Open Vocational Education Programme

Course code-455

Basic Rural Technology

4

OUR HOME ENVIRONMENT

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Basic Rural Technology

OUR HOME ENVIRONMENT

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FROM THE DESK OF CHAIRMAN ....

Dear Learner,

Welcome to the National Institute of Open Schooling!

By enroling with this institution, you have become a part of the family of the world's largest Open Schooling System. As a learner of the National Institute of Open Schooling's (NIOS) Vocational Programme, I am confident that you will enjoy studying and will benefit from this very unique School and method of training.

Before you begin reading your lessons and start your training, there are few words of advice that I would like to share with you. We, at the NIOS, are well aware that you are different from other learners. We realize that there are many of you who may have rich life experiences; you may have prior knowledge about trades and crafts that are part of your family's legacy; you may have a sharp business sense that will make you fine entrepreneur one day. Most importantly, you have the drive and motivation that has made you enrol with this institution, which believes in the spirit of freedom. Yes, we are aware that you have many positive aspects to your personality, which we respect and relate to them.

During the course of your study, NIOS will treat you as the manager of your own learning. This is why your course material has been developed keeping in mind the fact that there is no teacher to teach you. You are your own teacher. Of course, if you have a problem, we have provided for a teacher at your Accredited Vocational Institution (AVI). I would advise you that you should always be in touch with your AVI for collection of study material, examination schedules etc. You should also always attend the Personal Contact Programmes and practical / Training sessions held at your study centres. These will give you the necessary hands on training that is very essential to master a vocational course.

Studying for a vocational course is different from any other academic course. Here, while the marks obtained in the examination will indicate your grasp on your subject knowledge, your real achievement will be when you are able to apply your vocational skills in the market. I hope that this skill-based learning will help you perform your tasks better .This course of two year duration Diploma in basic Rural Technology has been developed in colloboration with Vigyan Ashram, Pune. It is a multi skilled programme, which will expose you to a variety of skills. We hope that you will find it useful. On behalf of NIOS, I wish you the very best for a bright and successful future.

Dr. S. S. Jena, Chairman,

National Institute of Open Schooling

FROM THE DESK OF DIRECTOR .....

Dear Learner,

In the fast expanding world of activities, learning new skills has become a necessity. Learning and re-learning has become essential for all. In such an environment, vocational education has assumed great importance. Vocational education, as a stream of education, promotes skill development, and training of youth and directs them towards meaningful employment.

In keeping with the needs of the Learners, NIOS conducts Vocational Education Programmes in many areas through distance mode. These programmes include Agriculture, Home Science, Engineering & Technology, Computer Science, Health & Paramedical. The Courses offered in these areas are aimed at providing self employment & wage employment opportunities for NIOS learners.

Vigyan Ashram under the leadership of late Dr.S.S.Kalbag, developed Rural Technology course for rural youth. Over the years, this course turned many youth into successful entrepreneurs. NIOS accrediated this course as Diploma in Basic Rural Technology and adopted it for further replication through AVI. This course will provide self-confidence to you and a new path to your future. You may be destined for starting a small enterprise and build your own future. This is multi-skilled programme, which will expose you to variety of skills. It includes Rural Engineering (Construction), Agriculture & Animal husbandry, Our Home Envjronment and Health sections. This will help in identifying learner's preference for future vocation. We are confident that this course will prove to be beneficial to you.

We wish you all the best in your future career.

Dr. K. P. Wasnik ,Director (VE),

National Institute of Open Schooling

A WORD WITH YOU . . .

Dear Learner,

Welcome to the Open Vocational Education Programme: "Basic Rural Technology"

This programme is developed specially for all those who are school dropouts and have started many small enterprises, do agriculture work as skilled workforce and they contribute substantially to the progress of India.

The multi-skill content with hands-on experience of this programme stimulates the intellect by going through concrete operations and then abstracting the concepts. At the same time by giving a variety of skills usable in everyday life, open the door of modern technology to the youth, allowing them to form their preferences and know their aptitudes thus enabling them to choose a career. It also improves their self-image and gives them confidence and hope for the future. The level of training, though basic, empowers them to start their own enterprise after a short stint with another enterprise in the field. Basic Rural Technology content and the system of Hands-on training not only make the education relevant but also understandable because it uses the 'learning while doing' system and is closely linked to services to the community. Students will get training by working in real life environment. Learner will also learn basic skill like Drawing, costing and project planning in DBRT programme.

The Self – Instructional Material of this programme consists of Four Modules: 1. Our Health, 2. Agriculture & Animal Husbandry, 3. Rural Engineering (Material, Mechanics, Drawing & Costing) and 4. Our Home Environment. Learner friendly approach has been adopted throughout this material. Each lesson is written in very simple and chronological order. The in- text questions are included in the text matter to analyze the learner's understanding of the lesson. The suggested activities are provided that go beyond classroom.

We hope that this programme will help you to carve an niche in your career and play an important role in the society.

With best compliments

Dr. Pawan Kr. Chauhan
Executive Officer (HPM)
National Institute of Open Schooling

Basic Rural Technology

4

SECTION - A
OUR HOME ENVIRONMENT

Course Content

1

PLANE TABLE SURVEY & MAPS

1.1 INTRODUCTION

Map is a picture of Earth's surface. Mountains, Valleys, Rivers and Sea along with Houses, Roads, Temples, Railway routes etc. are shown in it. In this lesson, we are going to learn about the importance of maps, technical terms , symbols and their types. We are also going to learn how to draw maps? We learn to make this map with the help of plane table instrument.

1.2 OBJECTIVES

After reading this lesson you will be able to:

- know what is map and its importance.
- understand the types of maps, symbols etc.
- use of different instruments in plane table survey.
- learn, how to draw a map using the plane table.

1.3 MAPS

The information, which cannot be given in words, can be expressed in brief through maps. Even those, who are illiterate, can read & understand maps. Language of drawing and reading maps is common all over the world. Oldest maps available are from middle Asia, they are over 5000 years old. Around 2000-2500 years back Greek people had tried to draw world map. At the end of first century, a scientist Tolemi wrote a book "Geographia". He introduced the terms latitude and longitude. He also discussed the method of showing rounded surface of the earth on plane paper.

Module-4

Notes

1.4 IMPORTANCE OF MAPS

Maps are very useful & important to us, How:

1. To understand roads and subways at new places.
2. To calculate distance between two places.
3. To know whether there are two or more paths to the same place and which is the shortest.
4. We can get information about mountains, rivers, valleys or any other thing, which may come on the way, and we can prepare for that.
5. We can get the information like height of the place or ups and downs on the road.
6. Boundaries of the land to define ownership.
7. Places like houses, farmhouses, mines can be shown on the map.
8. We can also mark crops, weather reports, direction of wind, rainfall on the maps.
9. Government needs the map to keep the record of the owners.

Who makes the maps?

An organization 'Survey of India' made the maps of whole India by making survey for over more than 100 years.

At present , we get the maps to scale 1:25,000 or city map with scale 1:10,000. The small scale maps(Means map giving the information of large places) are made with scale 1:10,00,000 or 1:25,00,000. The 1:6,000 maps are used to show ownership of the land and its boundaries.

1.5 TECHNICAL TERMS USED IN THE MAP

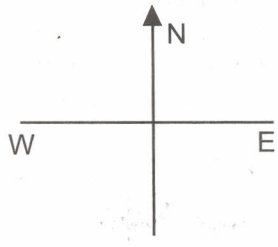
1. Scale

Maps are always to the scale. This means there is a fixed relationship between actual distance or shape and distance or shape on the map. The actual distance is in multiple of the distance taken on the map and this is called scale of map.

The scale is described in terms of 1:25000. This means 1cm distance on the map is equivalent to the actual distance of 25000cm (250 meter). If we know the scale of the map then we can calculate distance between two places.

2. Direction

North direction is marked on the map. Generally, it is on the upward side. Other directions are known from this. Following symbol is used to show north direction.



3. General Symbols

Following symbols are used on the map:

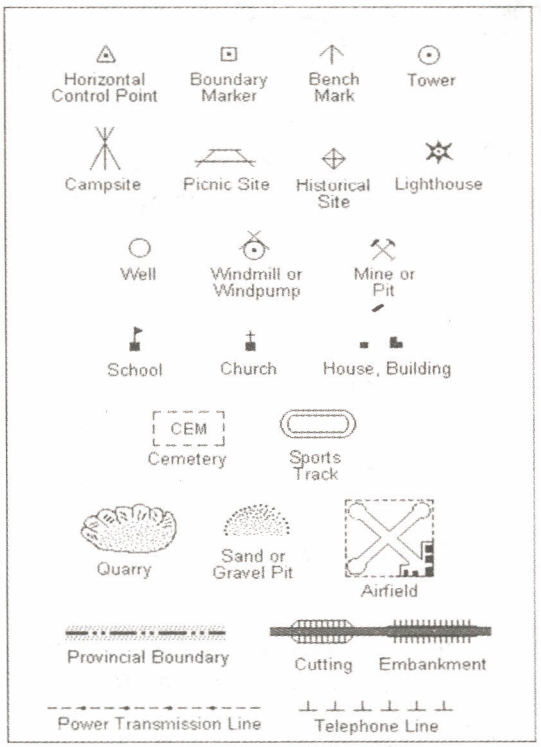
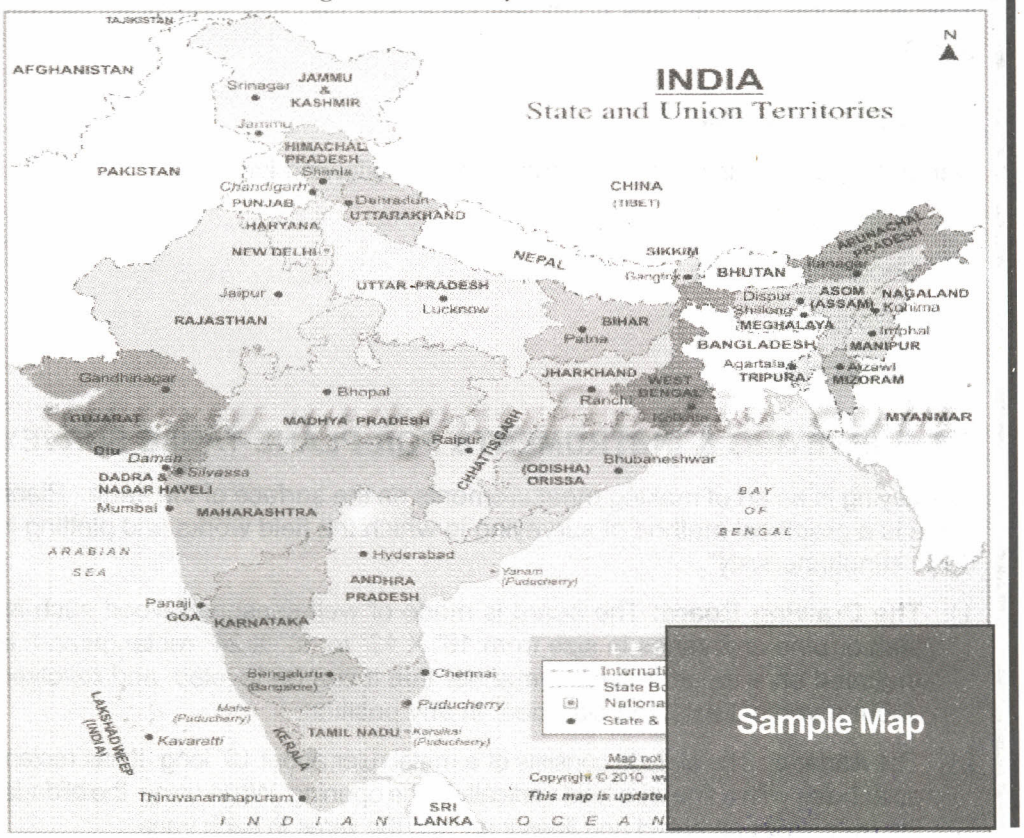


Fig.:1.1 General Symbols



4. Longitude and Latitude

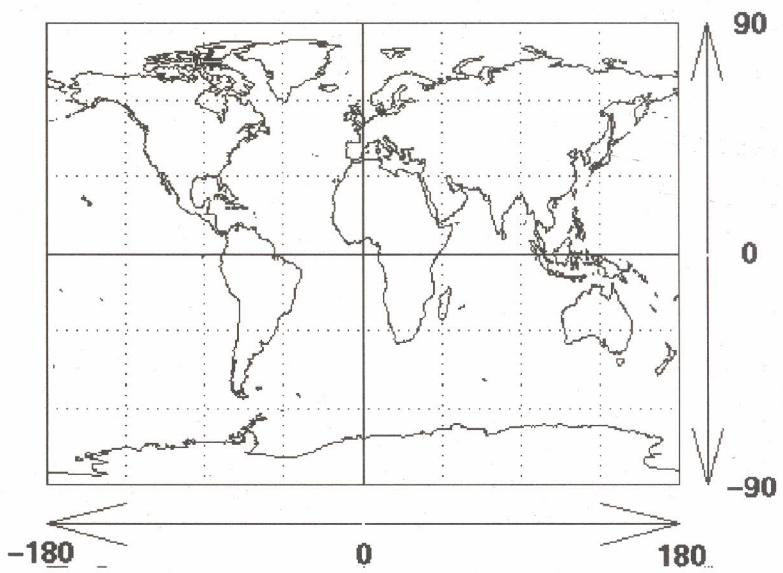


Fig.:1.2 Sample Map

Latitude is measured from the equator, with positive values going north and negative values going south. Longitude is measured from the Prime Meridian (which is the longitude that runs through Greenwich, England), with positive values going east and negative values going west. So, for example, 65 degrees west longitude, 45 degrees north latitude is -65 degrees longitude, +45 degrees latitude.

1.6 TYPES OF MAPS

Depending on the uses of maps, they may be following types:

1. Political map
2. Geographical map
3. Descriptive map
4. Statistical map

1.7 SURVEYING & INSTRUMENTS FOR PLANE TABLE SURVEY

"Surveying is an art of making measurements on the surface of the earth. Plane Table is a graphical method of surveying in which the field works and plotting is done simultaneously".

1) **The Drawing Board:** The board is made of well-seasoned wood such as teak or pine and varies in size from 16" X 12" to 18" X 24" rectangular. It is mounted on a tripod in such a manner that it can be leveled, and revolved about a vertical axis and clamped in any position.

2) **The Alidade :** The alidade consists of a metal ruler about 18" long. It has rectangular holes with a fine wire held vertically in the opening. While using the alidade, the user sights an object and lines it up with the wires in each vane.

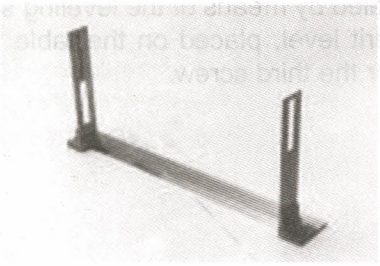


Fig.: 1.3

3) **A compass** is for marking the north direction on the paper .

4) **A plumbing fork** with a plumb bob for centering the table.

5) **Tripod :** A tripod is a three-legged stand for a drawing board , used to stabilize the drawing board.

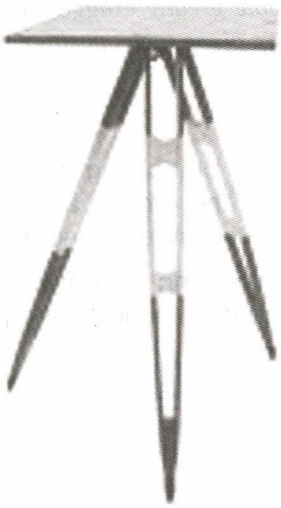


Fig.: 1.4 Tripod

6) **Other items:** Paper, Pins, Pencil , Rubber , Scale etc.

1.8 HOW TO USE THE PLANE TABLE?

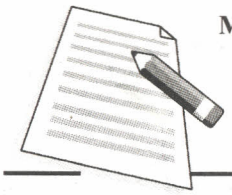
We are now going to draw a map of a school ground.

The following operations should be performed while setting up the table at a station:

Initially select a point from where all points will be seen.

1) The legs of the tripod should be spread well apart, and firmly rested on the ground.

2) Centering of the table is done by using plumb bob. If no plumb bob is available, centering of the table may be done by dropping a stone from a point on the underside of the board which is directly under the point on the paper.



Module-4

Notes

3) The table is then leveled by means of the leveling screws with reference to the level tube or spirit level, placed on the table first parallel to the two screws and then over the third screw.

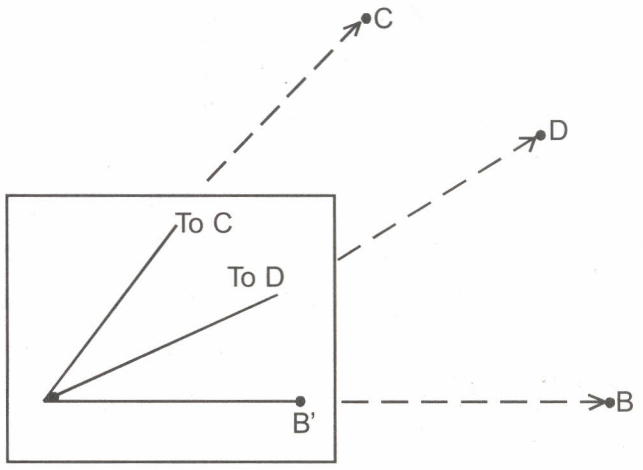


Fig.: 1.5 (plane table greatly exaggerated)
Mapping from a plane table, position A

Method of drawing map

Point A is marked on the paper, coinciding with point A on the ground. Other points viz. B, C, D are on the ground are seen from alidade. Actual distance of point A and point C is measured using meter tape.

A suitable scale is selected considering dimension of the paper and actual distance between the points. According to the scale, a line corresponding point

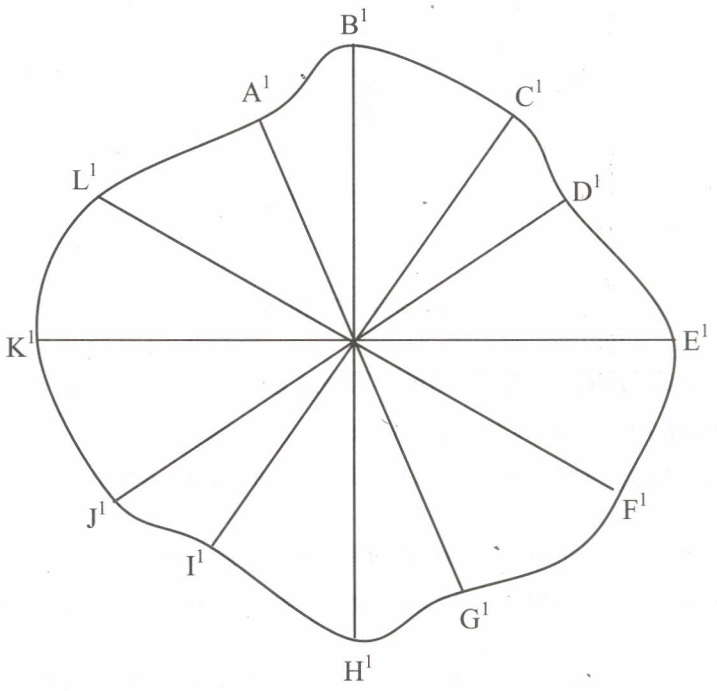


Fig.: 1.6

A to B is drawn on the paper using pencil. All point B, C, D... etc. are marked on the paper and joined with the A. Map is drawn by joining peripheral (B,C,D etc.) points in sequence on the field on paper.

(Sample image of the hand drawn map is shown in fig.1.6)

Precautions while drawing the map

Following precautions need to be taken:

1) The board should be horizontal.
2) The table should be accurately centered.
3) The table should be correctly oriented.
4) The objects should be sighted accurately.
5) The alidade should be correctly centered on the station point.
6) Plotting should be done accurately.

1.9 COMPUTATION OF AREA

One of the objectives of land surveying is to determine the area of the land surveyed.

- To measure area of the plot, first draw the map using plane table methods.
- Divide the entire figure into a number of triangles.
- Area of each triangle is calculated using mathematical formula.
- Areas of all such triangles are added to get the area of the field measured.
- The base and altitude of each triangle are scaled and its area is found by multiplying half the base by the altitude.

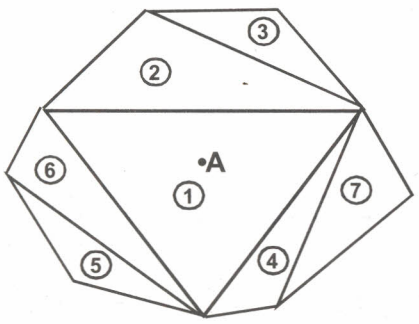


Fig.: 1.8

Area of field = Area of triangle 1 + Area of triangle 2 + Area of triangle 3 + ..

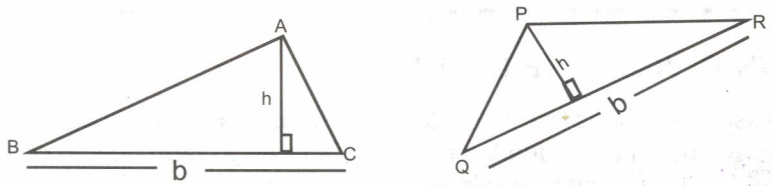


Fig.: 1.9

Area of triangle = ½ x b x h

1.10 Advantages & Disadvanges of Plane Table survey

Advantages of Plane Table Survey:

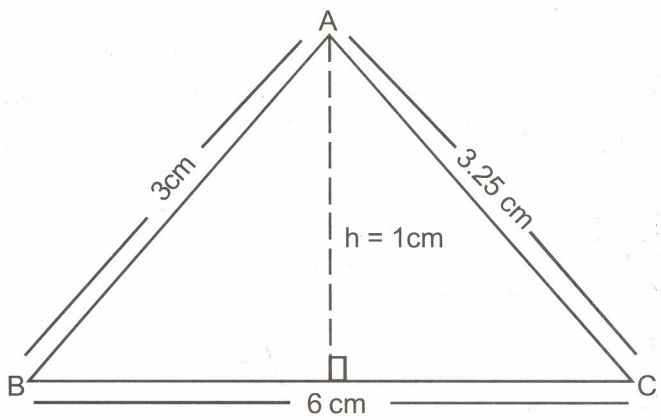
1) It is most suitable for preparing small scale maps.
2) It is most rapid.
3) No great skill is required to prepare a satisfactory map.

Disadvantages of Plane Table Survey:

1) It is heavy to carry.
2) It is not intended for accurate work.

INTEXT QUESTIONS 1.2

1) What is the formula for finding the area of triangle?
2) Find out the area of triangle of side 3cm,3.2cm,6cm?(**fig of the triangle)**



State True /False:

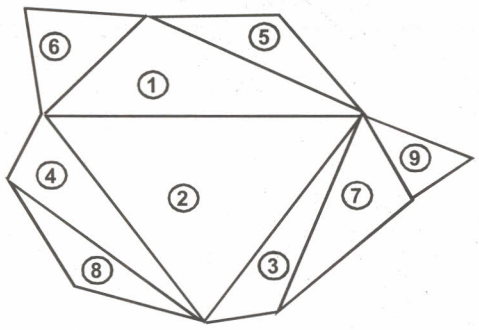
3) Height of triangle is called altitude of triangle (.....)
4) Plane table is intended for the accurate work (.....)

1.11 WHAT YOU HAVE LEARNT

In this lesson, you have learnt, map and its uses . Conducting survey and drawing the maps using the plane table survey. We also learnt how to compute area of the field using the plane table.

1.15 TERMINAL QUESTIONS

Following are reading of base and heights of triangles drawn in the field map drawn using plane table survey. Scale used 1cm: 100m. Calculate area of smaller triangles along with total area of the field.



Triangle No.	Base (cm)	Height (cm)	Area
1	5.5	1.1	
2	5.5	4.8	
3	5.0	2.2	
4	4.3	1.2	
5	4.1	0.7	
6	2.0	0.5	
7	4.2	0.5	
8	3.2	0.7	
9	1.5	0.5	

1.16 ANSWER TO THE INTEXT QUESTIONS

1.1

1. Area of triangle= ½ x B x H sq. units
2. Area of the given triangle = 3sq.cm
3. True
4. False.

1.17 SUGGESTED ACTIVITY

Take the map of world and find out Longitude and Latitude of atleast 5 countries of asia.

2

LEVELING

2.1 INTRODUCTION

It is very common, in our daily life to measure the difference between heights of two or more sights, points or spots. Sometimes we have to mark on the ground points at same level. For example, If we want to built house on sloping side of hill, then we have to mark point of equal-altitude.

Similarly, when we build channel in farm, we need to give proper slope so that water will flow easily by gravity. Water conservation works are carried on the barren sloppy land. Trenches and bunds are constructed on the slopping land. "The imaginary line joining all points of the same height on the ground is called contour line". We will learn about leveling, different types of instruments used for leveling and drawing of contour lines.

2.2 OBJECTIVES

After reading this lesson, you will be able to:

- Understand the use of instruments like spirit level, leveling tube, Dumpy Level.
- Apply the method to mark Contours on ground.

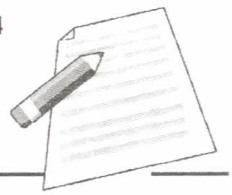
2.3 LEVELING

"Leveling may be defined as the art of determining the relative heights or elevations of points or objects on the earth's surface".

Following instruments are used for leveling:

a) Spirit-level

A bottle contain spirit as a liquid with an air bubble. When air bubble is at the center of two lines, the bottle is on perfect level. If the bubble is not in the center then tripod screws are adjusted to bring the bubble exactly at the center.



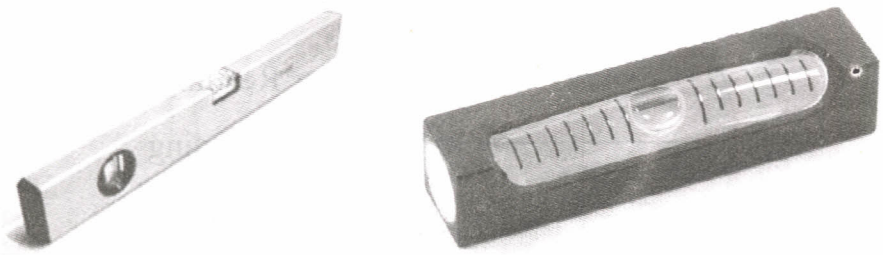


Fig 2.1 Level tube & spirit level

b) Level-tube

Water always remains at the same level. This principle is used in level tube. During construction, level tube is used to ensure all sides of the wall at same level. The level tube along with scale can also be used to find out height difference between two spots.

C) Dumpy Level

Dumpy level has an eyepiece , spirit level and three leveling Screws as well as a focus for the telescope lens – quite often the base has a 360 degree compass. This instrument is used for surveying. Dumpy level is used to measure height, distance direction of spot and we can draw contour. Spirit-level on the telescope is adjusted to plane level.

The dumpy levels have perpendicular cross hairs. There are the two short cross hairs above and below the main cross hair.

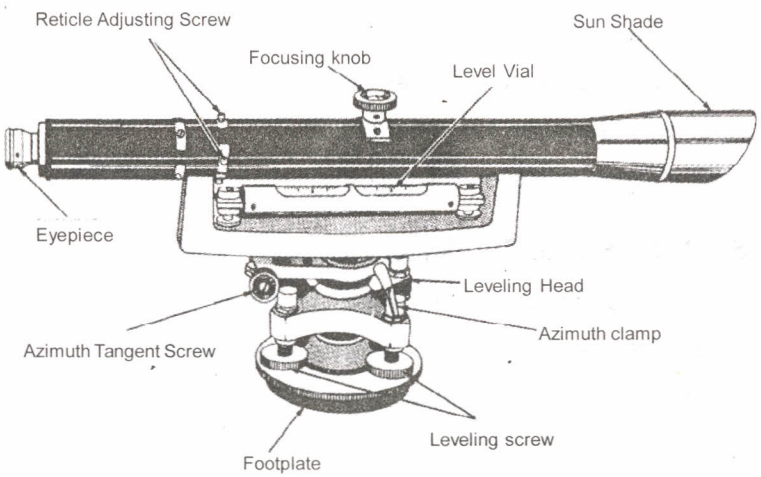


Fig. 2.2 Dumpy Level

The difference between upper reading & lower reading is multiplied by 100 to give you the distance from where you are to where the 'Staff' is:-

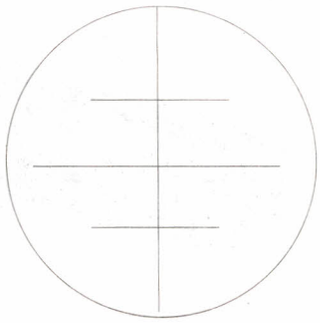


Fig 2.3

Example:

Upper Reading : 2.218

Lower Reading: 2.163

Distance between Staff & Dumpy level

= (Upper Reading - Lower Reading) x 100

= (2.218 – 2.163) x 100

= 0.055 x 100= 5.5m

Distance between staff & Dumpy Level = 5.5 meters.

Dumpy-level has compass to show direction.

2.4 DUMPY LEVELS IS USED FOR:

- Determining the height of a particular point.
- Determining differences in height between points.
- Drawing contours on a land.
- Providing data to calculate volumes for earthworks.
- Setting out level surfaces for construction.
- Setting out inclined surfaces for construction.

2.5 MEASURING HEIGHT USING DUMPY LEVEL:

- The place of which height is to be measured is called Station.
- Height is always measured with reference to sea level.
- Survey of India established benchmarks (B.M) at several places.
- Ideally the distances should be taken from the benchmark.
- If it is not available then we can select point on the map whose distance from sea level is known as the reference.
- We can fix any suitable point as temporary bench mark and all heights can be measured from that point. We can fix any temporary bench mark, but if its MSL(at temporary BM) is not sure,, then before starting the surveying permanent BM reading should be clear.

- Now we will learn how to take actual readings. Please observe fig.2. 4 carefully .
- In the picture Bench mark is setup at a height of 100 ft.
- As a first step we need to know the height of the place from where instrument is placed. In the picture, a boy is standing on a place from where survey will begin.
- To know the height of the instrument place a staff or level rod at bench mark location. And from the instrument take the reading on the staff. In this case reading on the staff is 5.5ft . This reading is called as back-sight reading (BS).

Height of the instrument = BM + BS

= 100 + 5.5 = 105.5 ft.

Now surveyor can go ahead and determine heights of other places. Look at the following figure to take further reading. These readings are called foresight reading (FS):

Now staff or level rods are put on the point (D) height of which is to be measured. The reading on the staff is recorded through telescope of dumpy level. (ref. fig.)

In present case, the reading shows 2.3ft. This reading is called Forward site (FS)

Therefore, height of point D is calculated as follows:

Height of point D = Height of Instrument (HI) – FS

= 105.5 – 2.3

= 103.2 ft

Distance between the instrument and the station D can be measured using meter tape or from the difference between upper & lower readings on the telescope.

INTEXT QUESTIONS 2.1

(1) Fill in the blanks:

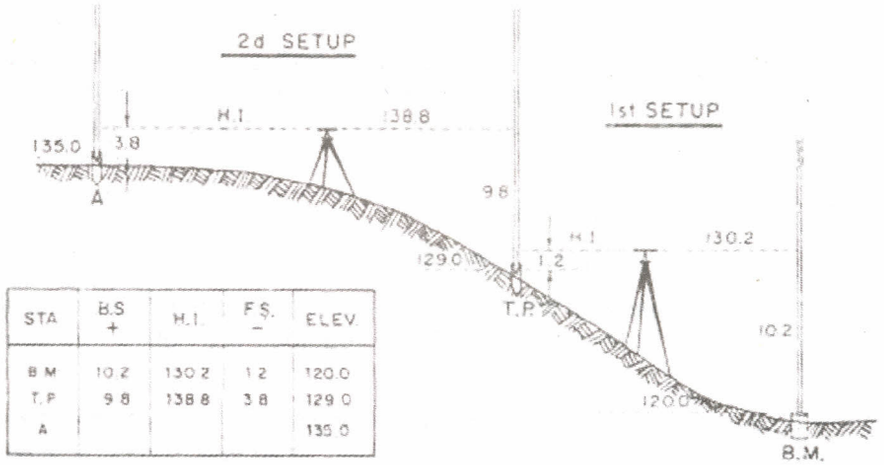
1. To check the level of the surface _____ instrument is used.
2. To determine the height between the two points _____ is used.
3. Water always remains in _____ level.
4. A meson always use a _____ for brick construction.
5. _____ is the lowest level of the earth.
6. Dumpy level survey measurements starts from a _____.

(2) State ture or false:

1. HI= BM+BS (True / False)
2. Elevation=HI +FS(True / False)

2.6 CHANGE POINT

If the area is hilly then you may not able to cover all points from one place. In such cases instrument is shifted to the convenient place. Height of this new station is measured from the existing location before shifting the dumpy level. New readings are for fore and back sights a taken as shown in fig.2.4.



STA	B.S +	H.I.	F.S. −	ELEV.
B M	10.2	130.2	1.2	120.0
T.P	9.8	138.8	3.8	129.0
A				135.0

Station	+BS	HI	FS	Elevation
BM 120ft	10.2 ft	130.2ft	1.2ft	129ft=TP
TP=X 129ft	9.8ft	138.8ft	3.8ft	135ft=A

BM-Bench Mark, TP-Temporary Point

Fig.2.4.

2.7 DRAWING CONTOUR LINES

All points of same heights are join together to draw a contour. For example a survey of plot of 120m. X 100 m. is done and heights are measured at different, points as shown in the fig.2.5

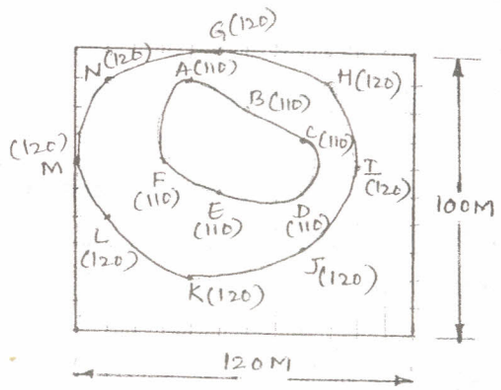


fig.2.5

2.8 USES OF THE CONTOUR LINES

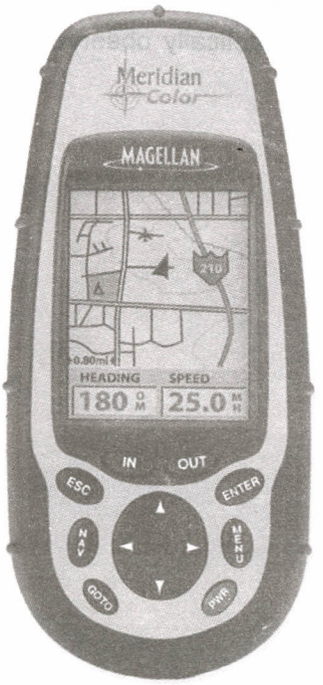
- To estimate the water storage capacity, back water limit and maximum water storage level of the dam.
- Volume of the proposed excavation work,
- To decide whether certain location is visible from another location,
- To decide exact line of railway or road way having safe slope,
- To determine the ground water level from contours of ground water.

2.9 GLOBAL POSITIONING SYSTEM (GPS):

Our ancestors while traveling used different landmarks, position of stars etc to guide them and save them from getting lost. . Now technology makes it possible to locate our position on the earth within a minute. This is possible because of invention of GPS (Global positioning system).

There are 27 satellites revolving around the earth about 18,000Kms. from the earth. There are at least four satellites visible from any point on the earth at any given time. GPS receivers calculate distance of the location from satellites by timing a signal's journey from satellite to receiver.

When you get such distances of the location from three locations, location of the point is accurately located on the surface of the earth. By using the GPS It is possible to carry out survey easily. It is possible to know longitude, latitude , distance of point from sea level. Vehicle tracking is the one of the fastest growing GPS application today. GPS equipped fleet vehicles , public transportaion systems , delivery trucks and courier services use recievers to monitor their location at all times for both efficiency and driver safety.



2.10 WHAT YOU HAVE LEARNT

In this lesson, you have learnt about need of leveling. Different instruments used for leveling and determining height of a place. We also learnt how to determine the height of a place and draw contour. We read about GPS & its applications.

2.11 TERMINAL QUESTIONS

1. Write an essay on the Leveling.

2.12 ANSWER TO INTEXT QUESTIONS

2.1

1. Level tube / spirit level
2. Dumpy Level
3. Same
4. Level tube
5. Sea Level
6. Particular point

1. True
2. False

2.13 SUGGESTED ACTIVITY

Visit any contruction site and practically observe the working of Level tube, Dumpy Level, Spirit Level.

3

BIOGAS

3.1 INTRODUCTION

If solid waste is not disposed properly, then it creates problems like increase in infectious diseases, contamination of ground water etc. Eco friendly ways of disposing the waste such as vermin- composting will help for small quantity of waste disposal. Biogas Technology offers dual advantageous; it will generate biogas as source of energy and also provide slurry which is good quality manure. In this lesson we are going to study details of biogas plant.

3.2 OBJECTIVE

After reading this lesson, you will be able to:

- Explain what is 'Biogas'.
- Explain the operation of Biogas plants.
- Understand different types of biogas plant
- Maintenance of biogas.

3.3 WHAT IS BIOGAS?

Biogas is generated by the bacteria in cow dung. Cow cut the grass with its teeth. Broken grass is digested in cow's stomach by bacteria. They broke it into chemicals and gases. The bacteria which come out with the dung continue with the same process, provided they are with condition similar to the cow's stomach like light and air have to be excluded and the dung has to be kept at a warm temperature, somewhere between 20°C and 40°C. This gives us biogas from the dung.

This kind of bacteria can digest other kind of bio wastes such as kitchen, any material with starch content as well.

BIOGAS CONSTITUENTS

Biogas is the mixture of gases, consists mainly of methane (CH_4: 60%) and carbondioxide (CO_2:40%) plus traces of hydrogen sulphide (H_2S) and several other gases.

Biogas may be used in the following three ways:

(i) Direct combustion for cooking,

(ii) Generation of electricity, and

(iii) Purification and export as compressed gas or in liquid form, just like CNG gas cylinders

FEED

Following feed is generally used in most of the biogas plant:

1. Cow dung,
2. Human excreta,
3. Non edible oil cake (like Mahuva),
4. Food waste,
5. Any material which has starch content.

Advantages of Biogas

1. The technology is cheaper and much simpler.
2. Slurry is very good manure and can be used as fertilizer and also in preparation of vermicompost.
3. Waste material is used to generate electricity as well as good fertilizer.
4. The digested material coming out of the plant will not have any odor and there will not be any mosquito/insects breeding on the same.

3.4 BIOGAS PLANT

A typical biogas plant is shown in the figure.

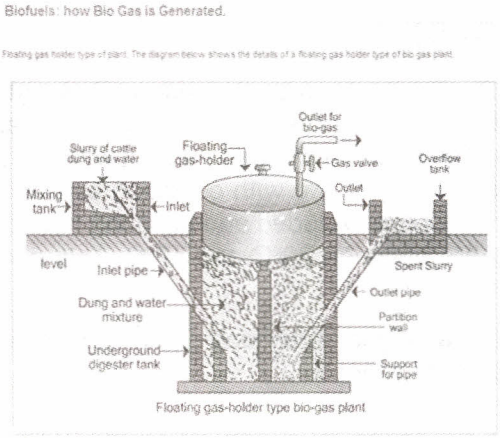
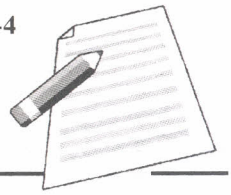


Fig. 3.1 : Biogas Plant



It has following components:

1. Feed Inlet: From where feed is fed into the system.
2. Digester tank: Where the feed and water will stay for some and bacterial operation will get completed.
3. Gas holder: It stores biogas generated.
4. Outlet gas: Gas generated is supplied through outlet valve.
5. Outlet slurry: Slurry is discharged from outlet pipe.

Types of Biogas plant

Based on various designs of digester, biogas are classified as:

1. Floating Dome type (KVIC Model).
2. Fixed Dome type (Janata Model).

1. Floating Dome type (KVIC) type:

In this model the gas stored in a tank. The tank is floating in slurry. Tank goes up as the gas gets generated and it lowers when the gas is consumed. The size of tank depends on the size of the feed. Normally, it is 50 times the amount of feed available per day. For Example if 20lits. of dung water mixture is put into a plant every day. We need tank of 20 × 50 = 1000 Ltr. capacity.

Generally, tank is made out of iron sheets. Therefore, cost of the biogas goes up. Recently many organizations started using PVC tanks.

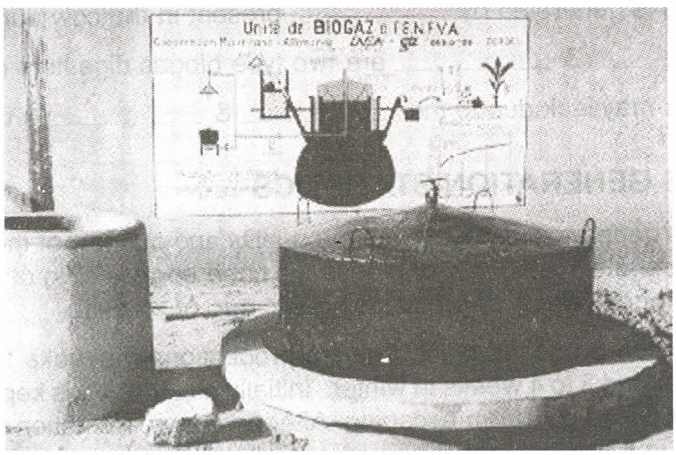


Fig 3.2 : Photo of Pabal biogas plant

2. Fixed dome type (Janata Model):

It is built either of cement-concrete or brick-walled. The gas is stored in the upper dome. With increase in gas, pressure in dome rises up. It pushes of the digested material out of the tank. The cost of a fixed-dome biogas plant is relatively low. It is simple as no moving parts exist. There are also no rusting steel parts and hence, a long life of the plant (20 years or more) can be expected. Fixed-dome plants are not easy to build. They should only be built where con-

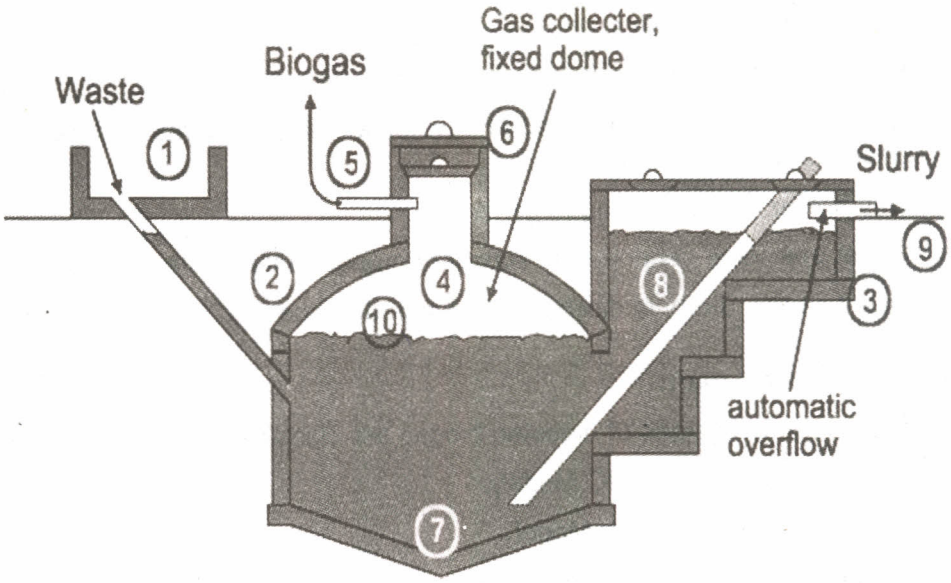


Fig. 3.3

struction can be supervised by experienced biogas technicians. Due to the porosity & cracks, gas generated may leak.

INTEXT QUESTIONS 3.1

1. Fill in the blanks:
   1. Biogas is generated by _____ present in the cow dung.
   2. _____ & _____ are two type biogas digesters available.
   3. Biogas may leak due to the _____ & _____in the tank.

3.5 BIOGAS GENERATION STATISTICS

Amount of gas generated changes with the quality and quantity of the feed. For example to generate 1cubic mtr. of biogas we need approx 25kg of cow dung. Whereas 3 kg of oil cake also produces 1cubic mtr. of biogas.

After installation of biogas plant, the gas productions may take from a few days in summer and 3 to 4 weeks in winter. Initially outlet valve is kept closed to prevent the produced gas from escaping. After few days, formation of bubbles will be noticed in the outlet tank. The gas is allowed to accumulate till it almost pushes the slurry to the level of outlet opening.

The initial gas has more carbon dioxide (CO_2) and less of methane (CH_4).It has oxygen as well as some other gases. This mixture of gases is allowed to escape by opening the outlet.

The gas is again accumulated for 3 days, now the biogas will burn with a blue flame and ready for use. This gas will not have any odor while burning. Proportion of fresh dung and water for feeding is 1:1 i.e. (50% fresh dung(kg) and 50% water (ltr).

Daily feeding of fresh cow dung per capacity of biogas is as below:

Capacity of Biogas	Required Dung	Water (LTR)
1 M^3	25 Kg	25
2 M^3	50 Kg	50
3 M^3	75 Kg	75
4 M^3	100 Kg	100
6 M^3	150 Kg	150

3.6 BIOGAS STOVE

Biogas gets generated at atmospheric pressure hence normal LPG gas stove will not work directly on biogas. You need to remove the pressure reducing pin from the LPG stove to operate the stove on biogas.

3.7 BIOGAS GENERATOR

Normally, 15KW above genset are available in the market which can be directly run on biogas. We can use dual fuel (Diesel + biogas) attachment on any diesel generator, can produce the required power.

Alternatively, if all other gases (Co_2 + H_2S + moisture etc) are removed from the biogas, then only methane remained. This methane can be compressed and used like Compressed natural gas (CNG) to run automobiles, generator.

INTEXT QUESTIONS 3.2

Fill in the blank:

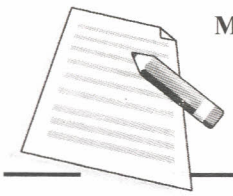
1) Biogas is a mixture of _____ and _____ gases.
2) Proportion of fresh dung and water for feeding in biogas is _____.
3) Daily the fresh dung slurry is added back in biogas plant to maintain the _____.
4) 2 M^3 biogas requires _____ Kg dung & _____ Ltrs. of water.
5) Initially biogas has a bad odor, due to the presence of _____ gas.
6) To produce electrical power, _____ Attachment is used on any _____ Generator.

Factor affecting production of gas:

Temperature – Lower the temperature, lesser is the gas yield. If the temperature goes down especially in winter it is advisable to use hot water to make slurry.

3.8 MAINTENANCE TIPS FOR BIOGAS PLANT

1. We must feed the biogas continuously. If biogas plant shuts down , it will take again 40 days to generate the biogas.



Module-4

Notes

2. Check biogas plant for leakages using soap solution.
3. In floating dome type, paint the dome regularly to avoid rusting.
4. Check for any blockages in pipe line etc., frequent observation is must on the regular basis.

3.9 WHAT YOU HAVE LEARNT

In this lesson you have learnt

- What is biogas?
- Different types of biogas plant.
- Feed to be used and procedure to use biogas.
- Uses an precautions while maintaining the plant.

3.10 TERMINAL QUESTIONS

1) Write flow chart of operation of biogas plant.
2) Write the major differences between the floating dome & fixed dome.
3) What are the other feeds used to generate the biogas.
4) Why biogas can't work over the LPG stove ? How we can make it to run?
5) Why in winter the gas production diminishes?

ANSWER TO THE INTEXT QUESTIONS

3.1

1. bacteria
2. floating dome & fixed dome
3. porosity & cracks

3.2

1) Methane and Carbon dioxide
2) 1:1
3) The microbial population
4) 50 Kg & 50Ltr.
5) Hydrogen Sulfide
6) Duel fuel, diesel

SUGGESTED ACTIVITY

Visit the nearby biogas plant & study the details discussed in the lesson.

4

SOLAR ENERGY

4.1 INTRODUCTION

Since the evolution of the earth, SUN is being the main source of human & plant life, as source of light, food production (photosynthesis) and growth. After the advancement in the solar technology the sun's energy is utilized for various energy applications like heating water, cooking food, power generation, etc.

Sun gives us energy, which arrives on Earth as a mixture of light and heat. Both of these are incredibly important—the light makes plants grow and provide us food, while the heat keeps us warm enough to survive. We can use the Sun's light or heat in many ways like Solar Cooker, Solar Heater, Solar Cells etc. In this lesson, we are going to study how solar energy can be utilized in different ways in our day-to-day life.

4.2 OBJECTIVES

After reading this lesson, you will be able to:

- understand the basic principle of solar cells and their structure.
- learn skills required in installation & maintenance of solar cells.
- understand the types and function of solar cooker.
- how to use solar cooker efficiently.
- make maintenance of solar cooker.
- discuss the use of smokeless chullah.

4.3 SOLAR CELLS

Solar cells are becoming more popular in places where it is not possible to provide electricity from the power grid and load shedding areas. The cost of solar cells has come down because of advancements in the semiconductor technology and mass production of solar cells. On an average, every square

meter of Earth's surface receives 164 watts of solar energy. This solar energy, in the form of solar, cells can be used directly to run a television or a car.

Basic principles of solar cell lighting system

The solar radiation falls on solar cells which converts sun light directly into electricity. Some solid materials like semiconductors generate free electrical charges upon absorption of a photon from sunlight.

Most solar cells are made from silicon. Silicon cell has property of both - a conductor and an insulator. When light falls on semiconductors, electrons starts flowing in semiconductors and current is produced. In order to get the desired voltage and current, solar cells are connected in series - parallel arrays is called 'solar panel'.

4.4 STRUCTURE OF SOLAR CELLS

A solar panel is a large rectangular flat plate, made up of many individual **solar cells,** covered with a protective sheet of glass.

Solar cells are also called **photovoltaic cells(PV cells)** because they use sunlight. "photo" comes from the Greek word which means 'light' and 'Volt means to generate electricity (Volt). Also 'Photon' means the energy packet which collects the energy from the sun & further transfers to the next cell through the motion of electrons.

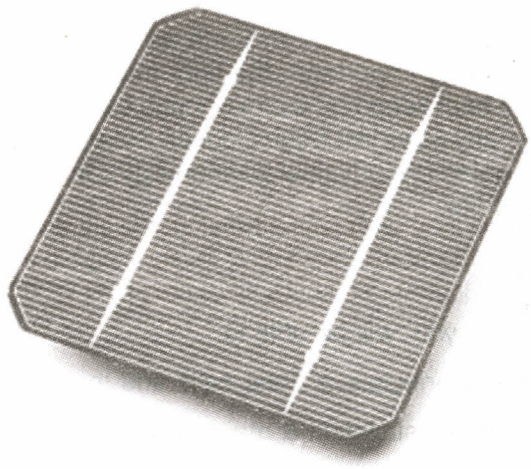


Fig. 4.1 : Solar Cell

4.5 ADVANTAGES AND DISADVANTAGES OF SOLAR LIGHTING SYSTEM

Advantages of Solar Lighting System:

- Once solar panels are installed, they produce energy without generating waste or pollution. They operate with little maintenance or intervetion.
- Solar power generation is economically competitive where grid connection or fuel transport is difficult, costly or impossible. For example, satellites,

hilly areas, remote locations and where power is not available.

- The DC power generated from the panels will be supplied to batteries to get charged.
- Inverters can also help us in conversion of DC to AC.
- This pumps can also be operated for lifting the water (moderate height)
- Operational cost is almost negligible.

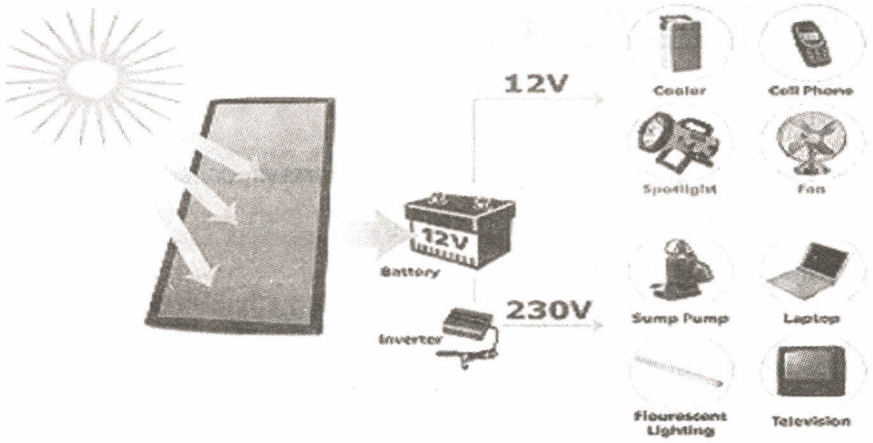


Fig. 4.2 : Schematic fig. shows the varied application of solar panels

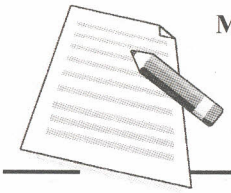
Disadvantages of Solar Lighting System:

- Solar energy systems do not work at night.
- Solar cells are currently costly and require a large initial capital investment. At present, solar panel cost about approx. Rs.300 per watt.
- For larger applications, big size batteries are required.
- Maintenance of batteries is always the critical issues.
- Solar cells are very delicate (need to be handled carefully)
- Need high precision machinery for the assembly of panels.
- The dust from the silicon cells is dangerous to health (while assembling the panels)

4.6 LIGHTING SOLUTION

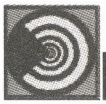
Selection of proper lighting device is very much important for optimum usage of solar energy. Following is comparison of different light sources.

Sr. No.	Parameter	Kerosene Lantern	Incandescent	Compact Fluorescent	Wled
1	Efficiency (Lumens/watt)	0.03	5-18	30-79	25-50
2	Rated Life (Hours)	Supply of kerosene	1000	6500-15000	50000



3	Durability	Fragile& Dangerous	Very Fragile	Very Fragile	Durable
4	Power consumption	0.04-0.06 Liters/hour	5W	4W	1W

From the table it is clear that White Light Emitting diodes (WLED) gives maximum lumens per watt. (Lumens is unit to measure light intensity). This means we save almost 1/5 of energy compared to incandescent bulb if LEDs are used.



INTEXT QUESTIONS 4.1

Fill in the blanks:

1) The solar cells are made up of _____.
2) A solar cells are connected in series – parallel arrays, called _____.
3) Solar energy system does not work during _____.
4) Energy packet is also called _____.
5) _____ cells dust is hazardous for the health.
6) Requires higher capital for the manufacturing of _____.
7) _____ is method by which _____ produce their food.

4.7 SOLAR COOKER

A **solar cooker** is a device which uses sunlight as a source of energy. It requires no other fuel to run. In India we get almost 250 sunny days. In this way solar cooker is an important substitute for cooking purpose in India. All solar cooker use sun light and heat to cook food.

Generally, cooking requires a temperature around 100°C (Boiling Point (BP of water). From sun we get the temperature near about 35°-40°C. By making proper arrangements in solar cooker device we can trap the heat cook very efficiently, saving huge amount of wood, kerosene and other possible fuels. Owing to this reason, the need of solar cooker has increased domestically.

Principles of Solar Cooker

All solar cookers use the sun's heat and light to cook food. The basic principles of solar cookers are:

- **Concentrating sunlight**: Initially sun rays are scattered and need to concentrate for higher temperature & heat. Mirrors or reflective metals are used to concentrate light and heat from the sun into a small cooking area.
- **Converting light to heat**: Sunlight heats the pan. A black pan will absorb almost all of the sun's light and turn it into heat. Solar cooker absorb maximum heat from sunrays.
- **Trapping heat**: Air flow will cool the surface. Therefore, air inside the cooker is isolated from the outside air. For better efficiency the collected heat need to be trapped.

4.8 TYPES OF SOLAR COOKERS

1) Box Type Solar Cooker :

The box type solar cooker consists of a rectangular box insulated on the bottom and sides & having two glass covers on the top.

A single glass reflector whose inclination can be varied with the attachment to the box. Temperature up to 150 deg. C can be reached in the cooker. But food containing water can be heated up to 100 deg. C.

Since temperature is not increasing beyond particular limit, there is no danger of food getting over cooked.

Various parts of Box type solar cooker are :

(1) Outside lid

(2) Glass reflector

(3) Cooking utensils

(4) Inside cover

(5) Double glass cover

(6) Box

(7) Handle

(8) Inclination Adjustment.

2) Concentrated Type Solar Cooker :

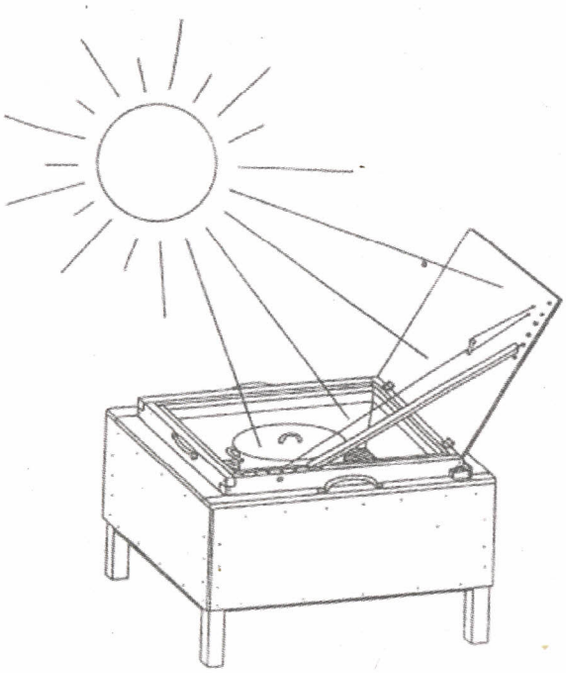


Fig. 4.3 : Box type Solar Cooker

In this type the radiation is concentrated by a parabolic (Curved) reflecting surface concentrating the radiation towards the focus. The cooking vessel is hence placed at the focus of the parabolic mirror. These cookers requires system to track sunlight. Temperature above 200°C can be achieved in such cookers. The reflecting surface can be glass mirrors, aluminum sheet and aluminum foil.

The main limitation with these cookers is that it requires constant attention to track the sun, as a result the operator has to be all the time in sun but can be compensated by automatic tracking system. Another disadvantage is that except for glass, the reflectivity of all other surfaces decreases with the passage of time. The concentrated cookers are useful where large number of meals to be prepared at the same time on daily basis like hostels, hotels, pilgrimage places etc.

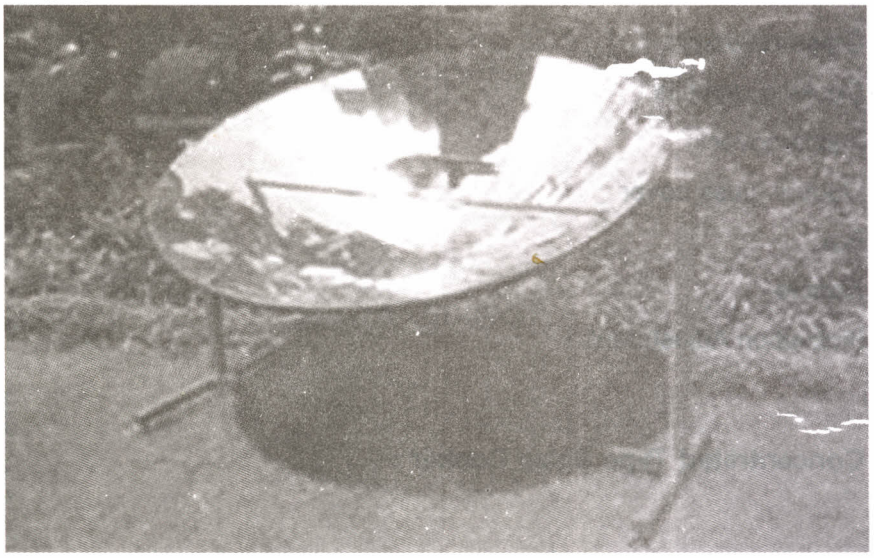


Fig. 4.4 : Concentrator Type Solar cooker

4.6 USE OF SOLAR COOKERS

Following are the basic principles for using solar cookers:

1) Food should be cut into smaller pieces for better cooking.
2) For food items like rice, use minimum amount of water.
3) Make sure that the shadow will not come on the sunlight facing area of the cooker.
4) Do not open the cooker for stirring because it will allow trapped heat to escape.
5) The reflecting surface need to be cleaned regularly for better performance .
6) Cooking time changes according to the place, climate & availability of sun. Time mentioned in the recipe books are indicative under standard conditions and need to check.

Advantages of Solar Cooker:

(1) It does not require constant presence while cooking.

(2) Since food cooks slowly, it becomes more nutritious.

(3) The fibers in the cereals remain intact.

(4) It does not require fuel. It requires only sunlight.

(5) It can also be used as a oven for baking.

Limitations of Solar Cooker:

(1) Solar cooker does not work on a cloudy days and during night.

(2) It can not be used for frying and making chapattis.

Cooking Time & duration :

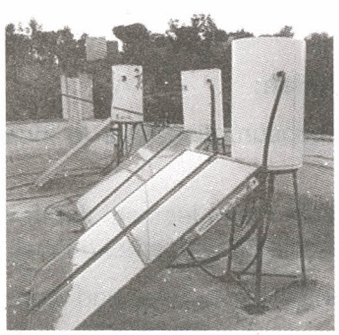
The best time for cooking is between 9 am to 4 pm during summer & 10 am to 3 pm during winter. The time taken for cooking depends upon type of food and sunny days.

INTEXT QUESTIONS 4.2

Write True or False:

1. Solar cookers can be used in a rainy (Cloudy) season. ( )
2. Solar cookers can be used for frying. ( )
3. Temperature around 100^0C is obtained in a solar cooker. ( )
4. Red colored utensils are used in a solar cooker. ( )
5. Solar cooker requires sunlight. ( )
6. Solar cooking is advantageous in maintaining the nutritious value of the food. ( )

4.7 SOLAR HEATER



Solar heaters are used to heat water for bathing, for industrial use etc and they are very economical.

Photograph showing typical solar heater installed for domestic purpose.

How it works?

A cold water is passed through series of pipes (black coated) inside a insulated box with glass fitted on it. Due to continuous flow of water under the sunlight, the water gets heated and stored in the collection tank. The equipment is working on the basic principle of "Thermo symphon"

Department of Renewable energy, Govt. of India, provides financial help to use solar energy.

4.8 SMOKELESS CHULAH

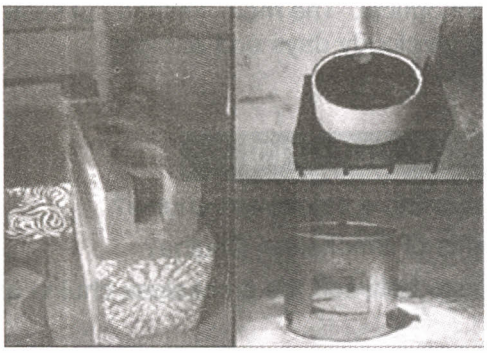
A **stove** is a very basic device used for cooking by burning wood. Most of the people living in rural areas use wood as fuel. Major problem with old stove is that it increases health problems from smoke particularly respiratory problems and eye ailments. The use of wood leads to deforestation. Therefore, we must work to increase efficiency of the stove.

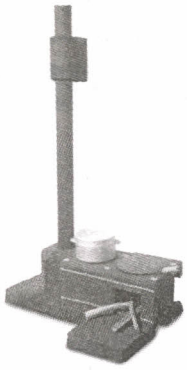
The traditional method of cooking in rural areas is on Chulah. The fuel is burnt under cooking pot. The thermal efficiency of this chulah is about 5 to 15 %. It requires large quantity of fuel. The smoke makes the cooking ports dirty and increases the work load of women. The smokes also create the problem of eye and chest diseases in women, take more time to cook. Smoke entering into the kitchen room leads to 'Indoor air Pollution'(IAP).

Smokeless chulha doesn't mean without smoke. It generates smoke but it is vented out of the room using pipe. The idea of a smokeless chulha is to not let all of the smoke come out and get on your face while cooking.

Benefits of Smokeless Chulah:

1. The reduction in wood consumption, due to increase thermal efficiency (20-25%)
2. The chimney system would mean less smoke in the kitchen, lessening of respiratory problems associated with smoke inhalation.
3. Removal of smoke means clean houses and utensils.
4. Reduces the cooking time.
5. Utensils bottom won't get blackened.





4.9 MATERIAL NEEDED FOR SMOKELESS CHULAH CONSTRUCTION

1) Bricks or mud made out of:
   a) Clay – 1 Part
   b) Sand – 5 part
   c) Bhoosa or paddy husk or cow dung.
2) Chimney made of metal or asbestos cement pipe.
3) Cap on the chimney top, to protect chimney from entering rain into and also controlling sparks leaving the chimney area.

INTEXT QUESTIONS 4.3

Write True or false:

1) Smokeless chulha is a pollution free stove.
2) Smokeless chulha saves wood.
3) Smokeless Chulha blackens cooking pots.
4) Smoke creates problem for eyes.
5) Three stone cooking stove decreases the Indoor air Pollution.

4.10 WHAT YOU HAVE LEARNT

In this lesson, you have learnt about the uses and application of Solar cooker, Solar cells, solar heater and smokeless and that food cooked in solar cooker is

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Notes

more nutritious and economical. The main limitation of solar energy devices is that they can't be used on cloudy days and at night.

4.11 TERMINAL QUESTIONS

1) What is the need of using a smokeless chulha?
2) What are the benefits of Smokeless Chulha?
3) What is the difference between the smokeless chulha and a conventional Chulha?
4) What is IAP? What are its problems?

4.12 ANSWER TO INTEXT QUESTIONS

4.1

1) Silicon
2) Solar Panal
3) Rainy Day
4) Photon
5) Silicon
6) Solar Cell
7) Photosyathesis, plants

4.2

1) False
2) False
3) True
4) False
5) True
6) True

4.3

1) True
2) True
3) False
4) True
5) False

4.13 SUGGESTED ACTIVITIES

Find out cost & time of fuel required to heat 10ltrs. of water using kerosene, wood and LPG. Also find out the time required for the same on solar heater. Find out cost of the solar heater suitable for one family and find out in how many years the investment will be recovered from the saving in fuel cost.

Similarly find out the cost, time required to cook 1 kg of rise on kerosene, LPG, wood and solar cooker. make a study and find out, which is the feasible method for cooking application.

5

GROUND WATER RESOURCES

5.1 INTRODUCTION

70% of earth surface is occupied by water. If we start measuring water on the earth then the figure will be too big even if we measure it in cubic kilometers.

If all water on earth is imagined to be filled in kerosene bottle (700ml) then available drinkable water will be equal to maximum one tablespoon. Out of which only 7 drops from it will be in the lakes and rivers. Remaining water is percolated as ground water.

5.2 OBJECTIVES

After reading this lesson, you will be able to:

- Understand the effects of water level in well.
- Know different resources of water.
- Learn advantages of ground water.

5.3 RESOURCES OF WATER

There is more ground water than the water in the rivers and lakes. Ground water means water percolated in the ground through cracks and pores of the sand/soil.

Total water on the earth always remains constant. It never increases or decreases. Water from ocean evaporates. These water vapors form clouds. When clouds get condensed due to low temperature, it rains. Rain water percolate in the ground, flows through the rivers and at the end goes to the sea. The same water again evaporates to form cloud. In this way same water gets rotated in different form. This is called the hydraulic cycle.

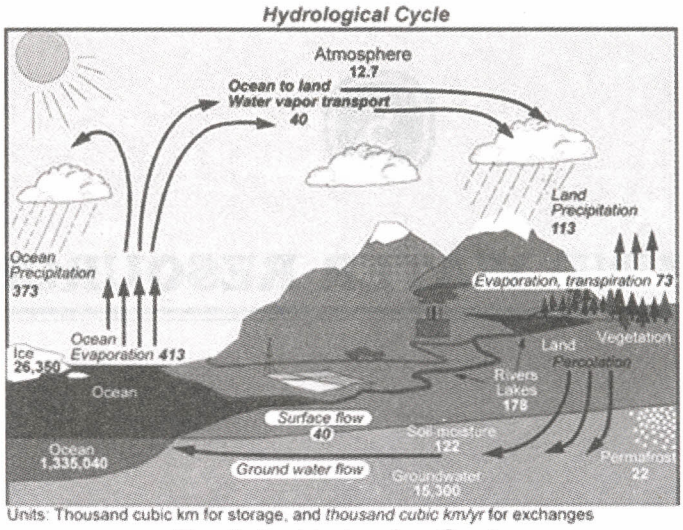


Fig. 5.1 : Hydravloc Cycle

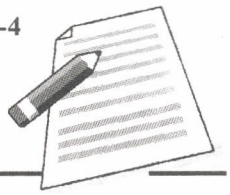
Total water available in the world

		World(Km^3)	India(Km^3)
1)	Evaporation:		
	On the ocean	350,000	
	On the ground	70,000	2,300
2)	Rain, Snow & water:		
	On the ocean	320,000	
	On the ground	100,000	4,000
3)	In the Ocean:		
	Flowing water		
	Through the river	28,000	1,100
	Through the land	600	

5.4 GROUND WATER

While raining some amount of water gets evaporated. Some water gets percolated in the ground. If it rains heavily then water gets accumulated and starts flowing toward downward side. Water which gets percolated inside the ground is called ground water. There are sand, soil ,cut stones and rocks on the ground. Rock has cracks in between and water gets percolated slowly through it.

When less water gets percolated?	When more water gets percolated?
1) When soil particles are small For example Chikni mitti.	1) When sand or soil particles are like beach sand for example Bhusabushit.
2) When land slope is more.	2) when land is flat.
3) When heavy rain pours in Less time.	3) when same rain falls over longer duration of time.



Soil and rocks are porous. Water, which enter into it tried to go deep due to gravity. Soil retains some amount of water through capillary action. Extra water goes deep. If the pores are big and well connected to each other then water goes in easily. Permeability of such soil is good.

If water come across rocks with no crack, then it doesn't go much deep (Permeability less or zero). Then such water gets accumulated. Stock of such ground water is called as Aquifer. The area where water fills the aquifer is called the **saturated zone** (or saturation zone). The top of this zone is called the **water table**. When a well is drilled it strikes water once it reaches below the water table.

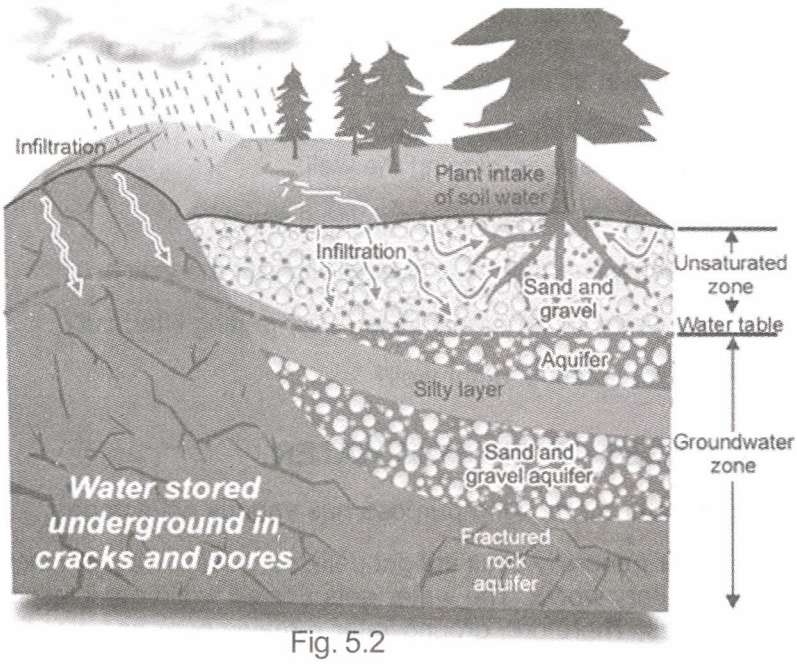


Fig. 5.2

Fig. 5.3

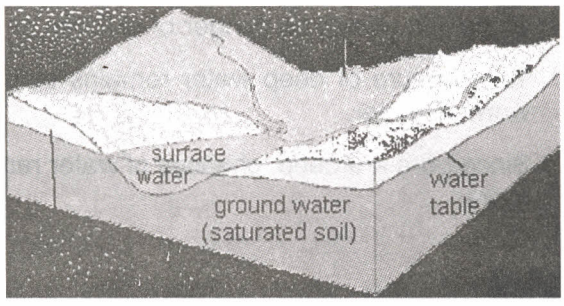


Fig. 5.4

When water percolates under ground and tried to flow through cracks and soil. It flows slowly. The flow of water is measured in meter/day.

Slope of water level and permeability of land:

If slope is steep then water will not percolate much, hence permeability of land is less. If slope of water level is 12 to 15 mtr/km then permeability is very less. If slope is 2-6 mtr/km then permeability is very good. In such places water gets percolated easily and comes into the well early.

5.5 WATER CONTOUR

Contours are drawn on the maps to show up and down on the earth. Similar to show water level under ground, water contours can be drawn. Land Contour remains unchanged over the years but water contour change with the season. In rainy season water level comes upwards and in summer it goes down.

5.6 EFFECT ON WATER LEVEL IN WELL

When water is taken out of the well, water level in the well goes down. Therefore, outside water starts percolating inside the well. If there is another well nearby then water level in that well drops down. If permeability of land is good then effect of lifting of water from one well can be observed even on well at 50 mtrs distance. But if permeability of land is less then such effect can be observed only on river at as distance 5-6 mtrs from it.

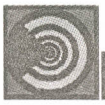
From water level, we can draw following information. This information will be useful while locating place for digging the well:

1. How deep water will remain after digging the well?
2. Whether water will remain available throughout the year?
3. How quickly water will get replenished after getting lifted out?
4. What will be the effect of other well?

5.7 ADVANTAGES OF GROUND WATER

Use of ground water for drinking purpose has various advantages:

1. Ground water generally does not get polluted, if it is away (at least 20 mtr.) from the sanitary works. The water gets filtered while percolating through sand & stones. Therefore, groundwater remains pure and clean.
2. Since bore well is closed, no risk of getting contaminated.
3. Since it is closed no danger of children or animals falling into it.
4. Temperature of deep water remains stable. It feels cool in summer and warm in winter.
5. Since bore are deep, chances of water remaining available in summer are more.



INTEXT QUESTIONS 5.1

State True or False:

1. Water level on the earth remains constant (True / False)
2. Earth surface is covered with 70% of water (True / False)
3. To dig a well , water peculation details will not help. (True / False)

5.8 WHAT YOU HAVE LEARNT

In this lesson you have learnt about different resources of water and their advantages.

Availability of water on earth is as follows:-

Approximate water in the world	1.36×10^9 Km^3	100%
Salty water		97%
Drinkable water (Including snow)	3.7×10^7Km^3	2.7%
Water in the form of snow		2%
Water in liquid form	9.5×10^6 Km^3	0.7%
Ground water	8.16×10^6 Km^3	0.6%
Water in river & lake	1.34×10^6 Km^3	0.1%

5.9 TERMINAL QUESTIONS

1. Find out various resources of water on earth.
2. How ground water can be utilized in useful purposes.

5.10 ANSWER TO THE INTEXT QUESTIONS

1. False
2. True
3. False

5.11 SUGGESTED ACTIVITY

Visit the nearby village / field well, study its water details from the owner. Also get details about the water peculation, availability of water during the summer.

6

FOOD PRESERVATION

6.1 INTRODUCTION

All living organism needs food. Food gives energy to do work. Hence, food is the basic need for all organisms. Therefore, proper knowledge and care of the food is first priority of all human beings. Food science plays an important role in the study of food.

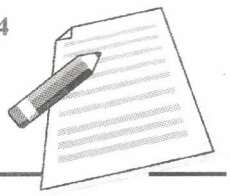
Food science is a study concerned with all technical aspects of food, beginning with harvesting, and ending with its cooking and consumption.

In modern life style, use of preserved food is tremendously increased. There is very high demand for the preservation of food. So there is very large scope for carrier in the food preservation. We always use lot of food items in preserved form e.g, milk and milk products, pickles, bakery products like cakes, biscuits, cold drinks, fruit juices etc. We can preserve food for long time by using different methods of the preservation. Let us study some methods of food preservation in this lesson. We must ensure that the quality of nutrients is not affected in the process of preservation.

6.2 OBJECTIVES

After reading this lesson, you will be able to:

1) Understand the importance of the food preservation.
2) Realize the causes of food spoilage.
3) Learn different methods of food preservation.



6.3 PRINCIPLES OF FOOD PRESERVATION

Food preservation means keeping food in such a state that it does not gets spoilt.

> Food is said to be spoilt if there is rotting i.e. bad smell, fermentation like bubbly gas in the food or spongy growth on the food.

In the food, there are millions of microorganisms present. In which some are useful and some are harmful. These microorganisms produces some acids, enzymes as their metabolic products which leads to damage to the food. Insects, rats and birds are also responsible for the food spoilage.

> Basic principle of the food preservation is that keep food safe from agent of spoilage.

Method to prevent food damage:

1. Controlling microorganisms
2. Controlling enzymes
3. Controlling insects, rodents, birds and other physical causes of food deterioration

Preservation of the food helps in necessary shelf life for different food is given below:

1. Perishable foods:

   Not processed and having shelf life less than 60 days. E.g. Meat, vegetables, fruits, milk.

2. Semi-perishable foods:

   Shelf life is between 2 to 6 months as results of the preservation method. E.g. Ice cream, cheese.

3. Shelf-stable foods:

   Shelf life is more than 6 months. E.g. Cereal grains, dehydrated pasta, frozen food, canned food, dehydrated vegetable.

Role of food preservation:

1. Eliminates any potential microbiological harm to the consumer.
2. Maintains quality of food (sensory perceptions).
3. Maintains nutritional value within of food product.

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INTEXT QUESTIONS 6.1

1) What is food science?

2) What is the principle of the food preservation?

3) Match the following;

Food	Shelf life
i. Perishable food	more than 6 month
ii. Shelf stable food	2-6 months
iii. Semi-perishable food	below 2 months

6.4 PRESERVATION METHODS

Thermal processing (Heating)

Application of heat:

- Heat inactivates enzymes.
- Kills microorganisms-most bacteria are killed in the range 82-93°C.

Thermal processing can be done by following methods:

- Blanching-The process of dipping the vegetables in boiling water for a specific period. E.g. Carrot, Cabbage etc.
- Pasteurization-In this method food is heated at very high temperature and then quickly cooled. e.g. Milk, for example.

Removal of heat (Cold processing)

Application of cold processing:

Low temperature decreases the rate of enzymatic, chemical and microbial reactions in food so it slowdowns microbial growth. The storage life of food is extended.

Cold processing can be done by following ways:

- Refrigeration-Food stored in low temperature, about 5°C. E.g. Milk and milk products.
- Freezing- Food store at 0°C e.g. Ice creams.

Control of water content (Drying)

Microorganisms require free water for activity. After removing free water from the food microbial cells multiplication will stop because water is unavailable for biochemical reactions. Hence, shelf life of food gets extended.

Control of water in food can be done by following ways:-

- Physical removal of water from food (dehydration)
- Removal of some of the water from food (concentration)
- Addition of substances that bind water in food, making it unavailable (sugar, salts)

Radiation (Use of microwave)

Application:

- Ionizing radiation inactivates microorganisms in food.
- Treatment with microwave inactivates enzymes in food.
- Ultraviolet rays are used to sterilize air and water used in food processing.

Atmosphere composition

Application:

Removal of oxygen from food inhibits oxygen dependant enzymatic and chemical reactions which inhibits growth of aerobic microorganisms.

This can be done by following ways:-

- Paraffin wax- coated on cheese cube.
- Nitrogen back flushed bags -Oxygen replace by nitrogen in the packs. E.g. Potato chips.
- Canning food (cured meats).

Addition of chemicals (Preservatives)

Additives in the food increase the shelf life of food by controlling the growth of the microorganisms. Preservatives are of 2 classes

1) Natural Preservative- Salt, sugar, lemon juice, spice;

2) Chemical preservatives-Organic and inorganic acids.

Here are some preservatives used for the food preservation:-

1) Salt

How salt work as a preservative? Salt in food changes composition of the food and osmosis starts in the food. Which result in water comes out of the food. And when there is less water less growth of the microorganisms. Salt is used in pickle, Chatni, sauce etc.

2) Sugar

How Sugar prevent food spoilage? Sugar dissolves in the water available in the food and results in less water available for the growth of the organisms.

3) Oils and Spices

This preservative helps to avoid contact of the microorganisms with the food and prevent contact of air with the food, hence no spoilage of the food.

E.g. In pickle oil and spices are used in large quantity.

4) Acids

Lemon juice, vinegar, citric acid etc are used as preservatives. Vinegar is used to preserve onion, tomato ketchup, lemon juice for pickle, citric acid in squashes etc.

INTEXT QUESTIONS 6.2

State true or False:

1) Addition of the spices in the food allows microorganisms grow quickly.

2) Sterilization increases the activity of the microorganisms.

3) In making of the squashes, we make use of any acid for the preservation.

6.5 WHAT YOU HAVE LEARNT

In this lesson we discussed the basic principle of the food preservation, need of preservation and different ways of preservation those are practice generally for increasing shelf life of the food. Henceforth you can identify what methods are to be used for different foods.

6.6 TERMINAL QUESTIONS

1) Write a note on the importance of the food preservation.

2) What is the food preservation of food with the help of preservative with the examples?

3) What is the application of the increasing and decreasing heat of the food?

ANSWER TO INTEXT QUESTIONS

6.1

Match the following:

Perishable food	_____	below 2 months
Semi perishable food	_____	2-6 month
Shelf stable food	_____	more than 6 months

6.2

1) False
2) False
3) True

SUGGESTED ACTIVITY

Find out traditional way of the food preservation in your home. Enlist the 5 ways of preservation with the examples.

7

ENVIRONMENT

7.1 INTRODUCTION

You must have heard about the Ganga Cleaning Project, Why do you think it became necessary to clean a river as lovely and pure as the Ganga? This is because a large number of people use Ganga water for bathing and performing other rituals and because we have also started using Ganga for disposal of a lot of waste products.

If you are living in a big city you must also be familiar with a lot of smoke and dust the air, the peculiar foul smell from rotting garbage, high level of noise from vehicular traffic and so on. Do you know all these cause a lot of problems? How are you affected by them? Can you avoid them? What can you do to avoid them and reduce their harmful effects? In this lesson, let us try to find answers to these and many more similar questions.

7.2 OBJECTIVES

After reading this lesson, you will be able to:

- define the terms pollution and pollutant;
- identify the various types of pollution;
- enumerate the sources, effects and measures for controlling different types of pollution;
- predict the consequences of pollution on living and non-living beings;
- discuss ways of making water safe for drinking;
- explain the meaning of deforestation and its ill effects on all living beings;

- suggest ways to deal with these problem.
- Predict the consequences of pollution on living and non-living beings.

7.3 POLLUTION AND POLLUTANT

These days people are talking a lot about pollution. Ganga water is polluted. Yamuna water is polluted; in fact all rivers are polluted. Air is also polluted because it is mixed with a lot of smoke and fumes. All these factors are making it difficult for us to breathe. You know that smoke is given out by automobiles, factories and the chullahs that people light. The atmosphere and the soil are also not spared. Lot of noise is polluting the atmosphere. Further, industrial, human and animal wasters are polluting the soil.

Can you define the term pollution?

Pollution is the addition of any substance to the environment in excess to what is normally present, thereby making the environment impure.

The substance which causes pollution is known as a *pollutant*. A pollutant is harmful to our health. When you wash clothes or bathe in the river, the dirt, soap, etc., are the pollutants. They make the water durty or unsafe for drinking. Can you give some more examples of pollutants? yes, you are right, dust, dirt, garbage, chemicals and chemical wastes are a few examples of pollutants. Can you say what and how they pollute?

Can you now list various types of pollution?

You are right. We can list four different types of pollution i.e., air pollution, water pollution, soil pollution and noise pollution.

7.4 AIR POLLUTION

You have heard that we should always breath in clear and pure air. You must also be knowing the composition of pure air. Yes, it is as follows:

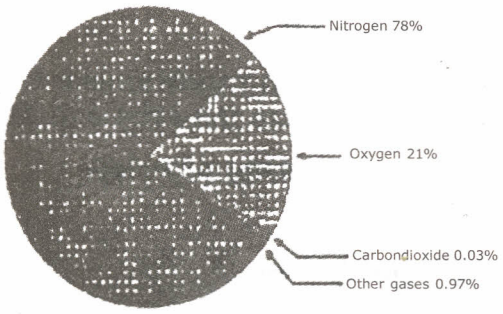


FIG. 7.1

Oxygen is the most important component of air. All living beings are dependent on it for life. Men and animals breathe in oxygen and breathe out carbon di-oxide. During the day, plants take in this carbon-di-oxide and give out oxygen. This helps in maintaining a balance in the composition of oxygen and carbon-di-oxide in the air. If things remain this way there is no problem. But something different is happening today. Most of the time, specially in city areas, the air that we breathe contains various pollutants.

Fig. 7.2

SOURCES

The sources of pollutants in the air are as follows:

(i) Human Sources

Human beings are the main culprits in causing pollution. Their various activities are worth examining because these are major causes of air pollution

(a) Combustion process

Combustion means burning. Smoke from burning may come from:

- Burning of a household fuel;
- Burning of coal in thermal power stations;
- Exhaust from automobiles;
- Bursting of crackers etc.

All these sources produce so much smoke that it is difficult to breathe. The smoke also affects the eyes and causes blindness.

(b) Industrial manufacturing process

- Smoke from factories.

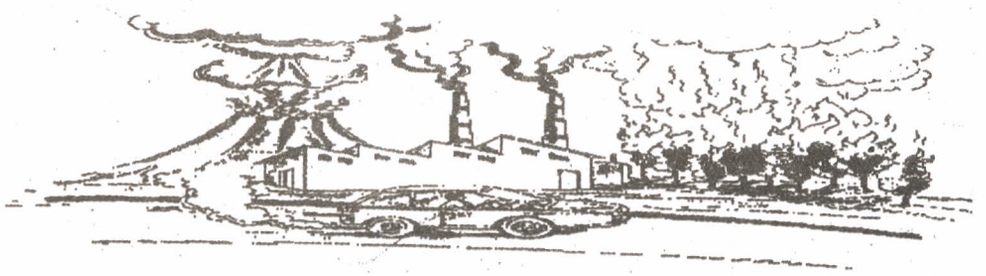
(c) Agricultural operations

- Spraying of insecticides through airplanes spreads the poisonous substance in a large area of the atmosphere.

(d) Use of solvents and spray paints.

(i) Natural sources

Besides human beings there are some natural sources of pollution too. These include the gases emitted from volcanoes, produced during jungle fires, and dust which spreads with the wind.



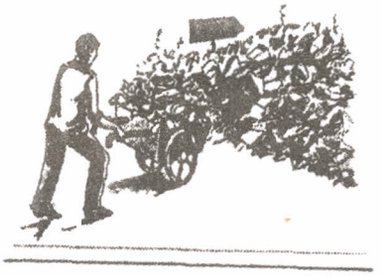
(i) Other sources

a) Have you noticed what happens when too many people called at a public place?

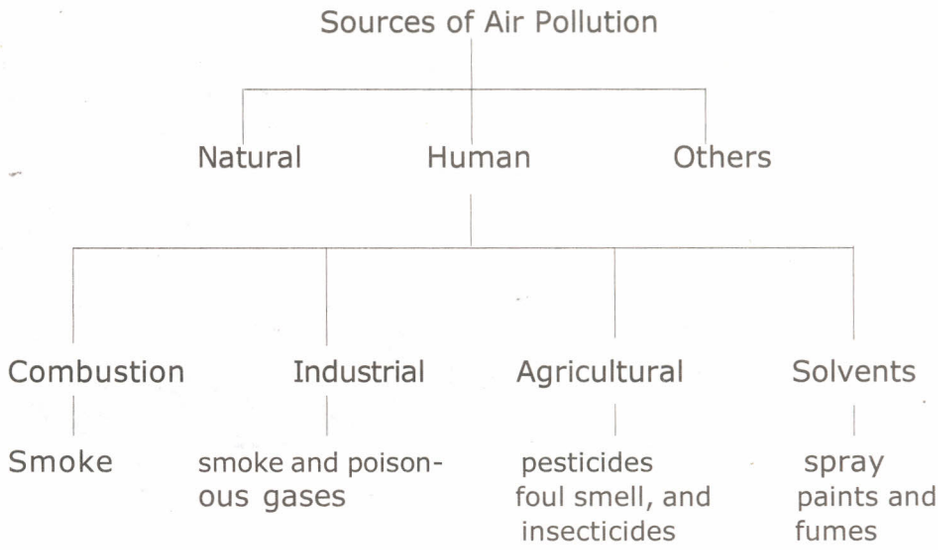
It becomes so stuffy inside that one finds it difficult to breathe. Can you explain why it happens? It is because too many people are breathing out carbon-di- oxide, thereby increasing its content in air and reducing the mount of oxygen. You also know that we need oxygen to breath in, not carbon-di-oxide. The increased concentration of carbon- di- oxide ($C0_2$) in air in a closed space causes the stuffy feeling.

b) Have you also noticed stink coming from rotting garbage, from dirty public urinals and toilets and from the human excreta left in the open? These also destroy the purity and freshness of air.

c) You may have also noticed many trees disappearing because people need them for building houses. When trees are not available the carbon- di-oxide is not taken away from the air and oxygen is not released. This disturbs the balance of oxygen and carbon-di-oxide in air and causes air pollution.



To sum up we can say:



EFFECTS

Let us now see some of the effects of air pollution.

(i) On human beings: The respiratory system of human beings is affected leading to several diseases like bronchitis, asthama, etc. Certain type of skin allergies like rashes and redness are also common.

(ii) On plants: Due to pollution, the plants get less sun light thereby affecting their food manufacturing process. Pollutants are also deposited on their leaves. This causes blocking of pores and restricts respiration.

(iii) On environment:

a) You have heard that aeroplanes semitones could neither take off nor land because of poor visibility. This is not only because of fog but also because of the presence of pollutants like smoke and dust in the air.

b) You have also heard about burning of oil fields during the Gulf war and the smoke produced by the burning of oil. This, you know, has led to a rise in temperature of the surrounding areas which has in turn destroyed vegetation; and spoilt the natural beauty of the surroundings.

Effects of Air Pollution

Human Beings	Plants	Environment
• Diseases of eyes skirt resp. tract allergies	• Decrease in food production	• Poor visibility • Rise in tempera tures • Destruction of vegetation + natural beauty.

Human Beings Plants Environment

Diseases of eyes, skin and respiratory tract allergies

Decrease in food production

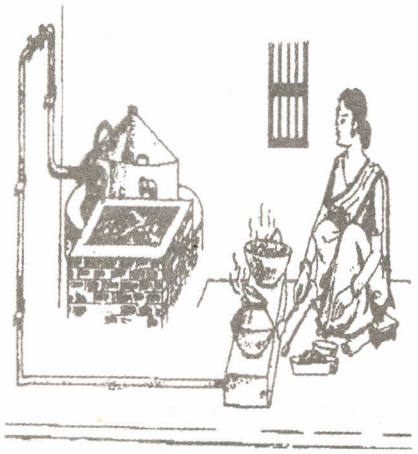
Poor visibility

Temperature rise

CONTROL

How we can control air pollution?

(i) Use a smokeless chullah at Home. Provide a tall chimney to the chullah to carry the smoke away.

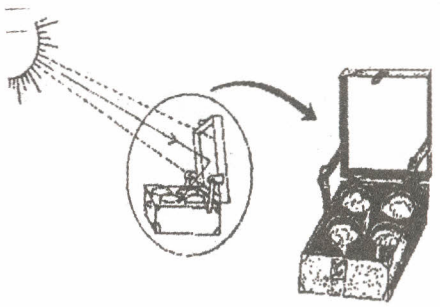


(ii) Use biogas which is a smokeless fuel.

(iii) Use a solar cooker at home which uses heat from the sun-light.

(iv) Factories should have chimneys filters. This will help in trapping the poisonous substances in the gases that are let out by than.

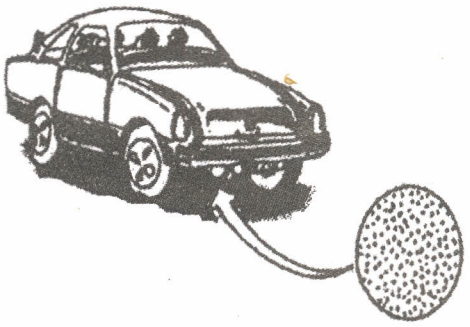
(v) Factories must be located far away from residential areas.



(vi) Vehicles must be fitted with special devices to reduce pollution. .

(vii) Use of unleaded petrol and CNG should be encouraged.

(viii) Garbage should not be burnt. It should be disposed off hygienically, preferably through sanitary landfills.



(ix) Roads must be metalled so that dust does not list and mix with air.

(x) Trees should be planted and cared for, so that these keep the air fresh and pure.

(xi) Crops should be grown in the fields all the year round so that the soil is not exposed to erosion.

INTEXT QUESTIONS 7.1

1. State which of the following statements are true or false. Also correct the false statements.

   (i) Wind reduces the amount of dust particles in the air.

   (ii) Tall chimneys fitted with filters, help to reduce air pollution.

   (iii) Location of factories away from residential areas reduces air pollution in cities.

   (iv) Adding a tall chimney to the chullah decreases air pollution.

2. List five sources and five control measures of air pollution.

7.5 WATER POLLUTION

You receive safe water for drinking from the taps. Do you know why? Before it is sent to your houses it is cleaned and also treated to kill all the germs. Can you list the characteristics of this water? It is water which has no taste, smell, color, dirt or germs. This is why it is called safe water and is suitable for drinking.

But not all water is safe for drinking or even for performing other chores in the house. Unfiltered water from a tap in a public park is muddy and smelly. Sometimes it also has solid particles. Your well/hand pump/pump/river water may also have some or all of these characteristics. You would not like to use this water for drinking, cooking or even for washing your clothes and utensils. This water is polluted.

Polluted water may be coloured, may have suspended particles, a foul smell and a bad taste.

SOURCES

In the beginning of this lesson, we have already stated some of the sources of water pollution. There are more sources of water pollution. Water gets polluted when the following are thrown in it;

(i) **Domestic wasters**: waste water from toilet bath and kitchen is disposed off in a nearby water source (river, lake or pond) and thus the water gets polluted. Very often garbage is also disposed off in this source of water and dead animals and half burnt dead bodies are also thrown in it. All these cause water pollution.

Sources of water are used for bathing animals, washing clothes and washing self after defecation. This also causes water pollution.

i) **Industrial wastes**: Waste and waste water from factories and power plants flows into the rivers, ponds, etc., and causes water pollution.

ii) **Agricultural wastes:** Fertilizers, insecticides, etc., go through the soil to the underground water and cause water pollution.

iii) **Oil pills**: Sometimes oil from oil tankers spills over in the water. This also causes water pollution.

Sources of Water Pollution

Domestic Wastes	Agricultural Wastes	Industrial Waste	Oil spills

EFFECTS

Who gets affected by polluted water? Yes, all those who consume this water, i.e., the human beings, animals and plants. The plants and animals life present in the water such as fish, sea weeds and sea plants also get fleeted by polluted water. Do you remember why? This is because pollution in water causes lesser availability of oxygen to them, They die because they cannot breathe without oxygen.

Drinking unsafe water causes diseases like cholera, typhoid, dysentery, etc. Bathing in polluted water causes skin diseases and allergies.

CONTROL

Can you suggest some remedies for water pollution? Look at the following list.

(i) Make sure that untreated sewage water is not thrown into the sources of water.

(ii) Industries should not be allowed to throw untreated wastes into the river or pond.

(iii) Defecation in open and near the water source should be discouraged. Use proper latrines for defecation.

(iv) Latrines, soakage pits, dumping grounds and land fills should be away form the source of water.

(v) Bathing of self, washing clothes or bathing animals in or near the harvested water sources should be banned. Rain water special ponds/wells should be used for washing clothes and bathing animals.

(vi) Rivers and seas should not be used for disposal of garbage.

(vii) If you are using a well or a pond as your source of water, see that it has a concrete well or parapet and proper pucca or firm flooring around it.

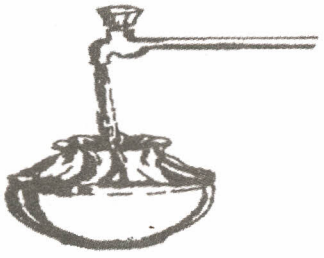
(vii) Water should be stored in clean containers which are kept covered. Use a long handled ladle to take water out from this container. Never dip your hand in the water.

7.6 MAKING WATER SAFE FOR HUMAN CONSUMPTION

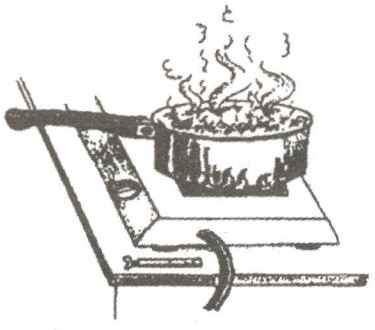
Now you know that not all water is safe for human use- drinking cooking and bathing. The tap water you receive at home is clear. Before it is sent to you it is filtered to remove any solid particles present in it and treated with chemicals to kill all germs.

But, water from ponds, rivers, wells and hand pumps may not be safe for drinking and cooking. It may contain germs and worms which cause diseases. Most of our population lives in villages and many such villages do not get tap water supply. People have to depend on other untreated water sources. This water can be made safe by using the following procedures at home.

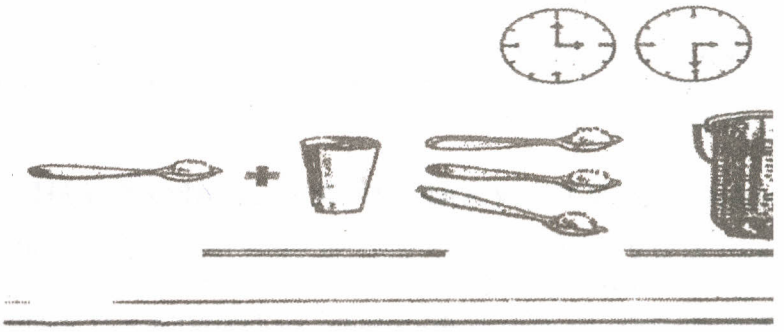
(i) Straining: Before filling, put a clean muslin cloth on the mouth of the pot and let the water filter or strain through it. Rambler, straining helps only in removing solid particles. It cannot do anything to the dm organisms which may be present in the water. Thus, the water may be clean but not safe.



(ii) Boiling: Boiled water is safe to drink. Boiling water vigorously for twenty minutes kills many disease causing germs that it might contain. The boiled water should be cooled, filtered and then stored in clean covered pots.



(iii) **Bleaching**: A big family consumes a lot of water which is generally difficult to boil. You can then use bleaching powder to make your water safe. Bleaching power is available at a chemist shop. How will you use it?



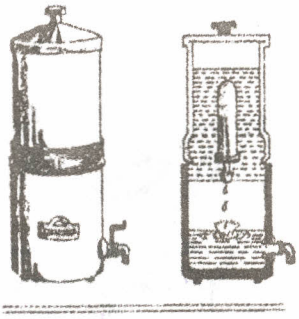
Take fresh bleaching powder and mix one tea spoon in a glass of water. Bleaching powder generates chlorine which helps in killing the germs. Take three tea spoons of this solution and add to a bucket full of water (15-20 liters). Leave it for about half an hour because chlorine requires time to act.

(i) Chlorine tablets/ Chlorine drops: Any one of these can be used to purify water. Find out the quantity to be used when you buy these. The directions about the use of tablets/ drops are also written on the packing. Read them and follow them. Also remember that tablets should be kept dry and out of children's reach. Water should be kept aside for half an hour to allow the tablets /drops to act.

(ii) Filters: Now-a-days many water filters are available in the market which can be used at home for making water safe for human consumption. There are two type's of water filters. These are filters which are directly fitted or connected to the tap and storage type of filters.

Filters which fit or connect on to the tap only remove the solid particles if there are any. The other types strain water and also use charcoal, ultraviolet rays or membrane filters to absorb smells and kill germs.

The storage type filter has two compartments, one fitted on top of the other. The upper receives unfiltered water and the filtered water flows to the lower compartment where it is stored. There



are ceramic candles fitted at the base of the upper compartment which retains any unnecessary ingredients present in the water. Clear water gradually trickles down into the lower compartment, where it is stored. These days special one liter bottles with filters attached at the mouth are sold in the market. These bottles can be carried everywhere to get clean drinking water.

Methods of Water purification

(i) Straining, (ii) Boiling (iii) Bleaching (iv) Chlorinating (v) Filtering

7.7 CONSERVING RAIN WATER - WATER HARVESTING

You are well aware that drinking water in most homes is supplied through water pipes connected to water treatment plants located near rivers, canals or large reservoirs. Due to excessive pollution of these water sources their water is neither safe nor sufficient for drinking. Many homes are dependent on wells, hand pumps, or small ponds, for their drinking water supply. Most of these sources are now becoming dry.

Rain water can be collected and stored in underground or roof top storage tanks to be used in times of scarcity. A part of it can be allowed to percolate into the ground to raise the level of underground water. This process of collecting rain water and conserving it is called rain water harvesting.

INTEXT QUESTIONS 7.2

1. List five sources and five control measures of water pollution.

2. Choose the most appropriate alternative:

   i) Water is safe for human consumption only when it is free of

   A. floating substances

   B. unwanted smells

   C. microorganisms.

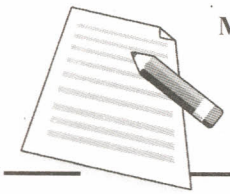
   D. all the above

   ii) Washing clothes near a water source is harmful because the dirt and soap released

   A. flow into the water.

   B. are absorbed by the soil to reach sub-soil water

   C. are left behind to create slush



D. are responsible for doing all the above.

iii) Bleaching powder helps in clearing the water by acting on

A. floating particles

B. foul smells

C. germs.

D. Mud.

iv) In the process of boiling

A. floating particle settle down

B. foul smells escape

C. colour disappears

D. germs get killed.

v) The method of straining water is help full in removing

A. floating particles

B. foul smell

C. germs

D. all the above.

vi) Defecation in open should be discouraged because the excreta

B. smells and spoils the environment

C. flows back into water during rains

D. is absorbed by the soil

E. is eaten up by dogs.

vii) The amount of bleaching powder for purifying water should be

A. 1 teaspoon in a glass.

B. 1 teaspoon, in a bucket

C. 1 teaspoon in a glass and 3 tea spoons of this in a bucket.

D. 1 teaspoon in a bucket and 3 teaspoons of this in a glass.

viii) After adding chlorine water should be left for

A. 5 minutes.

B. 10 minutes.

C. 1/2 hour

D. one day.

7.8 SOIL POLLUTION

Soil pollution can be defined as changes in physical, chemical and biological nature of soil to the extent that is has a harmful effect on

humans and other living beings. Soil becomes polluted when wastes from factories in the form of chemicals and metals are thrown on it. These poisonous substances in the soil enter the plants that arc growing there. It enters the human and/or animal system when we eat it.

SOURCES

Following are some of the sources of soil pollution

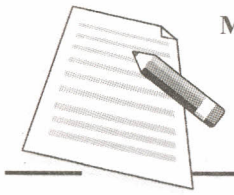
(i) **Domestic wastes:** When household garbage is left on soil it rots and becomes a breeding ground for insects, worms and germs. There may be disease gems already present in the garbage. Defecation in the open is a common practice in India. When people defecate and urinate on the soil dirt, germs and wol-111s are generated. When we walk barefoot on this soil these germs and worms enter our system causing stomach disorders. They enter into animal and plant system also, thus infesting all living beings. This way they enter into the food chain and further, into the human body.

(ii) **Defecation in the open:** Defecating and urinating in the open is a common practice in India. You can see people urinating on the roadside at all times. Early morning people are seen defecating in the fields or in open spaces. These spots are stinking and filthy. The urine and excreta may contain germs and worms which enter the soil and pollute it. If it rains, the dirt flows into the nearby source of water.

(iii) **Spitting**: We have yet another bad habit of spitting anywhere and everywhere. The sputum not only spoils the surroundings but may carry disease germs. It may dry up and disappear but the germs remain and pollute the soil.

(iv) **Industrial wastes**: Soil becomes polluted when waste from factories is thrown on it. These poisonous chemicals in the soil enter the plants and poison them or kill them. Infect, some chemicals can make the soil totally infertile.

(v) **Agricultural wastes**: If insecticides, pesticides and fertilizers are added in excess then they enter the plants or stick to the



Sources of Soil Pollution

Domestic Waste	Defeacation, Urination and spitting in the open	Industrial wastes Agricultural wastes

surface of the growing fruits and vegetables. These chemicals can enter your system and make you sick.

EFFECTS

Improper disposal of domestic waste, defecating, urinating and spitting in the open are all sources of spread of disease germs and worms into the soil. As mentioned earlier, when we walk barefoot on the soil, these germs enter our body and eventually making us sick. Very often industrial and agricultural wasters leave harmful chemicals in the soil. Plants and vegetables that are grown on such soils absorb these chemicals. Animals and human beings who consume these plants may fall ill.

CONTROL

Can you suggest some Measures to control soil pollution? Some of the menthols are as follows:

(i) **Proper disposal of garbage**: Garbage from homes should be properly disposed off so that it does not allow flies mosquitoes and cockroaches to breed. At home, it must be collected in a bin which should be kept covered.

(a) **Dump outside the limits**: If dumping household waste is done in pits which are covered with twigs and plants, the flies and mosquitoes can not breed on it. After the pit is full, cover it with soil and let the garbage be buried.

(b) **Land often,** Quite often, specially in big cities, the garbage collected is so much that small pits are no answer. Low lying areas outside the city limits. And away from the source of water are selected and garbage is dumped there every day. It produces foul smells and attracts birds, animals and insects. But since it is outside the city it does not affect the people so much except when they pass the ugly site and get the foul smell.

(c) **Composting:** The garbage from gardens is put into, a pit in one corner of the garden. At the -end of each day, it is covered with ash and leaves, Gradually the lower layers are converted into compost or manure. This manure can be used for gardening.

d) **Burning of refuse**: You all must have seen gardeners burning leaves and - grass which they have removed from gardens. Burning is a good way of getting rid of refuse because the quantity is reduced and germs, etc., do not get an opportunity to breed. But burning can produce a lot of smoke which causes air pollution.

e) **Incineration**: The latest technology in garbage disposal is the use of an incinerator. An incinerator is a furnace in which the rubbish is burnt. This is an expensive method became a lot of fuel is required to bum the rubbish. However, it is sterile and safe. The garbage is reduced to relatively small heap of ash.

Garbage disposal is a very serious problem for us these days. With crease in population the mount of water we produce is tremendous. The problem is accute due to yet another reason. With development in technology we have devised many new ways of packaging a product. It helps attracting customers, but produces a lot of garbage which has substances that are difficult to dispose of, e.g., plastics, tins, etc. Plastics can be recycled to produce plastic bags again. Hence, rag pickers visit the garbage collection sites and pick up the plastic bags used to throw away the garbage. Thus the garbage spreads and creates more dirt in the surroundings.

No one method of garbage disposal mentioned above is satisfactory. Each one has its own merits and demerits. A lot of research is going on all over the world to find the most suitable methods of disposing garbage of ail types. Till then we will have to be content with whatever technology is available and what ever we can afford. But a lot can be achieved in keeping our surroundings clean if we educate ourselves and our neighborhood about the proper disposal of garbage from our homes and our neighborhood. We must resolve that hence forth we will:

- throw our garbage not at the comer of the street but in the groper place;
- wrap it in a paper bag or a newspaper and throw.

(ii) Use of sanitary latrines: In order to avoid soil pollution due to urine and faeces people should be encouraged to use urinals and toilets. The Municipal Corporation in every city has built toilets for public use: People should also be encouraged to build and use simple sanitary latrines in their houses. An international agency 'Sulabh Sauchalaya' is constantly working to popularise sanitary latrines. They have a simple and inexpensive technique to build such toilets. You have already studied about it in lesson

(iii) Use spittoons for spitting: Educate people to use spittons.

(iv) Reuse and Recylce waste: Reuse empty tins, cans Ad bottles. Do not throw them in the garbage as far as possible. This will reduce the garbage a bit. We must try to recycle everything that can be recycled. For example old newspapers can be re-

cycled to produce fresh paper, papier mache products, paper bags, etc., old glass bottles, plastics, can be melted to prepare new glass products. Plastics can be recycled to form bags and other useful products. Therefore, you must remember to reduce the use of non-biodegradable product and try and reuse as many as possible. Further, wherever possible we should recycle these products and put them back in use.

(v) Limited use of insecticides/fertilizes: Insecticides are used to control the spread of insects which damage crops and harm us. Fertilizers are used to increase the yield of crops grown in the fields. Both are chemical substances. These are useful and harmless to human beings when they are used in controlled quantities. Excessive use of these leads to their deposition on the soil surface and hence causes pollution.

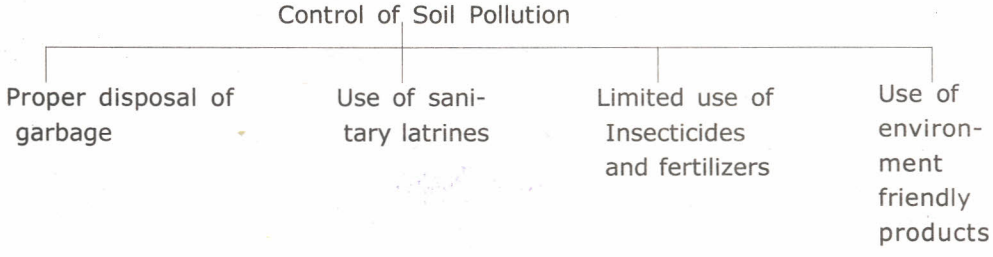
(vi) Use of environment friendly products: Do you remember ding in the newspaper that somebody threw a polybag containing garbage into the sewer? he sewer was blocked so badly that the municipality had to dig up the whole sewer line in order to correct the problem. It happened because the bag containing garbage did not decompose. The bag full of garbage and water was too big to pass through the sewer line, hence the blockage.

Plastic packaging materials have created yet another problem. If these are thrown away without thought they can be there fo months, spoiling the environment (because they do not decompose). They do not bum easily and if they do, they gases that are toxic. Thus, they become another source of air pollution.

Paper and cloth bags (cotton and jute) are made up of substances which decompose and disappear in the oil. Such products are called **environment friendly** and should be used more and more.

> Products like plastic bags do not degenerate and decompose when discarded. They add to the problem of soil pollution. We should avoid using them as far as possible.

Just as there are marks of standardization of quality for different products i.e., ISI, Agmark, FPO, Wool mark etc., a standardization mark for ecologically friendly products has been recently introduced. It is known as the ECOMARK. This mark is given to all products which are bio-degradable.



7.9 DEFORESTATION

You may be aware that there are many benefits that we derive from the trees and plants growing in our forests.

You only have to look around to realize what these benefits are. Even the chair that you are stetting on and the bed that you sleep. on are made from wood that we get from trees.

- Plants and trees also give us many other things like food, medicines, rubber, glue and paper.
- Forests provide fodder for our cattle and. home for wild animals and birds.
- Forests give us rain and at the same time prevent floods.
- The roots of the trees hold the soil together so that it is not easily carried away by wind or rain water. This keeps the minerals salts of the soil intact and thus the soil does not lose its fertility.
- Also, as you know, plants and trees use the carbon dioxide in the air and produce oxygen. This goes a long way in reducing air pollution.

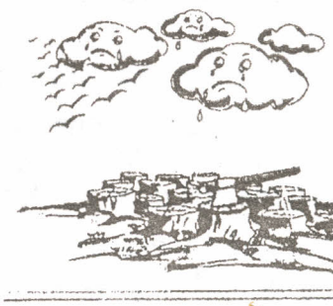
And yet, not realising the long term benefits of forests, man, for its own selfish reasons, cuts trees.

Cutting of trees or forests is called deforestation.

To meet the demand of wood, trees are being cut on a large scale. As result, the land which was once a forest becomes bare and deserted. What would happen if this trend continues? Can you list some of the harmful consequences? Yes, the results of deforestation are

- Damage to wild life who live in forests
- Increased air pollution
- soil erosion; washing away of the top fertile layer of soil
- drought and floods.

As you can see, the long term effects of deforestation are disastrous. And once the disaster sets in, it would be too late for any remedial action. So what should we do?



PLANTING TREES- AFORESTATION

The demand for wood and other plant products is so great that if indiscriminate deforestation continues at the present rate, the trees will vanish soon.

Unless all of us join to solve this prob1em at a fast pace, it may be too late.

1. The remedy for deforestation is aforestation or growing more forests, and reforestation or growing trees where forests have been cut.

Plant trees, rather than cutting them.

2. If a tree has to be cut, then only the top branches should be removed arid not the base of the trunk. This way the trees db not die but regrow when the season is favourable.
3. Try and prevent forest fires by not lighting a fire near dried and fallen leaves or tree trunks.

Our government has Forest Departments which look after the forests. They prevent forest fires, supervise grazing of animals so that no area is over-grazed, implement the law against cutting trees and take other suitable measures to protect the forests: They also provide facilities to people for growing more trees and make available seeds and saplings that grow faster and have resistance to diseases.

But what can we do to keep our surroundings green?

1. 'Each one plant one': Let each of us plant at least one tree near our house and take care of it.

2. 'Each one care one': If there are any plants or trees near our house which are drying, take charge, water them regularly and save them.
3. Do not allow anyone to cut or damage a tree. Now there is a law against cutting trees. People can be prosecuted.

If possible, make a 'green belt' in your neighborhood, by planting a large number of trees and looking after them Help can be taken form the local authorities in this regard.

INTEXT QUESTIONS 7.3

1. List five sources and five control measures of soil pollution.

2. List five methods of garbage disposal.

3. Tick mark (✓) the right answer:

(i) Soil pollution is not caused by :

a) rain
b) defecation
c) waste water from kitchen
d) fertilizers.

(ii) Chemical pollution of soil is the result of:

a) throwing garbage in the pits
b) burning garbage
c) throwing industrial waste
d) spitting

(iii) Use following items because they are environment friendly:

a) cloth
b) paper
c) leaf
d) plastic

(iv) rotting garbage causes pollution because:

a) it attracts birds and animals

b) it causes foul smell

c) it becomes a breeding ground for mosquitoes, flies and microbes.

d) It is absorbed in the soil

4. Tick mark () the statements which are true, and correct the false ones.

(i) Plants and trees use the oxygen in the air and produce carbon dioxide.

(ii) The roots of trees prevent soil from being carried away by wind or water.

(iii) Aforestation leads to droughts and floods.

(iv) We should plant and protect trees.

(v) Mass media should be used to encourage deforestation.

7.10 NOISE POLLUTION

You will agree that some sounds are pleasant wile others are not. You enjoy listening to music and your fiend's chit-chat but the running of machines, the roar of loudspeaker moving traffic make sounds which are loud and unpleasant. You know that noise is any unpleasant sound.

SOURCES

Look around you identify the sources of noise pollution. Some of them ale, the noise from:

(i) automobiles, trains and aeroplanes

(ii) loudspeakers, radio and television when played at full volume.

(iii) Industries and machines.

EFFECTS

What happens when you hear loud noises for a long period of time? Yes, they tend to disturb us, strain our nerves, cause headaches and mental disturbance. They are also affect the hearing ability of an individual. You must have noticed that quite often factory workers, pilots, drivers, etc., who are exposed to loud noise continuously, gradually loose the ability to hear soft sounds properly. Their eardrums get damaged, sometimes to the extent of deafness.

CONTROL

It is impossible to get rid of all noises completely, but we can definitely reduce them. Following are some of the suggestions for reducing noise pollution:

- Playing the radio and TV at low volume.
- Avoiding the use of loudspeakers. .
- Taking in low tones.
- Using the horn only when absolutely necessary,
- Fitting silencers to the engine of vehicles.
- Building factories away from residential areas.
- Building airports far away from city limits.

INTEXT QUESTIONS 7.4

1. From the following, select and tick mark the situations which lead to noise pollution:

   (i) Blowing horns on the roads.

   (ii) Loud speakers playing wedding songs.

   (iii) Talking to a friend

   (iv) Arrival of a train on the platform

   (v) A motor bike going at a fast speed

   (vi) Playing soft music in a room

   (vii) Bursting of fire crackers

   (viii) Running a grinding machine

   (ix) An aeroplane taking off at the airport.

2. Describe the effect of loud music on a school student studying for her final examination.

_____

_____

_____

You have learnt about different types of pollution and their harm full effect on all living beings. You have also learnt about some measures to control the different types of pollution. We hop that by exposing you to this information we have to reduce the fact that the control of pollution is completely in our hands. We have to reduce the production of smoke by using fuels that are smoke free, by keeping our vehicles in perfect order so that they do not emit smoke, by putting tall chimneys in our industry for smoke to go up in the sky and so on. These little efforts of

ours will save people from going blind and suffering from diseases of respiratory tract: It is for us to see that we reduce noise pollution to a minimum and thus save people from becoming deaf or mentally unstable. We alone can enforce stringent laws to avoid water pollution and thus save young, innocent children from dying from diarrhoea and dehydration; save adults from the trouble and pain of suffering from stomach upsets and hepatitis.

Our world is beautiful. We must enjoy living here. We must not spoil the natural beauty by our foolish acts of defecation and urinating everywhere, felling trees indiscriminately an tittering it with materials and products which are not environment friendly.

Let us pass a resolution and make a promise to ourselves henceforth. I promise to do the following:

- Plant trees and take care of them;
- Not let people cut trees;
- Use smokeless fuel in my kitchen;
- Use sanitary latrine to urinate and defecate:
- Protect water source from pollution;
- Not waste purified water;
- Play radio/TV at low volume;
- Keep my vehicle pollution free.

What will you add to this resolution and why?

Before we stop, we want to bring to your notice yet another thing. Allowing another person to spoil the environment as bad as doing it ourselves. We must protest when we see other spoiling the environment and thus help in its protection. People may do things dirty the the surroundings out of ignorance, habit or carelessness. Whatever is the reason, as a citizen of this country it is our duty to be vigilant and stop people from:doing things which are harmful to our environment. This can be done by educating, reminding or by punishing the offerners.

7.11 WHAT YOU HAVE LEARNT

In order to make it convenient for you to remember her are the main points of the lesson.

POLLUTION

AIR	WATER	SOIL
• Human	• Domestic waste	• Domestic waste
• Combustion	• Industrial waste	• Municiple wastes
• Industrial manufacturing process	• Agricultural waste	• Industrial wastes
• Agricultural operations	• Oil spills	• Agricultural wastes.
• Human activity		

PREVENTIVE MEASURES

- Filters fitted in chimneys of factories
- Factories away from houses
- Hygienic disposal of garbage
- Use of sanitary latrines
- Factory waste and sewage to be treated before disposal
- Promotion of rain water harvesting
- Filtering water for drinking purposes.
- Fertilisers and insecticides used discriminately
- Use of dilencers.

7.12 TERMINAL QUESTIONS

1. Define the terms pollution and pollutant.
2. What are the sources of air pollution?
3. How can water be made safe for drinking at home?
4. How can you control soil pollution?
5. What are the effects of noise pollution?
6. Mention two pollutants which pollute both soil and water.
7. How can you reduce pollution caused by smoke in your neighborhood?

7.13 ANSWERS TO INTEXT QUESTIONS

7.1.1

(i) False- Wind increases the amount of dust particles in the air.

(ii) True

(iii) False-Factories should be located away from cities.

(iv) True

(v) True

1. Refer text.

2. (i) c (ii) b (iii) b

7.2

1. Refer text

2. (i) d (ii) d (iii) c (iv) d

(i) a (ii) a (iii) c (iv) c.

7.3

1. Refer text.

1. Refer text.

2. (i) a (ii) c (iii) b (iv) d

3. (i) F. Deforestation leads to droughts and floods.

(ii) T.

(iii) F. Deforestation leads to droughts and floods.

(iv) F. Mass media should be made use of to discourage deforestation.

(i) (ii) (iii) (iv) (v) (vi) (vii) (viii) (ix) (x)

8

KNITTING

8.1 INTRODUCTION

Knit is a very favorite technique for making many patterns for sweater etc. because of possibility of the making patterns as per desire and colour patterns.

The two basic stitches — knit and purl — can be worked alone or together and form many other stitches. Knitting requires two needles and a continuous strand of yarn.

8.2 OBJECTIVES

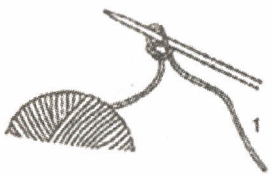
After reading this lesson, you will be able to learn:

- Know about Knitting needles.
- Requirements of knit stich.
- Understand the method of purl stitch.

8.3 KNITTING NEEDLES

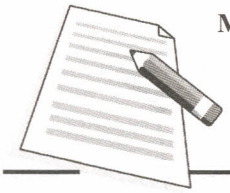
Knitting needles which are made up of aluminum, wood or bamboo are mostly commonly used. There is point at one end of the needle and a knob at other end which prevents stitches from slipping.

Stitch patterns can do by combining knit and purl stitches. By using this it is possible to make more than 100 patterns.



8.4 KNIT STITCH

Requirements: yarn of any colour, size 8 needle, small scissors Procedure:



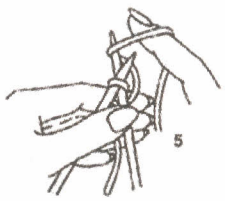
1) Make a slip knot on the shaft of one needle. This is first stitch.

2) Place this needle in left hand. Hold other needle in right hand to control the yarn. Insert point of right needle, from front to back, into the slip

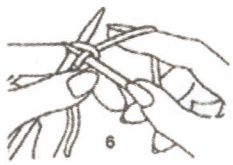
knot and under the left needle.

3) Hold left needle still in left hand, and move left fingers over to brace right needle.

4) With right index finger, pick up the yarn from the yarn ball.



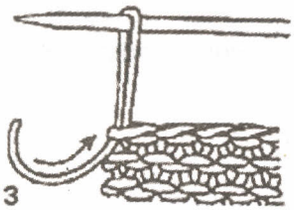
5) Release right hand's grip on the needle, and use index finger to bring yarn under.



6) Return right fingers to right needle, and draw yarn through stitch with point of right needle.

7) Slide point of left needle into back of new stitch, then remove right needle.

8) Pull ball yarn gently to make the stitch fit snuggly on needle. You have now made one stitch (called casting on), and there are two stitches on left needle.



9) Insert point of right needle, from front to back, into stitch just made, and under left needle. Repeat Steps 5 through 9, 26 more times, until you have 28 stitches on the left needle.

10) Now measure your work. To complete the block, now bind off all the stitches.

RESULT

Now pattern of garter stitch is ready.

PURL STITCH

Requirements: yarn of any colour, size 8 needle, small scissors.

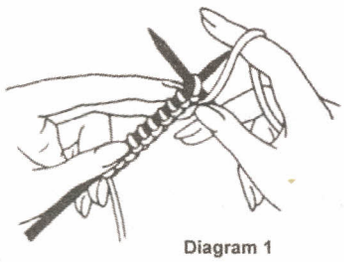


Diagram 1

A purl stitch looks just like the back of a knit stitch. If you purl every row, you get a texture, which is exactly like a knitted garter stitch.

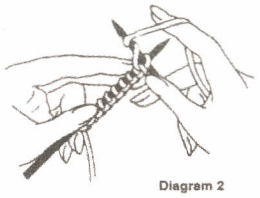


Diagram 2

Procedure:

1) Insert the needle into the front of the stitch from right to left.

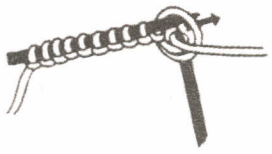


Diagram 3

2) Wrap the yarn around the right needle. The yarn will still be at the front of your work.

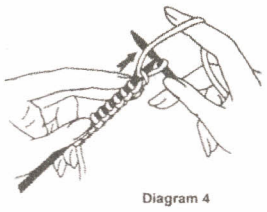


Diagram 4

3) Slide the right needle down, and then bring the tip from front to back through the stitch, bringing the yarn with it.

4) Slip the old stitch off the left needle. You now have a new stitch on the right needle. Notice that at the beginning and end of each stitch, the yarn is at the front of your work.

5) Now purl stitch is complete.

RESULT

By using the Knit stitch and purl stitch you can make any pattern of your desire.

Note: There are many more type of stitches which you can attempt with the help pf expert.

9

HOUSING

9.1 INTRODUCTION

House is one of the basic needs of human beings. All of us live in a house. There are many types of houses. Your relatives may be living in a small hut in the village. Your friend, Radha may be having a flat and another friend Sita may be staying in a bunglow in a city.

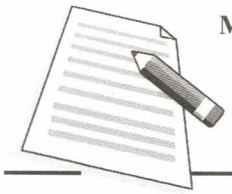
You can get the house constructed yourself or you can purchase a readymade house and if you cannot afford this you may stay in a rented house.

What are the points one must keep in mind while selecting a house? How best can you utilise space in the house? What tips are to be followed while decorating it? You will find answers to these and some other questions in this lesson.

9.2 OBJECTIVES

After reading this lesson, you will be able to:

- state the functions of a 'Home';
- suggest ways of providing adequate lighting and ventilation in the home;
- relate the effect of poor lighting and ventilation to ill health,
- identify ways of the maintaining sanitary conditions around the home;
- organise safe disposal of waste at home;



- clean ad maintain various surfaces in your home;
- organise work areas effectively and aesthetically.

9.3 FUNCTIONS OF A HOME

In general terms, the words 'Home' and 'House' are used inter-changeable. But there is a difference.

A 'House' is basically the physical construction made of brick, sand, cement, etc.

BUT

A 'HOUSE' becomes 'HOME' when all the family members start living there with love and affection.

Thus, home is a very important place for all of us. It will, therefore, not very difficult to list the functions of a home. These are:

1. **Protective** - Home gives us protection from outside heat and cold, sun, wind, rain, etc. It also gives protection to small children and old people who need special care.
2. **Economic** - your home facilitates income generating activities like pickle or papad making or any other similar activity. Families also save money by staying together and sharing everything available. The money thus saved can be more effectively utilized elsewhere.
3. **Religious** - A home provides a place for a number of religious activities. You celebrate various festivals while staying in a home.

4. **Educative** - A home is the centre of family life. A Child's basic education starts from the home, which helps in the development of personality.

5. **Social** - A home facilitates meeting with other people and promotes social interaction,

6. **Affectional** - Home is a place where all family members stay together with love and affection.

7. **Status-giving** - You enjoy a particular status in the society if you are staying in a home.

INTEXT QUESTIONS 9.1

Match the functions of a home in columns A with the activities given in Column B. (More than one answer may match):

A	B
a) Economics function	i) protection from rain
b) Educative	ii) envelop making
c) Protective	iii) celebrating Id
d) Religious	iv) inculcation of values in children
e) Social	v) settling a marriage
	vi) care of grand parents
	vii) friends preparing for an examination, at home.

9.4 HOME ENVIRONMENT

Observe the following aspects of your home:

- Does it get proper sunlight?
- Is it well ventilated?
- Is it kept clean, both in and around?
- Is it exposed to loud noise'?

Your surroundings play an important role in maintenance of good health. Your immediate surrounding is your 'home'. If your home environment is not suitable, you will not be healthy. Let us see how you can maintain a suitable environment in and around your home.

(i) Lighting

Lighting can be of two types:

(a) natural light

(b) artificial light

Natural light is the light that we receive from natural sources i.e. the sun.

When we use artificial means such as bulbs and tubes to produce light, it is known as artificial light.

EFFECT OF POOR LIGHTING ON HEALTH

When you check the lighting in your home, you must make sure that most of the rooms get some sunlight during the day. Can you say why?

You are right, sunlight acts as a mild disinfectant, i.e., it kills germs and keeps the place healthy. It also heats up the rooms and thus removes dampness from the home.

Sunlight is important for all the rooms but more specially for kitchen and bathrooms where water is mostly used. If sunlight does not enter into these areas they will remain dark and damp. It will encourage the entry of mosquitoes and cockroaches. It is not very hygienic to stay in such a house.

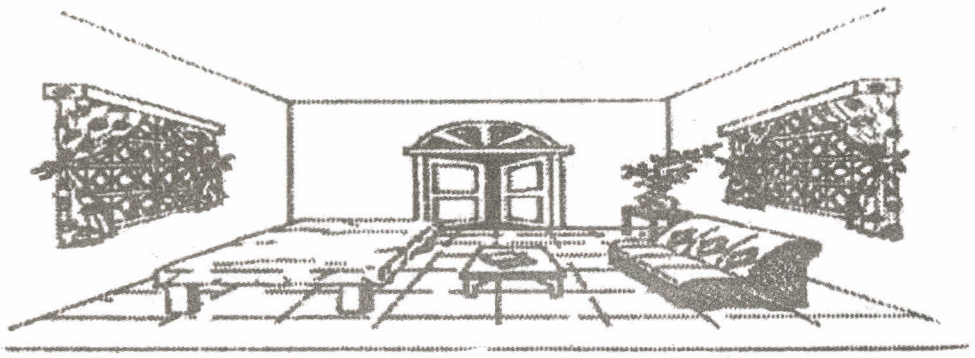
When artificial light has to be used, make sure that it is not too strong and that it falls on the work that you are doing and not on your eyes. Light falling directly on your eyes and will make them ache and water. You should be very careful that for studying there should be proper lighting. Otherwise, your eyes will soon be tired.

(ii) Ventilation

You know that fresh air is essential for healthy living. This is the reason why we must ensure that the house that we live in has proper ventilation.

> Ventilation means making arrangements for fresh air to circulate.

Circulation of air is necessary because the carbondioxide that we breathe out is removed and the fresh air brings in oxygen for us to breathe in. For this, the windows of the house should be kept open. Even in winters, when it is very cold, at least one window must be kept open so that fresh air can circulate freely. In all those rooms, with no provision of windows, ventilators can help circulation of air.

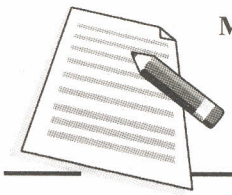


(iii) Noise

Are you affected by the loud horns of passing vehicles on the road near your house? Can you study properly when you brother plays the radio very loudly? Can you sleep when your mother is grinding the masala at home? The answer to all these questions is 'no'. This is because there is some noise disturbing you. But what is 'noise'?

> 'Noise' is unwanted or unpleasant sound.

Why does loud noise disturbs you? Loud noise interferes with your ability to think and work. Exposure to loud noise, as in factories may result in loss of hearing and cause deafness.



(iv) Sanitation

Can you say why it is important to keep our homes and surroundings clean? Because clean surroundings keep insects and diseases away from us. In order to prevent the spread of diseases and to keep our environment healthy, we must observe some do's and don'ts. Let us discuss some of them:

1. Clean the house

The house must be cleaned everyday. We must sweep and mop the house and remove dust and dirt from every nook and corner. The furniture must be wiped and cowebs removed. While mopping, it is better if you use some disinfectant like Phenyl.

> The house should be swept and mopped daily.

2. Remove the garbage

The garbage from the house, dust collected through sweeping, waste material like vegetable peelings from the kitchen, etc., should be put in a covered dust bin. This dust bin should be emptied into a packet everyday and this packet of waste should be disposed off in the public garbage bin, in the street. The packet prevents the garbage from spilling everywhere and acts as an effective and sanitary method of waste disposal.

> The household waste should be disposed off in the public garbage.

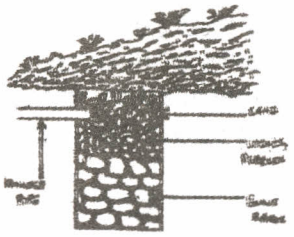
3. Disposal of waste water

There is generally a fair amount of waste water from the house. Waste water from the bathroom, washing place and kitchen should be led by a drainage pipe to a kitchen garden, or preferably, a soakage pit.

Soakage pit

Soakage pits provide a hygienic method of disposal of waste. They are cheap and easy to construct.

A suitable soakage pit is about 2 metres deep, 1 metre wide and long enough to deal with the household waste water. The average length is 2-3 metres. Fill one-third of the pit with coarse stones, preferably overburnt bricks of ¾ size. The middle portion is filled with small stones and pebbles, and the uppermost portion with sand. The soakage pit may be covered with earth and grass.



The waste water from the house is led through a drainage pipe to the soakage pit. The waste gradually percolates and soaks away into the ground from the pit.

Soakage pits should not be constructed near a well. Otherwise, the water in the well may get contaminated.

Waste water from the house should be led into the soakage pit.

4. Disposal of human excreta-sanitary latrines

Hygienic disposal of human faeces and urine is necessary to prevent the spreading of diseases. It is very important that all people should use proper latrines. Otherwise, diseases would spread through:

(i) flies sitting on food

(ii) drinking polluted water

(iii) eating contaminated raw vegetables

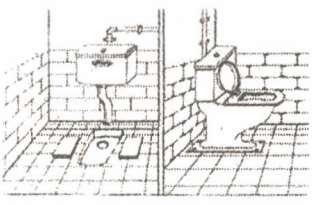
(iv) walking barefoot

The human excreta should be disposed off safely.

Let us look at some of the ways of safe disposal of human excreta.

A. Water closet

In the majority of large towns, human excreta is removed through the water carriage system. In this, along with the household waste water, the faeces and urine are carried away by a flush of water



through a system of drains and sewers. You must have seen the following type of water closets in houses.
water closet is a sanitary installation for reception of the human excreta. It is connected to a sewer through a pipe.

Water closet system is the most sanitary method for removal of human excreta.

However, this system does not work unless there is plenty of water available for the purpose. Also, it is expensive to construct.

As a result, in most of the villages and many of the towns in India, we find that the closets and sewerage system are not there. In such circumstances, the pit latrines or the bore hole latrines may be constructed.

B. Pit latrine

A pit is dug to receive human excreta. The pit should be more than 3 metres deep. This is to prevent flies from sitting on it as flies rarely live in holes as deep as this. The soil should be sandy and allow the liquid portion of the excreta to drain away, otherwise the pit will fill up quickly. Water should be added daily to help the feces to flow down and get decomposed.

There can be a concrete platform around the opening of the hole and raised foot stands. The opening of the hole should be covered with a lid. This will discourage flies attracted by smell and also prevent bad smell from spreading.

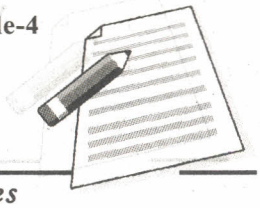
C. Bore hole latrine

A hole, a little less than half a metre in diameter, is dug deep into the ground, generally to a depth of 6-7 metres. The opening of the hole is covered with a concrete slab. A squatting plate is fitted.

When the hole gets filled with excreta, upto a metre from the top, the hole should be filled up with dry earth. The squatting plate which has been removed should be fitted over a freshly dug bore hole.

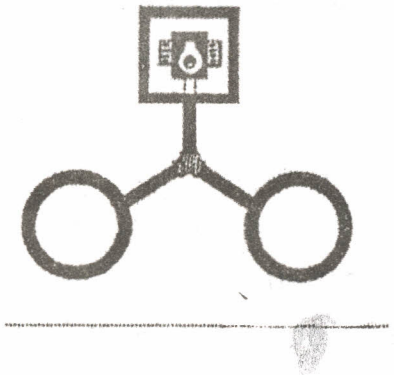
D. Sulabh Shauchalaya

As you all know, sewerage is the ideal solution for the disposal of human and other wastes, but it costs too much. Septic tank is another alternative but that, too, is costly. The latest development in the safe disposal of human excreta is the pourflush latrine with twin pits popularly known as Sulabh Shauchalaya. 1t has been deve1obed by Dr. Bindeshwar Pathak.



Principle of Sulabh Shauchalaya

The Sulabh Shauchalaya consists of a pan with a steep slope, needing only 1.5 to 2 lts of water for flushing. The excreta is carried into leach pits through pipes or covered drains. There are two circular pits constructed about 1m apart. Only one pit is used at a time. When one pit fills up, it is closed and the other pit is used. During a rest period of 2-3 years, the first pit can be cleaned out and is ready for use when the second pit fills up. Thus the two pits can be used alternatively and continuously.



Advantages of Sulabh Shauchalaya:

1. Very hygienic.
2. Low cost and easy to construct with locally available material.
3. Does not pollute surface or ground water.
4. Free from foul smell.
5. Maintenance is easy and low cost.
6. Needs only 1.5 to 2 lts of water for flushing as compared to 13 to 14 lts of water sin a conventional flush toilet.
7. Does not need scavengers for cleaning the pits.
8. The sludge from the pits is a good manure.
9. Vent pipe is not needed as gases are dispersed into the soil.
10. Eliminates mosquito, insect and fly breeding.

Sulabh Shauchalaya believes in restoration of human dignity and prevention of environmental pollution through low cost sanitation.

A housewife plays a very important role in doing so. But she has to work hard to do so. If will be easier if all the family members put in their little bit effort.

GENERAL CLEANING

You must have observed your house being cleaned everyday, but the store is cleaned only weekly or may be monthly. The entire house is thoroughly cleaned only before Diwali or some other major festival or before a marriage. etc, So, we can say, cleaning is – daily, weekly, seasonal.

Let us find out more about this.

DAILY CLEANING:

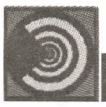
- Sweeping and mopping of floors.
- Dusting surfaces.
- Cleaning carpets durries.
- Making beds in the morning.
- Tidying up the objects in every room.

WEEKLY CLEANING:

- Thorough cleaning of baths, toilets and wash basins.
- Removing cobwebs.
- Cleaning shelves of kitchen.
- Cleaning door handles and other fittings.
- Polishing the wooden surfaces and other areas.
- Cleaning mirrors and pictures.

SPRING OR SEASONAL CLEANING:

- Airing mattresses, cushions, etc, in the sunlight.
- Washing curtains.
- Thoroughly cleaning each room by removing all furniture.
- Cleaning the store room.
- Cleaning the wood work and getting needed repairs done.



INTEXT QUESTIONS 9.3

Tick mark (✓) the most appropriate answer from the four choices given:

(1) Daily cleaning includes:

a) Cleaning before Diwali

b) Sweeping and mopping of floors

c) Cleaning door handles

d) Cleaning the wood work

(2) Weeking cleaning includes:

a) Making beds

b) Dusting

c) Washing curtains

d) Cleaning of toilets and wash basins

(3) Seasonal cleaning includes:

a) airing carpets

b) tidying up every room

c) sweeping and mopping

d) removing cobwebs

9.6 CLEANING DIFFERENT SURFACES

As we have discussed earlier, cleaning the room also involves cleaning of various surfaces like walls, mirrors, pictures, bathroom tiles, toilet floors, plastic mugs and buckets and metal. In order to clean the surface there are a number of materials required, besides using soap-water and disinfectants.

Let us see how various surfaces are cleaned:

1. Floor	Soap, water, broom, a little bit of kerosene oil added to the water makes marble floor sparkle.
2. Ceramic tiles	Soap, vim, water Kitchen and bathroom tiles
3. Plastic	Luke warm soapy solution, scruber. Mug, bucket, chairs, taps Use vinegar to remove stains on plastic articles.
4. Glass/Mirrors	Moist newspaper pad Window glass/mirrors
5. Metal taps	Tamarind/lemon/drymango powder, Brass taps, aluminium/ hot soapy water steel taps

INTEXT QUESTIONS 9.4

1. Name the things needed to clean the following:-

   (i) Floors _____

   (ii) Plastic mug _____

   (iii) Brass taps _____

   (iv) Mirror on dressing table _____

2. How will you make your marble floors sparkle and shiny but not slippery?

   _____

   _____

   _____

3. Name one thing you can use to keep the bucket in your bath-room stain free.

   _____

   _____

   _____

ACTIVITY

Clean at least one article from all the five categories discussed above. Record the procedure followed by you in detail. At the end, ask your mother to evaluate your effort and give as follows –

A - very good

B - satisfactory

C - unsatisfactory

If you get a 'C' grade in any article, repeat the cleaning process till the object becomes clean.

9.7 SPACE ORGANISATION

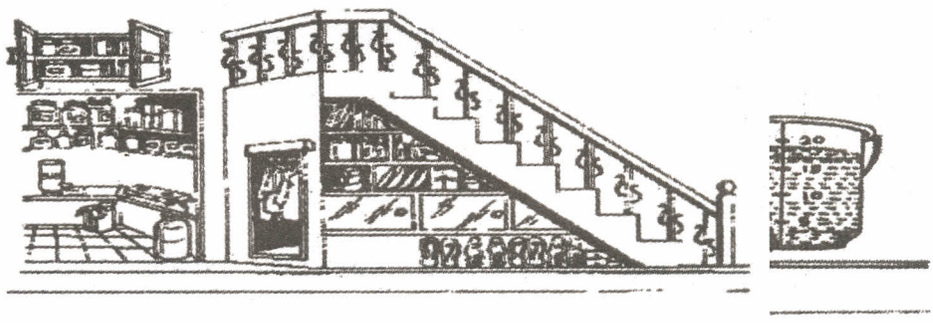
An ideal home is the one that provides space for all the functions of the family. The following activities are performed in a home:-

a) Cooking b) Dining c) Sleeping d) Bathing e) Storing

In big cities, it is not possible for all to afford house with separate space for these activities. Most people live in 'One-room houses'. They have to make the best use of their single room. Do you have any idea how it can be done?

The following points will help you-

- First of all make a list of all the activities taking place in this room.
- Set aside space for every activity
- Try to combine the activities so that they can be carried out in a common area. For example, dining can be done in the living/ drawing room area.
- Take care not to overcrowd the room with too much furniture.
- Try to use multi purpose furniture items like sofa-cum-bed. At night, the sofa can be pulled out and used as a bed for sleeping. The dining table can be used for studying. Two or more trunks can be joined together and converted into a setty. These multi purpose furniture items are available in the market.
- Some pieces of furniture can be used as storage units and room dividers. For example, the drawing room can be partitioned with shelves on either side. Books can be placed on the shelf facing the living room, whereas, crockery, cutlery, spoons, etc., can be stored on the shelves on the dining room side.
- Storage can be provided in the furniture itself like bed with boxes, tables with drawers, etc.
- The space below the staircase can be converted into a store-room or used as a spare toilet.



- The space below the windows, down to the floor can be converted into built-in-cupboards.
- Similarly the area above the windows to the ceiling can be covered and converted into lofts.

By carefully planning the one-room units and following the above tips, family can enjoy a comfortable life.

ACTIVITY

1. Visit two houses of your relatives. Make an observation about the utilisation of space. If space has not been utilized properly, give suggestions for improvement.

9.8 HOME DECORATION

Apart from having well arranged furniture in a room, one also likes to see it tastefully decorated. You can use your creativity in decorating walls, floor, etc. You can use potted plants and flowers and picture to obtain a pleasing effect.

1. Walls

The use of pictures in decorating walls is a very common practice and everyone does it. But, there are a few points you should always keep in mind if, you want the whole effect to be pleasing.

i) Select picture in proportion to size of wall, ie, large picture for a large wall and small ones for a small wall.

ii) Leave sufficient empty space around the picture. This gives it emphasis whereas too many objects around it spoil the beauty.

iii) Hang all pictures with the bottom edges in one line. Irregularly hung pictures look unattractive.

2. FLOWERS AND POTTED PLANTS

Flowers are not very expensive and are always very refreshing, colourful and provide a lot of variety. Similarly, potted plants kept in a room also bring a feeling of freshness as well as add to the beauty of a room.

It is very easy to create beautiful flower arrangements of your choice. Here are some points you must bear in mind while making flower arrangements-

- Choose flowers whose colour does not clash with the colour of walls, curtains, sofa, etc.
- Select the flower vase of appropriate size. For example, a small vase for large flowers or a tall vase for small flowers is not appropriate.
- Place the arrangement where it can be easily seen and appreciated.
- Keep the size of the arrangement according to the place it is meant for. For example, a tall flower arrangement would be suitable for keeping in a corner and a small one would be suitable for keeping on a dining table.

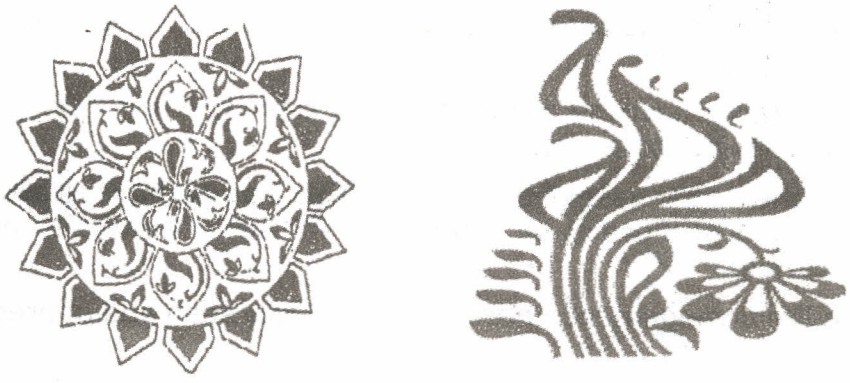
You can use the illustrations given below as a guide for making arrangement for your home or create some of your own.

3. FLOOR DECORATION

Decorating the floors has been an ancient art in our country. It is known by different names in different parts of the county- rangoli, alpana, kolam, etc. Floor decoration is generally done at the entrance, of the house, on steps, in front of the pooja room or as a border of a room. These floor decorations are specially made during festivals like Diwali. Durga Puja, etc.

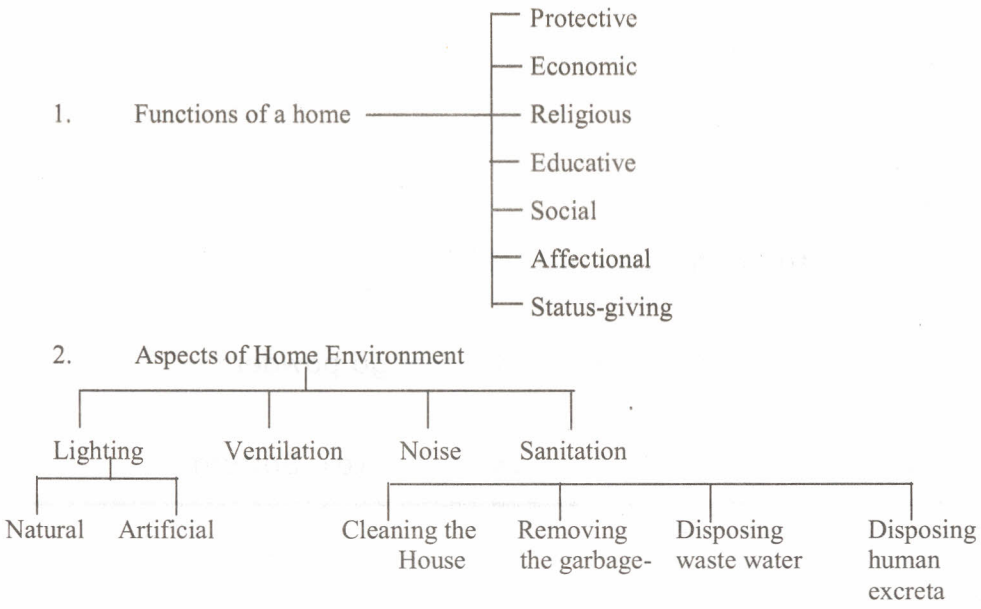
While making the decoration a free hand drawing of the pattern is made by chalk and then filled in using-

- Coloured powder
- Coloured sawdust
- Rice flour
- Fresh flowers petals
- Green leaves



9.9 WHAT YOU HAVE LEARNT

In order to make it easy for you to remember, here are the main points of the lesson:



9.10 TERMINAL QUESTIONS

1. State any five functions performed by your own home.
2. Which function of the home do you think is the most important?
3. Examine your home to see whether there is adequate ventilation. If not, suggest two ways in which ventilation can be improved.
4. What will be the effects poor lighting of your home on your health?
5. How will you clean - kitchen tiles, plastic mug in the bathroom, metal garden chairs in your home?
6. If you are asked to mange the store room in your home, how will you do it?
7. If you are living as a member of a family of five in a one room house, what ways will you adopt to make your home appear spacious and well arranged?

9.11 ANSWER TO INTEXT QUESTIONS

9.1

1. (a) (iii) (b) (i) (c) (iv) (d) (ii) (e) (v)

9.2

1. (a) (iii) (b) (i) (c) (iv)
2. (i) (b) (ii) (a)

9.3

1. (b) 2. (d) 3. (a)

9.4

1. (a) soap, water
   (b) kerosene oil
   (c) soapy solution, scrubber
   (d) Vinegar
   (e) tamarind, lemon or dry mango powder

9.5

1. (a) Size (b) Plain (c) Eye (d) Bottom