Work Integrated Education

Standard VIII

Activity Book

Government of Kerala
Department of General Education

Prepared by

State Council of Educational Research and Training (SCERT) Kerala
2025

THE NATIONAL ANTHEM

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

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Foreword

A beautiful and safe childhood is our right. It is during this period that we understand and assimilate our surroundings. Thus we integrate our surroundings into this era. Have you ever wondered who created the food, clothing, shelter, tools, roads, and everything else we see around us? The foundation of our lives is built upon the intelligence and hard work of countless individuals.

Much of the knowledge that we acquire is meant to be applied in various life situations. When we think in this manner, we can understand that we, too, have certain responsibilities towards our society. The ideas that we gain through the subjects that we study should be used for various careers. "Work-Integrated Education" is designed to help students obtain the skills necessary for this and apply them in real life. It is made possible by combining many skills, such as working with hands, making preparations, having a willingness to engage, using tools carefully, and co-ordinating our abilities with a clear sense of purpose. Work-integrated education becomes possible when all these skills come together.

Every subject that we study provides career-oriented perspectives, skills, opportunities and possibilities for its application. This book has been designed with this goal in mind. This book should be approached by considering factors such as the employment scenario, availability of materials, and the possibilities of the area we live in. This is not merely a book to read; it is an activity book meant for practice, analysis and skill development. It should help to foster an interest and positive attitude for the profession. We have a brain capable of imagination and hands capable of independent action. The study of other subjects give us the strength and support to coordinate them and work effectively. May the work-integrated activity book enables you to approach life with confidence.

Warm regards

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Director
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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)

Area 1

Agriculture

"Is there any creative endeavor on earth
As blissful as the art that makes the earth bloom."

- Vyloppilli Sreedhara Menon

Create a Flowering Season; Let's Decorate

Pic 1.1

After mid summer vacation students gathered happily in the class. Several new friends have joined the class. They came to 8th standard from other schools. Everyone is getting familiarised with each other. All of them are joyous of the new academic year.

An active discussion on agriculture is going on in the class on one of the initial days of school re-opening. The students who came to 8th standard from different schools proudly presented their agricultural activities which they had done last year in their schools.

They talked very happily about vertical farming and irrigation which they had done in 7th standard. Among them there were some students who cultivated several vegetables and earned income for Onam season.

After discussion the teacher put forward a new idea. "Let's cultivate flowering plants this time. If you start now, you can harvest several flowers during Onam season. We can prepare floral carpets (pookkalam) and can sell the excess flowers. What's your opinion?"

Students like the instruction of the teacher very much. Everyone was ready to cultivate flowering plants. In the subsequent days they were engaged in the activities related to that.

Shall we implement the instruction of the teacher?

Cultivating flowering plants for Onam season will be a good model for getting close to nature and to learn new ventures.

The life of a flowering plant begins from a small seed, presents its beauty and fragrance to the world and completes by making us happy.

With the cultivation of flowering plants, we can make them value added products also. Sectors such as flower arrangement, garlands, perfumes, dry flower craft etc are attractive and can earn income.

Floriculture : Fertile Land of Beauty

Floriculture suitable to our climate and soil, gives beauty as well as economic opportunities. Flowers can be produced by cultivating good quality plants using low cost techniques. Marigold, caesalpinia, gladiolus, tuberose, rose, jasmine, crossandra etc. are flowering plants suitable to grow in our climate.

Let's familiarise the cultivation practices of marigold and rose.

Activity 1

We can cultivate any one of the two flowering plants (Marigold, Rose)

1. Cultivation of Marigold

- Land which are fertile and getting sunlight are suitable for the growth of marigold.
- Marigold is cultivated mainly using seeds. Seeds can be sown in seed beds or protrays. Protrays should be filled with coco peat and compost and then seed should be sown in each hole.

Pic 1.2

- Seedings of 30 days growth (3/4 leaves stage) can be planted in the pot or on the field.
- Land may be prepared by ploughing and mixing with suitable fertilizers.
- Seeds /seedlings should be planted at a spacing of 45 cm × 45 cm
- Within 30 to 40 days after planting, pinching is essential for producing more branches and producing more flowers in a branch. This is a main cultural practice in the growth of marigold.
- As the plants grow, enough support should be given using stems.
- Harvesting can be started 2 ½ months after transplanting of seedlings. Harvesting can be done for almost 2 to 2½ months.

Protray

Protrays are small plastic trays having pits used for agriculture. This is very helpful for the healthy growth of plants. This is widely used for better germination, strong roots and easier transplanting. Farmers of Kerala use protrays abundantly for growing of vegetables and flowers.

Pic 1.3

Pic 1.4

Pinching

This is the technology of removing the growing tip of a flowering plant. This encourages growth of new branches and produces more flowers. Pinching method helps to improve the style and beauty of plants and increase the number and quality of flowers. Pinching is done from 30 to 45 days after transplanting. This controls the shape of plants and the growth of the stems. Plants will grow vigorously after pinching.

Pruning

Pruning of plants is the main cultural practice to improve plant growth and production. By removing the unnecessary, diseased, damaged or withered branches, nutrient absorption and growth of plants can be enhanced. Pruning helps to give good framework to plants and increase the production of flowers and fruits. Moreover, pruning helps in preventing the spread of diseases and also gives better yield.

2. Rose cultivation

Pic 1.5

- Rose is the queen of flowers.
- Roses are planted mainly in two ways. Local rose plants are cultivated using cuttings and hybrid varieties are cultivated using buddings.
- Rose plants can be planted in the field at a distance of 60 cm × 60cm. It can be planted in pots also.
- Rose can be planted by digging a pit of 30 cm size and adding necessary powdered cow dung and bone meal with the top soil. In the case of budded seedlings, the buds should be planted vertically above the soil.
- Rose is a plant which needs proper manuring. Organic manures such as cow dung and poultry manure should be used once in a month.
- Pruning is the most important cultural practice for rose cultivation. Dry, weak and overgrown branches should be cut off once in a month. Heavy pruning should be done once in a year.

Rose Varieties

Each variety of rose is known for its different qualities. Floribunda rose can be seen in different colours. It lasts longer than other roses. This rose grows in bunches. Hybrid rose, which is most suitable for growing in tropical places, gives large flowers. Miniature rose is the rose having small flowers. The cultivation of these are also easy. Climbing rose is a type of rose plant which can be trained to grow upward along fences, walls etc.

Flower Arrangement : A Beautiful Art

When you see beautiful flower arrangement, have you ever thought that how these flowers are arranged very beautifully. There are a lot of ways to display flowers in an attractive manner. Flower arrangement is not mere decoration, but it is a combination of creativity and artistry. Many decorations ranging from simple bouquet to fancy decoration are popular nowadays.

Florist is not mere selling of flowers, but it includes artistic arrangement and expressions. Floriculture has market possibilities in sectors such as weddings, celebrations, office spaces, hospitality business etc.

Flower arrangement is a creative art of arranging flowers. These arrangement of flowers and greenery creates a beautiful atmosphere in our homeyards, classrooms etc during celebrations including Onam.

Styles of Flower Arrangement

There are different styles for flower arrangement. All are different due to their characteristics and configurations. Mainly there are two styles of flower arrangement-Western style and Eastern style. Freestyle arrangements, the fusion of both styles also exist. Let's get familiarised with some important styles.

1. Western Style

It concentrates on the abundance of flowers and diversity of colours. Mathematical forms such as sphere, triangle and quadrilateral are more popular. Some of the Western styles are given below.

A. Horizontal Arrangement

This is a method of decorating flowers with a thick base, extending them lengthwise to the sides. This is mostly used for decorations.

Pic 1.6

B. Vertical Arrangement

This is the method of arranging flowers in such a way that they appear taller.

Pic 1.7

Pic 1.8

C. Triangular Arrangement

This is the arrangement of flowers in triangular shape. This is used for formal ceremonies.

D. Cascading Arrangement

In cascading arrangement, flowers are arranged as flowing downwards. This is used commonly in wedding decorations.

Pic 1.9

2. Eastern style

Minimalism : Minimalism is the style of arranging flowers using few flowers and giving importance to spacing between them. Ikebana is an example for this. This is a Japanese art of flower arrangement. This gives importance to equality, simplicity, harmony with nature etc.

Pic 1.10

Pic 1.11

3. Freestyle Arrangement

The flower arrangement which everyone creates in a variety according to one's own imagination is known as freestyle. Unlike traditional methods, this does not have a fixed framework.

4. Bouquet

Bouquet is the arrangement of flowers in a way that can be held in hand. Bouquets are used for weddings, gifts, receptions and other functions.

Pic 1.12

Activity 2

Let's prepare a Bouquet

Prepare a bouquet using various flowers and foliages.

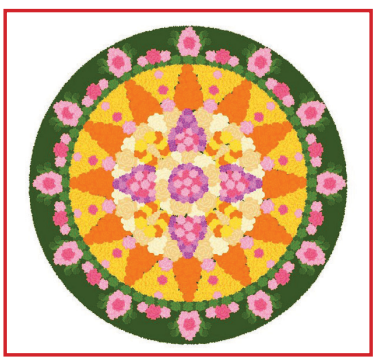
- Select flowers and foliages as needed.
- Arrange flowers according to colours and shapes.
- Main flower can be placed at the centre.
- Add other flowers proportionately on both sides.
- Make the flowers more attractive by using leaves .
- Use ribbon, string or tape for fixing the flowers.
- Add simple decoration as needed.
- Bind using materials such as glass sheet, if necessary.
- Soak the bouquet in cold water and keep it fresh.

Floral Carpets (Pookkalam)

Floral Carpet is a beautiful flower arrangement which is an unavoidable factor during Onam. This decoration, arranging in the floor using different coloured flowers, is a symbol of unity and happiness.

Some Styles of Floral Carpets

1. **Traditional Style -** Followed from ancient times. This includes local flowers and traditional structures. Usually this is made in a circular shape.



Pic 1.13

2. **Modern Style** - Includes new designs, three-dimensional designs, different coloured categories etc. This includes combination designs.

Pic 1.14

3. **Thematic Style -** Making of floral carpet based on a special theme. Interesting topics such as environment, cultural values, nationalism etc can be included in this.

Pic 1.15

Activity 3

Let's Make Floral Carpet

Prepare a floral carpet for the Onam celebration using the flowers you have produced. You should also invite your parents to watch it.

Value Added Products from Flowers

We have learnt about flower arrangements. The products from flowers are great source of income. There are various products from flowers such as rose water, essential oils, flower tea, herbal creams, flower candle, perfumes, agarbathi etc. This is an industrial sector. Today many entrepreneurs do floral product business. Many flowers that we neglect can be turned into attractive products.

Pic 1.16

Activity 4

Let's Make Rose Water

Haven't you ever seen rose water? You might have used it. Let's familiarise the way to prepare rose water.

Rose Water

Rose water is a perfume extracted by putting rose petals in boiled water. This is full of natural fragrance and benefits. Since ancient times, it has been popularly used as a cosmetic. Rose water is widely used in medicine and cooking.

Pic 1.14

Ingredients required :

1. Rose Petals (Fragrant red or pink rose petals are usually used.)
2. Boiled cold water (1 ½ cup of water for half a cup of petals)

Steps to Prepare Rose Water

- Select fragrant roses and separate the petals.
- Remove dirt and dust by washing gently.
- Add rose petals to water and boil.
- Boil the water slowly until the colour and fragrance of the petals mix with water.
- The water in the bowl smell like rose when the colour of the petals changes.
- Turn off the heat and wait until this rose water cools down.
- Remove the rose petals using a sieve.
- Store rosewater in thoroughly washed and dried air tight glass bottles.

Uses :

- Rose water can be used for beauty care and other purposes.

Moving Ahead

1. Conduct an exhibition based on the idea of Floriculture : Creativity and Entrepreneurship. Include the following in the exhibition.

- Floriculture varieties, sites, method of cultivation, cultivation practices, marketing possibilities, etc.
- Value added Products

Key Takeaways

Gains			
I know the various products obtained from flowers.			
I am familiarised with the flower cultivation.			
I am familiarised with the various styles of flower arrangements.			

Area

2

Plumbing

The future of agriculture relies on efficient water utilisation. Drip irrigation is the leading technique in this.

Dr.Daniel Hiller

Drip Irrigations System

Pic 2.1

Pic 2.2

Observe Pictures 2.1 and 2.2.

What are the similarities and differences between the farming methods depicted in the two pictures given above?

- Water is supplied directly to the first farm and through pipes to the second farm.
- The model shown in Picture 2.1 is the one that existed in our country in earlier days.

What are the limitations of this model?

- It is not practical to supply water directly to areas with limited water availability. In the past, Water was filled in clay pots with a wick attached at the base of the pot. But clay pots were later replaced by bottles. However, both approaches presented challenges, as manually filling each pot or bottle proved difficult and time-consuming.

The model shown in Picture 2.2 is now widely used across the world. Its key feature is the efficient and minimal use of water, ensuring better resource management. Additionally, it allows for the scientific application of fertilizers.

Drip irrigation is a precise method that delivers required amount of water and fertilizers directly to the base of the plant.

Drip Irrigation

Drip irrigation involves a network of PVC pipes fitted with emitters, which slowly release water and fertilizers directly into the soil near the plant roots, ensuring optimal absorption.

In the previous class, we practised a method where water was supplied to vertical farming towers in limited spaces. Similarly, what are the other irrigation methods?

- What are the advantages of drip irrigation system over the traditional methods?
- Use of water and fertilizers can be limited as needed.
- Better yields are obtained.
- Lower energy consumption.
-
-

If sensors are used, water and fertilizers can be supplied in precise amounts at the required time. This increases its practicality. It can be controlled even from distant locations.

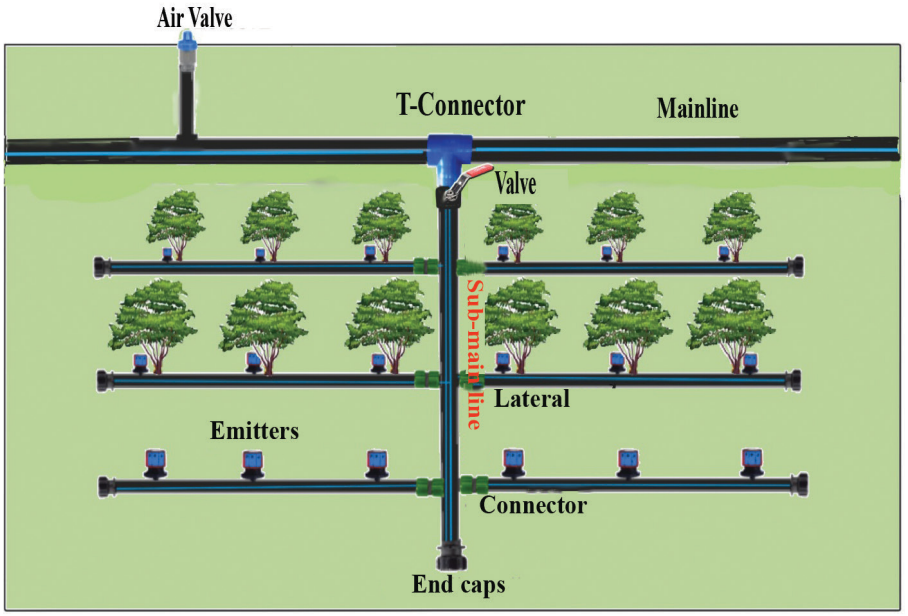
Agricultural Automation

To enhance the efficiency of farming activities, agricultural automation utilizes machines and equipment. This helps reduce human labour and makes farming more effective. In the long run, it also helps to reduce costs and improve productivity.

Would you like to try setting up a drip irrigation system in your home or school garden?

Before that, let's explore the different types of drip irrigation.

1. **Surface Type (Above-Ground Method) :** Since the pipes run above the soil, holes can be made in the required places for water distribution. This method is suitable for crops like okra, brinjal and chilli.
2. **Sub-Surface Type (Underground Method) :** Since the pipes are placed underground, perforated pipes with openings at specific intervals are used for water distribution.
3. **Micro Irrigation :** This method offers higher efficiency and reduces water wastage. However, it is more expensive due to the use of high-quality filters.



Pic 2.3

Now, let's get familiar with the distribution network in a drip irrigation system. The key components include the mainline, sub-mainline, drippers, and laterals.

1. Mainline

The mainline is used for transporting water into the field and distributing it to the sub-mainlines. It is typically made of thick PVC or High-Density Polyethylene (HDPE) with a diameter above 65 mm and a pressure capacity of 4 to 6kg/cm^2.

Pic 2.4

2. Sub-Mainlines

Pic 2.5

Sub-mainlines ensure equal distribution of water to the lateral lines. They are typically made of PVC, HDPE, or LDPE (Low-Density Polyethylene). These pipes have a diameter ranging from 32mm to 75mm and can withstand a pressure of 2.5 kg/cm².

3. Laterals

Pic 2.6

Laterals are used to uniformly distribute water through drippers or emitters. They are generally made of LDPE or LLDPE (Linear Low-Density Polyethylene). The internal diameter ranges from 10mm, 12mm to 16mm, with a wall thickness of 1mm to 3mm.

4. Emitters/Drippers

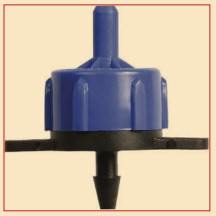
Water is finally distributed through emitters. Common types of drippers include Online Pressure-Compensating Drippers, Online Non-Pressure Compensating Drippers, In-Line Dripper, Adjustable Discharge Type Drippers, Vortex Type Drippers, and Microtubes. These are made of polypropylene or LLDPE.

Drippers

Online Pressure-Compensating Drippers : Distribute water and fertilizers uniformly, even over long distances and uneven terrains. These are made of a high-quality flexible rubber diaphragm or disc inside the emitter. It changes its shape according to pressure and distributes water uniformly. These are best suited for slopes and uneven terrains.

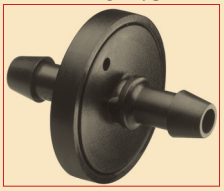
Pic 2.7

Online Non-Pressure Compensating Drippers : In these types of drippers the discharge rate varies according to water pressure. They are available in different designs, such as thread type, labyrinth type, zigzag path, vortex type, and flow path type. These are relatively inexpensive.



Pic 2.8

In-Line Drippers or In-Line Tubes : These drippers are fixed within the pipeline instead of being attached separately. They are commonly available in thread type, labyrinth type, and flow path type. Best suited for row crops where water needs to be evenly distributed along the line.



Pic 2.9

Activity 1

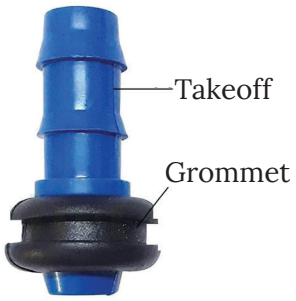
Setting up a Drip Irrigation System

To install a drip irrigation method, first select a suitable location and create a raised bed. Plant saplings at an appropriate distance (which varies depending on the type of plant). Arrange the pipes as shown in picture 2.3.

Before setting up the system in an actual field, let's try assembling it on a wooden board. The following materials are required:

Required Materials

1. 4m × 3m wooden board
2. ¾ inch HDPE pipe -2 metres
3. ¾ inch LDPE pipe -1 metre
4. ½ inch LLDPE pipe -3 metres
5. Online non-pressure compensating drippers -12 pieces
6. ½ inch end caps -6 pieces
7. ¾ inch end cap -1 piece
8. Grommet & Takeoff -7 pieces
9. Hand drill -1
10. S-Punch -1
11. ¾ inch T connector-1
12. Non-return valve -1
13. Air valve -1
14. ¾ inch clamps -7 pieces
15. ½ inch clamps 6 pieces
16. Screwdriver -1
17. Screws -as needed



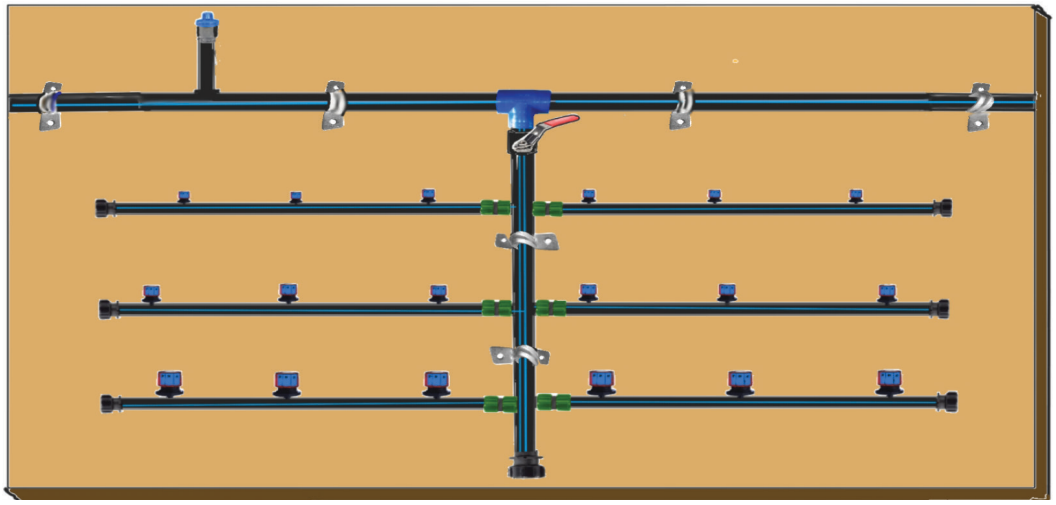
Grommet & Takeoff
Pic 2.10

Hand drill
Pic 2.11

S-Punch
Pic 2.12

Non return valve
Pic 2.13

Air valve
Pic 2.14



Pic 2.15

- Arrange the HDPE pipe (main line) on the wooden board as shown in picture 2.15.
- Use a hand drill to create a hole of appropriate size at the end of the main line. Install the air valve using the grommet and takeoff fittings.

- Install a T-connector in the middle of the mainline. Connect an LDPE pipe (sub-main line) to this T-connector.
- Create holes of appropriate size on both sides of the sub-main line and attach grommets and take-offs to connect lateral pipes.
- Fix the pipes using solvent cement.
- Use an S punch to create appropriately sized holes in the laterals and install emitters.
- Seal the open ends of the sub-main and laterals using end caps.

After securing everything, pass water through the system and check for issues if any. If there is leakage at the connecting points, loosen and reattach them properly. If water does not flow through the emitters, remove them, clean any dirt inside, and reattach them.

Try implementing this method in your agricultural field.

Are there any limitations in the drip irrigation method? Note them down..

- Clogging of emitters
-

This happens when unfiltered water from the tank is directly supplied to the mainline, causing emitters to get clogged.

Some filters used in the drip irrigation system are listed below.

1. Gravel Filter
2. Screen Filter
3. Centrifugal Filter
4. Disc Filter

Gravel Filter

Pic 2.16

A cylindrical tank is filled with fine gravel or coarse quartz sand of standard size that is free of calcium carbonate (usually 1.5 mm in diameter). These filters are effective in removing algae, organic matter, sand, and mud particles. This type of filtration is essential for the primary purification of water from open reservoirs, canals, or water sources where algae growth may develop.

Screen Filter

Screen filters are usually installed at the final stage of filtration. While most impurities are filtered out using a sand filter, small sand particles and other minor debris may still pass through. A screen filter, which includes a screen strainer, filters out all impurities and allows only clean water to enter the micro-irrigation system. The screens are typically cylindrical and made of either metal or plastic materials.

Pic 2.17

Centrifugal Filter

Centrifugal filters are effective for filtering sand, gravel, and other high-density particles from wells or river water. Water is passed over the top of a cone, creating a circular motion that generates centrifugal force. The particles thus separated are collected in narrow bottomed collecting vessels.

Pic 2.18

Disc Filter

The groove with discs filters is stacked with ring shaped discs. They are highly effective in filtering organic matter and algae. The discs are pressed together during filtration. The grade of the filtration depends on the size of the grooves.

Pic 2.19

Upgrade your existing irrigation system by adding a filter.

Remember that whatever filter you install, it is essential to clean it at regular intervals for efficient operation.

If the water tank is located far from the field, what factors should be considered while setting up the irrigation system?

If pipes are laid above the ground for a long distance, there is a high risk of someone stepping on them and causing damage. Isn't it better to lay them underground? For this, dig a trench about two feet deep, lay PVC or HDPE pipes, and then connect them to the main line.

What are the key points to be considered while laying pipes underground?

-
- Write them down in your work diary.

Moving Ahead

1. Observe the water distribution system in your school. What method is used to water the plants? What suggestions would you provide for more efficient water distribution? Draw a plumbing diagram and present your suggestions.
2. Find out the latest trends in water distribution systems and prepare a report.

Key Takeaways

Gains			
Learned how to supply water to agricultural fields through a drip irrigation system.			
Understood the plumbing technique of laying pipes underground.			
Identified the latest trends in water distribution system.			

Area

3

Media and Entertainment

"We are living in an era of unprecedented change, and I want to be a part of documenting it."

- Ron Fournier

Preserving Proofs

Pic 3.1

Observe the picture 3.1.

A discussion on celebrating Gandhi Jayanthi on October 2 is going on in the class.

Let's listen to their conversation.

Teacher : What are the programmes that we conducted last year? Do you remember?

Renju : Many students dressed up as Gandhi.

Rashid : We cleaned the school premises.

Mini : We conducted various cultural programmes in the afternoon. I have some photos with me.

The students and the teacher are continuing their discussion.

Doesn't your school also organize various day celebrations and activities?

Do you remember the programmes that were conducted in the previous years? You may not remember everything.

How can you recall and keep track of all the programmes conducted without missing anything?

- Document
-
-

Recording history is challenging due to the lack of documentation of significant events in the past. Precise documentation helps to keep without missing it. Today, there are many ways to store the documents systematically.

Documentation is the process of preparing and preserving information or data on any particular subject, event and project.

Thus, the data recorded digitally or in written form, is called a document.

Do you document the programmes in your school?

What are the benefits of documenting an activity?

- Precise evidence of activities.
- Ability to review or revisit as needed without missing anything
-
-

What are the ways to document the activities of an institution that serve as a key record for the historians?

- Data and reports in written form.
- Digital files and data base.
- Pictures, videos.

When documenting an event or activity, it is essential to ensure that all the vital information is captured and conveyed accurately. Objective and honest content is of primary importance. It is also important to make documentation authentic.

Be aware of misinformation

There are lots of false news being spread through social media. Messages like availing free internet data, winning prize money and spreading of fake videos and photos are the most common cybercrimes. In some situations, we can not identify authenticity of these news.

Fact Check

Fact check is a method used to identify the fake news spreading through social media.

The components needed for Drafted Documentation are given below.

- Cover page
- Introduction
- Foreword (if needed)
- Content
- Detailed report of programmes in sequence
- Conclusion

Activity 1

Report Preparation

Prepare a report of the activities conducted in your school last month. The day, date, time and venue of the activities should be accurate. Don't

forget to include the details of the participants, the responsibilities given, the method of organisation and the achievements and the drawbacks of the programmes in your report.

Audio Documentation

Haven't you learned the method of documenting sound in earlier classes?

How can we store the audio files?

- Hard disk
- CDs
-
-

Video Documentation

Don't you prepare short videos of the celebrations and functions you were in?

Do you know that it is a part of video documentation?

Let's get to know some of the stages in preparing a video documentation.

Pic 3.2

Planning

- **Theme :** The theme of the video documentation should be selected first. Activities of the school in a day can be taken as an example. You can select any of your interested themes such as doing the activity in the work book, science experiment, day celebrations etc.
- **Content :** Decide what could be included in video documentation. Prepare story boards/scenes according to it. For example: conversation, illustrations, narrations, background music etc.
- **Script :** Preparing the script according to the content is the next step.

- **Arrangements :** Set up necessary arrangements and equipment for video documentation. For Example: - camera/smartphone, sound recorder system etc.
- **Rehearsal :** Execution of dialogues and the camera movements can be rehearsed before recording.

Recording

Record video according to the script is the next step.

Editing

Editing involves adding the titles, audio and background music, removing unnecessary clips etc. There are various softwares and editing apps available for this.

Some of the free softwares for video editing are Kdenlive, OpenShot Video Editor etc.

There are lots of free apps available in mobile phones.

Moving Ahead

Prepare and present the documentation (report, audio and video) of a programme in your school.

Key Takeaways

Gains	☺	😐	☹
Understood about documentation			
Understood how to prepare a drafted document			
Learned how to prepare an audio documentation			
Learned how to prepare a video documentation			

Area

4

Printing and stationery

"Book binding is the art that gives pages longevity, power and beauty, turning them into a treasure."

The Art of Book Binding

Pic 4.1

The picture shows a collection of different poems, narratives, travelogues etc. that the students have prepared for the school magazine.

How can we make them into the form of a magazine?

-
-
-

Binding is the process of assembling papers into a book.

Binding helps to keep the books safe for a long period.

Papers can be assembled into a book through stitching or other binding techniques.

Binding is completed by attaching the cover page to the stitched book.

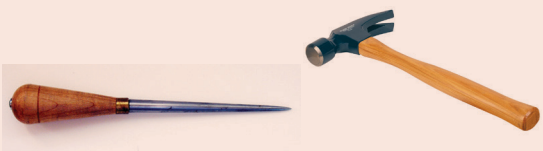
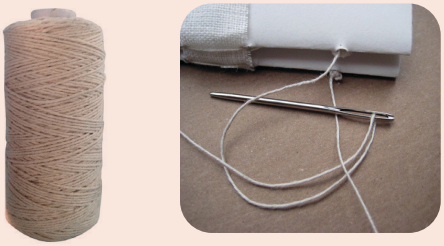
Varieties of stitching methods can be adopted according to the use and number of pages in a book.

Let's get to know different types of binding techniques.

What are the materials needed for it?

List out the necessary materials. Complete the table 4.1

- Binding thread
- Calico cotton/Rexin
-
-
-
-
-
-

Materials	Name and its usage
	**Bodkin** : used to make holes in paper **Hammer** :
	
	
	**Folder** : Used to fold the sheets of paper properly

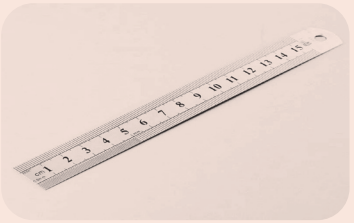
	
	

Table 4.1

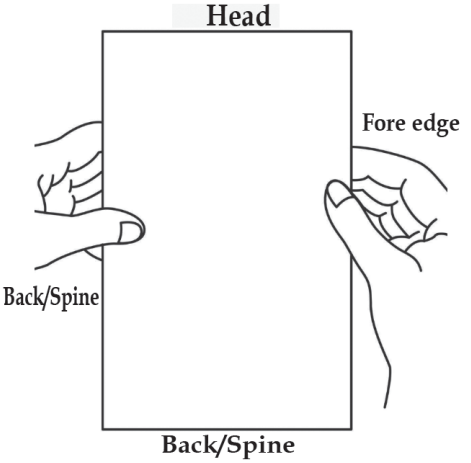
Method 1

Side Stitching method : Method of stitching the paper bundles

Materials needed

A4 size paper/paper available

- Binding needle
- Binding thread
- Paper cutter
- Steel scale



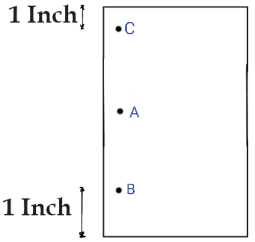
Pic 4.2

Method of making

- Stack the head and back sides of the paper to be stitched with precision.

Positioning of stitching

- Draw a line 1 centimetre apart from backside.
- Mark a point 1 inch below the head side (C).
- Mark a point 1½ inches above the tail side (B).
- Mark mid point between these two points (A).



Pic 4.3

- Make holes in these points with the help of a bodkin and hammer.
- Place it on the desk in a way that the stitching portion faces us.
- Insert the thread down the needle and pass it through point A, as indicated in the picture.
- Leave the tail of the thread 2 inches from the starting point.
- Pass the thread through hole B from the underneath.
- Pass the thread through point C from top to bottom.
- Pass the thread from the bottom of point A to the top.
- Create a loop by twisting the thread end you brought up and then pass the remaining thread through the loop.
- Pull the knitted thread tight to secure it.
- Finally trim the excess thread one inch away from the tail end.

Method 2

Centre Stitching method : the method of stitching folded paper bundles.

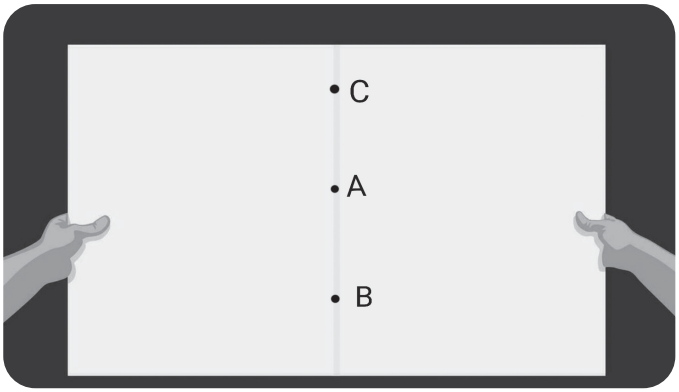
- Take 15 sheets of paper and fold them equally lengthwise.

Pic 4.3

Positioning of stitching

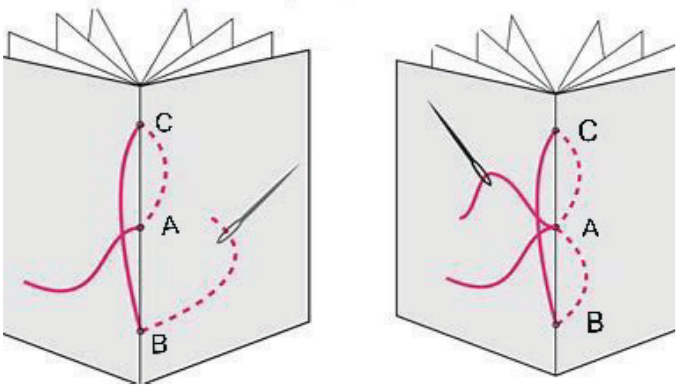
- Unfold the stacked papers.
- Mark a point 1 inch below the Head (C).
- Mark a point 1½ inch above the tail (B).
- After marking these two points, mark a third point exactly in the middle of them (A).
- Once all the three points are marked, use a bodkin and a hammer to make holes.

- Thread the needle as shown in the picture, passing the thread down through point A.
- Leave at least two inches of thread at the starting point.
- Next, bring the thread up through point B from underneath.



Pic 4.4

- Then, pass the thread down through point C.
- Bring the thread back up through point A from below.
- Create a loop with the threaded end, then pass the loose end of the thread through the loop. Pull it tight to secure the knot.
- Finally, trim the excess thread, leaving about an inch.



Pic 4.5

Method 3

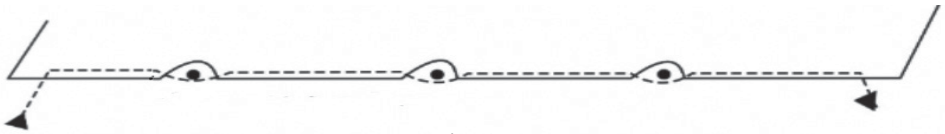
Zone-in Sewing : A Method of Stitching Folded Paper Stacks Together

- Take twelve sheets of paper and fold them equally lengthwise
- Arrange four such folded layers one on top of the other, aligning them neatly at the head and back edges.
- Use a folding stick to press and make the folds firm.
- Place the folded edge on the table facing the person binding the papers.

Positioning for Stitching :

- On the back side of the paper, mark a point one inch down from the head in the middle section.

- Mark a point 1 ½ inches from the tail end, moving upwards.
- Then, mark another point exactly in the middle of these two marks.
- After marking these three points, stack the folded papers together and use a hacksaw blade to cut approximately half a centimetre, ensuring the inner sheets are also cut.
- Take the required length of binding thread and thread it through a needle. Insert the needle from the outside through the cut made at the head end, passing through the centre of the first layer. Leave at least three inches of thread outside, as this will be used to tie the first and second layers together.
- Bring the needle out through the middle cut, loop it around the cord, and then pass it back inside again.



Pic 4.6

- Pass the needle and thread through the tail and place the second layer on top. Insert it inward through the cut section at the tail.
- Pull it out through the cut in the middle section.

Pic 4.7

- Wrap it around the cord, pass it inward again, and pull it out through the head. Tie together the thread ends from the first layer and the second layer.
- Place the third layer and repeat the stitching process.
- Pass it through the stitching of the second layer to join all three layers together.
- Repeat the same process for the fourth layer.
- With this, the stitching is complete.
- Trim off the excess thread, leaving about two centimetres.

Now, using a paper cutter and a scale, trim the forehead and tail to make them properly aligned. It would be better to trim the head section if it is not in proper alignment.

Activity 1

Binding the Papers Together

Select any one of the methods mentioned above and stitch the papers together for binding.

Note : you can use old magazine papers or newspapers for practice.

The binding process is completed when the stitched papers are made attractive with an outer cover.

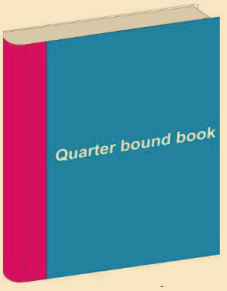
Materials Required

Strawboard (8 ounces), Calico cloth (1 metre), Binding glue, Cover paper, Marble paper

Binding Method : (Quarter Bound Binding)

Quarter Bound Binding

Quarter-bound binding is a bookbinding method where only the spine of the book is covered with calico, while the rest is decorated with marble paper to make it attractive.

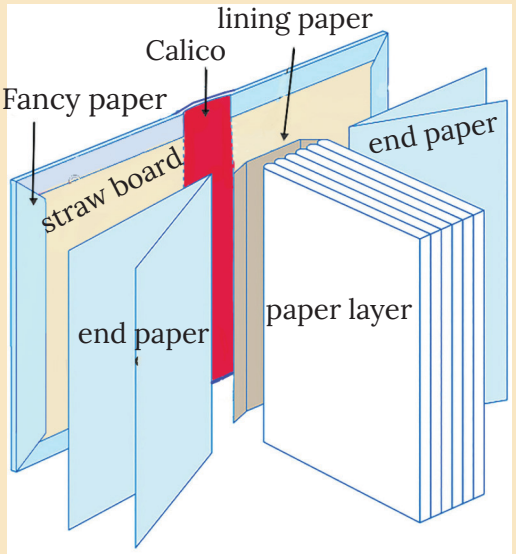


Pic 4.8

In this method, the endpapers are folded evenly in the dimensions of the stitched book and pasted with glue on both the front and back covers.

End paper

The sheets of paper that are attached or stitched on both sides of book for the purpose of binding are called endpapers.



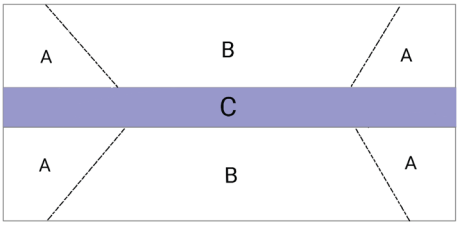
Pic 4.9

Now, let's prepare the lining using a cover paper.

A. The part to be pasted on the notebook.

B. The part to be pasted onto the strawboard.

C. The part to be pasted onto the back of the book.



Lining paper

Pic 4.10

Prepare this with a width of 10 centimetres and according to the length of the book.

This should be pasted on the back of the book.

Cut along the edges A and B, then glue them to the book and the excess part to the square strawboard, as shown in the picture.

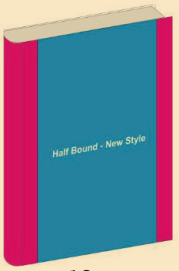
- Cut the calico in 10 centimeters width and a length that is 6 centimeters longer than the book's length.
- Attach it as shown in the picture 4.9.
- Fold the excess calico and glue it to the inner side of the strawboard.

- Paste the endpaper to the inner side of the strawboard.
- Paste the marble paper attractively so that the Calico frame appears on the outer side of the strawboard.

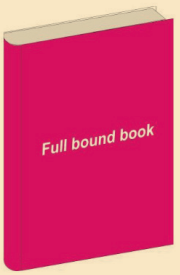
Half Bound is a binding method in which the spine and fore-edge of the book are covered with calico, while the remaining areas are made attractive with marble paper.

In the Full Bound method, the entire book is wrapped in calico fabric.

Half Bound



Half Bound
(A New style)



Full bound

Pic 4.11

Moving Ahead

1. Bind your old books with the help of the teachers.
2. Bind the library books which lost its cover pages or got damaged and make them prettier.
3. Try the binding methods as shown in the picture.
4. Try various new binding methods.

Key Takeaways

Gains			
Learned about different types of stitching required for binding.			
Learned various bookbinding methods.			
Able to bind a book.			

Area

5

Waste Management

Today's Waste, Manage Today's
No More Legacy Waste

Legacy Waste : A Habit to be curbed

Pic 5.1

You have already understood from the earlier classes that waste materials are not to be left over or disposed of by throwing out. You also studied that waste management can be done through 8R ways. There are many efforts taken to dispose of bio- degradable and non bio-degradable waste at its source. But still there are people who don't follow such practices. They still put all waste in a plastic cover and throw it in the public spaces. Let's understand its consequences in detail.

What is Legacy Waste?

The waste which is dumped at the housing areas, factory premises or barren lands without the proper classification will not be degraded even after a long period of time. The major reason behind it is the insufficiency of the micro organisms. Due to that the degradable waste will be stored in the lands. While the non- degradable waste is immune to microbial action it will accumulate at the land. Such accumulation of waste over the ages is known as Legacy Waste.

Pic 5.2

Legacy waste : Recurring hazards

Activity 1

Different Kinds of Hazards

Don't you see piles of waste in public spaces? You can find them at beaches, backwaters and especially all tourist destinations where the waste management system is not functioning properly. We can see garbage piled up on river banks, streams and canals. The fire hazards occurring at the scrap godowns are also common nowadays. Let's analyse such hazards of legacy waste in detail.

Observe the newspaper cuttings.

News 1

Fire at Brahmapuram waste plant

The Brahmapuram waste plant, is a 110-acre site, is located 17 kilometers east of Cochin city. It is functioning under the authority of Cochin corporation. The waste from the corporation and the nearby municipalities over the years made the legacy waste pile at Brahmapuram. Due to many reasons, firebreaks out here very often. Plastic waste at the surface level creates the firebreak during the summer seasons. Such a massive firebreak happened on March 3rd of 2023 at 11 am.

Fire at Kochi's Brahmapuram waste treatment plant has become an annual phenomenon

Most of the major fires were reported during the February-March period.

Updated - March 04, 2023 03:54 pm IST - KOCHI

THE HINDU BUREAU

Fire and Rescue Services personnel trying to douse the fire that broke out at the Brahmapuram solid waste treatment plant on Thursday. | Photo Credit: Thulasi Kakkat

Plastic waste piled up at Kochi Corporation's solid waste treatment plant in Brahmapuram has gone up in smoke without fail every year since 2019.

In fact, at least one major fire and numerous fires of varying intensity have been reported from the plant in the last five years, taking firefighters from several hours to several days to douse the fire and bring the situation under control. Most of the major fires were reported during the February-March period and had choked people with smoke in a wider radius

Pic 5.3

When the fire spread to the inner area of waste, it contributed to the production of toxic smoke. The smoke spread across Kochi and neighbouring areas through the wind causing respiratory problems and other health issues. The fire that lasted for days was brought under control by the collective effort of the Fire force.

News 2

Fire outbreak at Scrap godown

The scrap godown which functions in an illegal building on 27 cents among many houses got a massive firebreak. It happened on January 6 of 2025 at 9.30 am and fire force vehicles found difficulty in reaching the place through the narrow lane.

ആക്രി ഗോഡൗൺ തീ വിഴുങ്ങി

വൻ തീപ്പിടിത്തത്തിൽ ഇലക്ട്രോണിക് ഉപകരണങ്ങൾ പൊട്ടിത്തെറിച്ചു, ആളപായമില്ല

സമീപത്തെ വീട്ടുകാരെ മാറ്റി

കാക്കനാട്▸ തൃക്കാക്കര മേരിമാതാ സ്കൂളിനു സമീപത്തെ ആക്രി ഗോഡൗണിൽ വൻ തീപ്പിടിത്തം. തീപ്പിടിത്തത്തിൽ പഴയ ഇലക്ട്രോണിക്സ് ഉപകരണങ്ങൾ പൊട്ടിത്തെറിച്ചു, തീയാളിയതിനു പിന്നാലെ ആക്രി ഗോഡൗണിലെ ജീവനക്കാർ പുറത്തുകടന്നതിനാൽ ആർക്കും പരിക്കില്ല. സംഭവ സ്ഥലത്തെത്തിയ അഗ്നിരക്ഷാസേന മണിക്കൂറുകളോളം പരിശ്രമിച്ചാണ് തീയണച്ചത്.

ഞായറാഴ്ച രാവിലെ 9.30-ഓടെയാണ് തീപ്പിടിത്തമുണ്ടായത്. ചുറ്റും നിരവധി വീടുകൾക്ക് നടുവിലായി 27 സെന്റ് സ്ഥലത്ത് ഷീറ്റ് മറച്ചായിരുന്നു ഗോഡൗൺ പ്രവർത്തിച്ചിരുന്നത്. ടി.വി., ഫ്രിഡ്ജ് ഉൾപ്പെടെയുള്ള പഴയ ഇലക്ട്രോണിക്സ് സാധനങ്ങൾ, പഴയ ഫർണിച്ചർ, മാനിക്വിൻ, പേപ്പർ, പ്ലാസ്റ്റിക് ഷീറ്റുകൾ തുടങ്ങിയവ സൂക്ഷിച്ചിരുന്ന ഗോഡൗണാണ് അഗ്നിക്കിരയായത്.

എങ്ങനെയാണ് തീപ്പിടിത്തം ഉണ്ടായതെന്ന് വ്യക്തമല്ല. എന്നാൽ, ഗോഡൗണിൽ വെൽഡിങ് ജോലികൾ നടക്കുന്നുണ്ടായിരുന്നെന്നും അതിൽ നിന്നാവാം തീ പടർന്നതെന്നും ഗോഡൗൺ ഉടമ പോലീസിനു മൊഴി നൽകി. ആക്രി ഗോഡൗണിലേക്കുള്ള വഴി ഇടുങ്ങിയ റോഡായതിനാൽ ഏറെ പണിപ്പെട്ടാണ് തീ അണയ്ക്കാൻ അഗ്നിരക്ഷാസേന എത്തിയത്. ഉച്ചയോടെയാണ് തീ അണച്ചത്. നഷ്ടം കണക്കാക്കിയിട്ടില്ല. തെങ്ങിന്റെ ഉയരത്തിനു മുകളിലേക്കു വരെ തീ ഉയർന്നതോടെ സമീപത്തെ വീട്ടുകാരെ പോലീസും അഗ്നിരക്ഷാസേനയും ചേർന്ന് മാറ്റി.

ഇങ്ങനെയൊരു സ്ഥാപനം പ്രവർത്തിക്കുന്നതായി തങ്ങൾ അറിഞ്ഞിട്ടില്ലെന്ന് തൃക്കാക്കര നഗരസഭാ ചെയർപേഴ്സൺ രാധാമണി പിള്ള പറഞ്ഞു.

കാക്കനാട് സ്വദേശിയായ കബീർ സ്ഥലം വാടകയ്ക്കെടുത്താണ് ആക്രിസ്ഥാപനം നടത്തുന്നത്. ഇതിന്റെ ഭാഗമായി ദേശീയകവല റോഡിനു സമീപം പഴയ ഗൃഹോപകരണങ്ങൾ ഉൾപ്പെടെ വിലയ്ക്ക് എടുക്കുന്ന കട പ്രവർത്തിക്കുന്നുണ്ട്. ഇവിടെ വരുന്ന സാധനങ്ങൾ സൂക്ഷിക്കുന്ന ഗോഡൗണായിട്ടാണ് ഇതു പ്രവർത്തിച്ചിരുന്നത്. സാധാരണ ദിവസങ്ങളിൽ പത്തിലധികം ജീവനക്കാർ ഉണ്ടാകാറുണ്ട്. അവധി ദിവസമായതിനാൽ രണ്ട് ഇതര സംസ്ഥാനക്കാരുൾപ്പെടെ മൂന്ന് തൊഴിലാളികളാണ് ഞായറാഴ്ച ഉണ്ടായിരുന്നത്.

▶ തൃക്കാക്കര മേരിമാതാ സ്കൂളിനു സമീപം ആക്രി ഗോഡൗണിലുണ്ടായ തീപ്പിടിത്തം അഗ്നിരക്ഷാസേനയും നാട്ടുകാരും ചേർന്ന് അണയ്ക്കുന്നു | **ഫോട്ടോ: റിദിൻ ദാമു**

Pic 5.4

- Haven't you read the newspaper cuttings and the analysis.
- Have you noticed any instances where the fire outbreaks occured in legacy waste? Collect more news paper cuttings.
- What are the harmful contents in the toxic smoke? List them out.

A fire outbreak is one of the hazards of legacy waste which is accumulated in the land. But the legacy waste stored in water resources creates another hazard.

Search for missing worker in garbage

തിരുവനന്തപുരം:നഗരംവലിച്ചെറിഞ്ഞമാലിന്യകൂമ്പാരത്തിൽമുങ്ങിയതൊഴിലാളിക്ക് വേണ്ടിയുള്ള തിരച്ചിൽ രാവും പകലുമായി തുടരുന്നു. തലസ്ഥാന നഗരിയിലെ ആമയിഴഞ്ചാൻ തോട്ടിൽ മാലിന്യം നീക്കുന്നതിനായി ഇറങ്ങിയ കരാർ തൊഴിലാളിയുടെ ജീവനാണ് അപകടത്തിൽ ആയത്. തിരച്ചിലിനായി സ്കൂബ സംഘവും മാലിന്യം നീക്കാൻ ക്യാമറ ഘടിപ്പിച്ച റോബോട്ടുകളെയും ഉപയോഗപ്പെടുത്തി. പാറപോലെ ഉറച്ച മാലിന്യം നീക്കാൻ കഠിനപ്രയത്നം വേണ്ടിവന്നു. രണ്ടു ദിവസങ്ങൾക്ക് ശേഷം കരാർ തൊഴിലാളിയുടെ മൃതദേഹം കണ്ടെടുത്തു.

Pic 5.5

Observe the news cutting.

Amayizhanjan Canal Accident : Worker died after been trapped in garbage.

The mentioned disaster is the consequence of the waste accumulation in the canal. It is very common that the waste which is thrown to places will get stuck at the water resources and obstruct the flow of water. The tragic incident happened in Thiruvananthapuram Central Railway station premises during the cleaning of a section of the Amayizhanjan canal. The canal was severely clogged with plastic waste and debris and it has caused significant obstructions and difficulties to find the missing worker. Robots with cameras, scuba gear and bulldozer were used for the search. After two days searching, the dead body of the worker was found.

Analyse all the news cuttings and the related writings.

What are the major causes of such recurring issues? .....

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

How can we prevent them?

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

Share your findings with your friends and write down the conclusions.

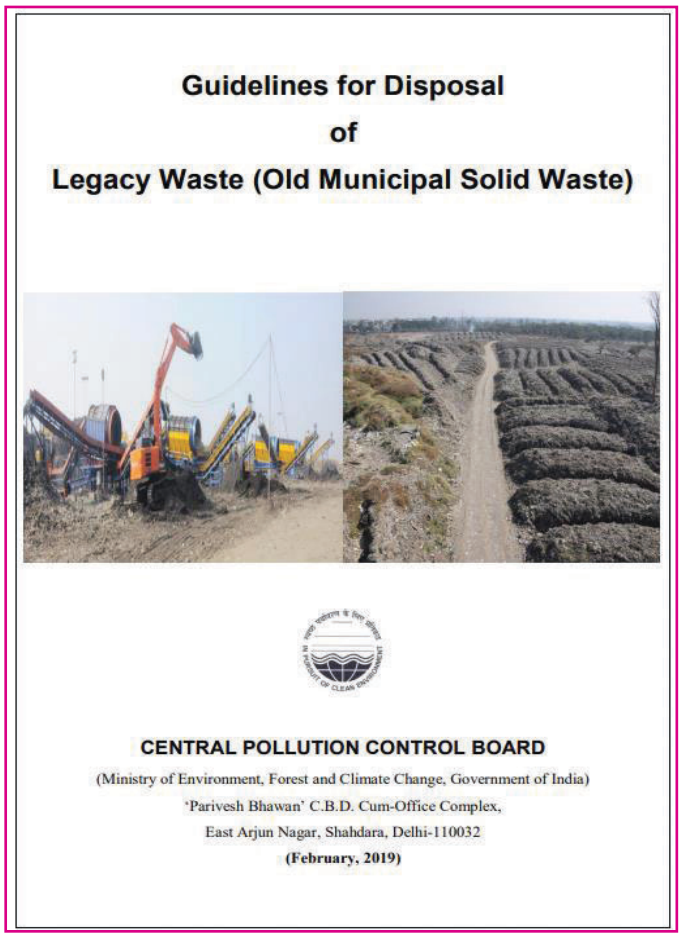
Legacy Waste : Burden to the future generations

Here we have just shown the major perils of waste. The instances at Thrikkakara scrap godown, Amayizhanjan canal Accident, firebreak at Brahmapuram waste plant are different forms of the same issue. It is not a simple problem which can be solved at a state level, rather it is considered a national issue.

Legacy waste is a burden passed from one generation to another. It is very common in the cities too. The intensity of this legacy waste issue is more intense in Kerala, since it is considered as a unit of urban housing. The challenges to cleaning and disposing of legacy waste are high population density, limited space, and intense rainfall.

Legacy Waste Management : Activities subject to law

Considering the social and environmental impacts of legacy waste management, National Green Tribunal started legal actions from 2019. On suggestion of the tribunal, related agencies conducted a comprehensive study. In February 2019, based on the study reports, the Central Pollution Control Board published guidelines for disposal of legacy waste. Swachh Bharat Mission also provides financial and technical aid to this.



Pic 5.6

Removal of Legacy Waste

The scientific process of removing the legacy waste from the dump yard is known as Biomining. The blockage of sewage and sewerage due to plastic waste is very common. Due to this, floods, occur in the city during the rainy season.

Using human resources to remove the legacy waste will repeat the tragic incident that happened at Amayizhanchan canal. Use of robots is prescribed in the guidelines. To familiarize this, expertise in the particular vocation is needed.

Observe the pictures.

Pic 5.7

Let's play at Brahmapuram

The waste plant at Brahmapuram has now evolved into a beautiful garden and playground after proper waste management. Using the biomining technique around 18 acres of land was regained. Around 6 lakh metric tonne waste was disposed for the purpose.

Innovative Solutions for Waste Management

The process through which the biomass extracted from the legacy waste is known as Bioremediation. With the machinery help, soil and biomass are filtered and extracted from the dry legacy waste. Then it is mixed with inoculum and made into compost. This compost can be used in farmland as a biofertilizer. All these steps come under the technical term Bioremediation.

Pic 5.8

Recycling the legacy waste can be done by recovering the metals like iron, steel, nickel, using an electromagnet. Classification of the plastic waste can be done based on the difference in the density. They can be collected and recycled. The differences in melting point can also be considered for classifying plastic waste.

Ingredients of Legacy Waste

Components	Percentage
Soil with biomass	35
Glass, metals, rubber	5
Cloth	4
Plastic	16
Inerts	40

Table 5.1

Let's Classify based on the variation in weight

Management of each type of waste varies. Hence, they should necessarily be classified. Let's look into the process of classifying waste based on their variation.

Pic 5.9

Observe the picture.

It is a sieve in the form of a belt moving with the help of a machine. Classification of the waste into heavy, light and magnetic can be done by using it.

Baling & Transportation

The classified waste cannot be transported in its same form. It should be weighed. Observe the picture 5.10.

Pic 5.10

Bulk Density/Apparent Density is a measurement related to it. Let's take a look at the method for finding out the bulk density.

Activity 2

Calculation of Bulk Density

Let's calculate the bulk density.

Materials Needed

- Shredded plastic carry bags which symbolize the legacy waste
- Beaker with a capacity of 200 ml.
- Suitable weighing balance

Procedure

Take a clean beaker with a mass of A grams. Put small pieces of plastic in it. Don't compress the content. Measure the mass of the plastic (B1 gms). Add more plastic by compressing it. Find the mass (B2 gms) again.

Bulk density before compressing the plastic = B1 – A /200 gm/mL -- gm/mL

Bulk density after compressing the plastic = B2 – A /200 gm/mL = ---- gm/mL

Analysis

Bulk density determines the effectiveness of the package. For example, if you are packing fried papad you can't compress it. It will break down. The reason behind this is that the bulk density of fried papad is small. While filling sugar in a bottle, you can shake it and add more sugar. The bulk density of the sugar is huge.

Relevance of Bulk density in Legacy Waste Management

By using vehicles, transportation of segregated waste like plastic and cloth is done. By compressing the maximum amount of the waste materials can be transported. Eliminating the gaps between the materials helps in this. The possibility of this method depends on the bulk density of the material. Calculating the bulk density using mass and volume will help to find the amount of plastic that can be transported.

Pic 5.11

It is desirable to increase the bulk density of plastic waste so that it can be transported in huge amounts. It should be tightly packed. For that purpose, there are baling machines that are used in waste collecting plants.

Quality Assurance of Plastic

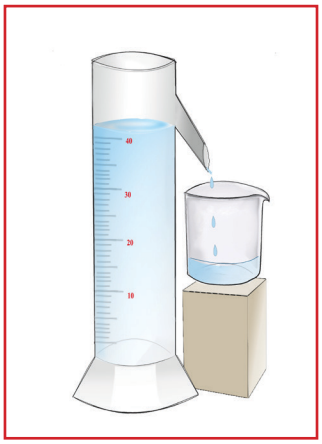
The density of a material is the ratio between its mass and volume. In the process of recycling of waste this measurement is important. The criteria of ensuring the quality of plastic is also important in the production of virgin plastic. Determining the density of plastic also helps in identifying the type of plastic.

Activity 3

Plastics with greater density than water

Required materials

- PET bottle, washed, dried and cut into small pieces - 10gm
- PVC pipe, cut into small pieces- 10gm
- PLA filament, shredded- 10gm (available from 3D printing shops)



Pic 5.12

Other Materials

- Isopropyl alcohol- 50mL (Density= 0.785 gm/mL, Boiling point= 82.3°)
- Distilled water- 50mL

Equipments

- Overflow jar- 40mL capacity- 1
- Measuring cylinder 20mL (with 1/10th calibration)- 1

Procedure

- Wash and dry both the overflow jar and measuring cylinder

Place both containers to securely collect the displaced solvent

Temporarily remove the measuring cylinder and place another container in its place. Refer Pic 5.12.

- Slowly fill the overflow jar with distilled water. Collect the excess water in the container and remove it.
- Instead, place the measuring jar there.
- Carefully deposit the 10gm of PET plastic pieces into the overflow jar. Refer to Pic 5.13.
- Record the volume (A mL) of displaced water (check the lower meniscus).

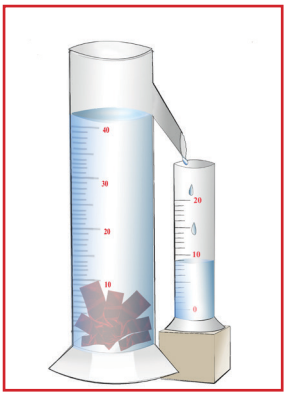
Density Calculation

Weight of PET= 10gm

Volume of PET= A mL

Actual density of the PET = $\frac{\text{Mass}}{\text{volume}}$ = 10/A gm/mL

Relative density of the PET = $\frac{\text{Actual Density}}{0.09975}$ = 10/A x 0.9975



Pic 5.13

Relative Density

It is the ratio between the density of a material and the density of the water.

Relative Density = $\frac{\text{Density of the material}}{\text{Density of the water}}$

It has no unit, since it is the ratio between two measurements.

Repeat the above-mentioned experiment using PVC and PLA. Tabulate the data.

Plastic		Density measured through the experiment		Actual Density gm/mL	
Name	Number	Actual	Relative	Actual	Relative
PET	1			1.380	1.383
PVC	3			1.300 – 1.700	1.303 – 1.704
PLA	7			1.230 – 1.260	1.233 – 1.263

Table 5.2

Activity 4

Plastics that are less dense than water

Additional materials required

- Shredded waste materials made of HDPE- 10 gm
- Shredded waste materials made of LDPE – 10 gm
- Shredded packaging film made of PP – 10 gm

(Other required materials are the same materials used in the previous experiment)

Procedure

- Wash and dry the overflow jar and the measuring cylinder.
- Place both the containers to collect the overflown solvent carefully.
- Replace the measuring cylinder with another container temporarily.
- Slowly fill the overflow jar with isopropyl alcohol. Collect the displaced isopropyl alcohol and transfer the container.
- Place the measuring jar there instead.
- Carefully put the 10gms of PP pieces in the overflow jar.
- Measure the amount of displaced isopropyl alcohol from the measuring jar (look at the lower meniscus). Note the volume (a ml).

Calculation of Density

Weight of PP = 10 gm

Volume of PP = a mL

Actual density of PP = 10/a gm/mL

Relative density of PP = Actual density/ 0.9975 = 10/a × 0.9975

Repeat the above mentioned experiment using LDPE and HDPE. Tabulate the data.

Plastic		Density measured through the experiment		Actual density gm/mL	
Name	**Number**	**Actual**	**Relative**	**Actual**	**Relative**
PP	5			0.895 – 0.920	0.872 – 0.922
LDPE	4			0.917 – 0.940	0.919 – 0.942
HDPE	2			0.940 – 0.970	0.942 – 0.972

Table 5.3

New Technologies for Management

Legacy waste is something we got through generations. But we should not pass it to the next generation. Rather than transferring it from one place to another, we need a permanent solution. Legacy waste should be excavated, segregated and disposed properly. Now you have got familiarized with some of the methods to execute the waste management. Sensors with the help of Laser technology can be used for segregating the legacy waste. Such waste can be used for road tarring mixed with bitumen or for making bricks and cement. Refuse Derived Fuel (RDF) plants can also be used for their energy consumption.

Moving Ahead

There should be a need to spread public awareness on the practical difficulty of legacy waste management. For that conduct a seminar on the topic. Also conduct an appropriate exhibition.

Key Takeaways

Gains			
Got an overview about the hazards of legacy waste.			
Familiarized with different legacy waste decomposition methods.			
Developed an attitude to prevent the generation of legacy waste.			

Today's legacy waste, Tomorrow's curse

My waste, My responsibility

Area

6

The Art of Clothing

"Stitching is an art merged with patience and creativity."

Variety of Clothing and Sewing Machines

Pic 6.1

Did you notice the different types of sewing machines given in the picture? Some of these might be familiar to you. Machines for different types of sewing are not only different in form but also in their working method. You might have seen sewing machines that work with the help of motors. They are not only helpful in decreasing human toil, but also in stitching very fast.

Today, there are automatic smart sewing machines in the market, that are programmed to perform various tasks like making clothes, doing decorative embroidery work, fixing buttons, etc.

As the variety in cloth designing increases, sewing machines are being designed so as to manufacture them with accuracy and speed. Have you noticed that, apart from cloth making, sewing machines are also used for making rexine, canvas and leather products?

Let's have a look at some of the sewing machines that are used for different purposes.

Domestic Sewing Machines

These machines designed for domestic use are simple and convenient to operate. They are suitable for simple sewing works. Electric motors can be installed to increase the speed of stitching.

Pic 6.2

Industrial Sewing Machines

As these sewing machines are used for commercial purposes, they are generally faster and capable of doing complicated sewing tasks. In addition, there are many differences in size, price and form.

Pic 6.3

Computerised Sewing Machines

Computerised sewing machines are modern sewing machines which make use of softwares. Its speciality is that different types of stitching and embroidery work can be completed by giving designs in the digital form. Today these kinds of sewing machines are widely used in homes also.

Pic 6.4

Industrial Embroidery Machine

Pic 6.5

These machines are designed to create intricate patterns and decorative stitching on fabric.

In the previous classes, we have been trained to fix the minor damages in clothes and to do embroidery work.

In this period of emerging fashion concepts, tailoring is a highly significant field with excellent career opportunities. To complete stitching quickly and accurately, we can rely upon sewing machines.

An image of a sewing machine that simplifies sewing tasks is given in pic 6.6. Let's familiarise ourselves with its parts and features.

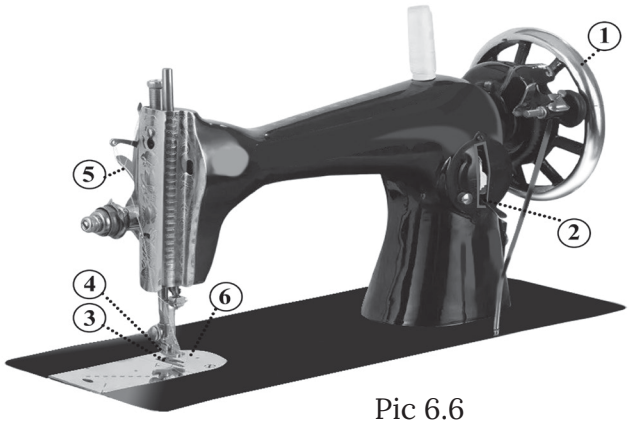
Parts and Features of a Sewing Machine

1. Balance wheel

Balance wheel is the part which helps the user to control the movement of needle and cloth while sewing. It is generally situated on the right side of the sewing machine. The balance wheel operates the sewing machine by rotating in the same direction.

2. Stitch regulator

This part is used to set the size of the stitches. The stitch regulator helps to adjust the length of the stitch according to the thickness of the fabric.



Pic 6.6

Pic 6.7

3. Feed dog

It is the tooth- like part under the needle plate. While sewing, it pushes the cloth backward.

4. Presser foot

This is the foot like part near the needle. It ensures smooth stitching by preventing the cloth from lifting when the needle moves.

5 Presser foot lifter

Used to raise and lower the presser foot.

6. Needle plate/ throat plate

Needle plate is the semi-circular part under the presser foot.

7. Bobbin, Bobbin case

A stitch is formed when the thread on the needle and bobbin interlock. Bobbin case is used to attach the bobbin and to give the necessary tension to the thread.

8. Shuttle

Shuttle is the part where bobbin case is secured. Its function is to feed the thread in the bobbin to the needle.

9. Treadle

This is the foot pedal that makes the machine spin. The balance wheel is controlled with the help of a belt.

The above explanation covers some of the mechanical parts of domestic sewing machines. Apart from these, a sewing machine is made up of many parts.

Pic 6.8

Find out and note down their names and characteristics with the help of your teacher.

In domestic sewing machines, there are some models that require oiling for maintenance. Oiling is necessary to reduce the friction between the moving parts and to smoothen the operation. Oiling helps to prevent wear and tear, prolongs the life of the machine and maintains its efficiency. Also, it is important to read and understand the machine manual and keep the machine clean and well maintained.

With the help of your teacher, examine the parts and features of a sewing machine. Identify the parts that need oiling. Do all types of sewing machines need oiling? What could be the reason?

Machine is to be set up before we start sewing. Let's look at the necessary steps for this.

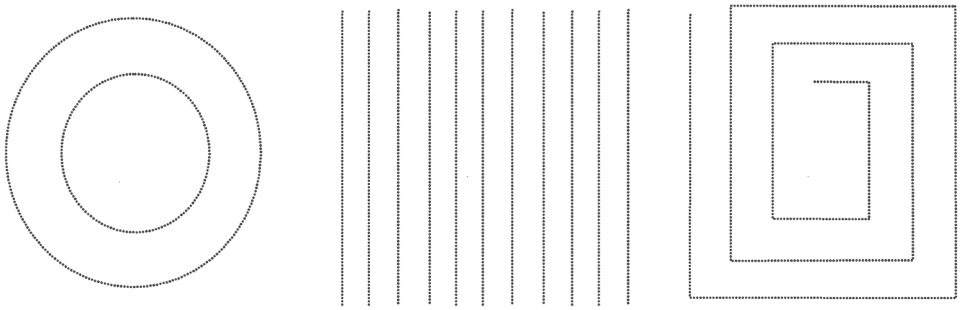
- Oil the machine if necessary
- Choose the thread that matches the colour of the cloth
- As per instructions, thread the machine and ensure it is ready for use.
- Set the thread on the bobbin. Make sure that the bobbin is attached to the bobbin case and it is installed correctly in the machine.
- Choose the appropriate needle for the machine. The needle used in each type of machine will be different. Make sure the needle is fixed on the machine properly.
- Adjust the tension of the thread according to the nature of cloth and type of thread. It is necessary to make sure that the stitches are neither too tight nor too loose.

Have you ever observed how the threads interlock to form a stitch on the machine?

Understand how a stitch is formed by operating the sewing machine under the supervision of the teacher.

Slowly increase the speed of the machine and practise sewing.

Activity 1



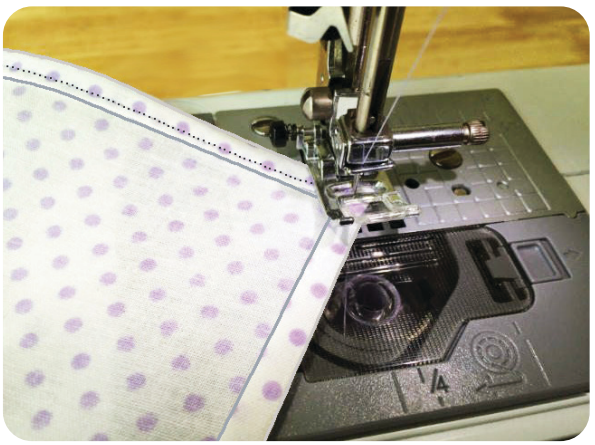
Pic 6.9

Copy the patterns in the picture on a paper or cloth and practise sewing over it with a sewing machine. Then, draw small motifs and practise sewing over their outlines.

Activity 2

What are the different cloth products that can be easily stitched by folding the edges?

- Table cloth
- Handkerchief
-
-



Pic 6.10

Shall we sew a handkerchief using a sewing machine? Before cutting the cloth, mark the required measurements on it.

To make the handkerchief more attractive, simple embroidery/fabric painting can be done. Then fold the four sides slightly and sew them together to complete the handkerchief.

Moving Ahead

Pic 6.11

The images given show some products that can be made easily using a sewing machine. Try making products like these that are useful to you.

Key Takeaways

Gains	☺	😐	☹
Gained knowledge about different types of sewing machines			
Understood the parts of sewing machine and their features			
Understood the adjustments to be made in the machine prior to sewing			
Able to complete the product by making simple stitches using a sewing machine.			

Area

7

Tourism

"Travel far enough, you meet yourself."

- David Mitchell

Let's Prepare for the Trip

Pic 7.1

What you have read is a notice given to the students.

If you are given such an opportunity, which places would you select?

What are the things that you should consider when choosing your travel destinations?

Write it down.

- Peculiarities of the place
- The distance between the selected destinations
-
-

You know that the places you choose as your travel destinations are usually places that have got some cultural, historical and environmental significances.



Pic 7.2

Tourism Circuits are those routes or networks connecting several major tourist spots or destinations.

For example,

Wayanad- Mysore – Bangalore

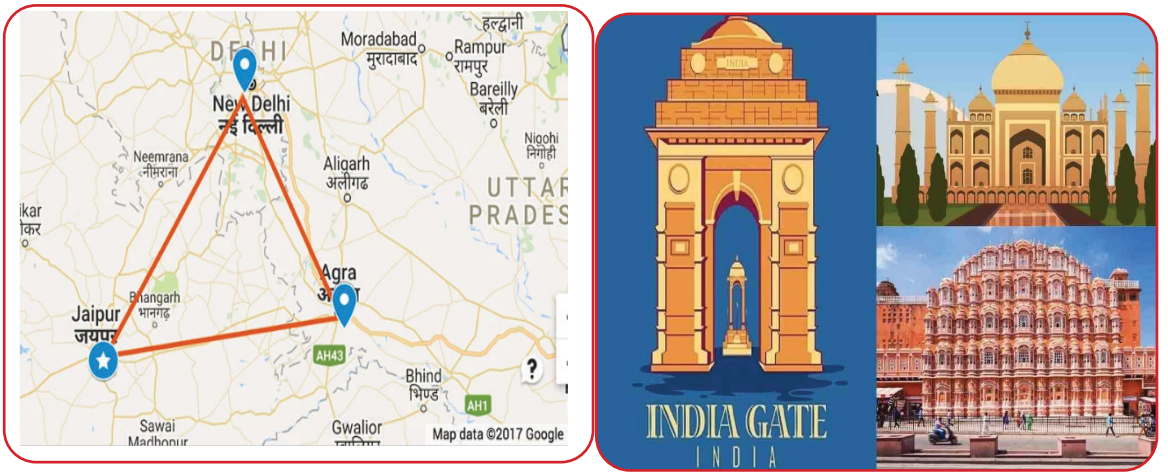
Alappuzha – Kochi - Munnar

Thiruvananthapuram- Kanyakumari

Some features of Tourism Circuits

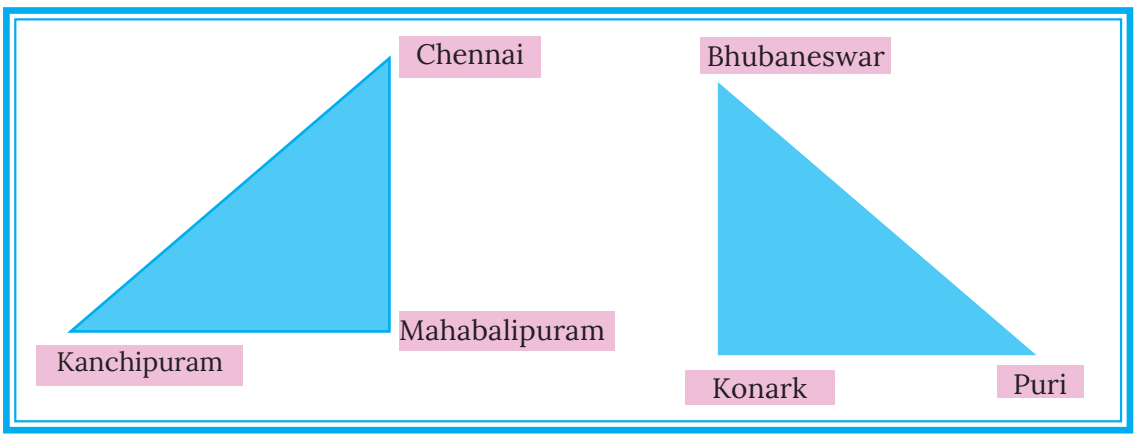
- The time and distance between each destination within the tourism circuit will be somewhat equal.
- The places or tourism spots coming inside the tourism circuit will be places with various attractive factors.
- The tourism circuit will be arranged in such a way that it covers maximum number of tourist spots.
- You can see more places at a lower cost.

The first tourism circuit in India is the circuit connecting places such as Delhi- Agra- Jaipur. This circuit is known as 'India's Golden Triangle.'



Pic 7.3

Other Popular Tourist Circuits:



Activity 1

Let's find out the Circuits

Wayanad- Mysore- Bangalore is one of the tourism circuits in southern India. Find and list out such suitable tourism circuits from the Kerala tourism map (pic 7.4).

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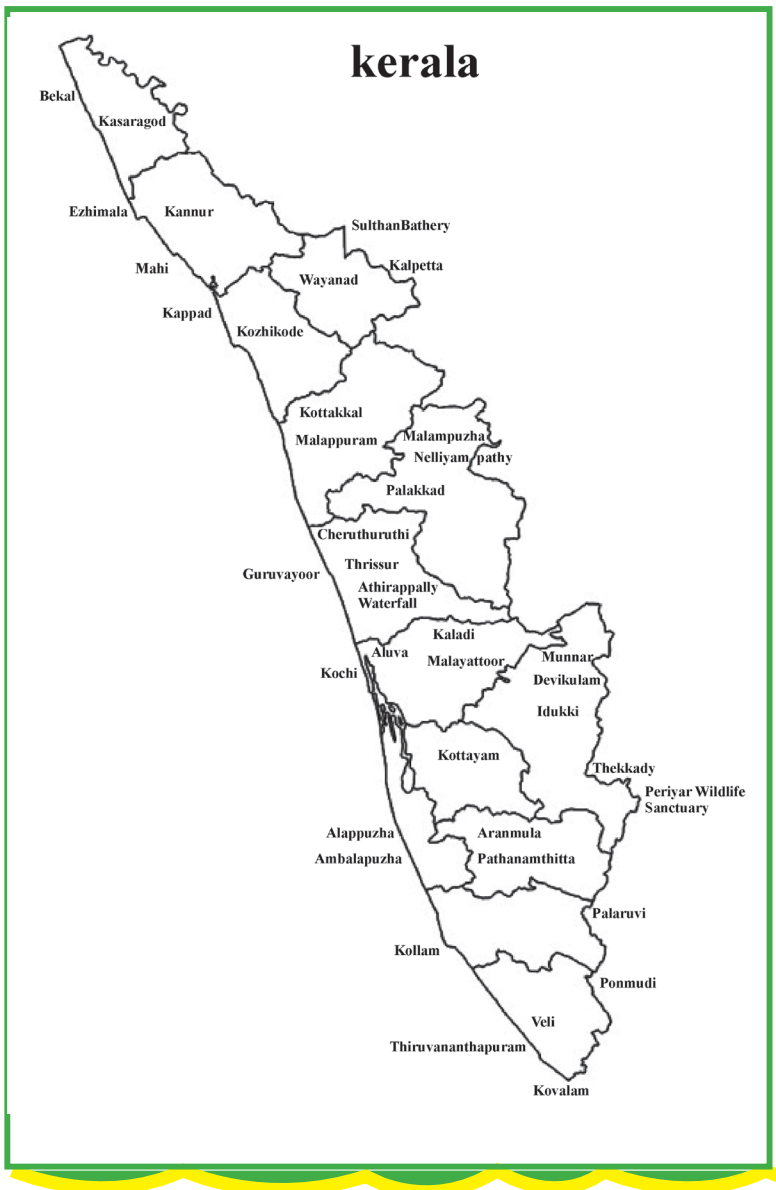


Pic 7.4

Tour Itinerary

Now we have selected the tourism circuit. What else is required to ensure that we reach the destinations within the stipulated time and that we follow the tourism circuit accurately?

Find and list out:

Itinerary is a detailed planning of a trip or a journey from its beginning to the end. Time schedule, places to visit, sightseeing spots, modes of transport, food, stay, shopping and other activities are all included in the itinerary. Look into the itinerary prepared by the tour operator for his tour group.

Day 1

5 am- arrives in Delhi

- Landing at Delhi Indira Gandhi International Airport
- Checking in at the hotel and getting ready to travel
- Breakfast

After Lunch

- Visiting the War Memorial, India Gate.
- Visiting Rajghat
- Bus tour along Rashtrapati Bhavan and Parliament House

In the evening

- Time to shop and enjoy street food around Connaught Place (Rajeev Chowk)
- Dinner
- Back to the hotel

Pic 7.5

Pic 7.6

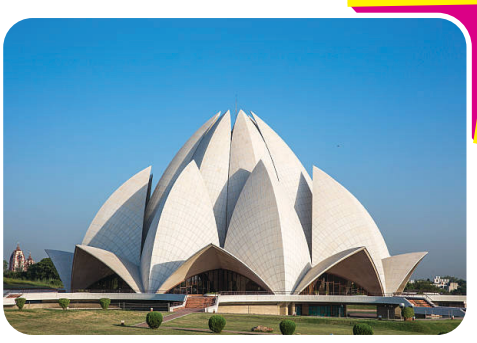
Pic 7.7

Day 2

On to Agra, enjoying the roadside views around Delhi.

In the morning

- Breakfast
- Visit Qutab Minar, a UNESCO World heritage site
- Visit to Lotus Temple and Humayun Memorial



Pic 7.8

After lunch

- Visit to Red Fort and to Juma Masjid
- Drive to Agra (approx. 4 hours drive)
- Check in at hotel in Agra

Pic 7.9

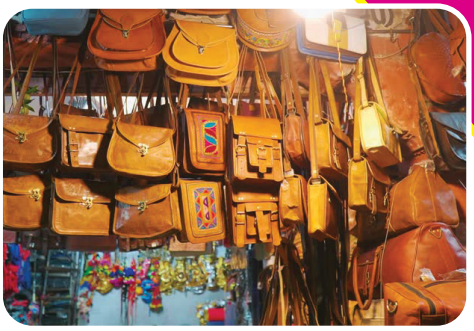
In the evening

- Visit Taj Mahal during sunset
- Dinner at a local restaurant
- Stay at hotel in Agra

Day 3

In the morning

- Breakfast
- Visit to Agra Fort, a UNESCO World Heritage Site
- Drive to Jaipur, the Pink City (approx. 5 hours drive)
- On the way, visit Fatehpur Sikri, the capital city of the Mughal Dynasty
- Lunch at a local restaurant on the way.



Pic 7.10

After Lunch

- Continue journey to Jaipur
- Check in at the hotel

In the evening

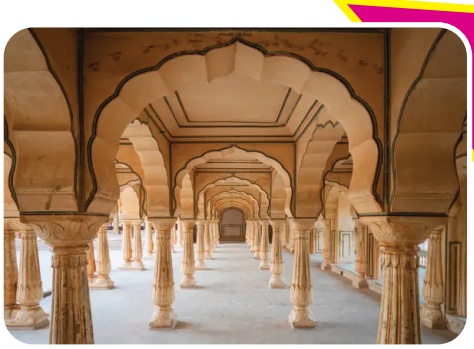
- An evening photography spot- Jal Mahal
- Shop at the local markets of Johari Bazar and Bapu Bazar for unique Rajasthani handicrafts
- Dinner and overnight stay at a hotel in Jaipur

Day 4

Jaipur Sightseeing

In the morning

- Breakfast
- Visit to Grand Amber Fort (opportunity for elephant ride to Fort)
- Visit to Jantar Mantar, an ancient astronomical observatory



Pic 7.11

After lunch

- Visit to Hawa Mahal City Palace
- Visit to the Albert Hall Museum

In the evening

- Dinner at a Rajasthani restaurant
- Enjoying unique art forms and music
- Stay at Jaipur hotel

Pic 7.12

Day 5

- Breakfast
- Leaving for Delhi (approx. five hours journey)
- Lunch in Delhi

After lunch

- Shopping at places like Dilli Haat and Sarojini Nagar Market
- Flight back to Kochi at 6 pm

Pic 7.13

Included in the package

- Hotel Accommodation (including breakfast)
- Travel expenses
- Tour guide

- Arts and cultural events
- Entrance fees
- Travel insurance

What is not included in the package

- Tips
- Other personal expenses

Different types of itineraries

Group Inclusive Tour (GIT) : This itinerary is prepared for groups. This group will have a minimum of 15 members. A fixed schedule and a proper travel plan will be prepared in advance.

Free Independent Traveller/Foreign Independent Traveller (FIT): It is a customized itinerary for a small group or individuals travelling independently.

Activity 1

Let's prepare an Itinerary

You have found the necessary tourism circuits for your school trip. Select one circuit from it and collect the necessary information and prepare the itinerary and present it to the class.

Moving Ahead

Find tourism circuits and prepare the necessary itineraries.

Key Takeaways

Gains	☺	😐	☹
A new tourism circuit can be found using the tourism map			
Knows what all things are to be considered while selecting a tourism circuit.			
Knows how to prepare a tour itinerary			

Green protocols to be followed in Tourist destinations

Pic 7.14

Area

8

Food Industry

“Baking is both an art and a science .”
Sherry Yard

To Market with Cakes

Pic: 8.1

Observe the picture and write down the names of bakery items that you are familiar with.

.....

.....

.....

.....

.....

Cake

The advent of cake in Kerala was in the British era. It is said that the Mamballi family in Thalassery was the first to make cakes in Kerala.

It is one of the most popular sweet snacks in the world. Cakes can be made in different tastes and shapes. List down the names of cakes that you like.

.....

.....

.....

.....

Baking is the method of making cakes. It is a method in which food is cooked on a set temperature in an oven.

It is important to consider quantity, ingredients and time while baking.

Proportion of quantity

1 cup = 250 gm

$\frac{3}{4}$ cup = 175gm

$\frac{1}{2}$ cup = 125 gm

$\frac{1}{3}$ cup = 80 gm

$\frac{1}{4}$ cup = 60 gm

1 tablespoon = 30 gm

1 teaspoon = 15 gm

Let us get familiarized with the materials required for baking.

[You can use alternative tools available at home]

Eg : Spatula - wooden ladle spoon

Measuring cup

Beater

Whisk

Spatula

Baking Tray

Measuring cup and spoon

Pic 8.2

Hope you are familiar with the baking materials. Shall we bake a cake?

Activity 2

Let us bake a cake

Sponge Cake

Pic 8.3

Set 15 minutes preparation time, 35 minutes for cooking and 50 minutes in total for baking a cake.

Essential Ingredients

1. All purpose flour – 1 cup
2. Butter- 100 gm
3. Powdered sugar-1 cup

[If you powder 1/2 cup sugar, you will get one cup of powdered sugar]

4. Baking powder -3/4 teaspoon
5. Baking soda – 1/4 teaspoon
6. Vanilla essence-1 teaspoon
7. Eggs- 3
8. Salt- one pinch

How to prepare

1. Line a seven inch baking tray with butter paper, spread the butter on it and sprinkle some flour evenly.
2. Pre-heat the oven to 200 degree Celsius for 10 minutes.
3. Mix flour, baking powder, baking soda and salt in a bowl. Sieve the mixture and keep it aside.
4. Beat butter and powdered sugar in a dry bowl. Then add eggs and vanilla essence to it. Whip it until it becomes cream.
5. Add the sieved flour mixture to the cream and whisk it in clock wise direction. Pour the batter into the baking tray. Tap the tray gently to remove air molecules, if any.
6. Bake the cake in the pre-heated oven at 180^{o} Celsius and set the timer for 30 -35 minutes.
7. De-mould the cake once it cools down.

Cake can also be baked in a thick bottomed pan with a lid. Place the cake pan on a ring in a pre-heated pan and bake it for 40 to 50 minutes with the lid on.

Icing

Icing is the method of making a cake delicious and attractive using whipping cream and icing sugar.

Let us get to know the tools required for icing.


Whisk


Piping tips

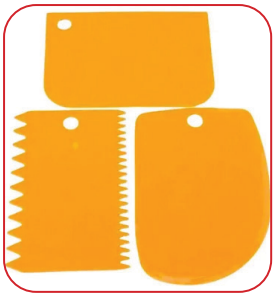

Spatula


Flower nail and scissors


Piping bag


Cake cutter


Brush


Scraper


Cake turntable

Pic 8.4

Let's do icing and make the cake attractive.

Activity 2

Let us decorate and make it enticing

Icing

Set 10 minutes preparation time, 25 minutes cooking time and 35 minutes total time for icing the cake.

Pic 8.5

Ingredients

Whipping cream -1.5 cup

Sugar solution [Sugar solution can be prepared by adding and dissolving sugar in the same quantity of water]

> It is advisable to cool the tools and beating blade by keeping them in a freezer.

Method of Preparation

Pour the whipping cream into a chilled bowl and beat it to its desired consistency.

[If the cream doesn't drop down when the bowl is inverted it has reached its desired consistency]

Pic 8.6

- Slice the baked cake into 3 layers.
- Grease the cake turntable with whipping cream.
- Place one layer of the cake on it and pour the sugar solution on top of it.
- Coat the cake with whipping cream.
- Place the next layer of cake above it and repeat the same procedure.
- Place the third layer of cake on top, pour the sugar solution and coat the whipping cream on top as well as on the sides. [This type of coating is called crumb coating]

Pic 8.7

[It is better to do the remaining icing after refrigerating the crumb coated cake for one hour]

- Turn the cake turntable and coat the remaining whipping cream on all sides of the cake.
- Do the finishing touch using a scraper.
- You may embellish and make the cake more attractive.

Pic 8.8

Moving Ahead

- Bake different types of cakes and conduct a fair in your school.
- Prepare a report on the marketing possibilities of cakes and present it in the class.

Key Takeaways

Gains	☺	😐	☹
Knows how to make different types of cakes			
Can make the cake enticing with icing.			
Understood the marketing possibility of cakes.			

Area

9

Housing

**"We shape our buildings;
thereafter they shape us"**

- Winston churchill

Sketches

Pic 9.1

Before the construction of any building, its outline will be there in our mind. An example of such a building and its outline is given in Pic 9.1. Draw the outline of the picture given.

List out the tools in your instrument box used in the preparation of the outline

-
-
-

Have you used all the tools in the instrument box?

The different tools of the instrument box are there to ensure the accuracy and precision of the drawing. Using these tools we can draw outlines accurately.

Drafting

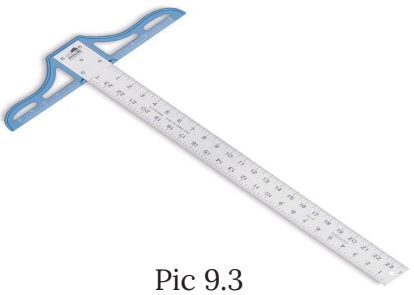
Drafting is the process of drawing the outline of a house, a building, things etc. accurately on the paper.

Let's see the uses of these tools.

Drafting tools

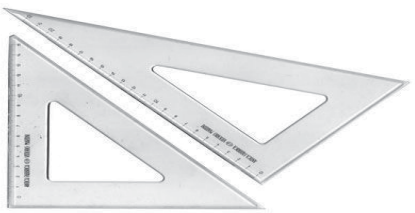
Pic 9.2

Drawing Board - Drawing board is a board or a base used to draw the outline.



Pic 9.3

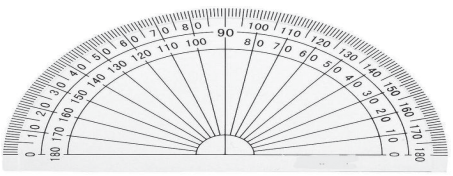
T Square -A tool used to draw straight lines and vertical lines.



Pic 9.4

Set Square - This tool can be used to draw angles having multiples of degrees of 15.

It can be used to draw vertical lines and also to divide a circle in 3,4,6,8 and 12 parts.



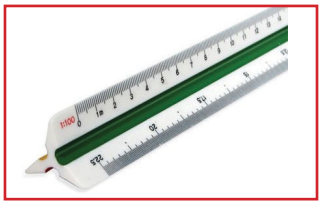
Pic 9.5

Protractor - A protractor is used to draw and measure any angle from 0 to 180 degrees.

Pic 9.6

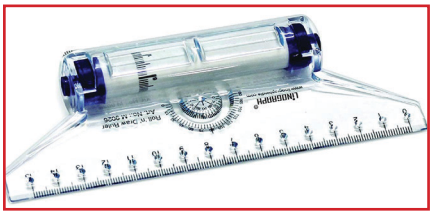
Compass – It is used to draw circles and other geometrical figures. It is very helpful to mark the measurements accurately.

Scale - Used to draw and mark the measurements.



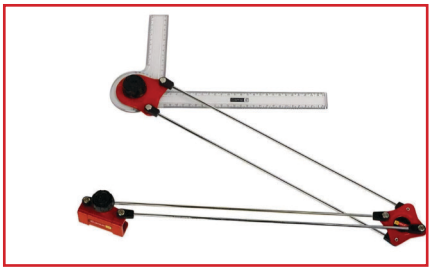
Pic 9.7

Roller Scale - It helps to draw many lines parallell to a line with ease and speed.



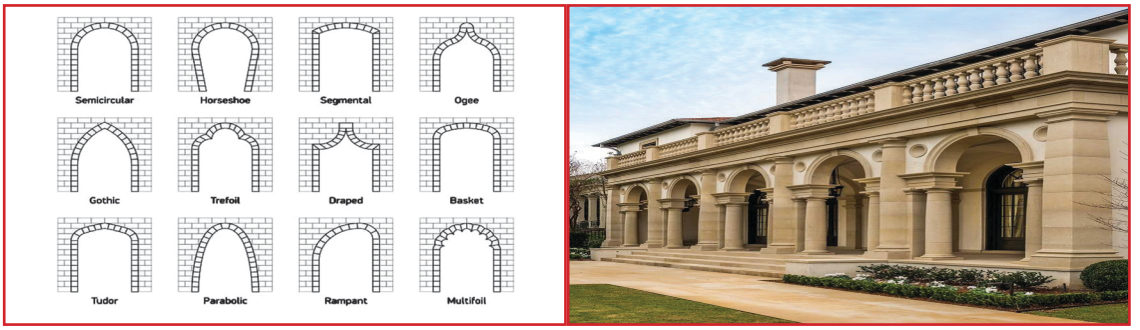
Pic 9.8

Mini Drafter - Mini drafter is a necessary tool in engineering drawing. Different angles and straight lines can be drawn with accuracy and ease.



Pic 9.9

Different types of arches

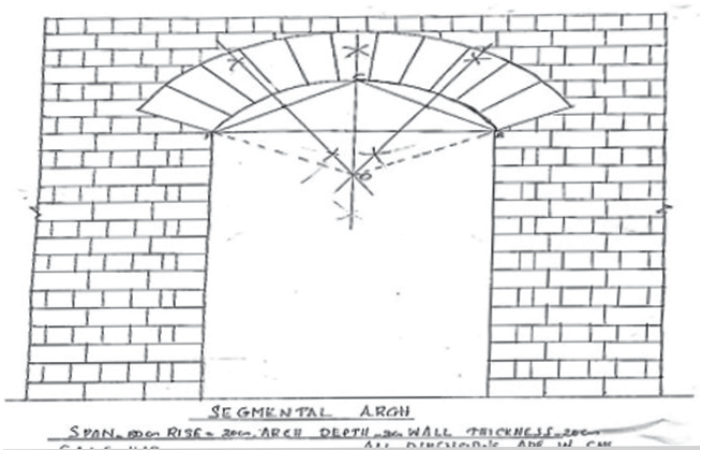


Pic 9.10

The arches make the constructions attractive. You might have seen similar arches in many of the famous constructions. There are different types of arches. One of them is segmental arch.

Segmental Arch

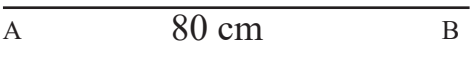
Arches are many depending on their shape. Among them segmental arch is an important arch. This arch is shorter than a semi circle.



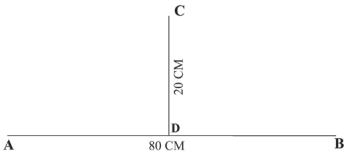
Pic 9.11

Let's draw a segmental arch of 80 cm width and 20 cm height with accurate measurements using the tools.

Draw a line (AB) of 80 cm in length.



Pic 9.12

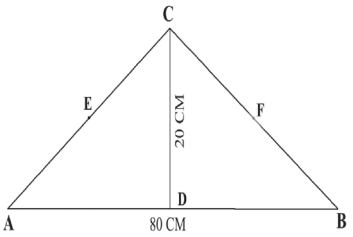


Pic 9.13

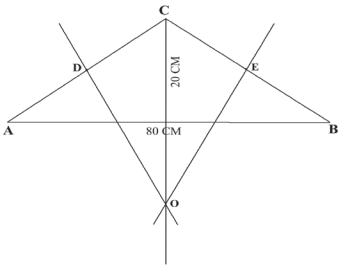
Draw a perpendicular line (DC) of 20 cm length from the mid point of AB.

Find the midpoints of AC and BC.

Mark midpoints of AC and BC as E and F respectively.

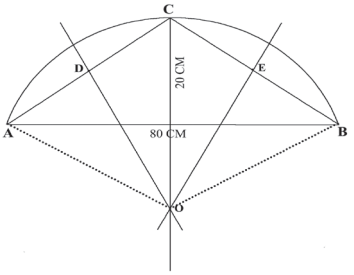


Pic 9.14



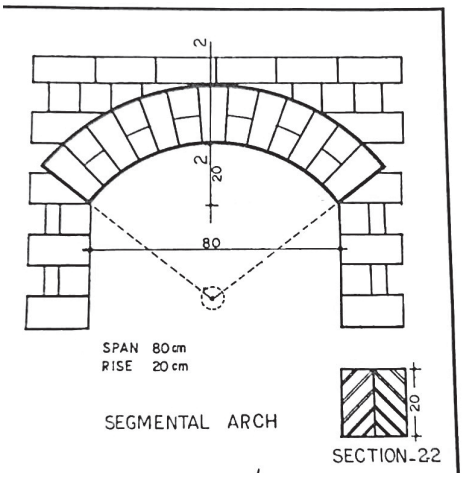
Pic 9.15

Draw perpendicular lines to AC and BC through E and F respectively. Find out the meeting (O) point of the perpendicular lines.



Pic 9.16

Draw an arc ACB with O as the centre and OA as the radius.



Pic 9.17

We have drawn segmental arch. With the help of instrument box, draw different types of arches (pic 9.10) as given above.

Moving Ahead

Draw an arch of your choice and exhibit its different models using available materials.

Pic 9.18

Key Takeaways

Gains			
Can recognise the drafting tools used in the drawing of engineering.			
Can use drafting tools accurately.			
Can create different types of arches using the drafting tools in the instrument box.			

Area

10

Craft

"The only way to do great work is to love what you do".

- Steve Jobs

Frame of Harmony

The discussion in the class on that day was about discipline.

“Is discipline only means remaining silent in class”?, Rima asked the teacher.

“Never. But it is not good to make noise in the class”, the teacher replied.

“Teacher, actually what does discipline mean”?, Anu raised the next question.

“I will tell you”, the teacher said with a smile.

“Discipline involves performing our tasks responsibly and maintaining order and organisation in everything we do. Punctuality, focussed learning, interaction with friends, doing one’s duties properly are all parts of discipline”.

Let’s begin the class by doing an activity on discipline.

Where do you keep the sandals in your home? Are they scattered around the yard or the veranda?

The majority of the students responded ‘yes’.

Some mentioned that they stack the sandals.

What is the situation in your homes? Are they scattered?

What do you think about arranging the sandals in a shoe rack?

It will keep the sandals in order.

Let’s learn to make a simple shoe rack.

Predetermining an apt place for each object in the home and other places and arranging them properly is also a creative art.

In our daily lives, we use a lot of items like the utensils of the kitchen, furniture in rooms, books and pens on the table etc. Care should be taken for their safety and proper use.

Success depends on acquiring good habits needed in life and acting accordingly.

What attractive things must can be used for production?

We can make a less expensive shoe rack with ease using the plumbing materials we learned in the previous class.

Activity 1

Making of a shoe rack

Materials needed

½ inch PVC pipe 16 metre, Elbow - 4 numbers, T Connector - 36 numbers, Stopper/Bush/Roller - 4 numbers, Hacksaw blade – 1 number

Procedure

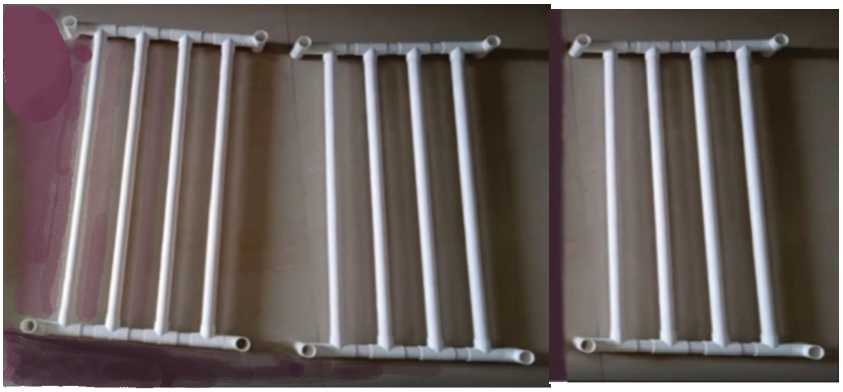
Cut 30 pieces of 5 cm long PVC pipe.

Connect six T connectors in series using five pieces (Pic 10.1).

Pic 10.1

Complete six pieces of this kind.

Keep both ends of the T connectors upright and connect each other using four PVC pipes of one metre length between the two sets as seen in the picture (Pic 10.2).



Pic 10.2

Prepare three layers like this.

Connect PVC pipes of 20 cm to the vertically arranged T connectors of each layer and join them one above the other.

This will act as the legs of the shoe rack.

Using stopper/bush/roller, the bottom part of the stand can be strengthened.

The topmost part can be beautified using an elbow, PVC pipe etc.

Pic 10.3

Now you are acquainted with the making of a shoe rack.

You can make many useful products like this.

Which are the products?

What is the use?

Products		Uses
1	Book Rack	To organise books
2	Spoon Stand	To keep teaspoons and spoons
3	Teapoy	To host and keep newspaper, magazines etc. in the living room
4		
5		

Hope you have understood the method of joining PVC pipes and strengthening them.

Now design a useful product of your interest.

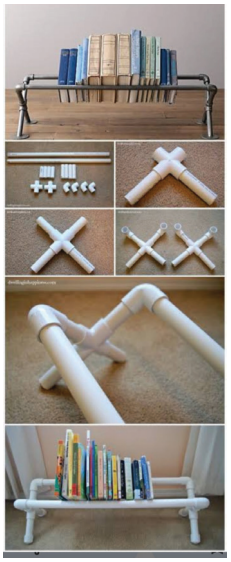
Prepare the list of necessary materials. Collect them and make the product.

Ensure innovation and usefulness in the production.

Moving Ahead

Observe the pictures.

Pic 10.4



Pic 10.5

Pic 10.6

Pic 10.7

Pic 10.8

We can make many other useful and interesting products using PVC pipes of different sizes, other plumbing materials etc.

Such products can also be made by using locally available materials instead of PVC materials. Eg: wooden pieces, reaper, bamboo, reed etc.

Make various products using these materials and display them in the class.

SARGALAYA - HANDICRAFT VILLAGE

Handicraft is a large job sector. Handicraft products have a good demand both at the national and international markets.

Craft villages in Kerala are an example for this.

Sargalaya is a handicraft village having an area of 20 acres situated at Iringal, near Vatakara in Kozhikode district. Such enterprises are flourishing in different parts of Kerala. Foreign tourists as well as local people are the consumers of these handicrafts.

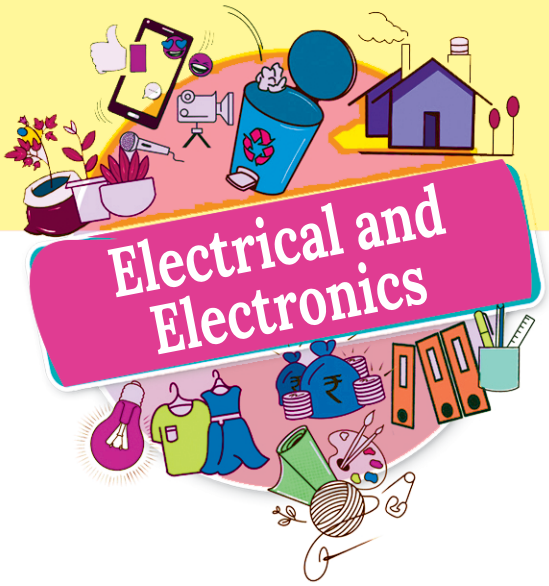
There are ample job opportunities in this sector.

Key Takeaways

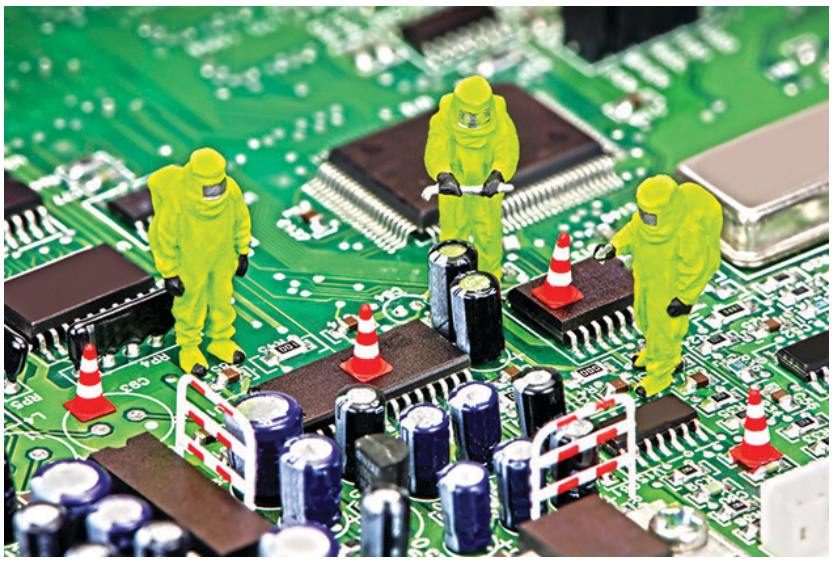
Gains	☺	😐	☹
Can cut and join pipes in accurate measurements			
Can construct different and useful products like shoe rack using various materials			

Area

11



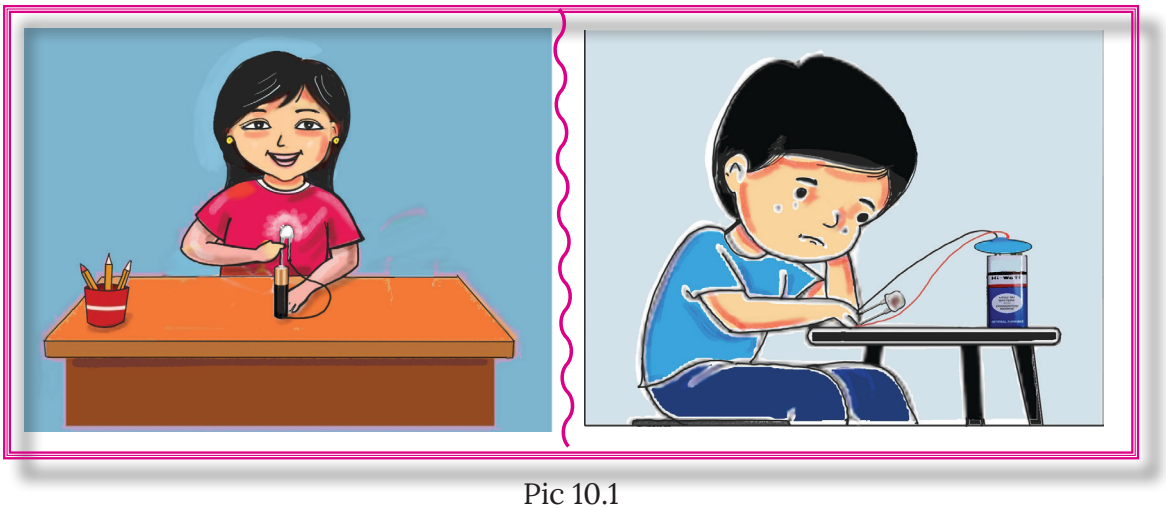
Electrical and Electronics



"The world of tomorrow is shaped by electronics. It enables new forms of communication, collaboration and innovation."

– Dr. Vint Cerf

An Introduction to Electronics



Pic 10.1

Observe Pic 10.1

Lima and Ishan are trying to light up the LED. The LED in the circuit prepared by Lima illuminates, but Ishan's doesn't.

Why didn't the LED light up in the experiment done by Ishan?

Each instrument works at a certain voltage, which will be recorded in the device. If the circuit has a higher voltage than the rated voltage of the component, the component will be damaged.

LED

The full form of LED is Light Emitting Diode. The longer leg is positive (+ve) and the shorter leg is (-ve).

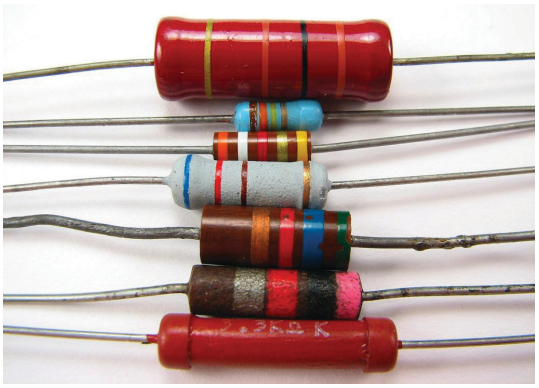
The positive and negative legs must be connected to the corresponding +ve and -ve terminals of the battery for the LED to function.

In the experiment conducted by Ishan, the battery was 9 volts, and the LED was 3 volts. Therefore, the LED was damaged due to the higher voltage applied to the circuit.

If the voltage from the battery is reduced will the LED still light up?

Mechanism to reduce voltage in a circuit

A resistor is a commonly used electronic component for reducing voltage.



Pic 10.2

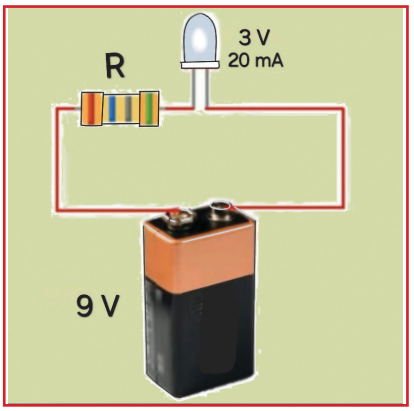
The value of resistors is indicated by 100 Ω 2 W, 100Ω 1/2W, 100Ω 1/4W

What is the method to illuminate an LED with a lower voltage rating using a 9V battery? For that we use a resistor, which is simple and low-cost.

You just need to install a resistor with a suitable value to reduce the voltage in the circuit. Let's see how to calculate the value of the resistor.

Activity 1

The method of selecting resistors with suitable values.



Pic 10.3

Observe the Picture 10.3. Here, we need to calculate the value of the resistor in the circuit. For this, we need to know the following values: the maximum voltage from the battery, the voltage of the LED and the suitable electric current intensity for the LED to glow.

Voltage supplied by the battery = 9 V

Voltage of the LED = 3 V

Difference in the Voltage = 9 - 3 = 6 V

Suitable current for the LED to light up = 0.02A (20 mA)

Required Resistance for the Resistor (R) = $\frac{\text{Difference in Voltage}}{\text{Suitable current for the LED to illuminate}}$

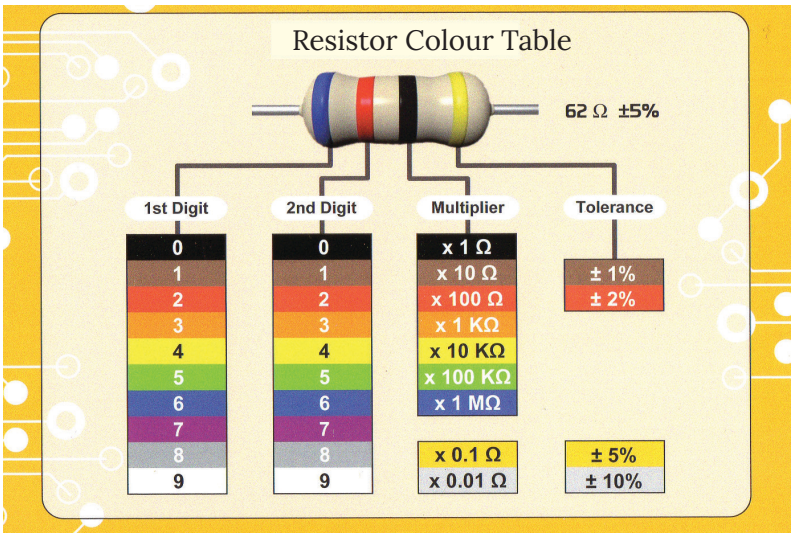
= 6/0.02

= 300 Ω

Power required for the LED to illuminate = Difference in voltage × Suitable current for the LED to illuminate

= 6 × 0.02 = 0.12W

The value of the resistor to be used in this circuit = 300Ω 0.12 W (0.12w, if not available, 1/4W can be used)



Pic 10.4

Select a suitable resistor by checking the colour code with the help of the teacher.

Assemble a 9V battery, LED and suitable resistor to glow the LED.

Pic 10.5

Observe the circuit built by Ishan. Did you construct it the same way? What are the possible drawbacks while assembling a circuit like this?

- If wires are loosely connected, there is a chance that the circuit may heat up.
-

Usually, electronic components are connected by soldering the wires.

Soldering ensures durability, efficiency and a neat appearance for the assembled circuit. By soldering the connections, the components can be ensured to last, function properly and be easy to reassemble.

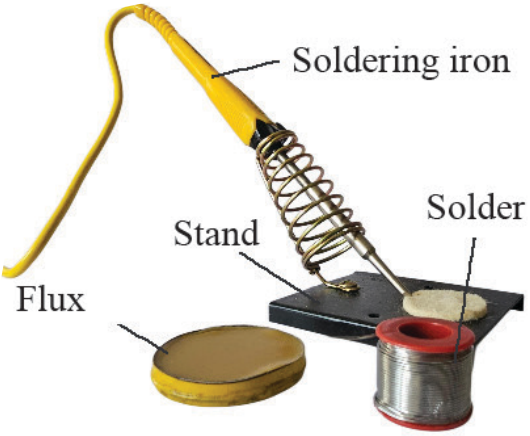
Activity 2

Practising Soldering

Learn how to solder and connect wire pieces properly.

Required Materials

1. Soldering iron-1
2. Flux-1
3. Solder- 1
4. Pliers- 1
5. 1 Sq mm wire- 5m
6. Gloves
7. Wire stripper



Pic 10.6

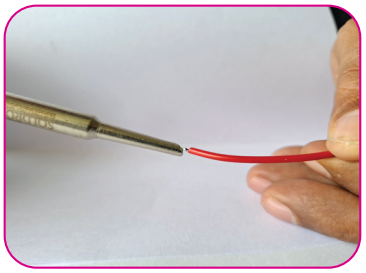
Soldering Iron

A soldering iron is a tool used for soldering electronic components.

Cut 1 sq. mm wire into 4 cm long pieces. Remove 0.5 cm of PVC insulation from both ends of each piece using a wire stripper. Solder the prepared wire pieces together to form a square shape.

Dip the area to be soldered into flux

Heat the tip of the soldering iron and then touch it to the solder



Apply the heated tip to the flux-coated area.

Pic 10.7

Repeat this process for all required soldering points.

Safety Precautions to be taken while Soldering

- Wear protective gloves, safety gloves and a mask.
- Perform soldering in a well-ventilated area to avoid inhaling fumes.
- Use a 15-30 watt soldering iron for most electronics work.
- Choose a soldering iron with a small tip for precision.
- After soldering, clean the tip of the soldering iron with a damp sponge to prevent oxidation.
- Select solder with an appropriate melting point. For most electronics work, a 3 : 2 tin-lead alloy is commonly used.

- Soldering should be done at the correct temperature.
- Ensure that the soldered joint is clean, smooth and free from excess solder.
- Use a stand to safely place the soldering iron while working.
- Patience and continuous practice will help develop soldering skills.

You have successfully soldered and created a square.

Now that you have soldered a square, try creating the shapes of the English letters A, B, E, and Q by soldering together different sizes of wire pieces.

Discuss and evaluate the shape and neatness of your creations with your friends.

Activity 3

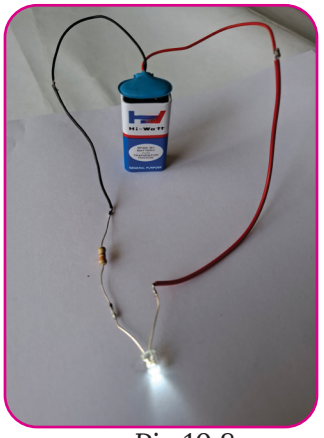
Soldering a Circuit

Since you've practised soldering, now let's solder the pre-assembled circuit (as shown in Figure 10.5).

Pic 10.8

Solder the wires as shown in the diagram and light up the LED.

What challenges did you face during soldering?

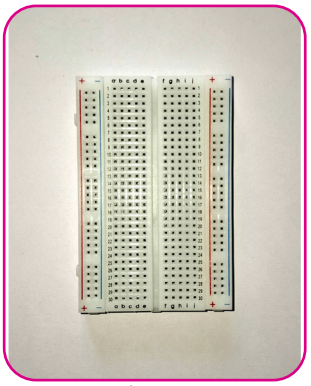


Pic 10.8

-

Breadboard

Observe Picture 10.9. A breadboard is a system used for building electronic circuits using electronic/ electric or electronic components without the need of soldering. It allows easy assembling and testing of components before permanent soldering.



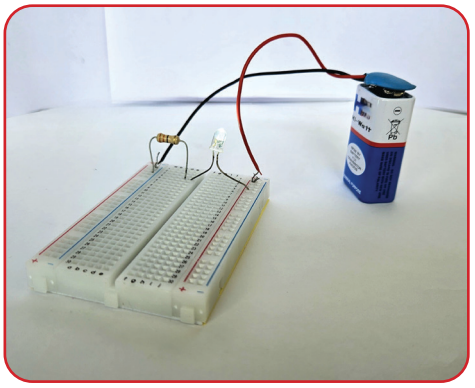
Pic 10.9

Activity 4

Building a Circuit Using a Breadboard

Required Materials:

(1) Breadboard – 1 (2) LED – 1 (3) Resistor – 1 (4) Jumper Wires – 4 (5) 9V Battery – 1



Pic 10.10

Follow Picture 10.10 to assemble the circuit and test if the LED illuminates.

If you can build a circuit with one LED, you can add more LEDs and arrange the circuit to create an emergency lamp.

To make the lamp turn on automatically in the dark, you can add an LDR (Light Dependent Resistor) to the circuit.

LDR

An LDR is a resistor that changes its resistance based on light intensity. It can be used to detect darkness and automatically switch on the lamp.

Pic 10.11

Moving Ahead

Build more electronic circuits using breadboard.

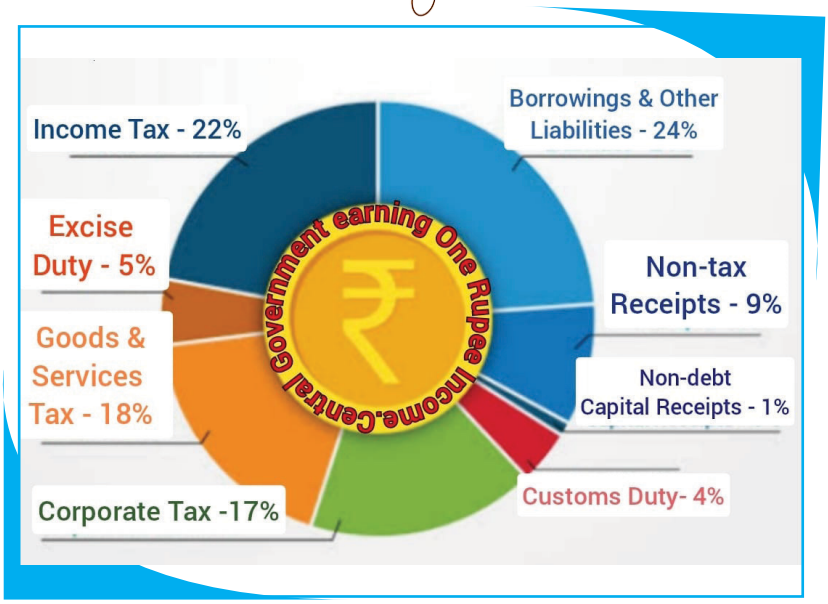
Key Takeaways

Gains	☺	😐	☹
Learned to calculate the value of the resistor required for a circuit			
Learned to reduce voltage in an electronic circuit using a resistor			
Able to solder using a soldering iron			
Learned to build an electronic circuit using a breadboard			

Area

12

Finance



"Each citizen contributes to the revenues of the State a portion of his property in order that his tenure of the rest may be secure."

- Montesquieu
(French Political Philosopher)

Tax System

Pic 8.1

You have understood that taxes are those funds that the government collects from the people for various expenses and for public services. The main aim of levying tax is to collect fund in order to finance the basic facilities, education, health care, defence and other public services.

Do you know about any taxes?

Take a look at the bill Ashin received after having food at a restaurant.

DINE-IN

TABLE: 1
GUEST:1

Date: 01-07-2017 07:19

SMN:H6
REF NO:KILDI1

NAME	QTY	RATE	AMT
GHEE PONGAL	1	50.00	50.00
COFFEE	1	25.00	25.00

Ticket Total:	75.00
Tax: CGST 9 9%	6.75
Tax: SGST 9 9%	6.75
Total:	88.50

THANK YOU! VISIT AGAIN!

TOTAL ITEMS:2

Powered by DinePlan
http://www.dineplan.net

BILL NO:1

Pic 8.2

Besides the 75 rupees that has been charged for the food, Ashin has paid an extra of 13 rupees and 50 paise. Do you know why?

These are Goods and Service Taxes that have been paid to the government.

Do you know about different types of taxes?

The Indian tax system has two categories of taxes – Direct Taxes and Indirect Taxes.

Direct Taxes

Direct Taxes are taxes that are directly paid by individuals or companies to the government without any intermediaries. Direct taxes are progressive in nature. This means that they depend on the ability of an individual to pay taxes. A person with a higher income will pay a higher share, whereas one with a lower income will pay a smaller share.

Income Tax is considered to be the most important among direct taxes. Individuals and companies with an income higher than the limit mandated by the government are required to pay income tax. Income Tax is levied by the Central Government. Besides this, local self-governing bodies also levy taxes as professional tax, building tax and land tax as direct taxes.

Income Tax

The Central Government levies income tax as per the Income Tax Act of 1961. Income is classified into different categories and taxes are levied accordingly. Incomes are classified as follows.

- Income from salary
- Income from house property
- Income from profession or business
- Income from Capital Gains (Profit gained from the sale of land, building or shares)
- Income from other sources (Savings Interest, Profit shares from companies etc.)

You have understood that income tax is levied according to the annual income of an individual, and varies from person to person. Additionally, various tax exemptions on the taxable income are also available. Income tax rates are decided every year as per the annual finance act passed by the Central Government. Therefore, income tax rates and exemptions vary from year to year. Income tax returns can be filed using the e-filing portal of the Income Tax Department and the taxes could be paid availing any of the online banking services that are available.

Activity 1

Let's find out the rates of Income Taxes

Find out and write down the income tax rates applicable to individuals for the given financial year by visiting the official website of Income Tax Department (www.incometax.gov.in) or by Google search.

Income Tax Rates

Tax slab under new tax regime
(As per the Central Budget 2025-26)

Income range (Rs.)	Tax rate
0 – 4 lakh	Nil
4 – 8 lakh	5%
8 – 12 lakh	10%
12 – 16 lakh	15%
16 – 20 lakh	20%
20 – 24 lakh	25%
Above 24 lakh	30%

Additionally, taxpayers with an annual income of up to ₹ 12 lakh will not have to pay any tax due to the enhanced rebate. For salaried individuals, the standard deduction has been increased to ₹ 75,000, making incomes up to ₹12.75 lakh effectively tax-free.

Permanent Account Number (PAN)

A Permanent Account Number (PAN) is a ten-character alphanumeric identifier, issued in the form of a polycarbonate card, by the Indian Income Tax Department. Details of all taxes related to an individual are recorded under this PAN.

Pic 8.3

When a person gets a PAN, the Income Tax Department is issuing a PAN card. The PAN Card has the PAN Number, name of the person and date of the person's birth on it. PAN card can also be used as proof of identification.

PAN Card is essential to ensure transparency in financial deals and for all other tax related needs of individuals and other business entities. It also helps curb tax evasion. PAN is mandatory for the filing of Income Tax returns, opening of a new bank account, conducting big financial transactions and the buying or selling of immovable properties.

Indirect Taxes

When Ashin paid the restaurant bill, did he directly pay the tax to the government?

The tax has been paid through the restaurant owner, who in turn pays it to the government after deducting his rebate.

The taxes collected by an intermediary (seller or service provider) from the consumer who ultimately bears the tax burden is known as indirect tax. Then the intermediary pays the tax to the government. Contrary to direct taxes, indirect taxes are not directly paid by individual; rather they are included in the prices of goods or services.

You would have understood by now that the Goods and Service Tax paid by Ashin is an Indirect tax.

In addition to Goods and Services Tax, Customs Duty is also an Indirect Tax. This is the tax levied on goods that are either imported to or exported from India. This helps to regulate international trade and protect domestic industries.

Goods and Service Tax

The Goods and Services Act (GST) is a comprehensive and transparent tax system implemented from July 1, 2017, with the slogan 'One Nation, One Tax'. The aim of this new tax system is to bring various central and state taxes under a single tax system and thereby unify the Indian trade scenario.

Have you heard about various Goods and Services Tax rates?

Based on the category of goods and services, the Indian GST rates are categorized into four different tax slabs - 5%, 12%, 18%, and 28%. Essential goods and services are either exempted from tax payment or very low tax rates are levied. Luxury goods are levied higher taxes. The GST Council periodically evaluates and renews the rates considering the financial situations and consumer needs.

Activity 2

Find out products and services with different GST rates

You have understood that there would be changes in GST rates and the products and services that fall under its purview every year. Collect more information regarding the products and services and their GST rates and fill up the table given below.

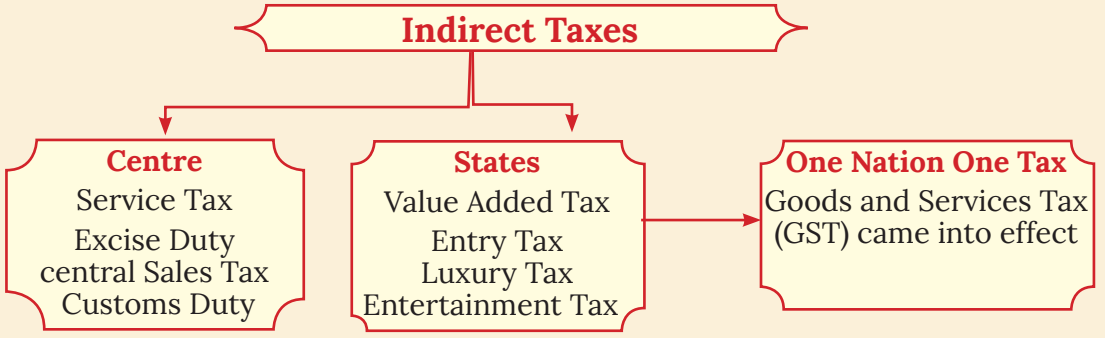
Products/Services and their GST rates

0%	5%	12%	18%	28%

Table 1.1

Previous Indirect Taxes

Earlier, Sales Tax was the most important Indirect tax levied by the Indian government. This was followed by Value Added Tax (VAT). Different states had different tax systems. Entry taxes were levied on goods that were transported across states. In 2017, the Goods and Services Tax (GST) replaced the then prevailing excise duty, sales tax, value added tax, entertainment tax, luxury tax and entry tax and brought all these under a single unified tax system. However, indirect taxes are still levied on products such as beverages and petroleum that fall outside the purview of GST.

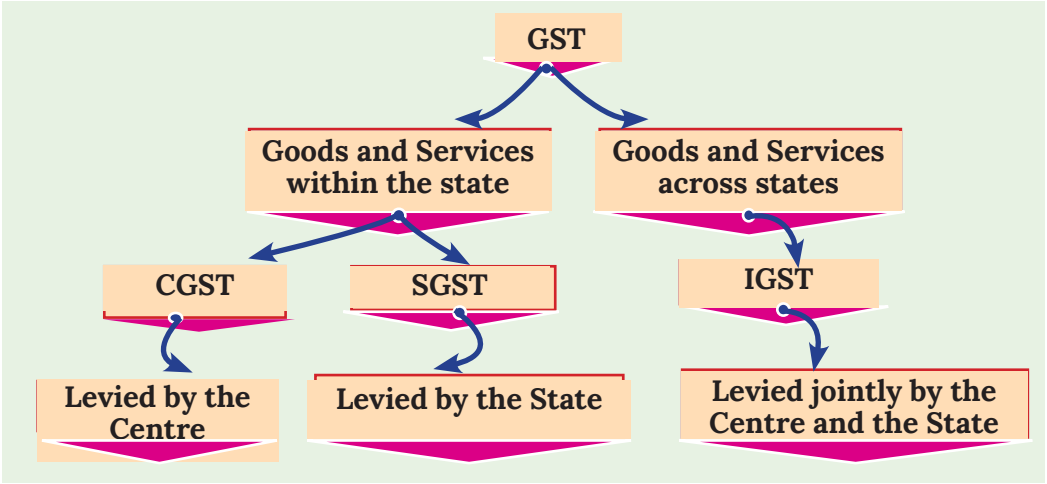


Components of Goods and Services Tax

Did you notice two types of taxes on the restaurant bill that Ashin received – CGST 9% and SGST 9% (Pic 8.2)?

These are the Goods and Services taxes that would be payable to the Central and State governments. Based on a general tax rate, both the Central and State governments levy separate taxes. This tax system thus has a dual structure.

GST has three components – Central Goods and Services Tax (CGST), State Goods and Services Tax (SGST) and Integrated Goods and Services Tax (IGST). CGST is collected by the Central government and SGST is collected by the State government. IGST is collected when goods or services are sold across states. Here the tax levied at a fixed rate is equally divided among the Central and State govermnents.



LuckyBillApp

This is an official platform that enables users in Kerala to upload bills, participate in lucky draws and win prizes. This is the first mobile app of its kind in India that has been launched to enocurage users to ask for bills while purchasing items.

Pic 8.4

Download and install the Lucky Bill app from Google Playstore. Upload GST bills and partcipate in lucky draw competitons. Users could win gift vouchers, gift packages and cash prizes as rewards. Prizes are sponsored by state government agencies public sector undertakings.

Benefits of Paying Taxes

Pic 8.5

You have noticed the picture given above.

As a citizen, how would you react in the above situation?

As a responsible citizen, you are expected to pay your taxes.

Have you ever thought about the benefits of paying taxes on time?

- If the consumer is not satisfied with the goods bought or the services availed, GST bills are compulsory for law suits related to compensation if the consumer is not happy with the goods or services.
- Loans and Credit Cards can easily be availed when you pay your taxes regularly.
- By paying taxes, we can support the government to improve the living standards of the people and to ensure economic equality and social justice.
- We can partake in the developmental initiatives of the government by paying our taxes.
- We encourage corruption and black money when we support tax evasion. This could eventually lead to a hike in the prices of goods and services.

MRP : The Consumer's Right

Minnu and Anu visit a store to buy a few items. Minnu notices "MRP: 50 INR (Inclusive of all Taxes)" written on the chocolate packet in small letters.

"What is MRP?" Minnu asked.

"MRP is the Maximum Retail Price," the shop keeper explained. "This is the maximum price that could be availed from a consumer for the product, and availing a price higher than this is not permitted."

"Why is it then that the same product is sold at a different price elsewhere?"

"An item could be sold at a price lower than MRP, but not higher than MRP," the shopkeeper said. "For example, I might sell this at 45 INR, but not at 55 INR."

You have read the conversation given above.

Who decides the value of a product that we buy? Can the shopkeeper quote any price as per their whim? Or has the government decided on the maximum price that could be charged for a product? Have you thought about this?

You might have noticed MRP (Maximum Retail Price) written on the packet of a product. What is it? Let us try to understand more about it.

MRP is the highest price that can be charged for a product by the manufacturer. MRP includes production cost, distribution cost, marketing cost, taxes and the seller's profit.

MRP is printed on the product's package. It is usually written as "MRP : XXX INR (Inclusive of all taxes". This clearly states that the price is inclusive of taxes and that no extra tax needs to be paid by the buyer.

Benefits of MRP

1. Saves the consumer from being overcharged
2. Sellers can avail the maximum price within the set limit
3. Ensures the same price for the same product across the country.
4. Prevents the same product from being differently priced in different shops.

How is MRP calculated?

Manufacturers consider various factors while deciding the MRP of a product. They are,

- Production Cost
- Transportation Cost
- Profit of sellers, distributors and intermediaries
- Government Taxes like GST

Activity 3

Find the MRP.

Select any three items that you recently bought for home. (Eg : Biscuit, Soap, Shampoo)

Find their MRP from the packages and note them down.

Examine the bill and find out the price at which these items have been sold at the shop. Find out if they have been sold at a price lower or higher than MRP. Discuss your findings in the class.

What would you do if a seller demands a price higher than MRP for a product? Find answers to the questions given below.

1. What would you tell a shopkeeper who demands a price greater than MRP?
2. Where would you lodge a complaint for the same?

What are the products that come without MRP?

You may call the National Consumer Helpline (NCH) – (1800-11-4000) if a seller demands a price higher than MRP. You may also lodge a complaint online using the Consumer Helpline Mobile App. While buying any product, take a look at the MRP, demand that a bill be given and become a responsible and mindful consumer.

Moving Ahead

- Conduct a seminar on the merits and demerits of the GST system.
- Collect the bills of various products bought or services availed during the past month at your home. Calculate the total amount spent as GST.

Difference between MRP and GST

While MRP (Maximum Retail Price) is the maximum price that could be availed for a product, GST (Goods and Services Tax) is the tax levied by governments for various products and services. MRP is inclusive of GST in many products.

Key Takeaways

Gains			
Understood that taxes are essential to generate money needed for basic development, health and education			
Gained an understanding regarding income tax rates.			
Gained the ability to collect data regarding various products and services and their GST rates.			
Developed the ability to identify the various components of GST and their rates from a bill.			
Realised that paying taxes according to the law is the responsibility of every citizen.			

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

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

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

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

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

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

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

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

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

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

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

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

CHILDREN'S RIGHTS

Dear Children,

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

Let's see what your rights are:

- Right to freedom of speech and expression.
- Right to life and liberty.
- Right to maximum survival and development.
- Right to be respected and accepted regardless of caste, creed and colour.
- Right to protection and care against physical, mental and sexual abuse.
- Right to participation.
- Protection from child labour and hazardous work.
- Protection against child marriage.
- Right to know one's culture and live accordingly.
- Protection against neglect.
- Right to free and compulsory education.
- Right to learn, rest and leisure.
- Right to parental and societal care, and protection.

Major Responsibilities

- Protect school and public facilities.
- Observe punctuality in learning and activities of the school.
- Accept and respect school authorities, teachers, parents and fellow students.
- Readiness to accept and respect others regardless of caste, creed or colour.

Contact Address:

Kerala State Commission for Protection of Child Rights

'Sree Ganesh', T. C. 14/2036, Vanross Junction

Kerala University P. O., Thiruvananthapuram - 34, Phone : 0471 - 2326603

Email: 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