. (Fig 1.8)

Message in the Poster

We know that the events in Hiroshima and Nagasaki were unprecedented acts of inhumanity in history. Shouldn't the message against war be the focus of this poster?

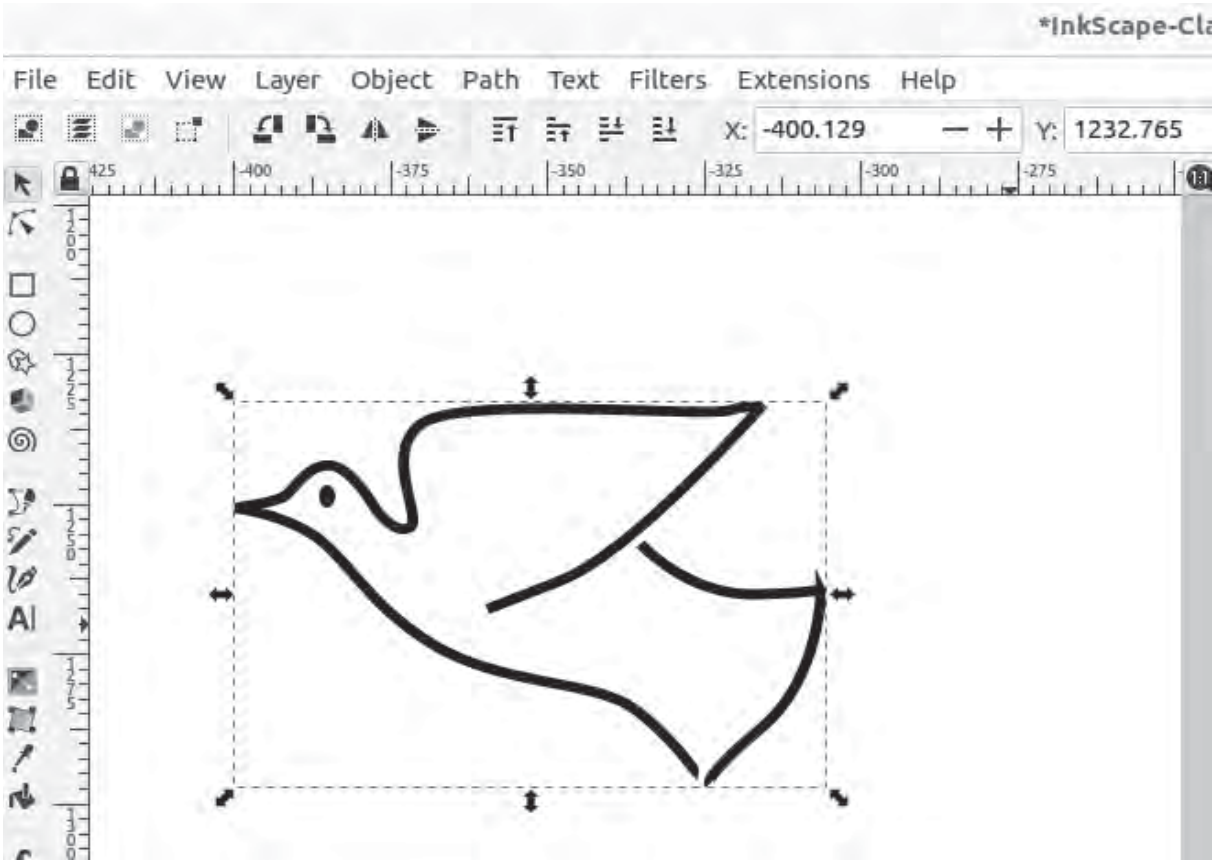


Fig 1.8 Picture of Dove Drawn in Inkscape

The outline of the dove is drawn using the **Bezier Curve** tool. The **Bezier Curve** Tool (B) in Inkscape is used to create regular lines and curved shapes.

Now we need the olive leaf. Let's draw it using the **Bezier Curve** tool.

Bezier Curve Tool

The **Draw Bezier curves and straight lines** tool (Pen Tool) in Inkscape is an important tool. This name is derived from the name of Pierre Bézier (1910-1999), a French engineer.

It is used to draw straight lines and curves that can be adjusted using Nodes and Handles

The Bezier Curve tool can be used to design complex shapes, logos, illustrations, and fonts.

First draw the Leaf Stalk as shown in Fig 1.9.

To Draw the Leaf Stalk

- Select the Bezier Curve tool and click where you want to draw on the canvas (an anchor point is formed there).
- Move the mouse and click at the point where you want to end the line, then press **Enter**. (The line can also be ended by Double-click or Right-click at the endpoint).
- To curve the line on both sides, select the **Edit path by nodes** (N) tool and click on the parts of the line where you want to curve, then drag them (see Fig 1.9).

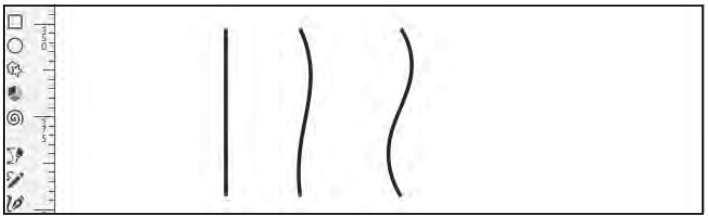


Fig 1.9 Olive Leaf Stalk Created with Bezier Curve tool

Now, using the tool **Create circles, ellipses and arcs** (E), olive leaves can be drawn

To Draw the Olive Leaves

- Draw a small circle using Create circles, ellipses, and arcs (E).
- Duplicate it (Select the circle→**Edit→Duplicate** (Ctrl+D) and combine it in such a way that the halves meet together.
- Give a different colour to the second circle created and reduce its Opacity. (To reduce the Opacity, just enter a number below 100 in the Opacity window found below the colour palette. (Example: 70) - see Fig 1.10).
- Now the common part of the two circles is in the shape of a leaf. To retain only this part, select both circles together and click on Intersection in the Path menu.
- Take duplicates of this as needed and place them at various spots on the stem that was drawn earlier.

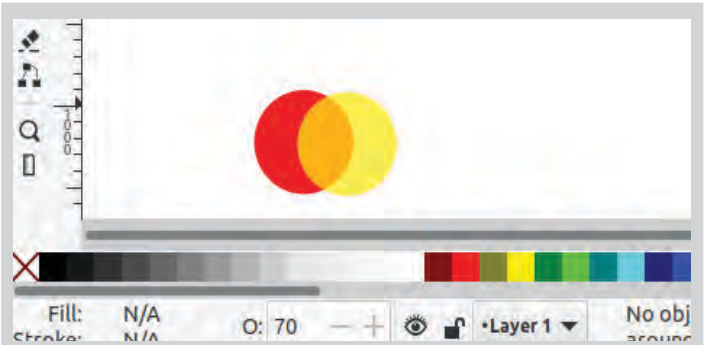


Fig 1.10 First phase of drawing the leaves

Enhancing Shapes

Using **Fill and Stroke**, colours can be applied to both the interior and the border of shapes. The Stroke style window allows choosing different types of borders and adjusting their thickness.

To blend edges and bring shadows and a three-dimensional effect to designs, the blur option in the same window can be used. The Opacity adjustment is used to control the transparency of colours, making shapes partially or fully visible.

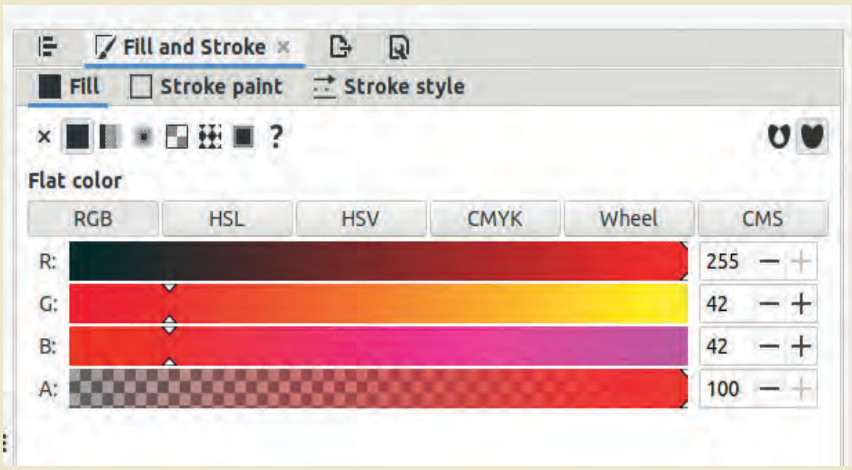


Fig 1.11 Fille and Stroke window

Make sure to adjust the size and orientation of the leaf accordingly. Don't forget to give colours that match the olive's stem and leaves. (Fig 1.12)

Once the activity is completed, select both the leaf and the stalk. Then, group them by pressing **Ctrl+G**. After attaching the brick to the dove's beak, the image of the dove flying with the olive leaf is completed.

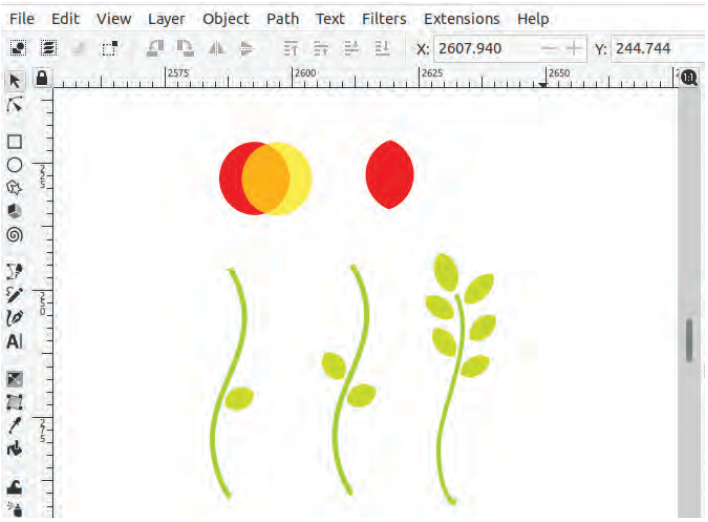


Fig 1.12 Olive Leaves Drawn in Inkscape

Making the Picture Attractive

We can include the dove flying towards the sky with an olive leaf of peace in our poster. What can be done to make this image more attractive?

Draw a circle and add it to the background of the image.

Drawing a Circle as the Background for the Picture

- Take the **Create circles, ellipses and arcs** (E) tool and draw a small circle. You can give the circle red colour.
- Bring the flying dove with the leaf into this circle.
- Right now,the circle is on top, and the dove is underneath. Use the **Pg Up** and **Pg Dn** keys to bring the dove to the top.
- To change the colour of the lines (Stroke colour) used to draw the dove (e.g.white), select the image and hold down the Shift key while clicking on the desired colour.(Fig 1.13)

How about improving the circle we created by adding a few smaller circles within it to form a pattern and make the design more attractive?

First, remove the dove from the circle, and then make changes to the background circle.

Fig 1.13 When background is added to the picture

Try the activities given below.

Pattern can be Created by Joining Multiple Circles

- Duplicate a circle, reduce its size slightly, and arrange it inside the original circle. (Make sure the ratio of the circle does not change when altering the size).
- The new circle can be given a slightly darker colour than the existing one.
- Draw a few more circles in this manner, gradually decreasing in size, and arrange them so that they come to the centre of the circle, giving them more and more dark colours.
- Use Align and Distribute in the Object menu to align and arrange multiple shapes as desired (Figure 1.14).

Align and Distribute

Align & Distribute is a powerful tool for arranging design elements with accuracy. It allows you to position multiple objects as intended, either next to each other or relative to the page.

You can open this window by pressing the Shift + Ctrl + A keys together.

The items can be arranged either by their page order or based on the first or last item selected.

The **Align & Distribute** feature is especially helpful for designs that require high accuracy.

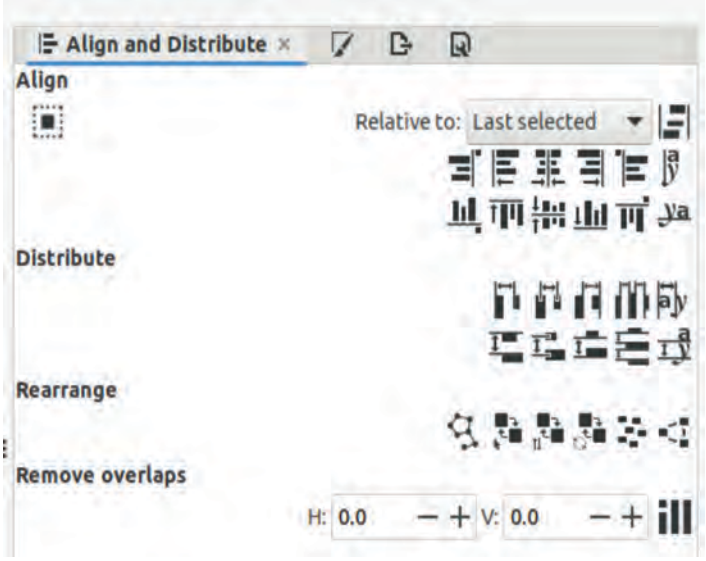


Fig 1.14 Align & Distribute Window

Find out the method in **Align and Distribute** which was used to arrange the circles concentrically.

The circle pattern is ready as the new background. Now, reattach the image of the flying dove holding the olive leaf at the top of the circle. Do you notice anything strange?

The dove and the olive leaf have gone below the circle, haven't they?

- Which key can be used to bring the dove to the top?
- What must be done to make this dove turn right as in Fig 1.15? Check the **Tool Controls bar** at the top of the canvas to see if this option is available.
- Can we position the dove's beak slightly outside the circle?

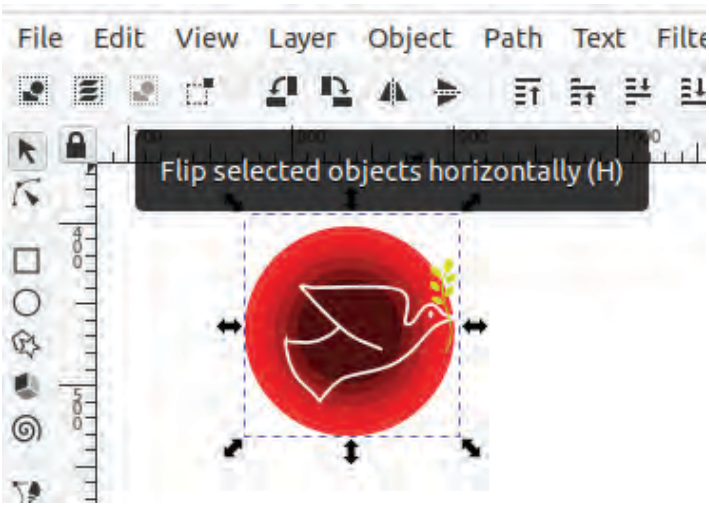


Fig 1.15 Flipped Image

Once the text, images, and other design elements needed for a poster are ready, the final step is to arrange them in an attractive and effective layout.

Arrange the image and text in appropriate positions above the square background of the poster. Ensure a balanced relationship between all the design elements.

When you revisit the poster and imagine yourself as a viewer with different preferences, you'll likely spot areas that can be improved. Use your creativity to

Digital posters are visual communication tools created using graphic designing software. They convey messages through design elements such as text, graphics, and imagery.

They are especially useful for sharing ideas on social media platforms. Digital posters differ from traditional posters due to their variety, ability to be continuously updated, and potential for widespread distribution.

add and refine details, making the poster more visually appealing (Fig 1.16).

Fig 1.16 The Completed Poster - Against War

Export the Poster from the Canvas

The anti-war poster for the Hiroshima Day campaign is now complete. **Save** the file once more.

Shouldn't the poster be exported from the canvas? We can convert the image to PNG format for convenient sharing through social media.

Export the poster you created to PNG format using the **Export PNG Image** option.

Exporting in Inkscape

Inkscape files can be exported to a variety of formats, including PNG, JPG and WEBP. Be sure to select the appropriate resolution, file size, and format for web and print projects. For screen/web display, a resolution of 96dpi is sufficient, while for print, 300dpi is preferred.

Export to PNG from Inkscape

- Select and group all the objects in the poster together.
- Select **File → Export PNG Image**. (Fig 1.17)
- In the window that opens on the right side, select **Selection** from the Export area. (You can export either the entire page or only the selected portions.)

- Make necessary changes in Resolution.
- Name the file and choose the folder to save it in.
- Then export the file.

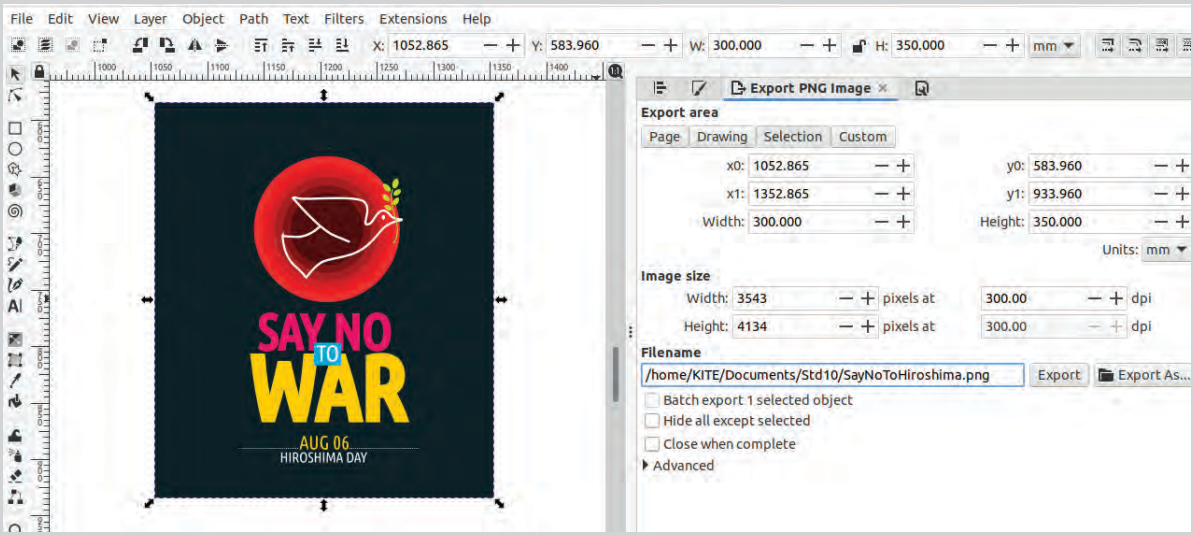


Fig 1.17 Inkscape - Export window

By the time the poster was finished, everyone had become skilled at designing. Now, prepare another poster on your own using Inkscape.

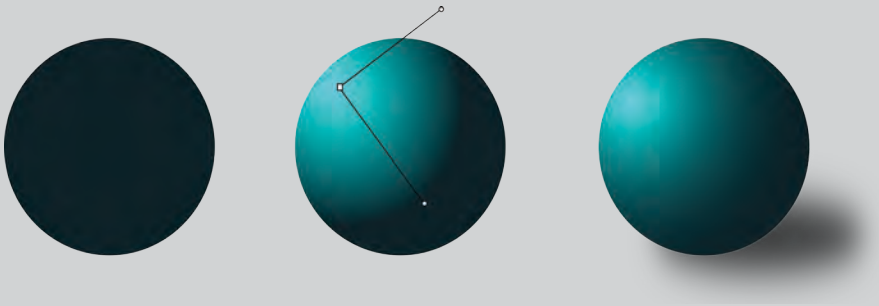
Shadows and Light in Harmony

It is easy to draw three-dimensional shapes using Inkscape. This is done by using shading that creates a sense of the glow and shadow that is created when light falls on an object. Inkscape's Gradient tool and Blur effect can be used for this purpose. Let's see how to draw a ball using these.

- Select the **Create circle and ellipses, arcs** (E) tool in Inkscape and draw a circle (you may need to hold down the Ctrl key to make it a full circle).
- A dark colour (e.g., dark blue) can be applied to the circle.
- Make a copy of the circle and place it on top (Ctrl+D).
- After selecting the **Create and Edit Gradients** (G) tool, choose **Radial Gradient** from the **Tool Controls bar**. Then, click on the upper circle and drag (the Gradient Handles will appear on the circle).
  - For shapes in a straight line, **Linear Gradient** should be used.

- Then, using the Edit paths by Nodes (N) tool, click on the middle of the Gradient Handles to give it a lighter colour (e.g. light blue) and click on the edges to give it a darker colour.
- Adjust the brightness of the light and the depth of the darkness on the opposite side by dragging, stretching, and repositioning the Gradient Handles as needed.

To add the ball's shadow, draw an ellipse beneath it and adjust its position and size. Set the colour to black, and in the **Fill and Stroke** window, adjust the Blur and Opacity settings as needed. Use the **Pg Dn** key to position the shadow below the ball.



Let's Assess

- Which tool should be used in Inkscape to create custom shapes by editing nodes and curves?

a) Rectangle Tool
b) Circle Tool
c) Pencil Tool
d) Bezier Tool

- What happens when two shapes are combined and selected in Inkscape, and the 'Path → Difference' operation is applied?

a) The two shapes combine to form one.

b) The part where the two shapes join is removed from the figure below..

c) Copies of both shapes are created.

d) The two shapes are divided into two parts.

- What happens if you set the Transparency of an object to 0% in Inkscape?

a) The object becomes transparent and cannot be seen.

b) The object turns white.

c) The object turns black.

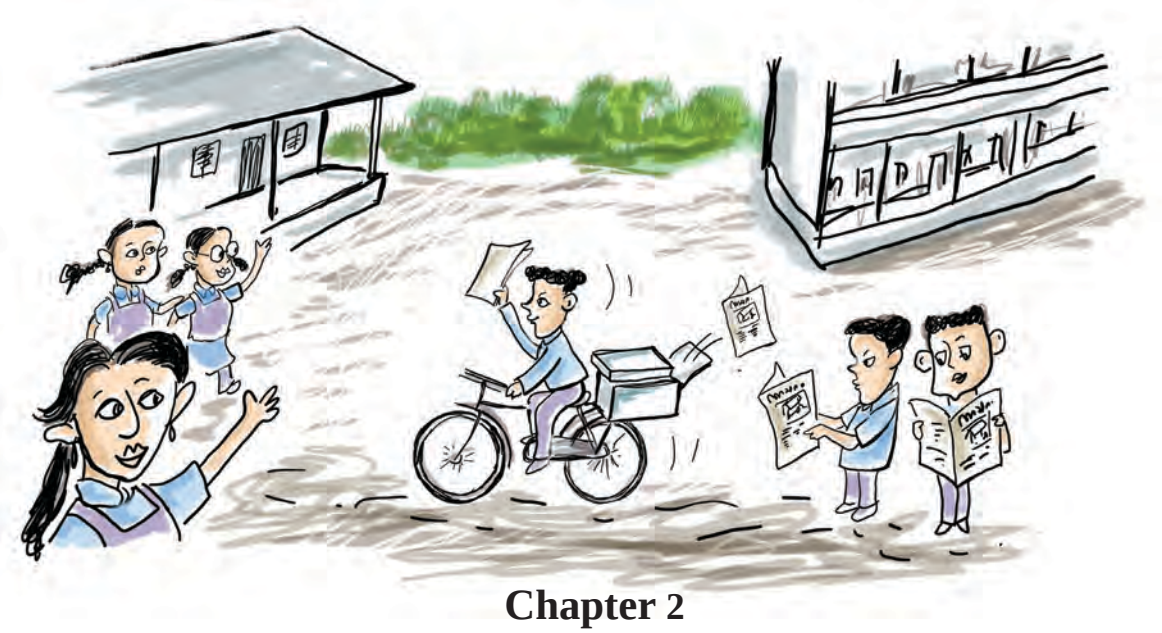
d) The object is removed from the canvas.

Extended Activities

1. Use Inkscape to create more smilies similar to these.

2. Draw the shape given below in Inkscape. Use 'Linear gradient' to design the outside of the cylinder.

3. A 6'x3' banner is needed to be placed behind the stage at the releasing ceremony of a short film made by teachers and students of the school. Design this banner in Inkscape and export it as a PNG file.
4. Prepare a cover page for the magazine that is intended to be published by the Vidyarangam Kala Sahithyavedi.
5. Imagine your school is hosting the Little Kites District-level camp this year. Use Inkscape to design a badge for the children participating in the camp.



Chapter 2

Let's Prepare a Newspaper

How many attractive and well-designed publications do we get to read every day! Check out the newspapers, periodicals and books that are available in the 'reading corner' of your school and library. Have you noticed the features of the arrangement of content in these?

News magazines and books which are published with excellent designs communicate with readers clearly. What makes each publication better is its visual beauty along with the quality of its content. With the advent of technology, we have developed new techniques and possibilities to make and improve the design of pages attractive.

Effective communication is the core of a page design. Newspapers and publishers have developed their own design style to make the content attractive.

Have you too come across the situations of page design ? We may require tools and techniques related to page design while preparing school newspaper to share the school news and reports and also while preparing digital magazines.

"Well designed pages are like an artwork.

They keep on talking to us."

A newspaper for School

Look at Fig 2.1. The image shows the sample of the front page of a school newspaper published by a school in Idukki district. What are the features of its design?

Fig 2.1 School Newspaper- Model

- Large heading.
- Excellent arrangement of news.
- Content divided into columns.
- .....

When designing newspapers or magazines, factors such as the images, fonts, headings, colours, captions, arrangement of letters and use of blank spaces play a crucial role in making the pages visually appealing. In earlier classes, we learned how to

create documents using LibreOffice Writer. However, specialized Desktop Publishing (DTP) software is used to design pages for publication and to prepare multi-page documents. The process of designing and publishing newspapers, magazines, books, etc., using such software is known as Desktop Publishing.

Now, let's try creating a school newspaper, as shown in Figure 2.1, using a DTP software called Scribus, which is available on our computers.

Desktop Publishing (DTP)

Desktop Publishing (DTP) is a method of preparing and printing pages using various designing software on a computer. In the past, the process of publishing a book involved multiple stages, with different professionals (such as typists, graphic designers, copywriters, typesetters, and printers) working on separate tasks. With the advent of DTP, these steps can now be completed quickly by one person or a team of experts, all working at the same location using graphics-based computers.

Scribus is a popular open-source desktop publishing software used for designing magazines, books, and newspaper pages. Many well-known Malayalam newspapers today use Scribus to design their pages. Other notable DTP software includes LaTeX, Adobe InDesign, Microsoft Publisher and QuarkXPress.

To the Page Design …

Look at Fig 2.1. The model of the first page of the newspaper we are going to create is shown here. What are the key features of this page?

The design of the front page is crucial in a newspaper layout because it acts as the "window" to the newspaper and showcases the most important news. The design style of the front page must be eye-catching and impactful. This page presents only brief snippets of information and images, without detailing the full news stories. Hints about the content in the inner pages are also provided here.

The design of such a page can be completed through various steps.

This is done by predetermining the page settings of the document we intend to print, in DTP software like Scribus.

Here we are going to prepare a document containing two pages. Open Scribus and start a new document for our newspaper after setting the necessary page configurations.

To Start a New Document in Scribus

- Open Scribus and select suitable Page Layout (here single page) from the **New Document** window.
- Select various settings like *page size, number of pages, orientation, margin* etc. from here.
- Then enter **OK**.

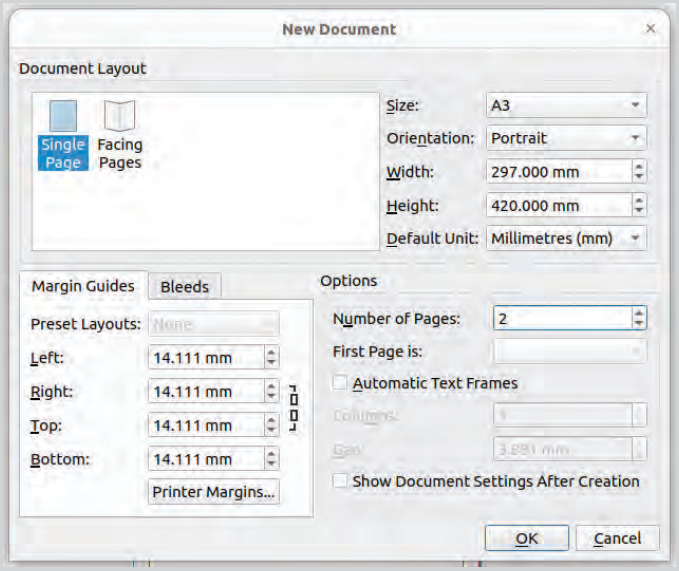


Fig 2.2 Scribus New Document Window

Have you opened a new document in Scribus ?

Look at the Scribus window that is now open. Check the tools and facilities for page design in this window. Take a look at Fig 2.3 for assistance.

Prepare Content

Collect news, images, cartoons etc., for preparing your school newspaper and save them to the computer.

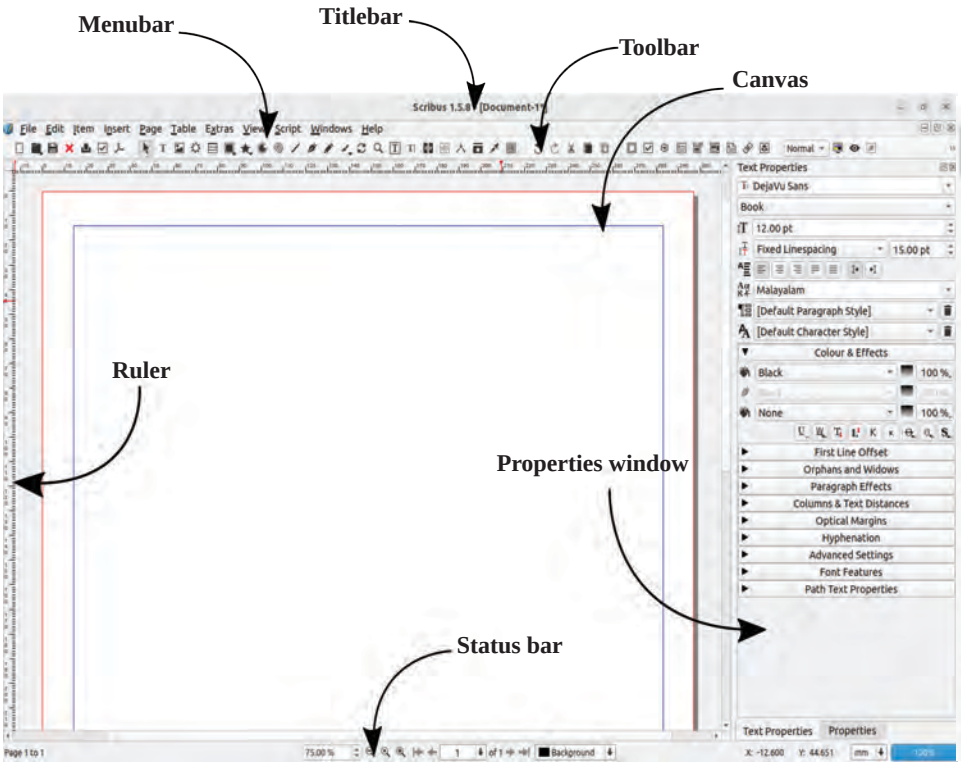


Fig 2.3 Scribus window

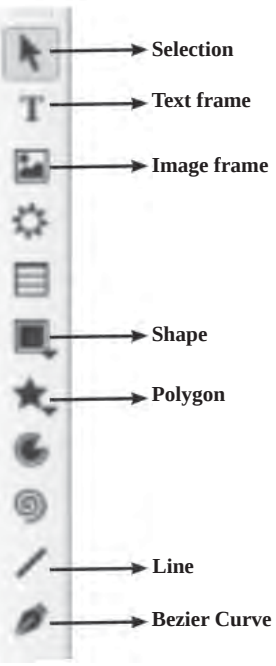


Fig 2.4 Tools in Scribus

Let's prepare a banner

Have you familiarised with the tools and facilities in Scribus.

Look at the Fig 2.5. As part of page designing we shall prepare a banner shape as in the model first.

Fig 2.5 Banner Model

We can use different types of shapes in page designing to communicate the idea clearly. Shapes help us determine the importance of the content and arrange the content on the page in a way that grabs the reader's attention.

Create a banner for the front page of your school newspaper in Scribus using shapes like the one in Figure 2.5. The **Shape** tool can be used for this.

To Prepare Shapes in Scribus

- Select the **Shape** tool from the toolbar and draw a square on the canvas (Fig 2.6).
- The dimensions are displayed at xyz at the top of the **Properties** part of the drawing. Enter the required dimensions here.

(Height : 28 mm, X-Pos :14,

(Y-Pos : 83, Width :145)

Properties Window

Additional techniques related to the arrangement of objects included in a page in Scribus are available in its **Properties** window. You will see separate properties windows for objects and texts. These windows can be seen from the **Windows** menu or from the menu obtained when right-clicked on the object.

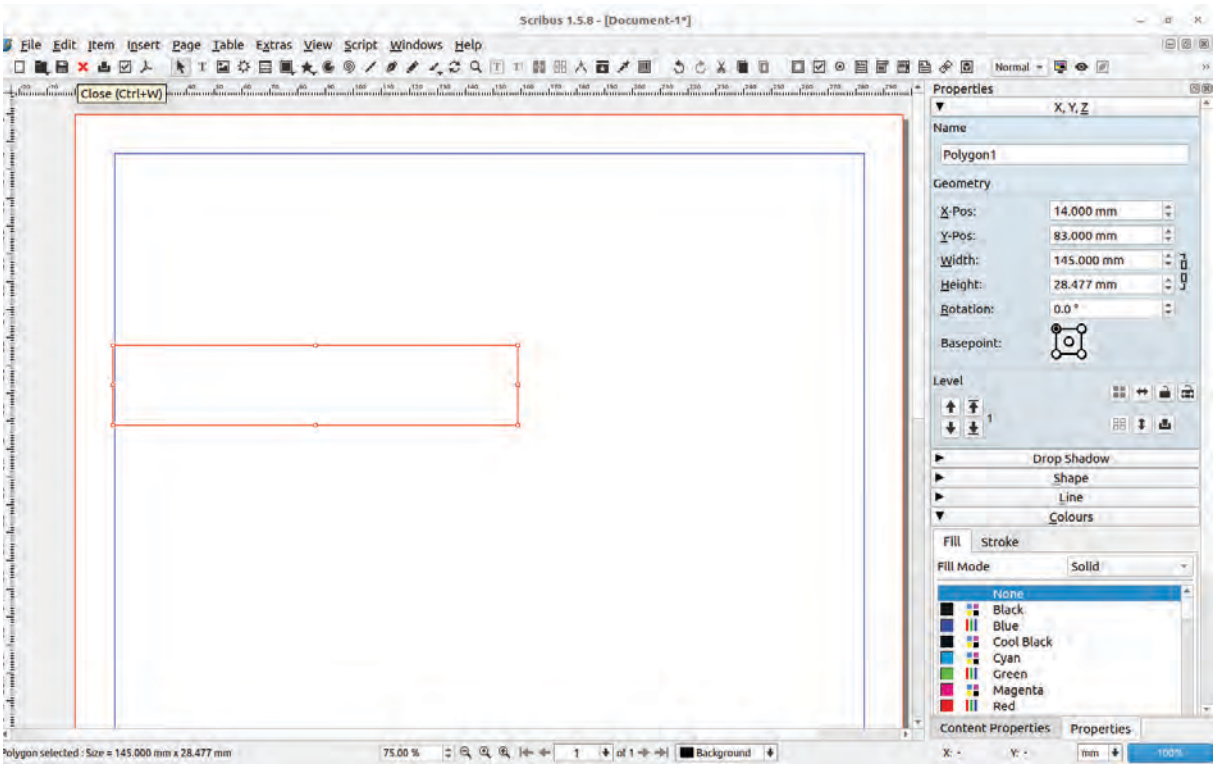


Fig 2.6 Shape Drawn Using Shape tool

Colour the Square

We have already understood that the choice and combination of colours play a crucial role in graphic design. Colours are equally important in page design when using graphics, as they can effectively draw the viewer's attention.

Examine the newspapers and periodicals available in your school to observe the types of colours used in them.

Now, let's proceed to colour the square we have drawn (Fig 2.7).

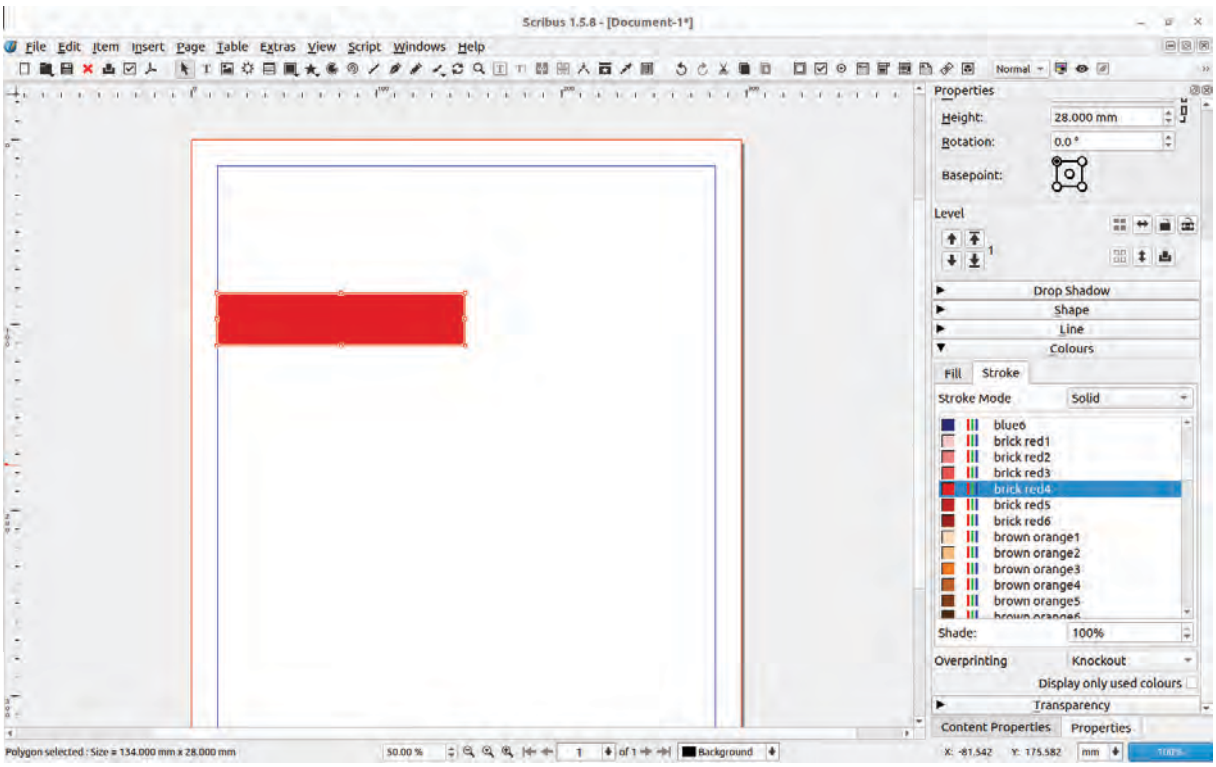


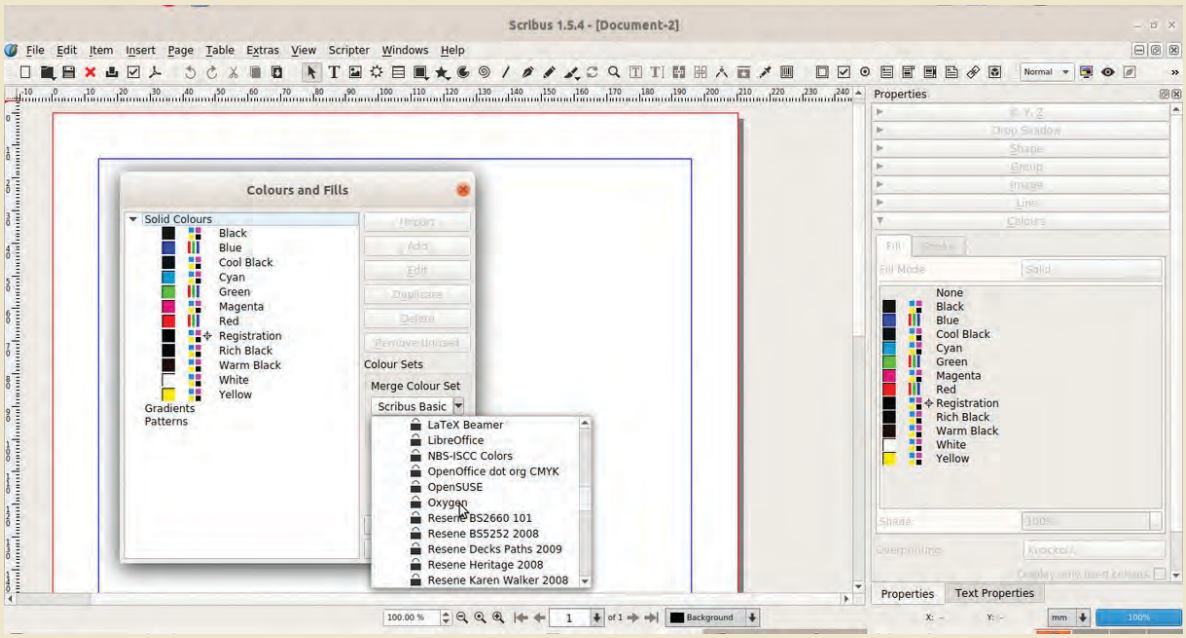
Fig 2.7 Coloured Shape

To Give Colour to Object in Scribus

- After selecting the rectangle, open the tab **Colours** from the **Properties** window.
- Select the required colour in the **Fill mode** from **Fill**.
- Select **None** in the **Stroke** tab as there is no need of stroke colour here.

Colour Palette in Scribus

In Scribus, there are three different methods to colour a shape namely Solid, Gradient, Hatch. Only limited number of colours will be displayed by default in the Colour Palette of the **Properties** window. Click on the **Colours and Fills** from **Edit** menu in order to get more colours. We can see the options for adding and removing colour here. In the **Merge Colour Set** seen here select **Oxygen** instead of **Scribus Basic** and click **OK**. What change has occurred in the Colour Palette?



Adjust the Shape of the Figure

Observe the shape of the rectangle of the model of the banner (Fig 2.5). How can we change the shape of the rectangle we have drawn? Let's do this activity.

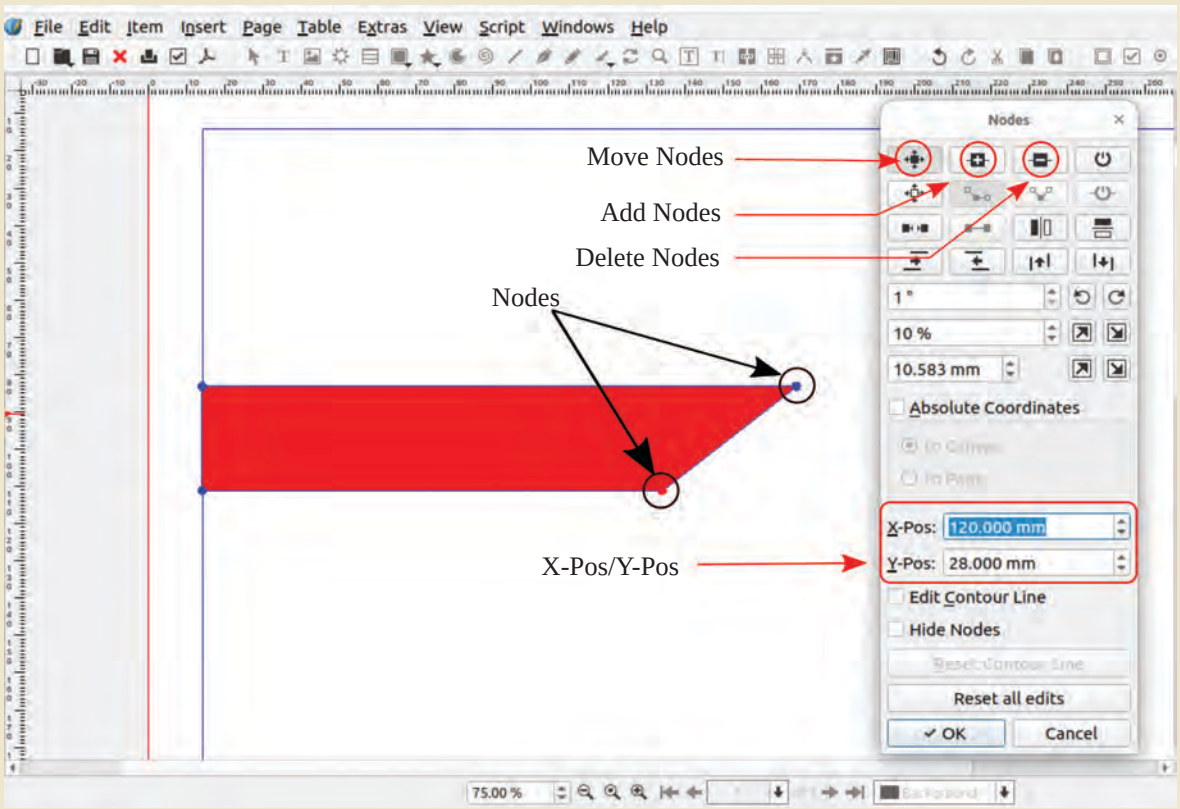
We can change the shape of the figure drawn in Scribus in various ways. Node Editing is a technique for that.

Fig 2.8 When the Shape of the Figure is Changed

Node Editing in Scribus

We know how to change the shape of figures using **Edit paths by nodes** in Inkscape software. Such an option to change the shape of figures using Node Editing is available in Scribus also.

In Scribus, the **Node Editing** window will be displayed when double clicked on an object for editing its Path. We can change the nodes, add new nodes or delete a node as needed.



To Change the Dimension of the Shape

- Double click on the drawn Shape and open the **Node Editing** window.
- Change the value in the **X-Pos** box in the Node window after clicking on the right bottom corner of the Shape.

If we make a small change in the size of the prepared shape using the Node Editing technique, we will get the new shape as shown in Fige 2.8. The width of the current shape is 145 mm. Change the width of its bottom side to 120mm instead of 145mm.

With this, we can see that the position of the selected node has been shifted slightly to left and the width of the rectangle in this side has been slightly reduced. Now we get the desired shape (Fig 2.9).

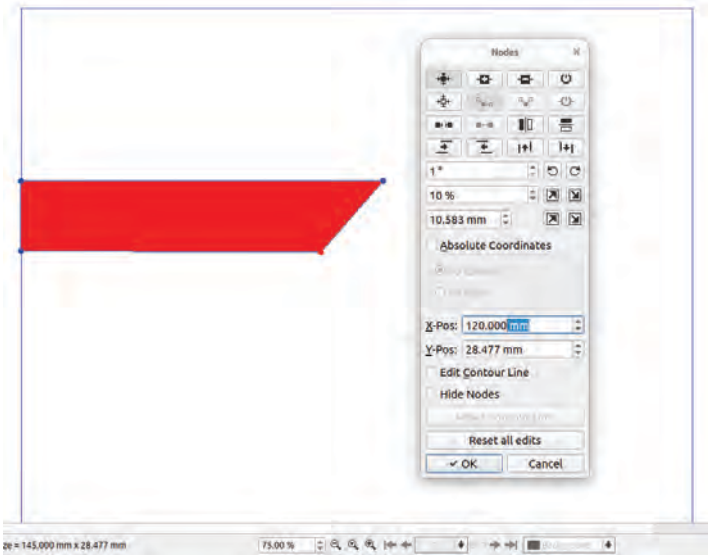


Fig 2.9 Node Editing Window

Now, take a copy of this shape in order to prepare the black coloured shape seen on the right side. Remember that you have to flip it to get the new shape.

To Prepare the Black Coloured Shape

- Select the first shape and copy it by clicking **Item → Duplicate/Transform→ Duplicate**.
- Give black colour to the copied shape.
- After that, click **Flip horizontally** under **X,Y,Z → Level** in **Properties** (Fig 2.10)
- Then, adjust the image as shown in Fig 2.11 using **Flip vertically** in the same window.
- Arrow keys on the keyboard can be used to adjust the two shapes accurately.

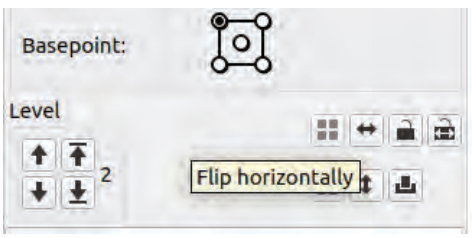


Fig 2.10 Level Window

Fig 2.11 Shape Obtained When Flipped

Apply Shadow to Object

The background of the banner has been created. If we give shadow to the shape prepared now, it will make the banner more attractive.

We can give shadow to the objects using **Drop Shadow** option in Scribus.

Give Shadow to the object you have prepared now. (Fig 2.12).

To Arrange the Shadow

- After selecting the object to which shadow has to be given, click on the **Drop Shadow** tab in the **Properties** window.
- Put a tick (✓) mark in the check box of **Has Drop Shadow** in the window that appears now.

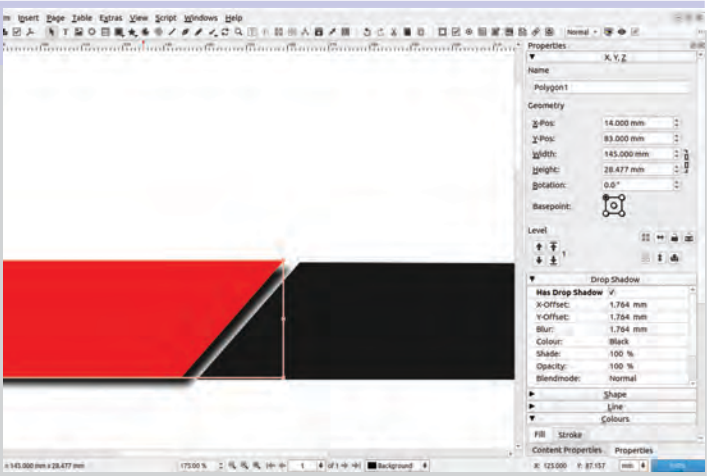


Fig 2.12 Image Giving Shadow

Have you finished giving shadow? Click on the **Preview Mode** icon in the toolbar to see what our design looks like. (Fig 2.13)

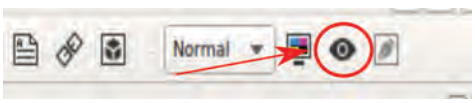


Fig 2.13 Preview Mode icon

Don't forget to save the work done so far **(File → Save)**.

Let's Give Title

The title of the newspaper is very important. A good header makes a document more distinctive and attractive.

Text frames are required to include and format sentences in Scribus. The text could be added only in text frames. The **Text frame** (T) tool is the option for adding text to a page in Scribus.

Let's prepare an attractive title for our newspaper using **Text frame**.

To Include Text in Scribus

- Select **Text frame** tool from the Toolbar. (This option is also available in **Insert** menu).
- Add **frame** by dragging in the canvas.
- Select required Font from the **Text Properties** window (Fig 2.14)

(In order to get Malayalam select Unicode Malayalam fonts)

- Click inside the **Text frame** and type the heading.
- Adjust the font size.

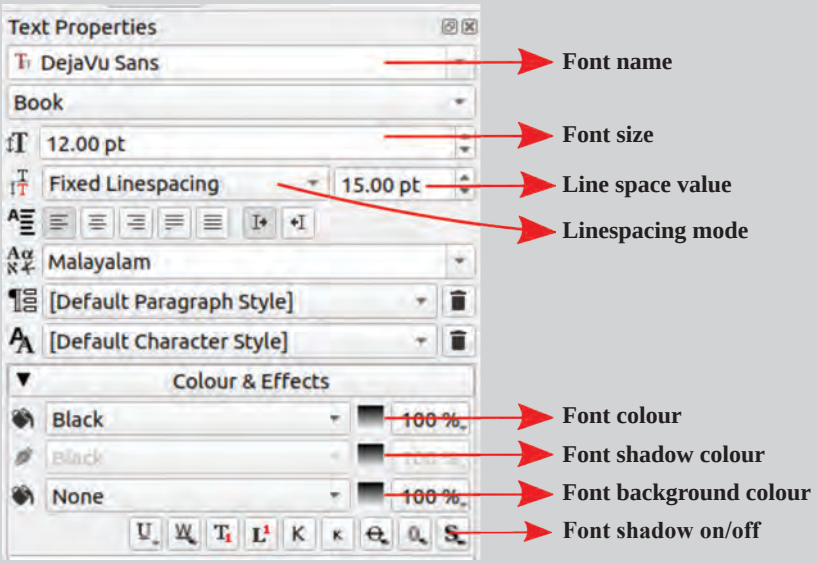


Fig 2.14 Text Properties Window

Let's Make the Title Attractive

It is possible to give a required colour to the title using **Colour & Effects** from the **Text Properties** window. Try giving different colours to the title of your newspaper and make it attractive.

What are the different options available in the **Text Properties** window for making the characters more attractive ? Complete the list given below.

- Colour & Effects
- ……..
- ……..
- ……..

While Adjusting the Font Size of the Characters

If the font size of the characters included in the page is larger than the size of the Text frames, then adjust the size by dragging the nodes available at the corners of the text frame.

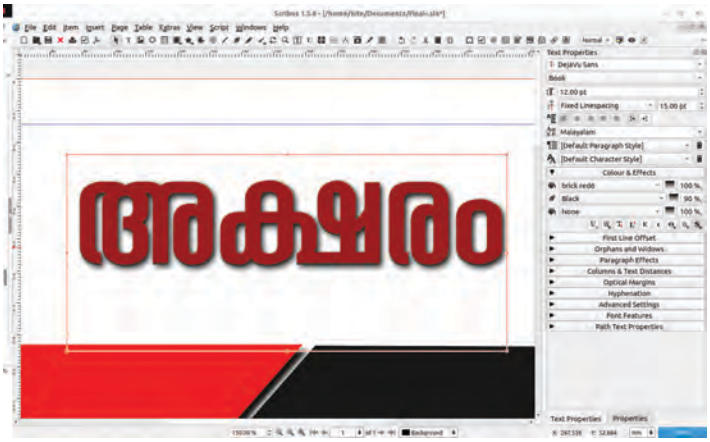


Fig 2.15 Title of the newspaper

Adjust the Line space

Automatic Line spacing can be used to adjust the spaces between the lines of the text.

To adjust the space between the words, select the whole content and apply **Justify** from the **Alignment** settings in **Text Properties** window.

Can you see a shadow of the title given in the figure 2.15 ? Give shadow to the title you have included as well.

Include Subtitles

Refer to Fig 2.16. The name of the school is added below the title as a subtitle, and the publication date of the newspaper is placed on the left side. Include similar elements in your page as required.

Fig 2.16 Subtitle Added to the Page

On the sample page (Figure 2.16), the email address is placed between two lines below the name of the school. Lines can be added in this way using the **Line** Tool in Scribus

To Include Lines

- Select **Line** tool from the Toolbar.
- Press the **Ctrl Key** in the keyboard, click on the starting point of the line and drag in straight.
- More lines can be added by taking copies of this line.

Complete the design shown in Figure 2.16 by adding lines using the Line tool and including the necessary text.

Include Images

A publication's first interaction with its readers is through the front page. Therefore, the selection of the content on the front page is very important.

We have recognized the importance of images in effectively communicating ideas. A powerful front-page image can capture the reader's attention and convey the message quickly.

How are images added to a page in Scribus?

You may have stored images on your computer that need to be included in your newspaper. Additionally, you can use the images available in the **School_Resources** folder.

To Include Image in a Page

- Select the **Image frame** from the toolbar.
- Then click and drag to the part where you want to insert the image and insert the frame.
- Right click on the frame and from the window that appears click on **Content → Get Image.**
- Open the folder containing the image and select the image and click **OK**.
- To adjust the image within the frame, right click on the image and select **Image → Adjust Image to Frame** (Fig 2.17)

Image Frames in Scribus

Image Frame is a technique for including images in Scribus. When you add an image frame to the page, it will be displayed as a rectangle.

The said frame can be changed accordingly to another shape if needed.

Image frames can also be created by drawing a shape using the **Shape Tool** and then select **Convert to Image frame** which is obtained on right clicking the shape.

Fig 2.17 Image Included in a Page

To Refine the Resolution of the Image

Right click on the image and give a tick mark to the **Full Resolution** from the **Preview Settings**.

Have you included the image ? Now, enlarge the frame using the **Selection** tool and adjust the image to the required size on the page.

You can also see the QR Code image of Schoolwiki school page on the right side of our newspaper headline. Similarly, include the QR Code image of your schoolwiki page on the top of the newspaper .

To Create QR Code

- Click on the Barcode icon on the Scribus Toolbar.
- Make the following changes in the **Insert Barcode** window that opens up (Fig 2.18)
  - Select **Two dimensional symbols** against **Barcode Family**.
  - Select **QR Code** against **Barcode.**
- Enter the schoolwiki page address of your school in **Contents**.
- Then click OK.
- You will get an image frame on the mouse now. Click and adjust where the QR Code is to be included.

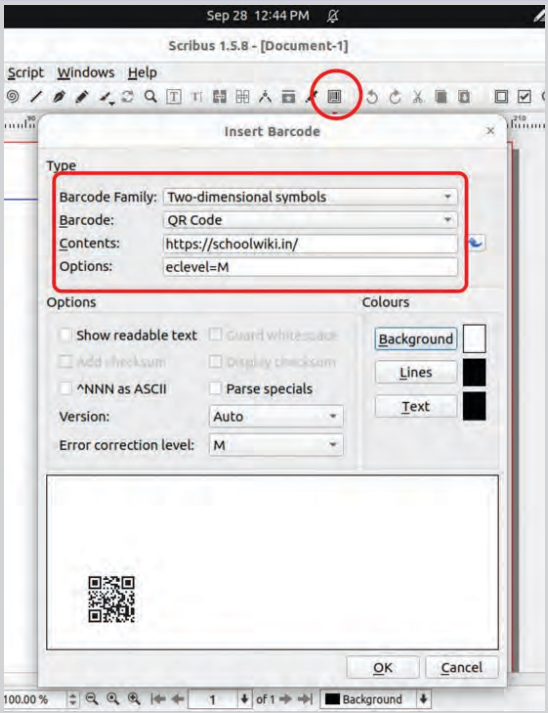


Fig 2.18 Scribus QR Code Window

So you have added the QR Code of SchoolWiki Page. What else should be added to the page?

- ……
- ……

We have not added news on the front page. For this, the news containing the special functions or activities of your school should be prepared and typed as a text file and make sure that it is saved on your computer.

Align the Letters

In newspapers, news is arranged in different columns. Vertically divided columns are an easy way to fit more letters in less space. The size of the columns vary in length depending on the importance of the news.

Content can be arranged appealingly using the Text frames and connected techniques in Scribus.

Arrange the collected news in different columns on the front page using the Text frame tool in Scribus.

To Arrange Text in Columns

- Select **Text frame** from the Toolbar.
- Adjust the **Text frame** by clicking and dragging below the image arranged on the page so that it fills up to the page margin.
- Click on the **Columns & Text Distance** tab in the **Text Properties** window and enter the number of columns and the gap.
- To bring the text into the frame enclosed in columns,
  - Right-click inside the **text frame**.
  - Then select the prepared text file from folder using **Content → Get Text** option and click **OK**.

Did you experience any difficulty in reading the Malayalam contents included in the **text frame**?

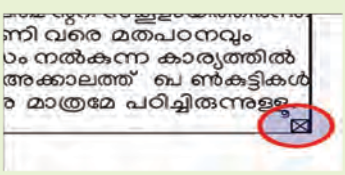
If the text other than English entered into Scribus are unreadable, we can solve it by adjusting the language and font of the content.

To set Malayalam Font in Scribus

- Select the whole text included in the frame (Ctrl + A).
- Select **Malayalam** from the Language box and select appropriate **Malayalam Unicode font** from the Font box available in the **Text Properties** window at the right side.

Text Overflow Icon

If the content placed in a **Text frame** exceeds the frame's capacity, an overflow icon appears at the right bottom of the frame to indicate that there is text remaining. By clicking on the icon, you can insert the rest of the content on the next page or anywhere else you want.



Look at the Malayalam content in your textbooks. The most important typeface used in its preparation is THUMBA, a Unicode font developed by CDIT, a government organization. What are the other Unicode Malayalam fonts?

Check your computer and complete the list given below.

- Manjari
- RIT Ezhuthu
- .....
- .....
- .....

Change the content added to the page to different fonts and observe the differences.

You may **save** the work you have done so far.

Images in between Text

When adding images to a Scribus page that contains text, sometimes the entire text may not appear alongside the image. In order to avoid the problem when text and images are mixed in this way, make necessary adjustments in ***Contour Line*** of the image.

To arrange images with texts

- Select the image.
- Select the **Shape → Text flow around frame** option in the **Properties** window.
- Click **Edit** next to Shape. A contour line will appear around the image.
- Adjust the distance of the contour line's nodes to the outside of the image frame. (Fig 2.19)

If the Image is below the Text

If the image is below the text frame, you can use **Level → Raise to Top** by clicking on the image.

Desktop Publishing - Career Opportunities

You can easily find a job in the field of designing if you have artistic talent and a good proficiency in using DTP software.

A large number of DTP professionals are currently employed in fields such as graphic designer, layout artist, desktop publisher, and print production specialists. Desktop publishing has employment opportunities in industries, entertainment and education (newspaper and magazine design, film, advertising, etc.)

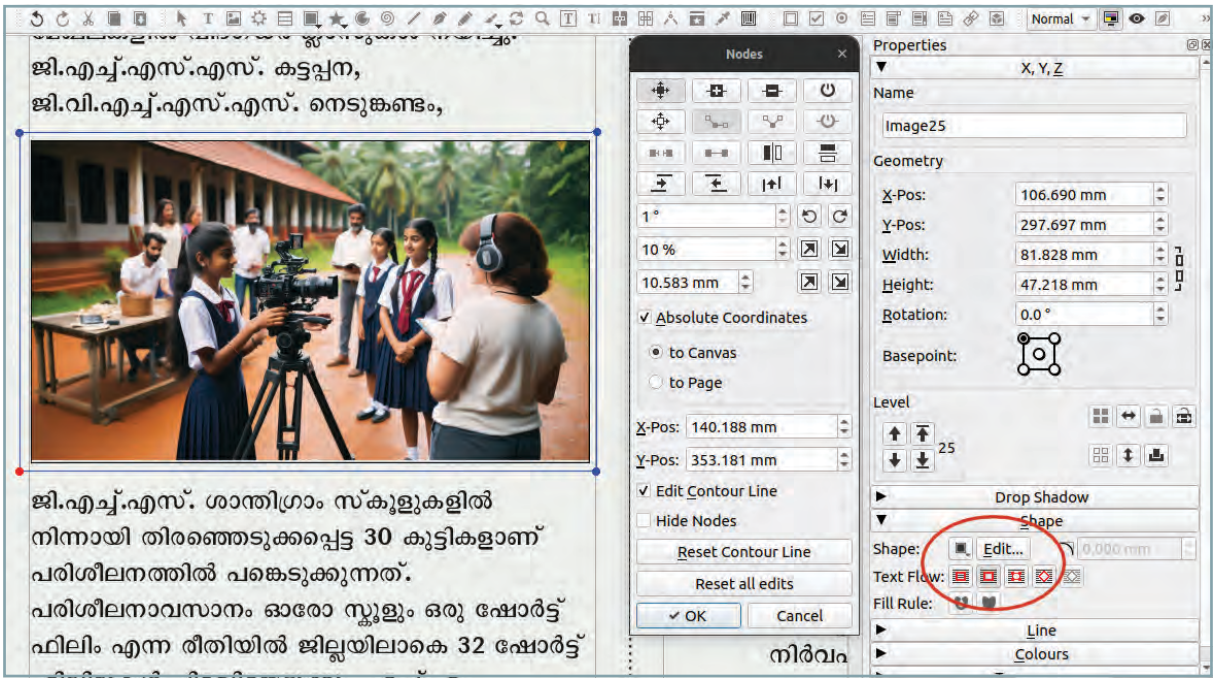


Fig 2.19 Contour Line Editing

The Text Flow facility is available in the Shape window to arrange letters in various ways. Use each of these and list their uses. (Table 2.1)

Text flow around frame disabled	To view the letters over the image
Text flow around bounding box	
Text flow around contour line	
Text flow around frame shape	

Table 2.1 Text Flow Options

Titles and Subtitles can be Added

Just like images, headlines play an important role in news. Main headlines are typically larger and bolder, while subheadings support the main headline by providing additional details.

Add the necessary headlines and subheadings to your news using new text frames.

Set Background Colour

Special editions of newspapers and magazines are now published in multicolour. If you draw shapes using Shape option in Scribus, you can colour the page according to the shapes. It can also colour entire pages if shapes are used as backgrounds.

Give background colour to the front page of the newspaper.

Fig 2.20 Front page completed

To Set Background of the Page

- Draw a rectangle which fills the whole of the page using **Shape** tool from the Toolbar.
- Colour the rectangle.
- Right click on the rectangle and select **Level → Lower to bottom**, for arranging it behind the text.

Our first page is ready. (Figure 2.20)

Now, prepare the second page in the same way.

Don't forget to save the file when changes are made in the document.

Export the Document

We need to print the prepared document. For this we have to convert this to either PDF format or other formats that support printing.

Export your newspaper to PDF using the **File → Export** feature in Scribus.

Don't forget to print the newspaper and distribute it in school.

Let's Assess

- What is Scribus mainly used for?

a) Video editing
b) Photo editing
c) Desktop publishing
d) 3D modelling

- What is the use of Text frames in Scribus?

  a) to draw shapes.

  b) to type sentences and format them.

  c) to include images.

  d) to colour the background.

Extended Activities

1. Prepare your school magazine using Scribus.
2. Create posters for the school's Day celebrations using Scribus software and share them.

Chapter 3

Computer Language

Look at Fig 3.1. Can you identify the difference in Sandeep's routine during the holidays?

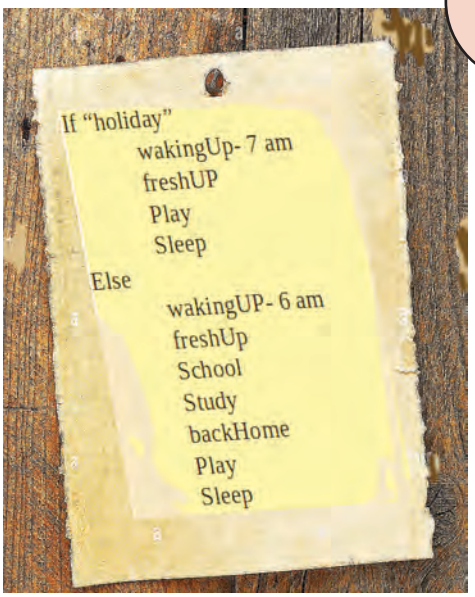


Fig 3.1 Schedule of routine

What did you find?

Certain things that are done on normal days are not done on holidays, right?

Sandeep's daily schedule is based on the habits, suggestions and knowledge he gained from various sources.

Aren't we the same?

The knowledge and habits gained from experiences and studies, along with the advice or instructions we receive from others, lead us.

Don’t you know that computers also work based on the instructions given to them and the knowledge they gain from those instructions?

How do computers understand the instructions we give them?

A computer is an electronic device. Like any electronic device, computers only know ON and OFF states.

Instructions are given to computers through **binary language** codes that only use the symbols 0 and 1 to represent **ON** and **OFF** states.

But we don't know binary language. Then how can we give instructions to computer in binary language?

Imagine you have a friend who only speaks Bengali, and you don’t know the language. How would you communicate with them?

A mutual friend who understands both Bengali and Malayalam could help you communicate effectively.

In this way, our computers have programs that can translate instructions given in a language into binary language. These are known as high-level languages and translator programs.

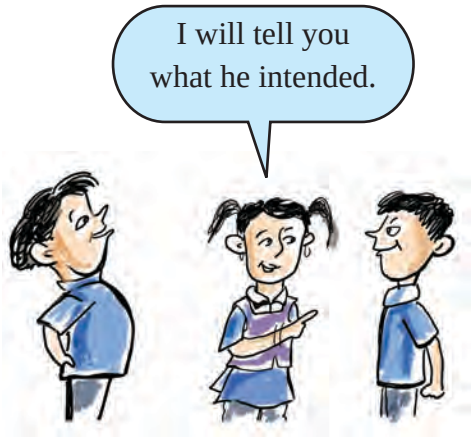
Translator programs are mainly of two types - **Compilers and Interpreters**.

Computers with the help of translator programs understand and act according to the high-level language instructions that we give.

Binary Language

A language that uses only **ON** and **OFF** is called a binary language.

These states are denoted as *High, Low* or *1, 0* or *True* and *False*.



Compilers and Interpreters

Compilers are translators that completely convert instructions into binary language and compile them into a separate file. In contrast, interpreters process and execute each line of code one at a time during execution.

Binary files (executable files) created by compilers do not require the original high-level language code (source code) to run later. However, when using interpreters, the source code must be present on the computer to execute the program.

High-level programming languages such as C, C++, and Java use compilers to convert and run programs. Python, on the other hand, is an interpreted programming language.

Let's get familiar with such a high-level language in this lesson.

Have you noticed the daily routine of Sandeep given at the beginning of the lesson? Sandeep is working on the instructions received one by one for each day.

Similarly, computers can be given precise instructions to solve a problem and thus can be used for problem determining and solving. In this way, it is said that programming is giving the necessary instructions to computers to do a specific work.(Task).

For example, suppose the computer needs to be given instructions to prepare a program to calculate the age of a person.

What are the information needed to determine someone's age?

- You should know in which year the person is born.
- .....

What is the age of a person whose year of birth is 2011?

If the current year is 2025, the person will be 14 years old, right? How did you find it?

Just subtract the year of birth from the current year.

That is,

Age = current year - year of birth

If the above mentioned things are written step by step,

- Current year (current_year)=2025
- Birth year (birth_year)=2011
- Age = Current year - Birth year
  (age=current_year – birth_year)
- Display the age on the computer.

The process of writing the steps for solving a problem in a specific order is called an **algorithm**.

Let's prepare a computer program to calculate the age of a person according to the above given steps.

Which computer language should we choose to prepare this program?

Many languages are available today for developing computer programs.

Which are the computer languages you have heard of?

- .....
- .....
- .....
- .....
- .....
- .....

Java, C, C++, Python, Ruby, PHP and many other programming languages are currently available for programming. Here we use the language **Python** for making programs.

PYTHON

Python is a suitable programming language for everyone—from young beginners exploring programming to experts working on advanced concepts like robotics and data science. Its simple syntax makes it easy to learn and use.

Fig 3.2 Guido van Rossum

Fig 3.3 Python Logo

The Python language was developed in 1990 by Guido van Rossum (Fig 3.2), a computer engineer from the Netherlands. Python is an open-source programming language.

Lets Make a Python Program

Let's see how to make the program for calculating age that we mentioned earlier using Python.

For this we have to use the Text Editor application on our computer. A Python interpreter is required to translate the prepared program into binary language.

Look at the program given below. The previously written algorithmic tasks are converted to Python language here. Open the application called **Text Editor** on the computer and type the program, without making mistakes. Then save it in your folder.

```
birth_year=2011

current_year=2025

age = current_year - birth_year

print("Your age is : ", age)
```

Program files written in Python should have the extension .py added to their file names. For example, the age finder program can be saved as Find_age.py.

Isn't the file saved? Now try to run the file Find_age.py using the Python3.

To Run Python File

- Open the folder where the file is saved.
- Right click on the empty space in the folder. Click on **Open in Terminal**.
- Then, type the below given command in the terminal and press **Enter**.

python3 Find_age.py

See that when the program is run, the age is printed on the terminal. (Fig 3.4)

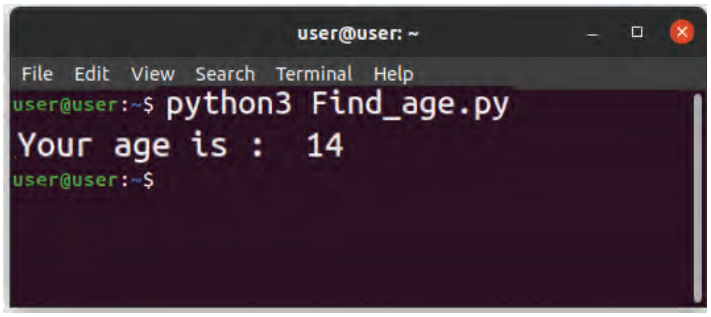


Fig 3.4 Terminal Window

Check and find out how the line print("Your age is :" , age) is run in this program.

After printing the text 'Your age is :' the calculated value is printed in place of age.

A similar program to find the area of a square of fixed length and width is given below.

length=35

breadth=65

.....

print("Area of Rectangle is: ", area)

Variables

Just like in mathematics, variables can also be used in computer programs. They are used to temporarily store data required for the program to run.

When using variables in a program, their names should start with a letter (alphabet) and must not include special characters, except underscore (_).

The term **Datatype** indicates what type of data each variable contains. Examples of datatypes include integers, floats, strings, images, audios, dates, and times. However, in Python, you don't need to specify the datatype when creating variables.

What should be added to the missing line in this program?

Open a new document in a **Text Editor**, complete the program, **save** and **run** it.

When the program was run to calculate age, we got the output based on the year we entered in the program. Anyone running this program at any time will get the output "14 years."

What should be done to convert this to a program that displays the age of any person who runs the program ?

If it is possible to input the current year and birth year to the program while running the program, it can be used anytime to calculate anyone's age, right?

Let's see how this program can be modified by giving name, birth year and current year of any person as input while running the program.

Instead of the statement birth_year=2011 in the above program, try the following statement.

birth_year=input("Enter your year of birth:")

After changing the program, run it using Terminal.

What did you find?

.....

.....

In this way, let's add the following lines at the beginning of the program.

name=input(" What is your name?:")

current_year=input("Enter current year:")

When we run this program it asks for your birth year, name and current year and stores the birth year,

name and current year typed by keyboard in the variables *birth_ year*, name and *current_year* respectively.

Save and **run** this program.

Did you get the output when made changes in this program?

This problem arises because mathematical operations are not possible with the inputs we have given. Difference can be calculated only if the data obtained as input is converted into numbers.

While Using the Input Function

In Python, data obtained using the input function is in text format, also known as a string.

Information like a person's name or address is typically made up of alphabetical characters, while details such as year of birth, height, or weight are represented as numbers.

Mathematical operations like addition, subtraction, multiplication, and division cannot be performed on text. Therefore, numbers in text format must be converted to numeric format for calculations.

The function int() can be used to convert data available in String form to integer form.

Let’s rewrite the program as given below accordingly.

```
name = input("What is your name:")

current_year = input("Enter current year:")

birth_year = input("Enter your birth year:")

age=int(current_year) - int(birth_year)

print(name, " Your age is : " , age)
```

Note that the **int()** function is used in the line where the calculation is taking place.

Python Operators

Operators that can be applied to different data and variables in Python.

1. **Arithmetic Operators:- For doing mathematical operations**

Addition	+
Subtraction	-
Multiplication	*
Division	/
Modulus	%

2. **Assignment Operator:-- to give a value to a variable = is used.**

   Eg; Mark=50

3. **Comparison Operators:- To compare values:**

Equal to	==
Greater than	>
Less than	<
Greater than or equal	>=
Less than or equal	<=
Not equal	!=

4. **LogicalOperators:- For Combining multiple statements :**

   and, or, not

Python IDE, i.e., IDLE

We made the program in **Text Editor**. However, when preparing large computer programs, special software known as **IDE (Integrated Development Environment)** is used to help **run** the program easily and fix errors. The window of IDLE3, an IDE for writing programs in Python, is given in Fig 3.5.

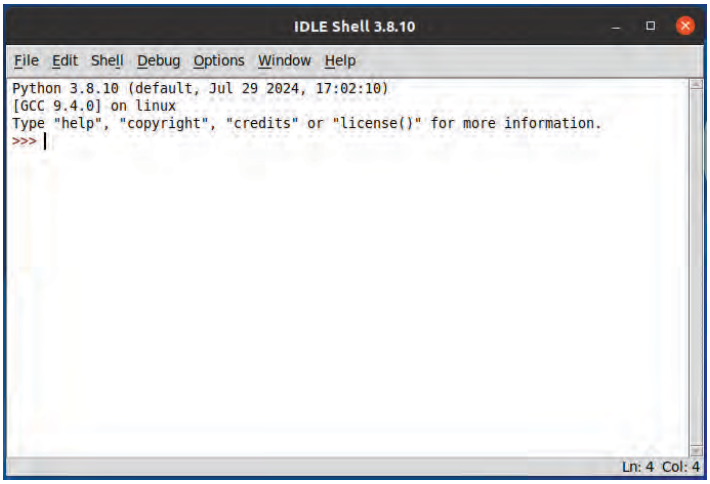


Fig 3.5 IDLE 3 Window

Open **IDLE3** on your computer and check what features are available in it.

Don't you see features that help you create a new file, **save** it, and **run** the program?

Let's Run the Program in IDLE3

The program that we prepared earlier was **run** in the terminal. Prepare and **run** the program in IDLE3 as shown below.

To run the Program in IDLE3

- Open IDLE3 and open a new editor using the option **File → New File.**
- Type the program without making mistakes. (Fig 3.6)
- Give file name and save the file using the option **File → Save**.

- Then **run** the program by clicking **Run Module** from the **Run** menu.

```
name=input("Enter your name:")
birth_year=input("Enter your birth year:")
current_year=input("Enter current year:")
age= int(current_year)-int(birth_year)
print(name, "  Your age is : " , age)
```

Fig 3.6 Program made in IDLE3

```
File  Edit  Shell  Debug  Options  Window  H
Python 3.8.10 (default, Jul 29 2024, 17
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or
>>>
========== RESTART: /home/
Enter your name:Sandeep
Enter your birth year:2011
Enter current year:2025
Sandeep   Your age is :  14
>>>
```

Fig 3.7 Output Window of the Program Made in IDLE3

While running the program name, year of birth and current year are given as input. Didn't you get the output according to the given data?

Conditional Statement

Didn't you see from the schedule given at the beginning of the lesson that Sandeep gets up and does other things on holidays unlike normal days?

That means, in certain days he works in one way and in other days he works in another way. Similarly in computer also, in some cases the flow of the program has to be varied depending on the conditions .

This is referred to as branching in programming methodology.

For example, during our school's sports fair, children compete in different categories based on

their age. Those aged 14 years and above are placed in the junior category, while those under 14 fall into the sub-junior category. Let's see how we can modify the program to display the category based on the age calculated in the program.

The **if...else** statement (condition) is used to check whether a specific condition is satisfied or not. If the condition is met, the program executes one set of instructions; otherwise, it follows a different path.

The way to type **if...else** statement is given below.

```
if <condition> :
        statements for condition true
else:
        statements for condition false
```

In our program, if the age is 14 years or older, the program must print the category as Junior, otherwise print the category as Sub-Junior. Then, It can be written using conditional statement as given below.

```
if age>=14:
        print("Your are in Junior Category")
else:
        print("You are in Sub-Junior Category")
```

Let's add these lines and run the previously prepared program.

```
name=input("Enter your name:")
birth_year=input("Enter your birth year:")
current_year=input("Enter current year:")
age= int(current_year)-int(birth_year)
print(name, "  Your age is : " , age)
if age>=14:
    print("Your are in Junior Category")
```

Syntax

Each programming language has its own terminologies and rules for writing programs. This is called **syntax**.

Pay special attention to the indentation of the line after **if <condition>**: which is executed when the condition is met, and line after **else**: statement which is executed when the condition is not met.

Python statements should be written using lowercase letters of the English alphabet. It is part of the syntax of Python language.

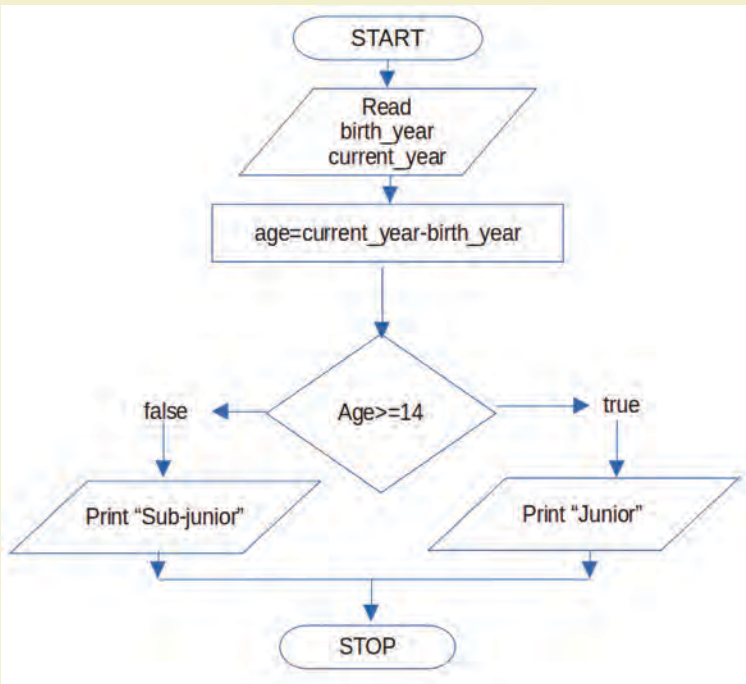
```
else:
    print("You are in Sub-Junior Category")
```

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.10.12 (main, Nov 20 2023, 15:14:05) [GCC 1
Type "help", "copyright", "credits" or "license()"
>>>
========== RESTART: /home/
Enter your name:Anu
Enter your birth year:2013
Enter current year:2025
Anu  Your Age is : 12
You are in Sub-Junior Category
>>>
```

Fig 3.8 Output of the Program Using *if...else*

Flow Chart

Look at the pictorial representation (Flowchart) of the program that we made. Such a diagrammatic representation is helpful in analysing and solving large and complex problems easily.



Here, we have checked only one condition. In some cases, if the first condition is not met, it is to be checked if other conditions are satisfied.

For example, those above 16 years should be categorized as Senior, those above 14 as Junior, those above 12 as Sub-Junior, and those below 12 as Kiddies.

To check these multiple conditions, the **if...elif...else** format can be used, as shown below.

```
if age>=16:
    print("Your are in Senior Category")
elif age>=14:
    print("You are in Junior Category")
elif age>=12:
    print("You are in Sub-Junior Category")
else:
    print("You are in kiddies Category")
```

Modify and run the program accordingly.

Loop Statements

Now, our program can calculate a person's age by taking the name, year of birth and current year and print the age category.

Suppose more than one child from a class participates in the school sports meet. What can we do to change this program to find the age and category of all of them?

The number of lines should repeat, as many times as the number of children participate in the competition, right?

Loops statements can be used to give instructions in this case.

There are mainly two types of loops in Python.

1. while loop

2. for loop

while loop

The syntax of while loops is as follows.

```
while <condtion is true> :
    statements to repeat
```

Suppose three children from our class are participating in the sports fair. Let's see how to do it using a **while loop**.

We can add a variable called *count* in the program. Initially its value can be set to zero.

count = 0

For each repetition, the value of the variable count is to be incremented by 1.

For this we can use the code

count=count + 1

A total of three children are participating. Only when the count is less than three it should repeat. If it is 3 or greater than 3 the program should end.

Then the condition for checking statements in while loop is *count < 3*.

That is,

while count < 3 :

Now add the required codes and rewrite the program as shown in figure 3.9.

File Edit Format Run Options Window Help

```
count=0
while count<3:
    name=input("Enter your name:")
    birth_year=input("Enter your birth year:")
    current_year=input("Enter current year:")
    age= int(current_year)-int(birth_year)
    print(name, "  Your age is : " , age)
    if age>=14:
        print("You are in Junior Category")
    else:
        print("You are in Sub-Junior Category")
    count = count + 1
```

Fig 3.9 Python Program Using *while* Statement.

Did you note that statements to repeat are written one indentation away from the while block?

Now **run** the program.

The program ends when three children's data is entered, right? Why is it so?

- When the program starts, the value of the variable count is zero.
- Each time the code in the while block is executed, the value of count is incremented by one.
- When repeated three times, the value of count becomes 3. Then the condition *count < 3* is not met and the program ends.

Consider rewriting the program to accept number of children as input when this program runs (Fig 3.10). The variable *no_of_students* is used here to take the number of students as input.

```
File  Edit  Format  Run  Options  Window  Help
no_of_students=input("Enter the number of students:")
count=0
while count < int(no_of_students):
    name=input("Enter your name:")
    birth_year=input("Enter your birth year:")
    current_year=input("Enter current year:")
    age= int(current_year)-int(birth_year)
    print(name, "  Your age is : " , age)
    if age>=14:
        print("You are in Junior Category")
    else:
        print("You are in Sub-Junior Category")
    count = count + 1
```

Fig 3.10 Program that Accepts the Number of Students as Input

Difference between =, = =

= operator is used to assign a value to the variable

Eg: price=200 means to add the value 200 to the variable price.

The == operator is used to check whether the right and left sides are equal.

Eg: price==200 checks if price is 200.

for loop

Another technique for handling iteration statements is for loop.

Consider a Python program prepared using a **while** loop to print the numbers from 1 to 100 on the screen.

```
count=1
while count <=100:
    print(count)
    count = count +1
```

Now write and **run** this program in IDLE3.

Now, see the same program written using a **for loop**.

```
for count in range(1,101):
    print(count)
```

Did you type and run the program?

What are the differences between while and for loops? See Table 3.1.

while	for
Initial value is given to the variable count. *(count=1)*	All these are indicated in one line.
Given the code to increment the value *(count=count+1)*	for is used along with range. *for count in range(1,101):*
Given Code to check condition. *(count<=100)*	

Table 3.1 The difference between using *while* and *for loops.*

The Statement *range*

- In Python, *range* is used to arrange a set of numbers systematically.
- If *range (10)* is given, the decimal numbers from 0 to 9 (0, 1,2,3,4,5,6,7,8,9) are available for further computation.
- *range(1,10)* gives the 9 numbers from 1 to 9 (1,2.,3,4.5,6,7,8,9).
- *range(1,20,2)* gives the odd numbers from 1 to less than 20 (1, 3, 5, 7,9, 11,13, 15, 17, 19).
- That means the sequence of numbers will increase by two.

Now we have come across some programs prepared using Python language.

As we have just done, is it possible to get text output only using Python?

For example, if you want to draw a picture on a computer, what software do you usually use?

- Gimp
- Inkscape
- .....

Can you run a program that draws a picture? let's examine.

Python Graphics

Not only text, but Python can also draw images and geometric shapes, by providing graphical output as well. Python has library modules to meet various needs. By using the turtle graphics module, you can create programs that generate graphical output in Python.

To draw a line in turtle, we use the command forward.

If we are using this single command ,

from turtle import forward can be typed at the beginning.

Open IDLE3 and run the python program given below (Fig. 3.11).

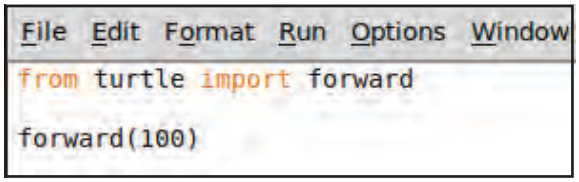


Fig 3.11 Python program for drawing a line.

Python Modules

Modules are Python files that contain functions, variables, and classes for specific purposes. Modules can be included in the program as needed using the keyword import.

Some python modules

os - For functions related to the operating system

math - For mathematical operations

Eg: *sqrt,sin,cos* etc

turtle - graphics, drawing

datetime - those things related to time and date

A 100 pixel long line appears in the **graphics window** (Fig 3.12).

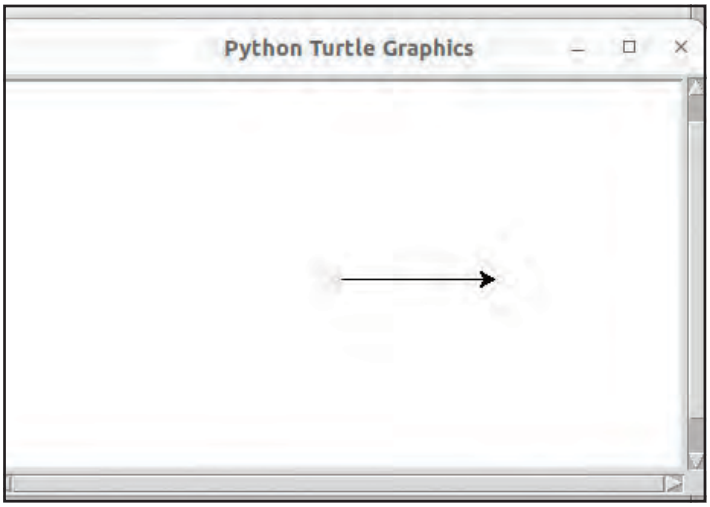


Fig 3.12 Python Graphics Window.

Add the statement from turtle import * at the beginning of the program to add all the functions and classes available in the turtle module to our program.

You have seen that the forward instruction can be used to draw a line.

The command *right(90)* can be used to rotate 90 degrees to the right.

If so, what instructions should be given to draw the shape of a playground with 100 units long and 100 units wide? (Fig 3.13).

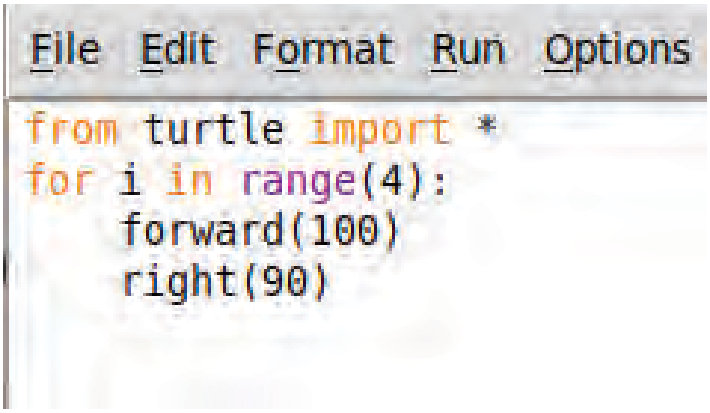


Fig 3.13 Program to Draw Playgound with 100 Unit Length and 100 Unit Width.

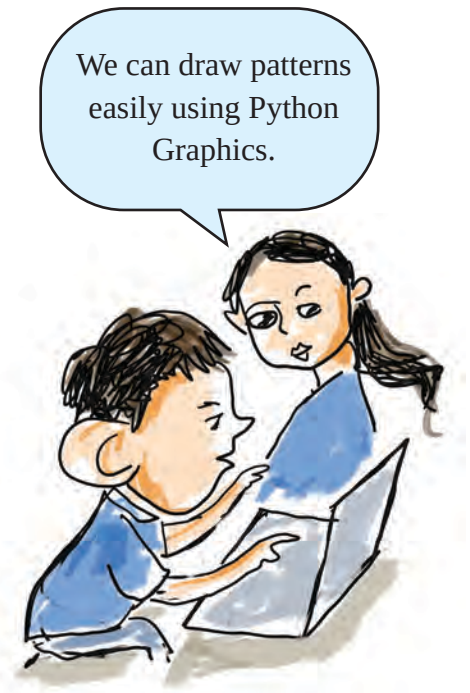
In this program, the instructions to move forward 100 units and turn right 90 degrees are executed four times to produce the shape of a rectangular playing ground.

What colour are the shapes we have now?

Open **IDLE3** and try typing and running the programs shown in Figures 3.14 and 3.15 one by one.

```
File  Edit  Format  Run  Options
from turtle import *
color("red")
for i in range(8):
    forward(100)
    right(45)
```

Fig 3.14 Program 1 to draw shape using turtle graphics




```
File  Edit  Format  Run  Options
from turtle import *

circle(100)
```

Fig 3.15 Program 2 to Draw Shape Using turtle graphics

See the outputs of the programs. Did you notice the use of *forward, left, right, circle, range* commands ?

Now, use these programs to draw different shapes and observe the output and complete Table 3.2.

Make changes in the colour of the line, length, number of sides, angle and radius of the circle .

Python Code	Use
color("red")	
circle(100)	To draw a circle of radius 100 unit.
left(45)	
right(45)	
range(8)	

Table 3.2 Python Graphic Codes and Uses

Lists in Python

Using the option **list** in Python, it is possible to store different data in a single string.

See how the names of the various colours are included in the variable colors.

colors = [“red”, “yellow”, “blue” , “green” , “orange”,“violet”]

The data in a list can easily be used in a program that uses the for loop command. Try running the program given below.

```
for clr in colors:
    print(clr)
```

A Python program to create circles of different colours and radius is given in Fig 3.16. Type this program and run it and observe the output.

Fig 3.16 Python Program for creating Circles with different colours and radius

Let's Assess

- a=100
  a=a+25
  print(a)

  What will be the output of this program?

- Which is the python program to **print** even numbers from 20 to 40?

  a) for i in range(20,42,2):
  print(i)
  b) for i in range(20,2,42):
  print(i)
  c) for i in range(20,42):
  print(i)
  d) for i in range(1,2,20):
  print(i)

Extended Activities

1. Create and print various lists in Python.
   - Names of friends
   - Names of flowers
   - Names of planets in Solar System

2. Write a Python program to find the area of a field if its length is 120 m and width is 50 m.

3. Write a Python program that takes three different numbers as input and print the largest number among them.

4. Take the score obtained by a student in a subject (out of 100 marks) as input and write a Python program to calculate the grade based on the following conditions.

   Score>=90 Grade= A+

   Score>=80 Grade=A

   Score>=70 Grade=B+

   Score>=60 Grade=B

   Score>=50 Grade=C+

   Otherwise print "Not Eligible"

5. Draw a rectangle with a length of 200 units and a width of 100 units, using blue, green, red, and yellow colours for the sides.

Chapter 4

Cyberspace

I alone exist in this monitor of mine
In the Cyberspace that infinitely grows
On this solitary journey into alien universe
Leaving this earth of mine.

Cybermoon
(Alamcode Leelakrishnan)

How about exploring the world described in the poem?

Nowadays, the internet is widely used for various purposes, including education, entertainment, and business, rather than just communication. With this advancement, people have embraced a collaborative culture, working together across distances. The internet has become an essential part of modern civilization.

Haven't these continuous advancements in information technology shaped many aspects of our relationships and habits? Write them down in your notebook.

- Goods being delivered to homes without visiting shops has become common.

- Entertainment like movies, music, and sports is now just a click or tap away.
- .....
- .....
- New types of crimes have emerged.

The way we handle money transactions has changed, and now we can communicate with people across any distance through sight and sound. Amazing, isn't it?

You know how deeply the internet has become a part of our lives. Whenever we transact online, we step into a unique digital space. This virtual space where the computers, phones, servers, other digital devices, networks, and the information transferred through them are all linked together is called **cyberspace.**

Whenever we interact on the internet, whether it's performing a search, liking a favorite post, or any other activity, our footprint is imprinted there. This is known as a **digital footprint**. In cyberspace, there are friendships, quarrels, and conflicts, just like in real life. Everyone who engages there creates a **cyber identity**.

Digital Footprint

Digital footprint is the set of information (trace of information) created while using the Internet. This includes the websites we visit, the posts and photos we share on social media, the apps we use, and the data we provide for online services. A digital footprint is any trace of our online activity that can be seen or followed by others.

Cyber Identity

A person's identity in the cyber world is their digital representation. It is not confined to a single ID but is shaped by the information and activities linked to their online presence. Numerous factors contribute to digital identity, including social media profiles, search engine activity, visited websites, phone numbers, gaming IDs, the identification number of the device used, location, and more.

Have you ever stepped into cyberspace?

Table 4.1 gives some of the contexts in which we interact with the cyber world. Consider the tools and information involved in these interactions. Add the missing items to the list.

Contexts	Relationship with the Cyber world
Purchase and recording of goods from ration shop.	E-POS device, Fingerprint.
The information being printed in the passbook using the printer installed in the bank.	Printer and account details connected to the network.
Watching online class.	
Searching for routes on map software while travelling.	
Requesting your favourite music and controlling of home appliances with voice command.	Home appliances, voice messaging, Internet of Things.
Playing online games with a distant friend.	
Smartwatch that tracks health information such as heart rate, sleep patterns etc.	Smart watch and mobile connected with it, Internet and health data.

Table 4.1 Some Cyber interactions in everyday life.

Internet of Things (IoT)

The Internet of Things (IoT) refers to a network of physical objects connected to the Internet. These objects are equipped with sensors and software, enabling them to collect data, communicate with each other and interact with their environment

Does the list cover all of your interactions in cyberspace? In what ways do we access the cyber world? Mobile phones, smartwatches, passbooks, printers, and IoT devices serve as both direct and indirect gateways to cyberspace, don't they?

We've frequently mentioned the terms **internet**, **cyberspace** and **cyberworld** in many occasions. While these are interconnected, it's important to understand that they are not the same.

Cyberspace is an imaginary digital realm where online activities and interactions occur. Similar to the universe with its stars, galaxies, and planets, cyberspace encompasses the internet, digital systems, and exchanges of ideas. As we know that the **internet** is a global network of interconnected computers that communicate using various protocols. It relies on physical infrastructure such as servers, routers, and data centers, connected by cables and satellite links. The internet is a component of the broader concept of cyberspace.

The ***cyberworld*** is a unique environment within cyberspace. It refers to specific virtual spaces such as *virtual reality platforms*, *online multiplayer games*, or *immersive simulations*. When we log into an online game or a virtual reality platform, we enter the cyberworld created within cyberspace.

What else can we explore about cyberspace? Let's find out!

Belongings in Cyberspace

We have understood that a person establishes a relationship with cyberspace through his interactions there. Now let's check what are the belongings in cyber space.

Cyberspace is bounded with many things, such as the Internet, different hardware, network protocols, information, databases that store it, web pages, and security systems. These are called **Cyber Infrastructure**. In short, we, the contributors of digital data, actively engaged in an uncontrollably growing cyberspace, are both its nurturers and beneficiaries.

There are many studies going on to make the experience of the real world possible in the cyber world. As a result of this, the **Metaverse** came into existence with the help of artificial intelligence technology.

Let's Learn through Games

What if learning mathematics like playing a video game? As you get the correct answers, you can proceed to the next level. You can get your friends to help.

Gamification refers to the integration of game design elements into learning environments. By introducing elements like points, badges, leader boards and challenges, it can turn conventional style of learning into a fun and interactive process. Metaverse can make gaming experiences more engaging and realistic.

Avatars in Cyberspace

Avatars are digital representations of users often used in virtual environments such as online games, social media platforms, and virtual reality experiences. In the digital world, people can communicate and interact each other with their avatars.

Metaverse

Think of a the character you've read in your life that sticks out in your mind, or from your favourite cartoon/gaming experience.

- What if this character could tell us stories from the cyber world?
- What if this character could come directly into our classrooms?
- What if we could take a virtual tour of a historic site while sitting in our school lab?

Metaverse is the system that provides us with such an experience.

The Metaverse is an immersive platform used for gaming, social media, shopping, education, and much more. It functions as a vast virtual world where you can explore, meet others, play games, and work—all through the internet. The Metaverse integrates advanced technologies like *Augmented Reality* (AR), *Virtual Reality* (VR), *Artificial Intelligence* (AI), and *Blockchain* to create an artificial world similar to the real world. Avatars represent the user's presence in the Metaverse.

The Story of the Word

There is a famous story about cyberspace.

Cyber experts Bobby and Jack try to extort money from the powerful Chrome of the cyber underworld. Chrome is a woman who has achieved fame and fortune through illegal activities. Moreover, they have a robust computer network. Bobby and Jack use a sophisticated ***hacking*** *tool to infiltrate Chrome's computer network.*

*Hacking is like breaking into someone's house without their permission. In the story, Jack and Bobby manage to steal a lot of **digital assets** from Chrome. But soon, Chrome gets caught by the police. Meanwhile, Bobby and Jack face big problems because of their actions in cyberspace. As they go deeper into the dangerous world of hacking, they learn some important lessons. The story is full of interesting events and characters that make it exciting to follow.*

The story is not being detailed in full here as it may become a **Spoiler**.

Have you heard of Spoiler?

A spoiler is a term that refers to information that reveals the climax or main plot of a movie or novel. When introducing works in cyberspace as videos, blogs, or podcasts, warnings called 'spoiler alerts' are used.

Hacking

Hacking refers to unauthorized access to a computer or network, often considered a cybercrime. It can involve stealing sensitive information, damaging computer systems, or exploiting systems for malicious purposes.

On the other hand, ethical hacking involves using hacking techniques to identify vulnerabilities in computer systems or networks, but only with the owner's permission. The goal of ethical hacking is to enhance security and prevent cyberattacks. Unlike unauthorized hacking, ethical hacking is legal and not considered a crime under current laws.

The story of Burning Chrome, mentioned above, was written by William Gibson in 1982. Following this, he published another novel in 1984 titled Neuromancer, which popularized the term "cyberspace." This science fiction (Cyberpunk) work explores futuristic cities dominated by advanced computer technology.

Have you understood the concept of Digital Assets mentioned in the story?

Digital Asset*s* refer to financial assets that exist only in digital form and do not have a physical existence. Despite being intangible, they hold value equivalent to money and can be traded. Examples of digital assets include digital currencies, digital wallets, points earned through online shopping, NFTs, domain names, and software.

NFT

The full form of **NFT** is Non-Fungible Token. It refers the valuable things in the cyber world. Such objects are proprietary. You can buy them for money and sell them to someone else. Some examples are digital art, digital versions of music, paintings, photographs, videos, and rare in-game items or characters.

Cryptocurrency

Cryptocurrency is a digital currency. Transactions in this are secured using a technology called cryptography. Blockchain technology is also employed to record transactions, and making them transparent and secure. Unlike traditional currencies such as the rupee, dollar, or euro, which are issued and regulated by governments, cryptocurrencies operate on decentralized networks powered by advanced technology. Examples of cryptocurrencies include Bitcoin, Ethereum, and Litecoin.

Let's Prepare a Table of Digital Assets

We now understand what digital assets are. We all deal with various digital assets in our daily lives. Table 4.2 contains details about some of these digital assets. Review the table and fill in the missing information.

Digital Assets	Type	Purpose
Audacity	Digital Media	
Khan Academy	Online Educational Platform	Free online learning resources
Krita	Digital Art	
OpenSea		NFT online market
www.samagra.kite.kerala.gov.in	Domain name	
	e-Books	

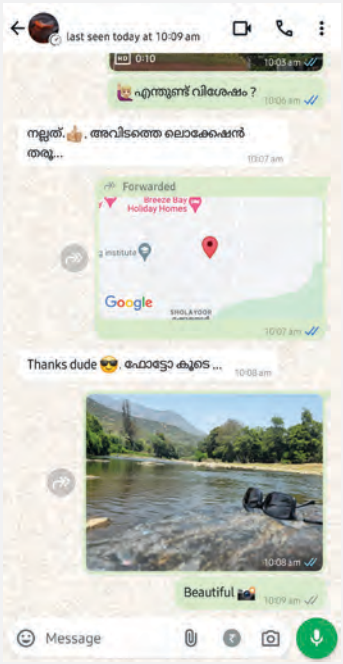
Table 4.2 Digital assets and types

Expand the list by finding more digital assets you manage.

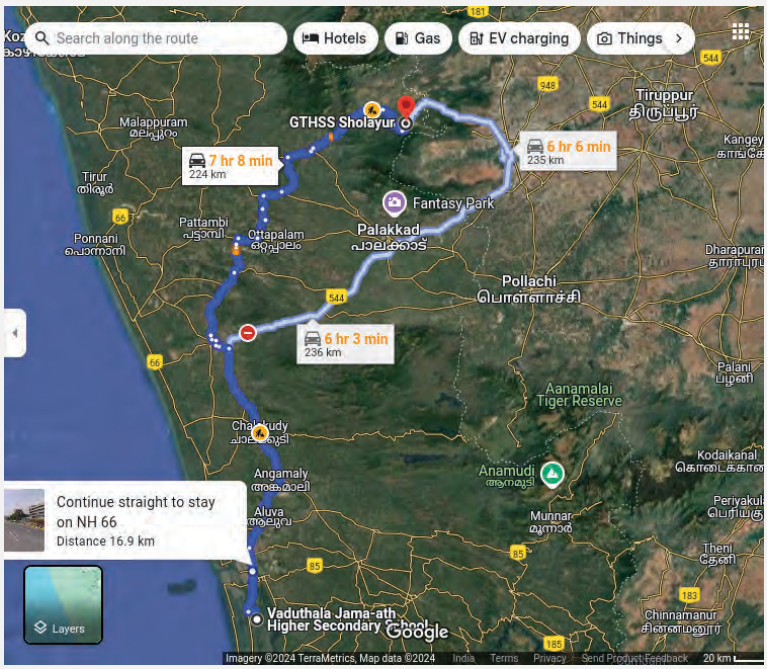
Information diversity in cyberspace

You have learned about the diversity of information in cyberspace from previous classes. In the early days, most of us were consumers of cyberspace information, but today, we all are producers of information. Each one of us is participating in the creation of information in cyberspace through different interactions in every moment.

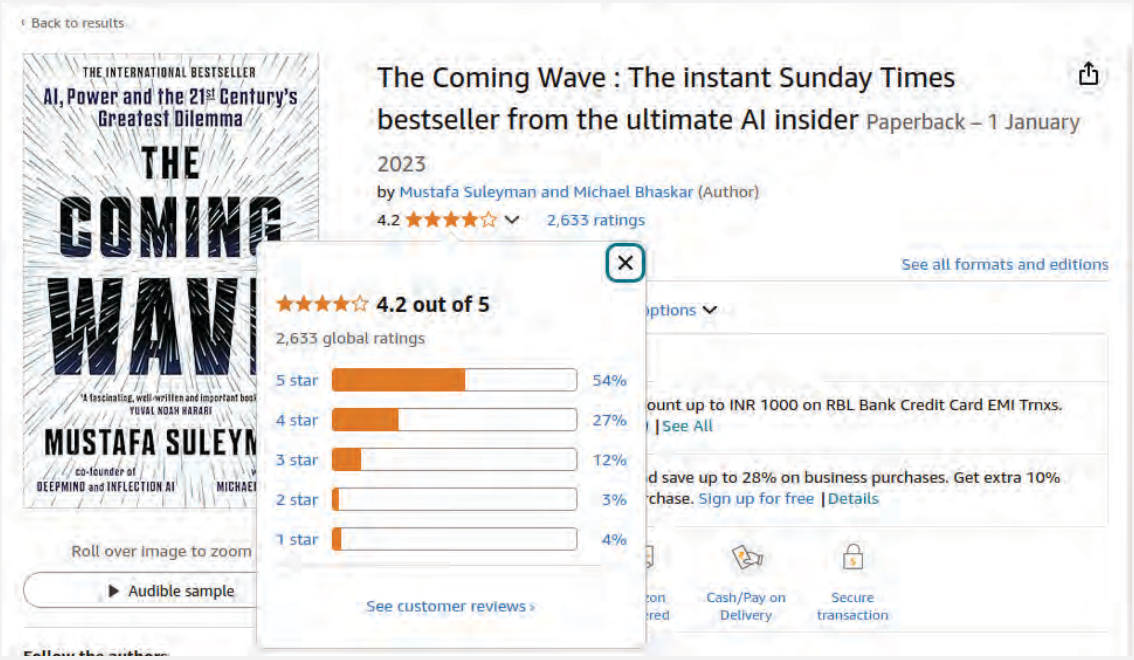
Fig 4.1 provides some examples of how information is produced in cyberspace. Examine the figure and find out the types of information in these cases and record it in the notebook.



a) Chat Including Different Types of Data.



b) Information in Online Map.



c) Review of a Product in a Shopping Site.

Fig 4.1 Different Data Created in Cyberspace

Data Collection

Explicit data collection occurs when a user knowingly provides their information, such as by filling out forms, signing up for accounts, or giving consent for data collection.

Implicit data collection refers to information gathered without the user explicitly providing it. This includes data like browsing history, location information, and details about devices connected to the internet

(a) : Location, Text, Image, Emoji

(b) : Information created while using online map.

(c) : .....

Data is often described as the currency of the 21st century or the oil of digital wealth. The image, voice and video files that we send through email and other messaging apps, information generated by **IoT** devices and various sensors are all added to cyberspace. The comments, likes, shares and reviews we give on shopping sites are also data.

Notice the map data in Fig 4.1 (b). We all use online maps while travelling. The places visited on the way, the time we spent, the places where the vehicles were going slower... all such information can be indirectly generated by the apps we use.

Due to the advancement of technology, the amount of digital data around the world is growing rapidly. Studies published in 2024 indicate that the amount of digital-based data generated by social media, e-commerce, and the Internet of Things (IoT) will be approximately 2.5 quintillion bytes (2,500,000,000,000,000,000 bytes) per day. The interesting fact is that the major share of this data has been created within the last few years only. The information that is being produced in such a large quantity, quickly and in a reliable manner is called **Big Data**. Big data refers to very large and complex datasets that traditional data processing software cannot handle efficiently.

While Using the Information from Cyberspace

If you were asked to write an essay on a topic related to a lesson, where would you search for additional information?

- Library Books
- Newspaper
- Periodicals
- Wikipedia
- ……..……..

The information gathered from these sources can be organized and used to form your essay. You can utilize one or more of these sources for this purpose. These sources are referred to as **sources of information**.

What can we do with the content available?

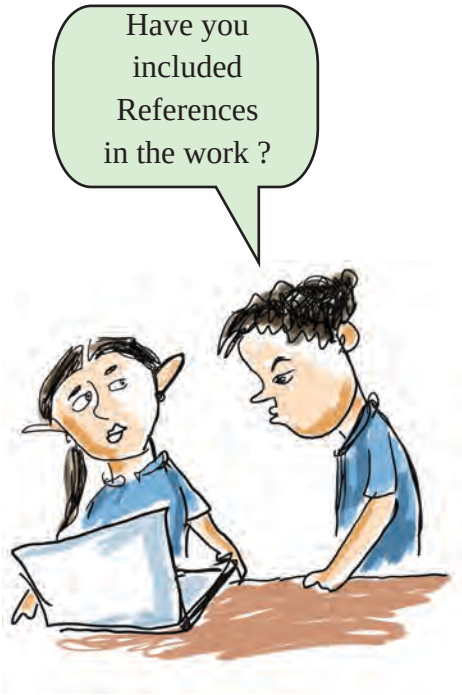
1. The essay can be completed by arranging the available information in a specific order.
2. Based on the available information (references), we can rewrite it in our own words.
3. .....

As a student, the second method is likely the best, right? This approach offers more learning opportunities, as it allows us to incorporate our own perspectives and avoid using incorrect facts. You can also create tables, graphs, and images based on the information you've gathered.

Will this complete our essay? Not yet. We must properly record the source of the information we've used. Only then will our work be complete. The original authors from whom you have got the ideas, theories, figures, and findings for the development of our work

should be acknowledged. It is actually an honour to their intellectual contributions and efforts.

The details of the sources of all the information used in our work are called **References**. The name of the author, date, place of publication, etc., provide the complete details so that readers can find and verify the exact sources of information. Publishing someone else's study or work under your own name without citing the sources is equivalent to theft. The act of presenting someone else's ideas, expressions, or work as your own is called **plagiarism**. There are efficient software tools available for detecting plagiarism. One may face disciplinary action if plagiarism is found in works submitted as part of a course or study.



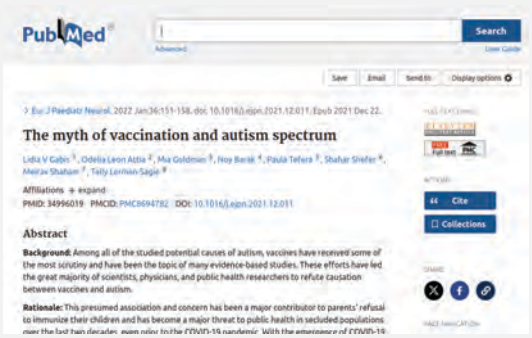
Paddy and Chaff in the Fields of Knowledge

You might already be familiar with fake news. We learned how to identify it from the textbooks of previous classes. But even beyond fake news, there are other situations in cyberspace that can spread misinformation. For example, articles about medical treatments written by people without proper expertise, or information that has become outdated due to recent discoveries or changes, can be shared wrongly. So, when sharing information online, remember:

- The information must be authentic.
- It should be from reliable sources.
- It must be up to date.

It's important to pay close attention to these things to avoid spreading wrong information.

Observe the Fig. 4.2 given below. It provides scientific explanations to counter the unreliable information being spread.



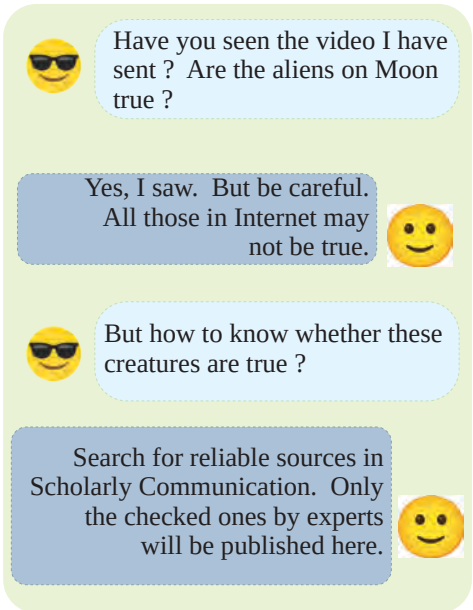
a) Scientific article against the propaganda that vaccination and autism are interrelated.

b) Message by UNICEF against the propaganda that Corona and 5G are related.

Fig 4.2 Some Scientific Explanations against Misinformation

False propaganda that vaccination and autism are related has hindered vaccination efforts in many countries and has become the reason for the spread of the disease. However, numerous studies have shown that there is no connection between vaccines and autism. Similarly, there have been false claims linking 5G technology to the Covid-19 pandemic, All these were widely circulated through social media.

What can you do at school to raise awareness about fake news ? Discuss this with your friends and come up with ideas to help spread the truth.



Reliable Sources

What do you usually do to find information quickly in cyberspace?

- Use Search engines
- Use AI systems

But is all this information accurate?

Information published on the internet can sometimes contain errors, biases, inadequate research, or outdated knowledge. To avoid these issues, it is important to rely on **reliable sources of information.**

When searching information for educational, research, scientific, or industrial purposes, it is essential to use trusted sources. Some examples of reliable sources include reports from scientific conferences, scientific journals, books, theses, and reports from recognized agencies. These are documents certified and published by experts or scientists in their respective fields.

Using websites like www.scholar.google.com and www.semanticscholar.org, you can find only credible scientific publications. You can learn more about this by scanning Fig 4.3 in the SAMAGRA Plus portal.

Now, use search engines like Google Scholar or Semantic Scholar to search for the following topics and observe the search results.

You can note down the differences in your notebook.

- Future of cryptocurrency
- Hidden figures in history

Fig 4.3 How to search for science publications - Video Link

Share Information Carefully

We have already discussed different types of data collection in cyberspace. But have you ever thought how implicit data, which is not directly collected from the user, is gathered?

This is done by tracking a person's behaviour and interactions in cyberspace. In simple terms, every action we take online is monitored using different technologies.

For example:

- Which websites do we visit?
- Who do we become friends with?
- What types of posts do we like and share?
- What products do we buy?
- .....
- .....

In this way, our likes, opinions and relationships are recorded in many places.

These surveillance systems, in turn, use these direct and indirect information about us in a variety of ways.

Although we like to share our achievements with others, we should take care to keep our passwords and personal information confidential. When sharing sensitive details like passwords, ATM PINs, etc., in the cyber world, we must be more vigilant and cautious. Below are some confidential details that should be kept private:

- Photo
- Bank details
- .....
- .....
- .....

Don't you think that we need a lot of care in our every interaction in this world of illusion?

Dangers of Excessive Use

Has the excessive use of internet bothered you in any way? Let's come back to the story of **Burning Chrome** that we met earlier. The characters in the story live in a hyper-technological society, where interactions with cyberspace (and each other) are mediated by machines. Such an intense induction with technology creates a sense of emotional and social alienation. These often create mental or physical ailments. Check figure 4.4, some of the problems with excessive cyber travels are illustrated in the figure.

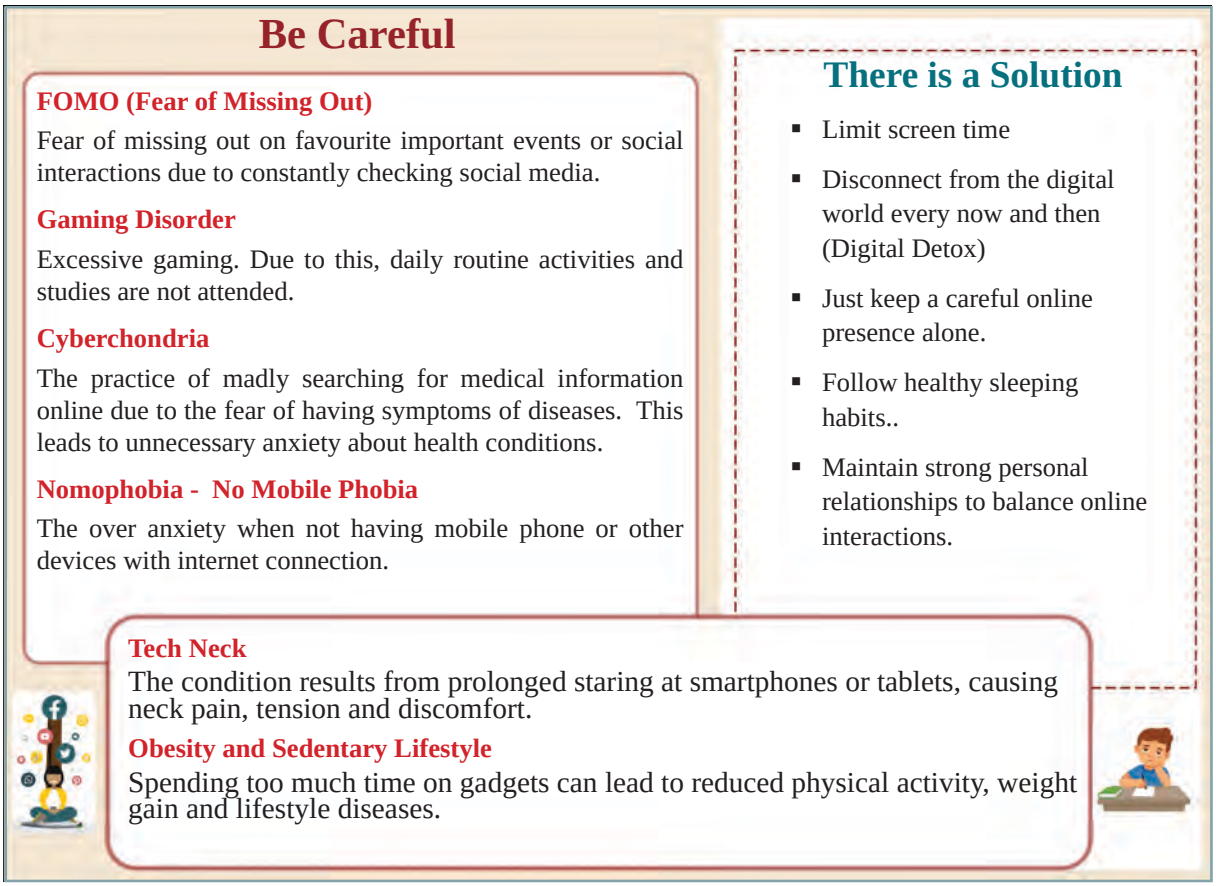


Fig 4.4 Problems Caused Due to the Excessive Use of Internet

What other problems can arise due to unrestricted internet usage? Discuss it with your friends and write it down in your notebook.

Dear Netizens, brothers,

Our etiquette in the cyber world is called Netiquette.

Cyber Etiquette

Human interactions are based on many rules, guidelines, and social norms. As citizens of the boundless cyber world, where there is a lot to give and take, we too have certain moral responsibilities.

Netiquette refers to a set of rules for good behaviour on the Internet. It's important to be as kind and respectful to others online as we are offline.

- Do not share harmful or hateful messages, comments, trolls, posts, or news with others.
- Record disagreements in a respectful manner.
- Avoid sharing other people's personal information.
- Follow the rules of the websites or forums you use.
- If you notice inappropriate content in cyberspace, report it to your teachers or the cyber police.

Let's Assess

- What is the name given to the information that is being produced in large quantities, rapidly and in different ways in cyberspace?

a) Digital Footprint
b) Bigdata
c) Cyberdata
d) Indirect information

- Identify the odd one which do not include in Digital Assets.

  a) School Computer Lab b) Software

  c) Reward point from Bank d) Digital Image

Extended Activities

1. There are many words that have taken on different meanings over time. Some examples are - *file, virus, attachment, remote, spam, selfie, hashtag, meme, Playground, troll, cyber pollution, dark web*... Find more such words. Classify which of these words are associated with cyberspace.
2. Organize a seminar in school on the dangers of excessive internet use.

Chapter 5

Make the Web Look Stylish

Fig 5.1 Webpage Design - Sample 1

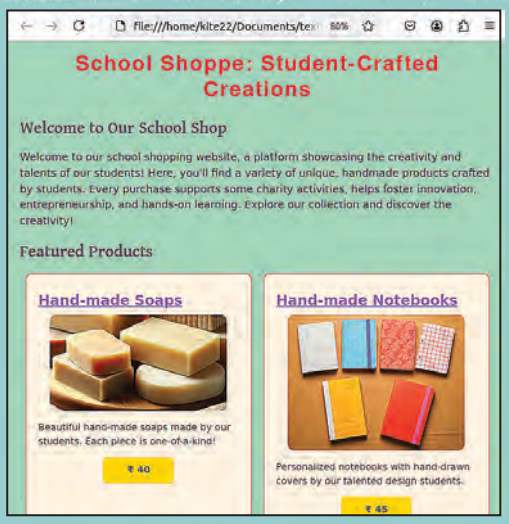


Fig 5.2 Webpage Design - Sample 2

Two web pages with the same content are shown in the image. Which one seems more appealing?

Doesn't the webpage in Fig.5.2 look better organized?

The arrangement of content, the choice of colour schemes, the selection of elements to be included, and

functionality are all important aspects to consider when designing a webpage. If a product has a good design, its appeal will naturally increase, right?

Exploring the Differences Between Webpages

What are the differences between the two webpages shown in the image? List them. (Table 5.1)

Figure 5.1	Figure 5.2
Texts in same colour	Text in different colours
	Background color for the page

Table 5.1 Differences between webpages

We have learned how to create a webpage in our previous classes. To create the webpage in Figure 5.1, it is enough the HTML techniques we have learned so far. However, the webpage in Figure 5.2 has been created by incorporating a technique called 'style.'

We have learned how to make text attractive and convenient using style option in wordprocessors. Such styles can also be applied for designing webpages.

How to add styles to a webpage? Let's check.

Let's Find the Difference in HTML Codes

The HTML code for a similar small section from two webpages is given below. Examine the differences between them. (Fig 5.3, 5.4)

```
<h2>Featured Products</h2>
 <div>
  <h3>Hand-made Soaps</h3>
  <img src="soaps.png">
  <p>Beautiful hand-made soaps made by our students. Each piece is one-of-a-kind! <br>Price ₹40</p>
 </div>
```

Fig 5.3 Webpage Created without Style Codes

```
<h2 style="color: #0000FF;">Featured Products</h2>
 <div style="background-color: #9FE2BF;">
  <h3 style="text-align: center; color: #A569BD;">Hand-made Soaps</h3>
  <img src="soaps.png">
  <p style="text-align: center; background-color: #FFD700; color: #333333; font-weight: bold;">Beautiful
      hand-made soaps made by our students. Each piece is one-of-a-kind! <br>Price ₹40</p>
 </div>
```

Fig 5.4 Webpage Created with Style Codes

Division Tag (div)

The tag is one of the most useful tags when designing a webpage, as it helps to divide the code in a webpage into different sections (divisions). It also allows various elements to be organized neatly inside this tag.

In Fig 5.4, there are additional codes starting with "style" in blue colour. These are codes that help in adding styles to the web page. Let's see how they make the web page attractive.

These webpages are provided in the folder; Class_10/Webdesigning under **School_Resource**s with the names One_ product_basic.html and One_ product_ designed.html. Open and analyse them in a **web browse**r as well as in a **Text Editor**.

Let's Find Style Properties

Haven't you examined the source code of the web pages? Now, find the styles given to each HTML element/tag shown in Fig 5.4 and complete Table 5.2 below:

Tag/Element	Style Code
<h2.....>Featured Products</h2>	style="color: #0000FF;"
<h3.....>Hand-made Soaps</h3>	
	style="text-align: center; background-color: #FFD700; color: #333333; font-weight: bold;"

Table 5.2 Style Codes

HTML Element and Style Code

An HTML element usually consists of an opening tag, a closing tag, and its content. <h2>Featured Products</h2> is an HTML element. Here, <h2> is the opening tag, and </h2> is the closing tag. However, tags like <hr> for drawing a horizontal line and
 for a line break are elements that do not have closing tags or any content. The style code is added along with the opening tag of an HTML element.

The style attribute is used here to apply styles to an element. Along with this, instructions are provided on how the element should be arranged on the webpage.

The style attribute is added in a similar way to how we add attributes like colour, font, and size to the font tag when creating a webpage in HTML. The main goal of this is to make the content of the webpage look more attractive. The styles written this way are called Cascading Styles.

Structure of Styles

Given below is the code used to style the <h2> tag in the webpage in Figure 5.4.

style="color: #0000FF;"

What would be the purpose of this?

The content inside the <h2> tag should appear in blue colour (#0000FF) when displayed in the browser, right?

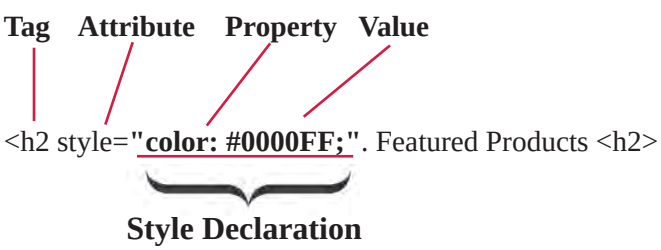
Examine how the font size, background colour, paragraphs, and divisions ( ) are configured on this webpage using the style attribute.

Colours

You can use either colour names or hexadecimal codes to set colours. For example, to make the text blue, you can use **color:blue** or **color:#0000FF**. When colouring an image in Inkscape, check if these colour codes are available in the **Fill and Stroke** window.

When Using the Styles

Style instructions consist of two parts: the property of the style and its corresponding value. For example, the instruction in the style attribute of the **h2** tag is **color:#0000FF;** Here, **color** represents the property of the tag element, and **#0000FF** is the value assigned to that property. A **colon (:)** is used to separate the property from its value, and a **semicolon (;)** is added at the end to complete the instruction.



Do you understand the structure of styles? let's analyze the remaining style properties in the HTML code shown in Fig 5.4 and complete Table 5.3 by identifying the features.

Style	Property	Value
Align the text to the centre	text-align:	center;
Adjust the thickness of the font	font-weight:	

Table 5.3 Style property and its value

Background-color, color

The style property used to set the background colour of an element is **background-color**.

The **color** property is used to define the colour of an element's content (foreground), means the text colour neatly inside this tag.

Add More Content to the Webpage

How can we add more content to the webpage we just examined?

The webpage One_product_designed.html shown in Fig 5.2 contains details about the product "Hand-made Soaps." Similarly, we could expand this page by including information about other products like notebooks, LEDs, washing powder, and candles.

The style applied to the "Hand-made Soaps" section can also be used for the additional sections. But how can we do this?

For example, let's say we want to add a product called "Hand-made Notebooks" priced at Rs.45 to the webpage. **Open** the file One_product_designed.html from the Webpagedesigning folder in a **Text Editor**. After the existing content, just copy and paste the code for "Hand-made Soaps," and update the image name, product price, and other details as needed.

Some images required for our webpage are included in the Webdesigning folder. Add the name and necessary details of the image file containing notebooks

to the HTML file, and save the file as Two_products.html (Figure 5.5).

```
<h2 style="color: #0000FF;">Featured Products</h2>
  <div style="background-color: #9FE2BF;">
    <h3 style="text-align: center;color: #A569BD;">Hand-made Soaps</h3>
    <img src="soaps.png">
    <p style="text-align: center; background-color: #FFD700; color: #333333; font-weight: bold;">Beautiful hand-made soaps made by our students. Each piece is one-of-a-kind! <br>Price ₹40</p>
  </div>
  <div style="background-color: #9FE2BF;">
    <h3 style="text-align: center;color: #A569BD;">Hand-made Notebooks</h3>
    <img src="notebooks.jpg">
    <p style="text-align: center; background-color: #FFD700; color: #333333; font-weight: bold;">Personalized notebooks with hand-drawn covers by our talented design students. Perfect for school and gifts.<br>Price ₹45</p>
  </div>
```

Fig 5.5 Code with Two Products

By including as many products as needed, the page can be expanded. You should open the page in a web browser and check how they are displayed.

Repetition of Styles

Now, check which tags in the Two_products.html page have repeated styles.

In the newly created HTML page (Two_products.html), examine which tags have the same styles applied.

- div
- h3
- p

Refer to Figure 5.5. Style code has been given each time to style these tags. Here, even if you want to give the same style to the same tag in different places, you have to repeat the style codes.

Let's look at the inconveniences caused by this.

- The size of the HTML program increases.
- Maintaining the code is becoming difficult.
- If changes are made to the styles, they need to be made for every line.
- .....

In short, this type of **inline cascading style** has limitations when used on pages with more content.

Digital Footprint

Inline cascading styles involve adding styles to a specific HTML element directly within its own HTML tags.

What's the solution for this?

Let's Avoid Repetition

Let's see how to give cascading style to content without repeating codes.

The problem of code repetition can be solved by defining all the styles for a tag in a separate section on the page and ensuring the tag automatically applies those styles wherever it is repeated.

Look at Fig 5.6. The features required for the **<h3>** tag are included within the **<head>** section at the beginning of the HTML page.

```
1 <html>
2 <head>
3 <title>School Shopping Website</title>
4 <style>
5 h3
6         {
7         text-align: center;
8         color: #A569BD;
9         }
```

Fig 5.6 The Style is Added Separately

By including style suggestions like this in an HTML page, what differences can be observed compared to what was done before?

- Earlier, style was an **attribute**, but here it is a **tag**.
- Here, the style instructions are given as the content of the style tag.

Beginning of CSS

CSS was introduced by the World Wide Web Consortium (W3C) in 1996. The idea was proposed by **Haakon Wiam Lee** and **Bert Bos.**

- The style is given inside the curly brackets {} within the **<style>** tags.
- .....

Thus, **type selectors** are styles that are intended to be applied to tags on a webpage. Open the Two_products.html file and convert the style instructions used on that page into this format (see Fig 5.7). Save the file with a new name (Schoolshop_internalcs.html), then open it in the browser and observe.

```
<html>
<head>
<title>School Shopping Website</title>
<style>
h1
        {
        text-align: center;
        color: #FF0000;
        }
h2
        {
        font-family: Gentium Basic;
        color: #0000FF;
        }
h3
        {
        text-align: center;
        color: #A569BD;
        }
p
        {
        text-align: center;
        background-color: #FFD700;
        color: #333333;
        font-weight: bold;
        }
div
        {
        background-color: #9FE2BF;
        }
</style>
</head>
<body>
<h1>School Shoppe: Student-Crafted Creations</h1>
<h2>Welcome to Our School Shop</h2>
<h2>Featured Products</h2>
  <div>
    <h3>Hand-made Soaps</h3>
    <img src="soaps.png">
    <p>Beautiful hand-made soaps made by our students. Each piece is one-of-a-kind! <br>Price ₹40</p>
  </div>
  <div>
    <h3>Hand-made Notebooks</h3>
    <img src="notebooks.jpg">
  </div>
    <p>Personalized notebooks with hand-drawn covers by our talented design students. Perfect for school and gifts.<br>Price ₹45</p>
  </div>
</body>
</html>
```

Fig 5.7 Webpage modified using internal cascading styles

Measurements of CSS

Different dimensions are used in CSS to specify the length, width, height, etc. of different elements. px is a measurement used in comparison to the pixels of a screen. Apart from this, centimeters (cm), inches (in) are also used. These are usually called absolute measurements.

Apart from this, relative dimensions like em and % are also used in CSS to enable the adjustment of web page content according to each screen.

Internal Cascading Style

Internal cascading style is the method of adding styles for HTML elements within the **<style>** tag in the **<head>** section of the same file. Style instructions are given inside the **{}** brackets within the **<style>** tag.

Here we have added the style inside the <head> section of the HTML file. Adding style in this way is known as internal cascading style.

Internal cascading style is more convenient compared to inline cascading style.

List the characteristics of the internal cascading style compared to the inline cascading style in the table (Table 5.4).

Inline Cascading Style	Internal Cascading Style
Each tag needs to be styled everytime.	Need to style a tag once.
Codes are getting complicated.	
Codes are getting longer.	

Table 5.4 Inline Style and Internal Style

Cascading Style Sheets

Fig 5.8 Wikipedia Pages with Similar Styles

See Fig 5.8. These are screenshots of two different pages on Wikipedia. What are their characteristics?

- The layout is similar.
- .....

Similarity in design can be seen across all Wikipedia pages. On many other websites, the layout of the main page is often used as a template for designing their associated pages as well.

Did Wikipedia make all its pages look the same by repeatedly using style codes on each page as in the internal style model, just like we did now? If it is so, these codes need to be used repeatedly across all of Wikipedia's millions of pages.

Cascading Style Sheets provide a solution to this. In this method, styles are created in a separate file (external style sheet) and applied to all the required web pages.

Let's Create a Cascading Style Sheet

Let's see how we can apply the styles specified within the style tag of the saved file, Schoolshop_internalcs.html, to another page using Cascading Style Sheets.

For this, follow the steps provided below.

To Create an External Stylesheet

- Open a new document in the **Text Editor** and type all the style instructions used in webpages in the document.
- Save this file with the extension css (style.css).
- Create a new HTML page (Schoolshop_externalcss.html). You can prepare the new HTML file by removing all the style-related instructions inside the <**head**> tag from the previously created Schoolshop_internalcs.html file
- **Save** the css file and the HTML file in the same folder.
- Then, include the code shown in the image below, exactly as shown in Fig. 5.9, into the <**head**> tag

Cascading Style Sheets

CSS is an abbreviation for Cascading Style Sheets. Stylesheets are files that store the styles to be used on a web page separately by excluding the content. In webpages, all the cascading styles we use are combined into a single file, given a preferred name, and saved with a .css file extension. When creating webpages, it is possible to include all the cascading styles provided in this file using a single line of code, which is the advantage of this approach. The purpose of cascading style sheets is to describe how a page written in a markup language should be displayed. Cascading style sheets help avoid the repeated use of styles in webpage design, make coding tasks relatively easier, and bring beauty, and order to the design.

of the Schoolshop_externalcss.html file, where the CSS file is to be used. Save the file.

(In the filename section, we should include the name of the file we created, along with the .css extension.)

<link rel="stylesheet" type="text/css" href="filename.css">

```
<html>
<head>
  <title>School Shopping Website</title>
  <link rel="stylesheet" type="text/css" href="style.css">
</head>
<body>
```

Fig 5.9 Code to Link CSS File into a HTML Page.

Now open the file in a **browser** and watch for the output. Hasn't the style appeared on the page?

Like this, include the styles from the CSS file to all the required pages.

Cascading Style Order

If an element has more than one cascading style, the order of precedence determines which style is applied.

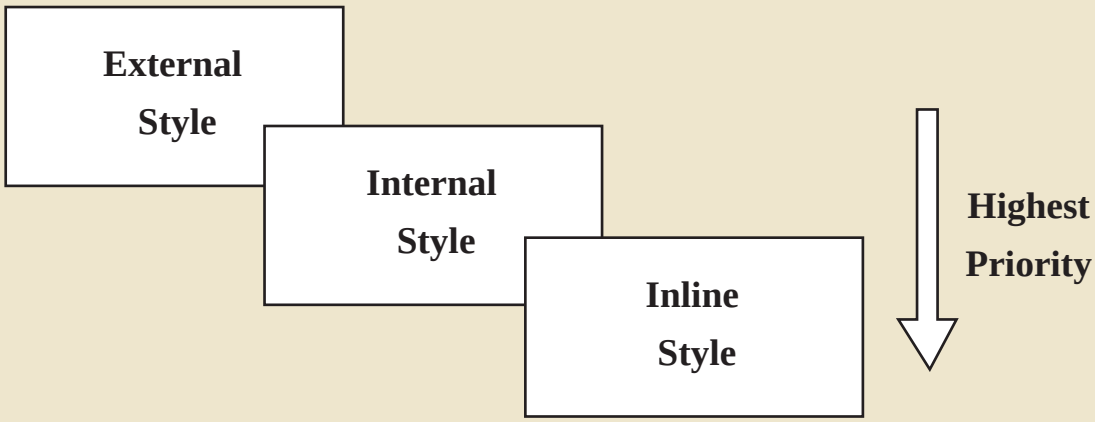
See Fig 5.10. Here, notice the background colour (lightblue) given to the paragraph as an external style. At the same time, another background colour (hotpink) has been given to the paragraph as an internal style on the page. In this case, the background colour given as an internal style will be given to this paragraph.

```
p {
        text-align: center;
        background-color: lightblue;
        color: #333333;
}
```

```
    <p style="background-color:hotpink">Beautiful
  hand-made soaps made by our students. Each piece
  is one-of-a-kind!<br>Price ₹40</p>
```

Fig 5.10 Cascading Style Order

If the same element is given styles externally, internally, and inline, the browser's priority for choosing the style is given below.



We have already learned how to add styles directly to an element's opening tag and apply common styles to all elements using their tag name. In addition to these methods, there are other ways to apply styles without using tag names. You will explore these advanced methods in higher classes. Similarly, to make the webpage you created accessible to everyone over the internet, there are additional steps to learn. These too will be introduced in higher classes.

Let's Assess

- Which style feature is used to bring the text in a webpage to the centre of the page?

  a) color: #a569bd;
  b) font-family: Gentium Basic;
  c) text-align: center;
  d) font-weight: bold;

- <h3 style="text-align:center;color:#a569bd;">Hand-made Notebooks</h3>
  Which cascading style is used in this line?

  a) Inline
  b) Internal
  c) External
  d) Outline

- While using external cascading style sheet, which tag can be used to include the stylesheet in an HTML page ?

  a) rel
  b) type
  c) css
  d) link

Extended Activities

1. Create a webpage using CSS to promote the sale of native products and home-grown vegetables cultivated in your ward.

2. The text below is intended for designing a webpage to publish school news but is incomplete. Copy this code into a text editor, apply suitable styles, and enhance the appearance of the webpage.

```
<html>
<head>
<title>GHSS Alappuzha - School News</title>
</head>
<body>
<div>
<h1>Welcome to GHSS Alappuzha - School News</h1>
<p>Stay updated with the latest events, achievements, and announcements!</p>
</div>
<div>
<h2>Sports Day Highlights</h2>
<h3>Exciting Moments from the Field</h3>
<p>Our Annual Sports Day was a thrilling success, with students competing in various events
    such as races, football, and long jump. Here are the key highlights of the day.</p>
</div>
<div>
<h2>School Kalolsavam Highlights</h2>
 <h3>Amazing Performances by Our Students</h3>
 <p>This year's School Kalolsavam displayed incredible talent from our students.Various art
forms were showcased,leaving everyone amazed at the creativity on display.</p>
</div>
</body>
</html>
```

Chapter 6
The World of Robots

What do you see in the picture? It's a robot cleaning the trash.

Have you seen robots ? In which fields are robots used?

- In factories
- In agricultural areas
- For entertainment
- .....
- .....

Today, robots are used in various fields such as agriculture, vehicle manufacturing, space missions, and many others. Their use increases the productivity and reduces the workload on humans. Let's explore the fascinating world of robotics.

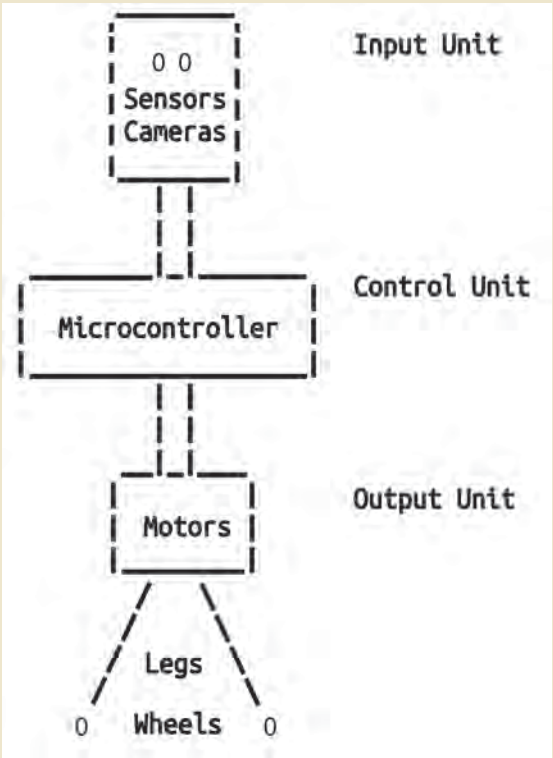
How Robots Work

Have you ever thought about what robots are capable of? Robots can perform complex tasks quickly

and accurately for extended periods without tiring. These machines come in different sizes and shapes, designed to suit specific tasks and environments. Robots can take forms such as small vehicles, birds, animals, human hands, and even full human-like figures.

Have you ever thought about how robots work? Robots recognize their surroundings and analyze the information they recognize. Based on the analyzed information and the instructions they receive, they make decisions and act independently.

Basic Components of a Robotic System



Robots use various types of sensors to perceive their surroundings. These sensors (input devices) gather information, which is then processed by microcontrollers or microprocessors. The choice of processor depends on the volume and complexity of the data to be processed. As the data requirements grow, the efficiency and number of processors are scaled accordingly. Based on the processed information, the robot's control unit manages the output devices.

Output devices in robots include LEDs, buzzers, display units, motors, and complex mechanical components, depending on the specific application. The components responsible for enabling automatic movement in robots are known as actuators. Examples of actuators include servo motors and stepper motors.

Have you understood the basic components required for the functioning of robots?

Now complete the table 6.1 on the components of robots and their uses. Some of the components mentioned in this are available in the **robotics kit** in your computer lab. Check them out to complete the list.

Category	Component	Use
Input Unit	Light Sensor	To detect the presence of light.
	IR Sensor	To detect the presence of objects with the help of infrared rays.
	Microphone	
	Camera	To collect information in the form of images.
Control Unit	Arduino	The information received through input devices is processed, decisions are made based on the given instructions and actions are carried out throught the output devices.
	Raspberry Pi	
	ESP32	
Output Unit	LED	To display the output in the form of light.
	Buzzer	
	Servo Motor	Used to perform automatic/mechanical movement.

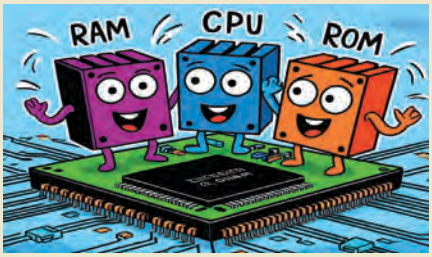
Table 6.1 Components of Robots and their Uses

Robotics

Robotics is the science that studies the design, construction, operation and control of robots using appropriate software. It combines electronics, mechanical engineering, and computer science. Knowledge in these diverse fields is essential for building robots. The rapid advancement of artificial intelligence technology is also driving significant progress in the field of robotics today.

Usually, programmable **microcontroller** chips act as the brains of robots. The Arduino UNO board in the robotics kit given to schools has a microcontroller

Microcontroller



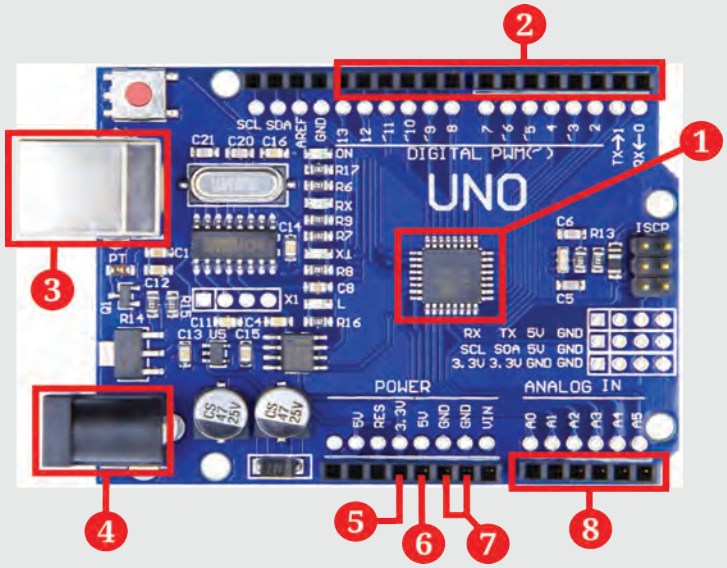
A microcontroller is a small computer integrated into a single chip. It contains the main components of a computer system, including the processor, RAM, ROM, and input/output interfaces, all within the microcontroller chip.

called ATmega328P embedded in it. Using Arduino and its related components, we can create prototypes or miniature versions of electronic devices commonly seen around us. Let's explore how to make such devices using the components in the robotics kit.

Let's Get to Know Arduino

Arduino is a world famous open-source hardware/ software platform. Arduino was created in 2005 by a research team at the Interaction Design Institute Ivrea in Italy, with the aim of making physical computing devices that connect sensors, actuators and other components easier, cheaper, and more popular to build.

Arduino models are available to suit different needs. The Arduino Uno R3 model is shown in Fig 6.1.



1. Microcontroller Chip (ATmega328P)
2. DIGITAL I/O PINs (0 to 13)
3. USB Port
4. External Power Supply
5. 3.3V DC PIN
6. 5V DC PIN
7. GND
8. Analog Input

Fig 6.1 Arduino Uno R3 - Major Components

Look at Table 6.2 and find the major components of Arduino and their uses.

Component	Use
Microcontroller Chip (ATnega328P)	This part is called the brain of Arduino. It collects information and controls the devices according to the instructions.
DIGITAL I/O PINs	Collects data from input devices. Controls output devices. The pins marked with tilde (~) symbol can also be used for Pulse Width Modulation (PWM).
USB Port	For connecting to computer to upload programs and transfer data.
External Power Supply	For supplying power to the board from the battery or other external source.
5V PIN	This provides a steady 5V.
3.3V PIN	This provides a steady 3.3V.
GND	This provides the ground potential (0V) of the Arduino.
Analog Input	For measuring analog voltage.

Table 6.2 Arduino Uno R3 - Major Components and their Uses

Breadboard

A breadboard is a device that allows you to build and reuse circuits by connecting electronic components to each other without soldering. The terminals of electronic components can be attached to the holes in the breadboard. These holes are internally connected to each other using conductive wires, as shown in the second picture.

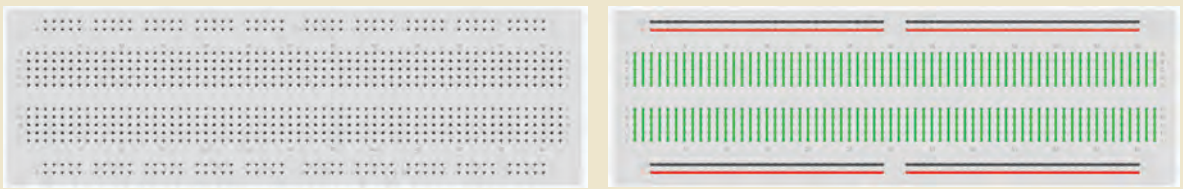


Fig 6.2 Breadboard

Let's Light LED Lamps

Haven't you prepared circuits for lighting a filament bulb used in a torch battery (Fig 6.3) in

Fig 6.3 Circuit of Filament Bulb

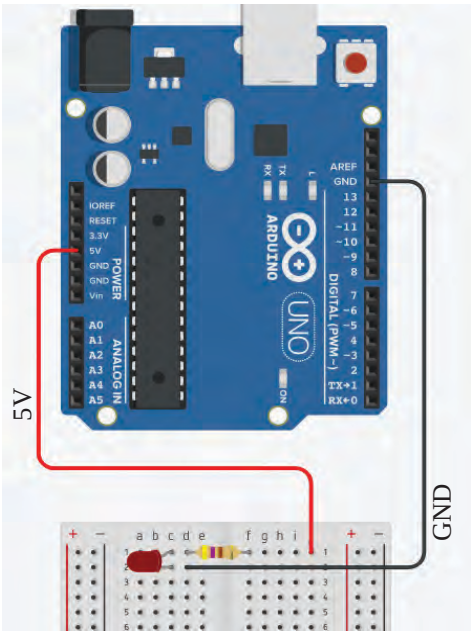


Fig 6.4 LED bulb Circuit Using Arduino

science classes? Now, what about preparing a circuit for lighting an LED?

See the circuit diagram given in Figure 6.4. Here, instead of a battery, Arduino is used to provide power.

Let's take a look at the things to note when designing a circuit like this.

- The positive terminal of the power supply should be connected to the anode of the LED and the negative terminal should be connected to the cathode of the LED.
- A suitable resistor should be connected in series in the circuit.

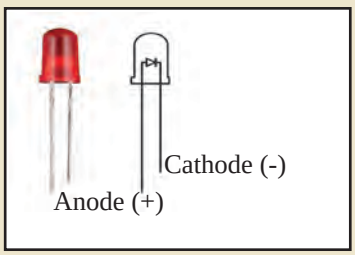
Open the robotic kit and make a circuit as shown in Fig 6.4 using the *Arduino, LED, resistor* and *jumper wires*. Then, connect the Arduino to the computer. The USB cable in the kit can be used for this.

Doesn't the LED light up? Repeat the experiment using LEDs of different colours.

Blinking LED

You now understand how to power an LED using an Arduino.

LED (Light Emitting Diode)



An LED is a two-terminal electronic device belonging to the diode category that conducts electricity in only one direction and emits energy in the form of light. Electricity will flow through the LED circuit only if its anode terminal is connected to the +ve of the battery and cathode to the -ve of the battery. Typically, the anode terminal of the LED is slightly longer than the cathode. To prevent excessive current flow and potential damage to the LED, a resistor must be connected in series with the LED circuit. The resistor's value depends on the maximum power the LED can handle and the voltage of the power source.

Now, let's learn how to make an LED blink using Arduino. What changes need to be made in the circuit for this?

We are using 5V power from the Arduino to operate the LED. But is it enough to simply connect the 5V pin to make the LED blink? No, the 5V pin provides a constant 5 volts, so it cannot be used to make the LED blink.

To create a blinking LED, we need to connect it to one of the **digital pins** (PIN 0 to 13), which can control the power (turning it ON/OFF). We then give the necessary instructions to the Arduino to control this power.

Observe the circuit diagram shown in Fig 6.5 and build the circuit based on this model.

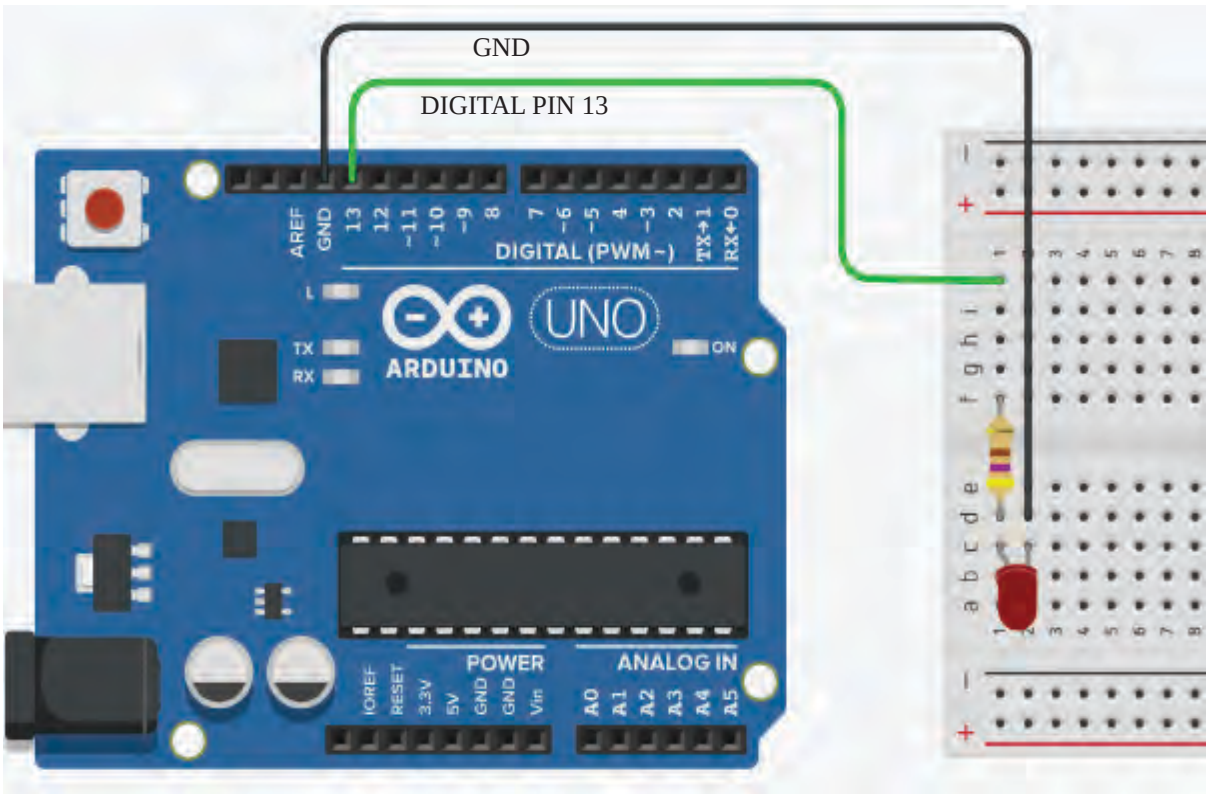


Fig 6.5 LED Circuit Connected in PIN 13 of Arduino

In the circuit, the anode of the LED is connected to DIGITAL PIN 13 through a resistor. When this pin is ON, the LED will light up, and when it is OFF, the LED will go out.

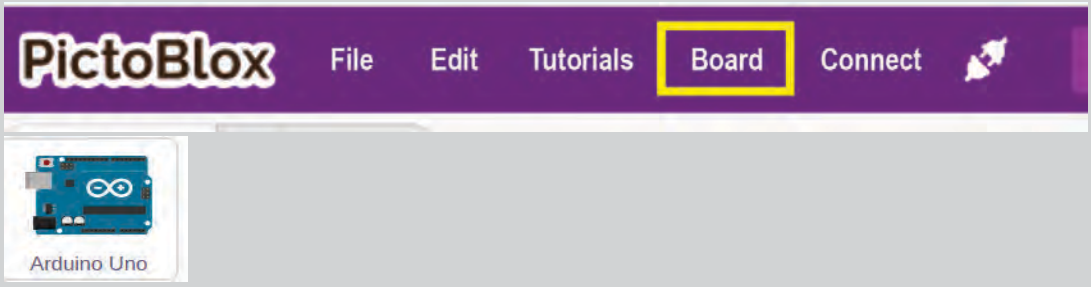
The Arduino circuit is now complete. Next, we need to give the Arduino a command to turn PIN 13 ON/OFF.

To do this, you need to write a program on the computer. This can be done using **PictoBlox**, which we learned in previous classes. Before writing the program, we need to set up the connection between the Arduino and the computer.

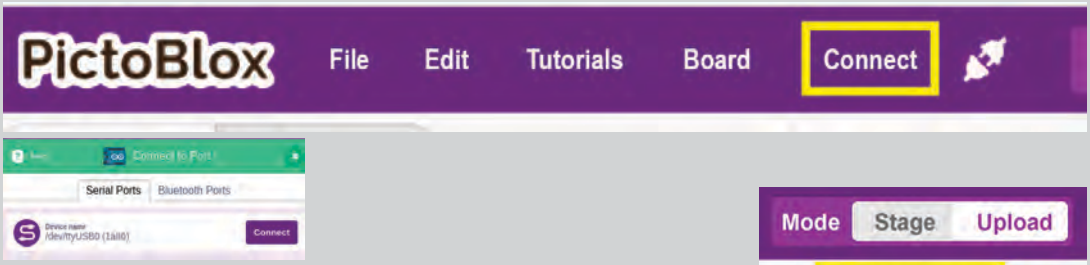
Connect the Arduino board to the computer as shown below.

To Connect Arduino to Computer

- Connect Arduino to computer using USB cable.
- Open **PictoBlox** on computer and select **Block Coding**.
- Then, select **Ardunio UNO** board from **Board** menu.



- Open the **Connect** menu and click the **Connect** button against the Arduino connected via USB to establish the connection.

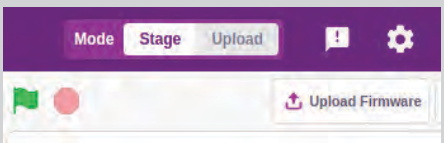


- After that, change the programming mode to **Upload Mode.**

Programming Modes in PictoBlox

There are two ways to program Arduino using PictoBlox.

1. Upload Mode:



In this mode, the program prepared on the computer is completely uploaded to the memory of the Arduino microcontroller. Later, it does not require a computer to **run** the program. The Arduino only needs to be powered on.

The given code block will only work in **upload mode**.

2. Stage Mode:

In this mode, the Arduino must first be configured using the **Upload Firmware** method to **run** the Arduino. Once the firmware is uploaded, the Arduino will operate according to the instructions received via the USB cable. In this mode the program can be **run** only when the Arduino is connected to the computer.

This code block will only work in **stage mode**.

Have you connected the Arduino board to the computer? Now, check the Blocks tab in pictoblox. Here you will see some new code blocks related to the Arduino Uno.

From this, you can find out which instruction should be used to turn *DIGITAL PIN 13* ON.

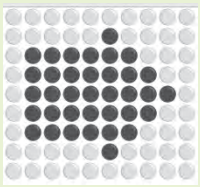
If so which instruction should be used to turn *DIGITAL PIN 13* OFF?

- Just make the output of *DIGITAL PIN 13* LOW.

Now prepare the program given in Figure 6.6 and upload the program to the Arduino using the 

button.

Language of Computers



In the previous chapter, we have learned about binary language, the only language that computers can understand. We have already discussed that instead of **0** and **1** in the binary number system, we use **LOW, HIGH, FALSE, TRUE, OFF, ON** respectively. These are called "bits". Each bit represents a switch, which can be on (1) or off (0). These bits are added together to represent all the information we use on computers every day, such as text, images, and videos.

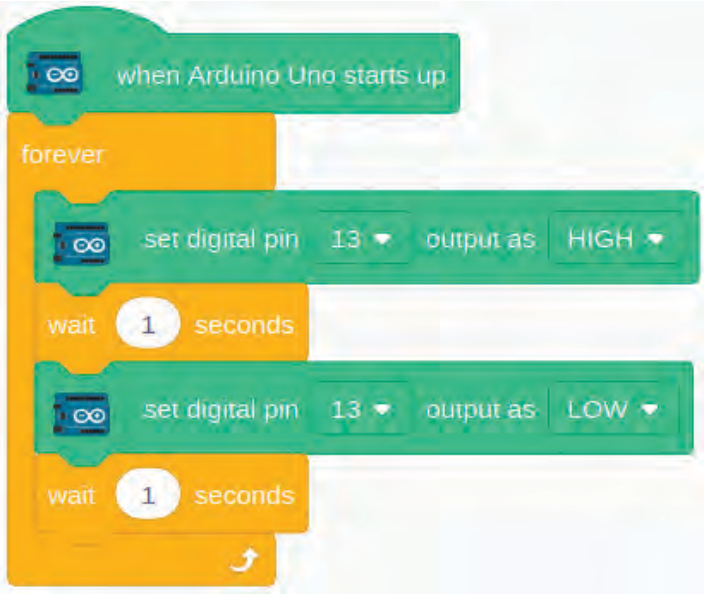


Fig 6.6 LED Blinking Program

Is the LED in the circuit blinking?

What changes should be made in the code to increase the speed of blinking of the LED? Try to do it.

Beep... Beep…

We made a system, blinking LED using a computer program. Is it possible to make a device that produces a beep sound at intervals in the same model?

Observe the circuit diagram in Fig 6.7. Here, a buzzer is connected in the circuit instead of an LED.

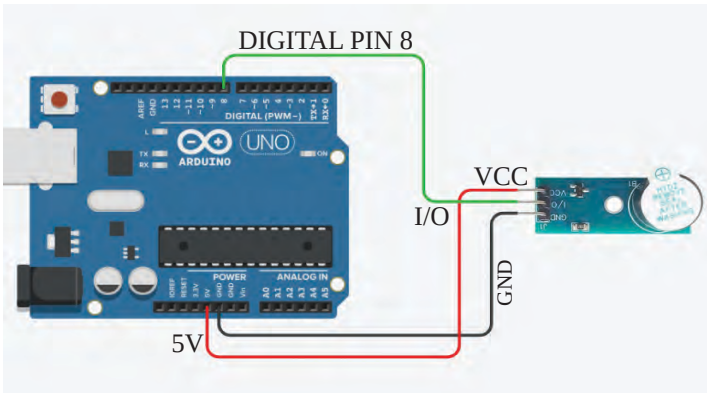


Fig 6.7 Circuit in which Buzzer is Connected

Buzzer Module

This is an electronic component used to produce a beep sound. It can be powered by connecting the VCC of the buzzer to the 5V of the Arduino and the GND of the buzzer to the GND of the Arduino. It produces sound when a LOW signal is given to the I/O PIN. The sound stops when a HIGH signal is received on the I/O PIN.

Observe the figure and identify the digital pin in Arduino board with which the middle pin of buzzer (I/O PIN) is connected.

If we want the buzzer to produce a 'beep' sound at regular intervals, what changes should we make in the program we prepared earlier? Try it.

Automatic Sanitizer Dispenser

We have discussed that robots collect information from their surroundings through various sensors and act accordingly. Let's try to build a sensor-based device.

Do you remember how we used sanitizer to clean our hands during the COVID-19 pandemic to prevent the spread of disease?

Imagine a sanitizer bottle that dispenses sanitizer as soon as our hand comes near it, without having to touch the bottle.

How do these devices detect the presence of our hand?

- IR sensors
- Ultrasonic sensors
- LiDAR (Light Detection and Ranging)

This can be achieved by using the above given sensors.

Mini pumps or electronic taps are commonly used to control the release of sanitizer. There should also be a controller chip to connect the sensor and the tap to each other.

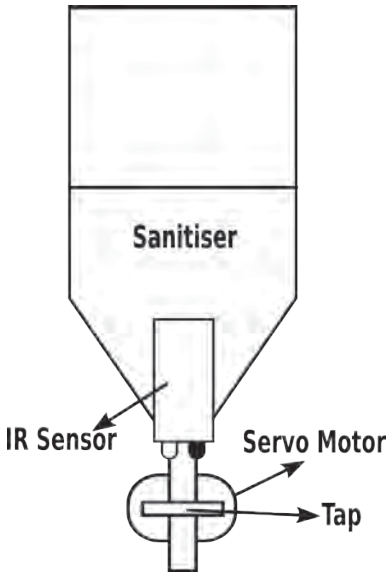


Fig 6.8
Automatic sanitizer dispenser Design

Let's make a device that detects the presence of hand and dispenses sanitizer. It should be made according to the model given in Fig 6.8.

What components are needed for this? Let's check the availability of these components in our robotic kit.

- *IR sensor module* to recognize the presence of hand.
- *Servo motor* to control the tap of the sanitizer bottle.
- *Arduino* to control these logically.

Observe the circuit in Fig 6.9. What settings are made in it?

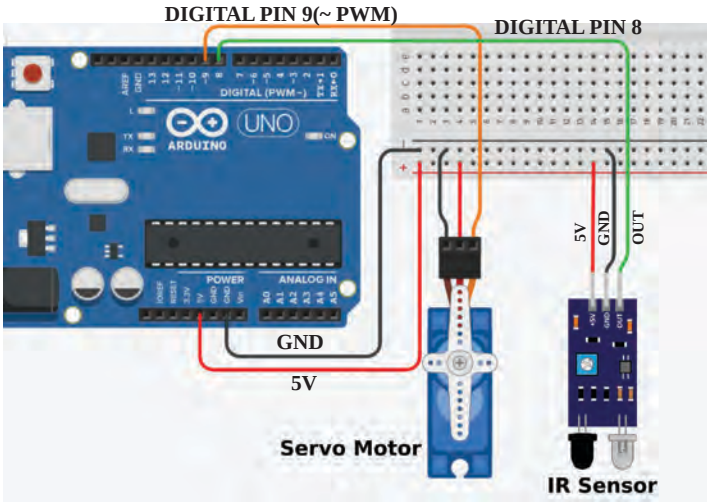
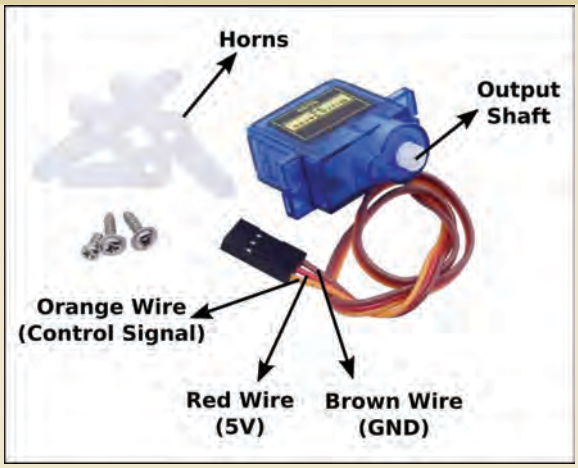


Fig 6.9 Automatic Sanitizer Dispenser Circuit

- Power is given to the servo motor and IR sensor from Arduino.
- The output pin of the IR sensor module is connected to DIGITAL PIN 8 of Arduino.
- The control pin of the servo motor is connected to DIGITAL PIN 9 of the Arduino. (DIGITAL PIN 9 is also a PWM pin. PWM pins are used to control the servo motor).

Set up this device as shown in the diagram in Fig 6.8 using Arduino, servo motor, IR sensor module and sanitizer bottle.

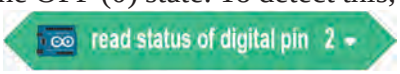
Servo Motor



Servo motors are not designed to rotate continuously like other motors. A servo motor with three connection wires has a control wire in addition to the power wires. The servo motor shaft rotates through angles from 0 to 180 in accordance with the signal voltage supplied to this control wire. Servo motors are usually controlled by Arduino using PWM (Pulse Width Modulation).

The red wire of the servo motor shown in the picture can be connected to the 5V of the Arduino and the brown wire to the GND of the Arduino to provide power. The signal received on the orange wire determines the angle to which the output shaft of the motor should rotate.

Now, let's prepare a program to make this system work.

- When an object comes in front of the IR sensor, the output pin will be in the OFF (0) state. To detect this, we can use the code 

in PictoBlox. In this state, the tap of the sanitizer bottle should be opened.
- The device should be set up in such a way that when the shaft of the servo motor reaches 90 degrees, the tap of the sanitizer bottle should be opened. Then, to open the tap, just give the code 

.
- After that, the device should also be adjusted in such a way that the tap closes when the servo motor shaft reaches 0 degrees. The device configured in this way opens the tap when the hand comes near and closes the tap when the hand is removed. The code prepared in PictoBlox for this is shown in Fig 6.10.

IR Sensor Module

This is an electronic component that is used to detect obstacles in front with the help of infrared waves. If an object comes in front of the IR sensor module, the OUT PIN will become LOW (OFF) and when the object moves, the OUT PIN will become HIGH (ON).

Fig 6.10 Automatic Sanitizer Dispenser - Program

Make necessary changes in this code as per the design you made for your Sanitizer Dispenser and upload it to the Arduino and run it.

The automatic sanitizer dispenser works by recognizing the presence of our hand.

Have you seen other devices that work by recognizing our presence in this way?

- Automatic tap
- Automatic door
- ……..……..

Discuss whether it is possible to prepare a model of these devices using the components in the robotic kit.

Artificial Intelligence and Robotics

We have learned in previous classes that artificial intelligence is a technology that enables machines to learn and solve problems by imitating human intelligence and thinking skills. Artificial intelligence and robotics can do many amazing things when they come together. Just imagine what they could be.

- Robots that perform surgeries in the healthcare sector.
- Robots that manufacture products in factories.
- Robots that engage in space travel.
- Robots that engage in agricultural work.
- Robots that prevent environmental pollution.
- ……..……...

In short, robots are growing to be able to perform tasks with precision and efficiency beyond human intelligence.

Aren't you interested in creating devices that work with artificial intelligence? How about we make one of them?

A Door that Opens by Recognizing Faces

We have discussed the functioning of a door that opens automatically by recognizing human presence. A passive infrared sensor (PIR sensor) is usually used in such a system. This sensor detects the infrared heat radiation emitted by the body of living beings. Therefore, the door will open even if animals come.

How can we make a door that opens only when there is a human presence? Why not use the computer vision technology that we learned in previous classes for this?

Shall we make a smart door system that opens only when a human face is seen in front of the camera?

Since Arduino does not have a camera, we can use our laptop's camera to prepare this system. Therefore, we need to prepare the program in **Stage Mod**e in Pictoblox.

Human faces can be detected using the extension named **Face Detection** in Pictoblox.

To Include Face Detection in Stage Mode

- In Stage Mode, connect the Arduino to the laptop and configure the Arduino using the **Upload Firmware** option.
- Then include the facility in the following way:,

 Add Extension →

 Face Detection

Set **Stage Mode** in Pictoblox as shown on the left and include the **Face Detection** extension.

Did you add the Face Detection extension to your system?

Now, let's prepare a miniature of the door that works by recognizing faces. Examine the diagram in Fig 6.11. Prepare the circuit and create a miniature of the smart door system.

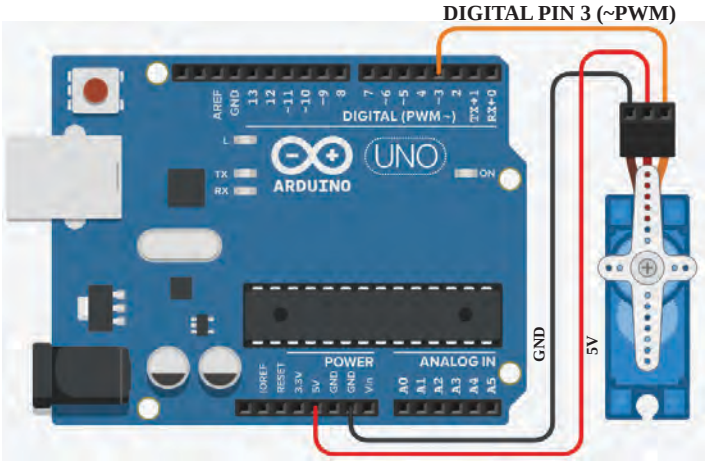


Fig 6.11 Smart Door System - Circuit

Now let's program it.

How can we detect if a human face is caught on camera?

- In Pictoblox, we can turn on the camera using the code 

.

- You can analyze the images captured by the camera using 

and find the number of faces identified using the 

code.

Examine the code given in Fig 6.12. The shaft of the servo motor is rotated to 90 degrees to open the door and to 0 degrees to close it.

Make necessary changes in this code according to the configuration of the servo motor attached to the smart door system you have prepared and try it out.

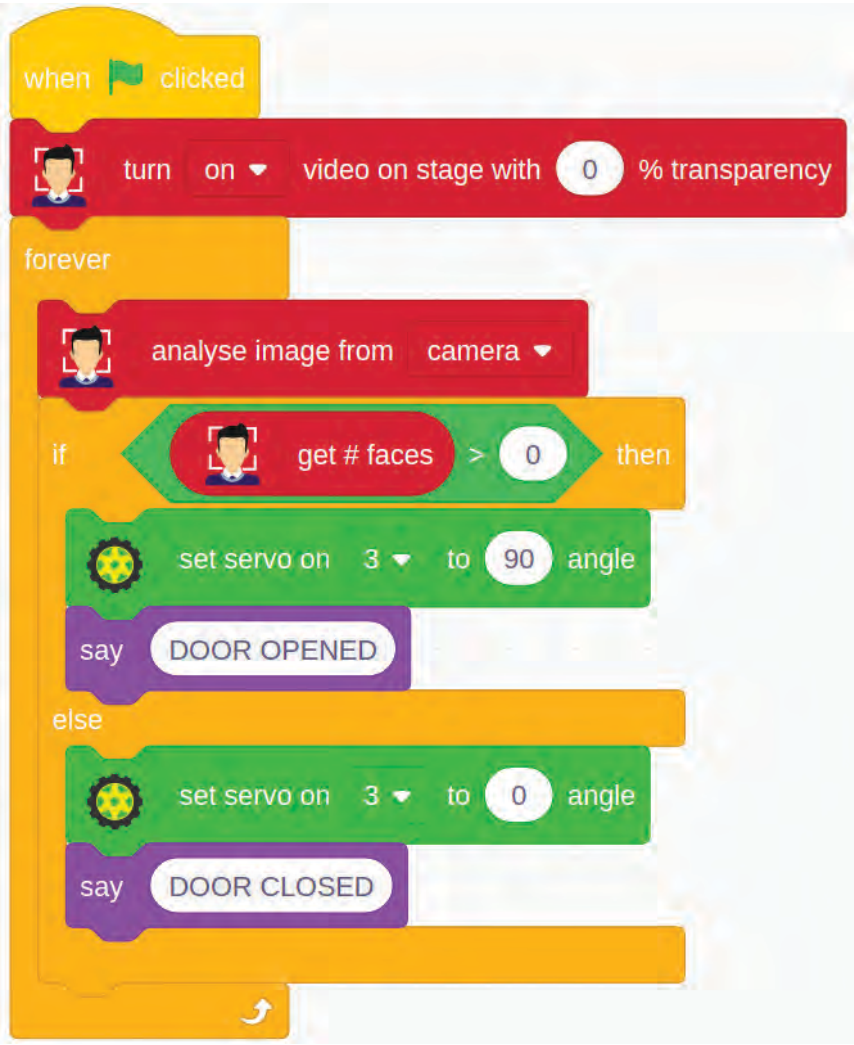


Fig 6.12 Smart Door System - Program

Let's Assess

- Which of the following can be used as an actuator in a robot?

a) IR sensor
b) Servo motor
c) LED
d) Arduino

- Analyze the code given in the figure and find the correct statements given below.

a) An output device is connected to Digital PIN 4.
b) An output device is connected to Digital PIN 10.
c) An input device is connected to Digital PIN 4.
d) An input device is connected to Digital PIN 10

Extended Activities

1. Did you use Arduino to light up an LED? Make a model of a traffic signal using green, red, and yellow LEDs.
2. Modify the smart door system you created so that it recognizes only you and functions accordingly.
3. Using the light sensor from the robotic kit, create a model of an LED light system that automatically turns on at night.

NOTES

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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
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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