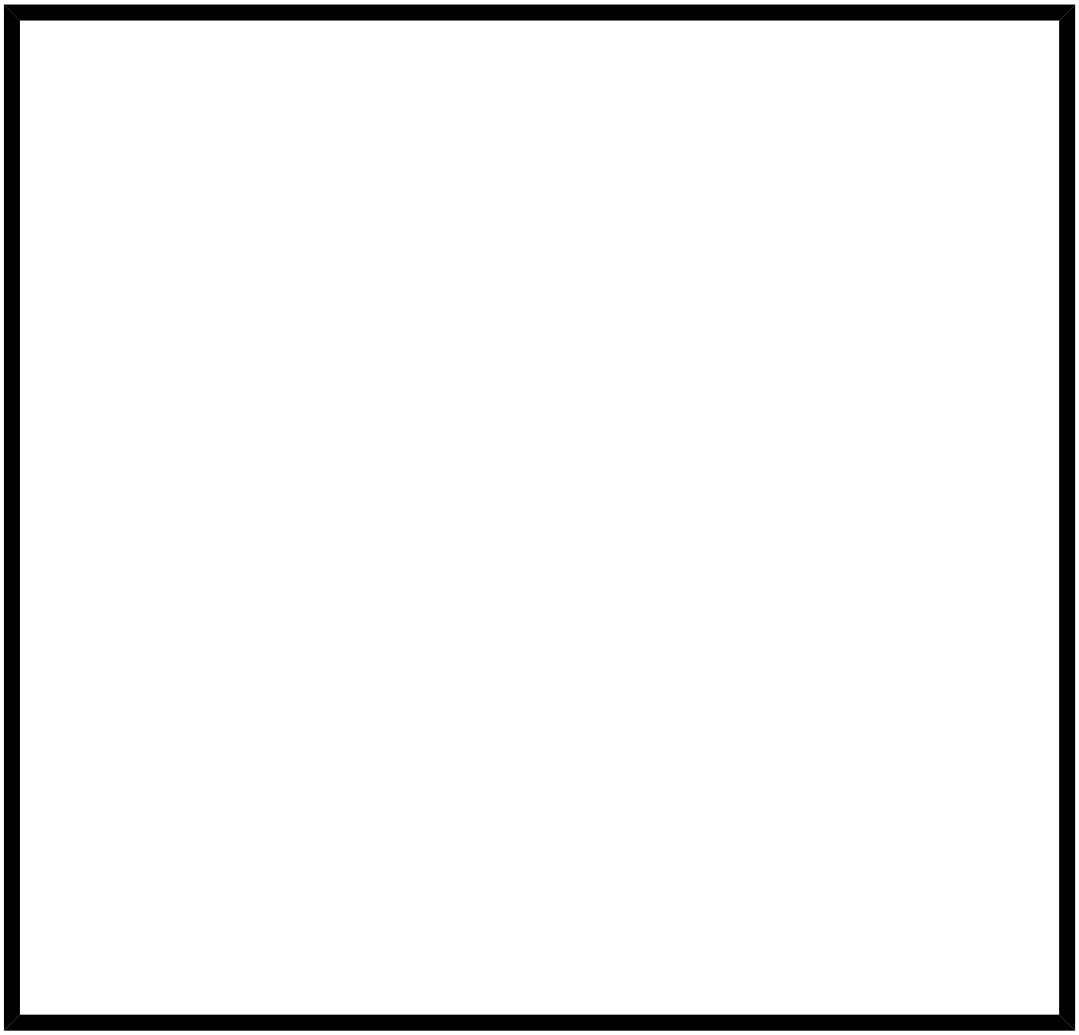
INTGERATED SCIENCE STUDENT TEXT



Grade - 6

INTEGRATED SCIENCE

STUDENT TEXT

Grade 6

Organized by:-

- Zenebe Hailu
- Legesse Ashenafi
- Adeferis Teferi

Edited by:-

- Lewtayehu Legesse
- Ashenafi Jama
- Abdi Jemal

Introduction

The integrated Science grade- 6 text book is designed to help the students to observe their environment carefully. It is a product of a revised curriculum, which has been done in 2000 Ec. The most important components of the environment air, water and earth are treated in accordance with the revised curriculum. There are several number of activities where the students should actively involve in it. This will develop the creativity of the students, and help the young to cope up with the global problem. The young may start this by exercising preliminary experimental works. It will be basic for the future scientific investigation and research works. The units our body, plants and animal are also produced to meet the students' ambition of knowing their environment. Several easy and logical activities are given in those units that can enable to observe the life linkage to man, plants and animals. So, the text helps to produce a competent and creative youngsters.

The Writers

Contents

UNIT -1

AIR

Unit Out comes

After completing this unit, you will be able to:

- Define mixture and air
- Identify and separate mixtures using simple methods.
- Demonstrate the methods of keeping room air clean and describe importance.
- List the causes of air pollution.
- explain the effects, and methods of prevention of air pollution.
- Describe on one hand the benefits of technology- on the other hand its contribution to air Pollution.
- Explain the role of technology to prevent air pollution.
- Understand the causes and symptoms of air borne diseases.
- Give examples of air borne diseases and mention some methods of prevention.
- Discuss the effects of dispersing human waste at wrong places
- Demonstrate scientific enquiry skills
- Develop skills in classifying by comparing and contrasting, asking questions interpreting – illustrations drawing conclusions, applying. Concepts relating cause and effect

1.1 Air as a mixture

Competencies

By the end of this section, you will be able to

- Define mixture as two or more substances
- Describe air as a mixture of several gases.
- Name the two forms of mixtures.
- Identify the two forms of mixtures.
- Separate mixture by using simple methods.

Activty1.1

- Let students tell the teacher different substances say about 20 or 30. Group the class in to three and select out the mixtures. Discuss the grouping made by each group with the class.

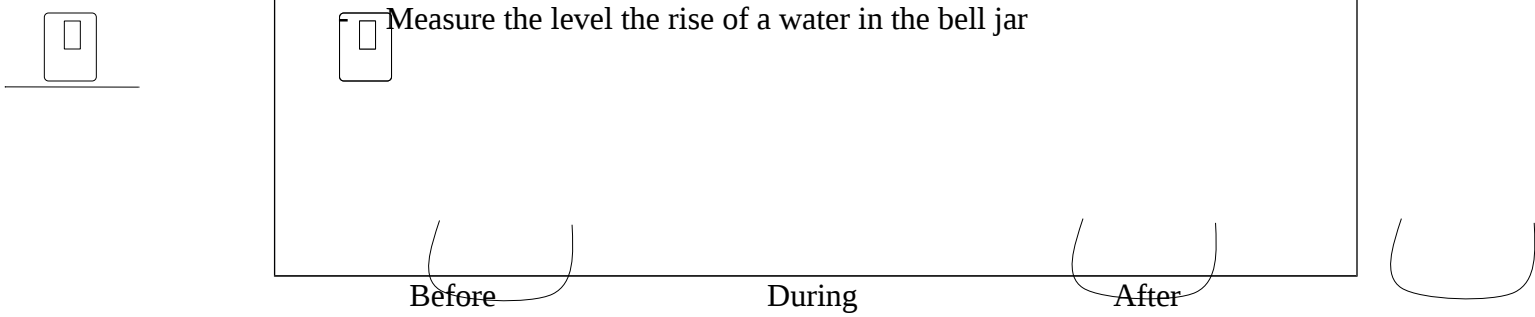
What is air? How do you detect the presence of air in your environment?

Air is a mixture of gases. It is made up of nitrogen, oxygen carbon dioxide, argon and other traces of some noble gases. These gases are not chemically combined with each other. The most abundant gaseous components are nitrogen and oxygen. The amount of nitrogen and oxygen are almost have a constant proportion on the surface of the earth. That is $\frac{1}{5}^{th}$ of air is oxygen (0.209)

Activity 1.2:- To show that $\frac{1^{th}}{5}$ of air is oxygen

Perform this activity in groups

- Take a trough half filled with water
- Burn magnesium ribbon in as inverted bell jar
- An shown in the figure
- Measure the level the rise of a water in the bell jar



Before During After

Time to time and place to place. What are the factors or activities that can increase the amount of carbon dioxide and water in air around as?. There is a concern that of higher concentration of carbon dioxide and other gases in the atmosphere will lead to global warming (higher temperatures at the Earth's surface).

The mixing ratios of the main gases, namely nitrogen and oxygen are roughly the same throughout the atmosphere. But these gases will not chemically combined rather they remain as component of the air as a mixture. It is also important to visualize that the components of the air can not be seen with naked eyes. However, this does not show necessarily that components of all mixtures cannot be seen with naked eyes. There are mixtures where the components can easily

be seen with naked eyes for example, a mixture of maize and barley or a mixture of iron- filings and sulphur can be seen.

There fore, a mixture is a heterogeneous association of substances obtained by two or more different substances. These substances are not chemically combined with each other as air mixtures can be composed of entirely of solids liquids or gases or a mixtures of different states. On the basis of the nature their components, they can be classified in to two. Homogeneous and heterogeneous mixtures are the two groups of mixtures.

Homogeneous mixtures are mixtures where the components cannot easily be seen with naked eyes. For example, a mixture of table salt and water. Once the salt dissolves in water, it has a uniform composition (having the same taste through out). In other words it shows the same properties in the whole solution. It is also important to understand as in the mixture of gases (Air) or in a solution that the atoms or molecules are interspersed.

Heterogeneous mixtures are mixtures where the components can easily be identified with naked eyes. They have distinguishable phases. Moreover, they do not have uniform composition showing different properties in different proportions. For examples a mixture of iron filings and sulphur. It is easy to identify sulphur from the mixture by its color. Besides this iron filings are black in color and can be attracted towards a magnet.

Table 1.1 The difference between homogenous and heterogeneous mixtures

Homogeneous	Heterogeneous
- Uniform - Cannot be easily detected - The component cannot be easily identified - Simple technical muted evaporation filtration	- Non- Uniform - Can easily be detected - The component can easily be identified - Mechanical method of separation sieving or handpicks

Activity 1-3

- Perform this activity in a groups of students A,B and C
- Let students A take a sequence of table sash and dissolve it in 100 ml of water Student B can take a teaspoonful of table salt and dissolve it in 100 mlof water. Students C take a teaspoonful of soil and put it in 100 ml of water. What is your observation about the three mixtures? Are all homogeneous?

A mixture will have the properties of the substances from which it is made. Each substance in a mixture will keep its own properties. For example a mixture of table salt and water, have a salty taste it indicates the property of the sast. If salt and sugar are mixed, both tastes will be noticed in the mixture. Similarly if a mixture of sand and salt are kept in water, they can easily be seen when the salt dissolves. There fore, the components of a mixture can easily be noticed. A mixture can be separated into its components by using their properties. Some of these properties are color size density solubility and boiling point. Mixtures are usually separated in to different parts by methods involving physical changes.

Example:- To separate salt from water –solution, boiling is important

There are different techniques of separation based on the properties of components of a mixture. Some of these are winnowing, sieving magnetic filtration decantation evaporation and distillation of –solid –solid mixtures.

A) Techniques of separation where the components differ in size or mass

Fig 1.1. winnowing and sieving

Ethiopian farmers usually carrying out the winnowing process during harvest time. They do so to get a clean and better quality crops for the market, A mixture of rice and flour can be separated by sieving.

Activity 1-4

Suppose a farmer has found maize and teff mixed during collecting crops. He tried to separate by winnowing but failed. What appropriate technique should he use?

In many industries sieving is important to make the product better and conducive. So, the method is widely applicable. Where do you expect that sieving is important to separate mixtures in your locality?

Solid-solid mixtures can also be separated by hand picking, magnetic method or sublimation method. For example, a clean coffee preparation to the market unwanted particles can be removed by hand picking. On the other hand, a mixture of sulphur and iron filings can be separated by magnetic method. A mixture of ammonium chloride and table salt separated by the sublimation method. Ammonium chloride is a subliming substance (solid – gas). A denser insoluble solid and liquid mixture can be separated by decantation.

B) Solid –liquid where the solid do not dissolves

Fig 1.2 Coffee ceremony in Ethiopia

Even though it is not quite perfect this method is widely applicable in Ethiopia. It is commonly used in rural areas while preparing drinking water and local alcoholic beverages. Centrifuge in a modern technique and mostly applied laboratories and clinical lab. There is also another common method of separation. It is filtration method which is more effective even when the solid component is lighter. The materials needed for filtration are filter paper, funnel and beaker. The apparatus can be settled as shown in fig 1.3

Different materials - Funnel - filler paper - Baker	a properly settled apportion with stand

Fig 1.3 Filtration

The solid component collected on the filler paper is called residue. The liquid passes through the filter paper run off in to a beaker and called filtrate. This method is more applicable in preparing drinking water and other industries. Some of these industries are malt-factory, soap industries and beer-factory. Can you name other industries that use flirtation in the process of manufacturing.

A safe drinking water can be obtained by using a special water filter. This is a special sand filter with many fine pores or holes .

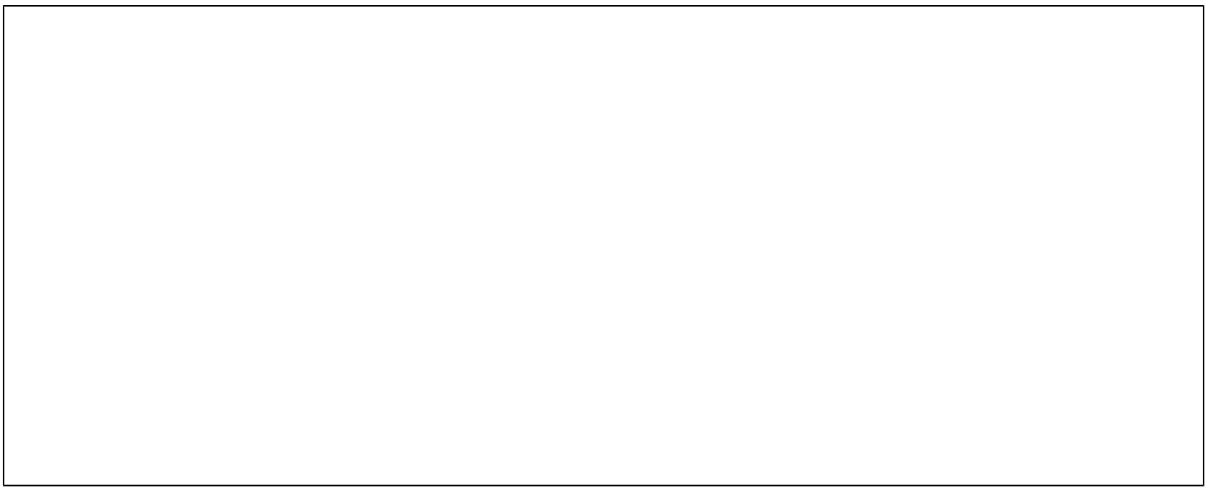


Fig 1.4 water filters

When water passes through this candle the holes trap particles which are present in water. Harmful bacteria which can make us sick can not be killed by this method. A modern electric

Water filters kill the bacteria using ultra-violet rays, How can this be possible? The most effective way to purify water is by chlorination .

C) solid-liquid where the solid is soluble

A soluble solid and its solvent can be separated by an evaporation, for example a mixture of table salt and water. When the solution is left in an open dish the water will evaporate leaving the salt behind. Evaporation is quicker if the solution is placed in a broad dish.

Activity 1-5

W/ro Aselefech has sent her daughter to buy a kilo of salt. On the way from shop to home her daughter has mixed the salt with sand. Suggest which methods w/ro Aselfech can carry out to get the pure salt back.

Some mixtures contain two substances neither of which will dissolve in water. In this case, another solvent must be used to separate the mixture. For example, a mixture of sulphur and sand can be effectively separated by using methyl benzene (toluene). The sulphur dissolves in toluene while the sand does not.

On the other hand, there are mixtures that contain two substance which dissolve in water, The components can be departed by fractional crystallization (Liquid – solid). This is done because the two soluble solid may crystallize at different temperature.

D) Liquid – Liquid mixtures where they are immiscible

When two immiscible liquids are found, first let them settle down after that the mixture is poured in to a separator funnel. The more dense liquid will settle to the bottom

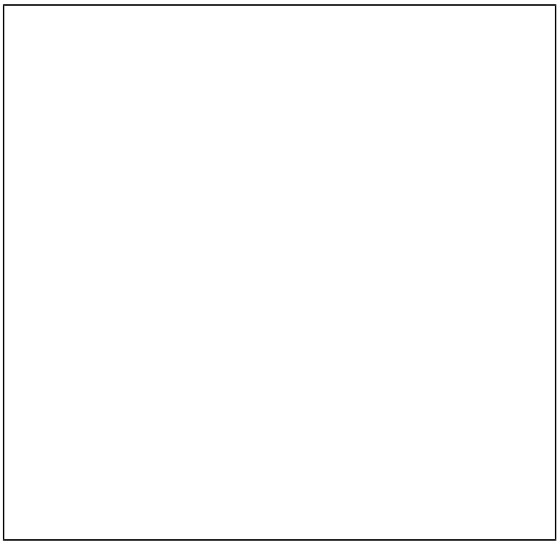


Fig 1-5 Separatory funnel

Water and oil are immiscible liquids. They can be separated using separatory funnel. The more dense liquid will settle to the bottom of the funnel can be run off by opening the tap. The run off liquid can be collected in one container when all the lower liquid has been runoff the tap is closed and the first container is removed. The remaining liquid can then be run in to a second container, A mixture of water and oil can be separated by this method. Can you suggest some mixtures of liquid which can be separated by this method?

Ethanol and water are miscible to each other such kind of liquids are separated by distillation. There are different forms of distillation such as simple, fractional and destructive. The separation is taking place by evaporation followed by immediate cooling process.

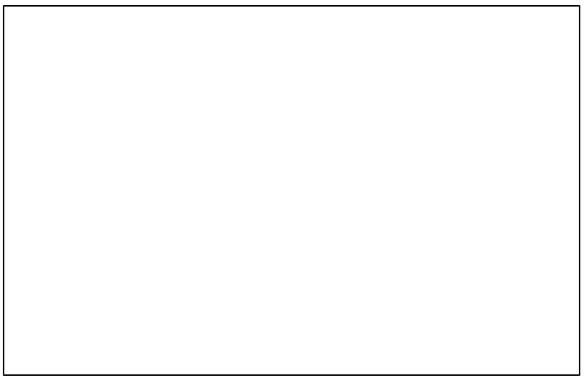


Fig 1.6 simple distillation

Petroleum or crude oil is separated in to its fraction (parts) by fractional distillation. Mixtures of different liquids with different boiling point are separated by this method. In fractional distillation the fractionating column is important to separate liquid in accordance with their boiling point.

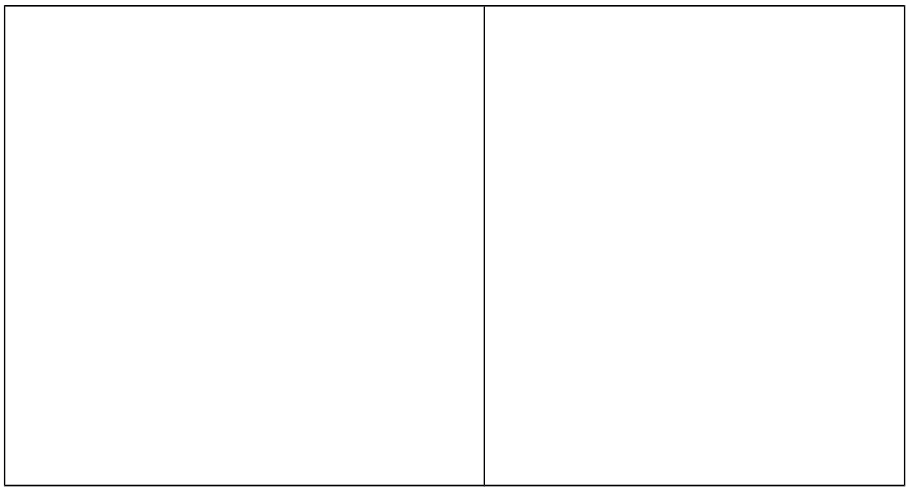


Fig 1.7 Fractional distillation

Gas-Gas mixtures such as air are separated by the fractional distillation of liquid air. There fore the gaseous- mixtures are cooled first up to their liquefying point (gas to liquid). This method can also applicable where more than two-liquids and two –solids are mixed As in the case of petroleum refineries, this could be possible at a large scale.

Exercise 1.1

Choose the best answer

1. Which of the following is a mixture?
    i. A) water B) table salt C) sand D) Iron.
2. One of the following is a quicker method of separation
    i. A) Distillation B) decantation C) Filtration D) evaporation
3. Air is a mixture of 78% nitrogen, 21% of oxygen and 1% of other gases. Which technique is used to separate them?
    A) evaporation B) filtration C) fractional distillation
    D) decantation
4. Which technique of separation is appropriate to separate a mixture of sand and table salt?

    Dissolution followed by
    A) evaporation ⫟ condensation
    B) filtration ⫟ evaporation
    C) Decantation ⫟ filtration
    D) none

1.2 Air pollution.

Competencies:-

By the end of this section, you will be able to: -

- Tell the importance of clean air.
- Demonstrate method of keeping room clean (fresh air).
- List the causes of air pollution.
- Explain the effect of air pollution.
- Describe the benefits of technology to humans.
- State how technology is contributing to air pollution.
- Explain preventive methods of air pollution
- Describe environment friendly technology to minimize air pollution.

What makes the roof and walls of kitchen black?

What will happen to your lung if dirt's like your kitchen taken through nose and mouth? Discuss your ideas with the rest of the class.

The study of the relationship of plant and animals their physical and biological environment is called ecology. One of the member of our physical environment is air. We continually inhale and exhale air in to our lungs. The gases exchange between the air and the blood the through the lungs. Therefore, the air that passes into lungs and may also enter in to our blood.

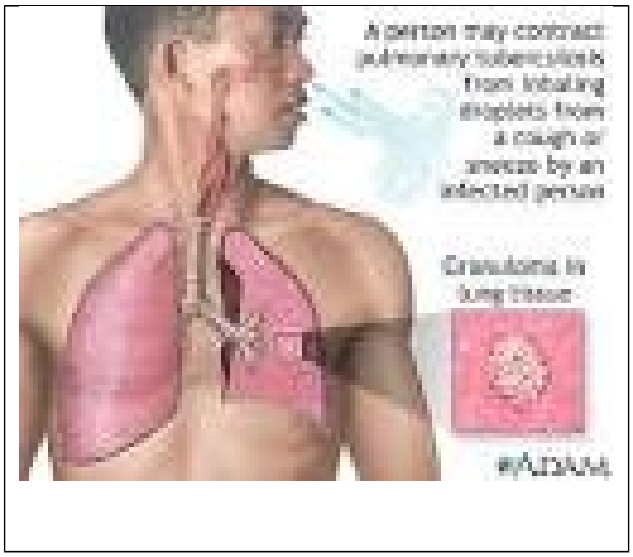


Fig 1.8 movement of air nose to lung

The air that entered in our body filtered at different stages. For example, the nose of every animals contain tiny hairs that is used for this purpose. A clean air is very important because it minimize the dirt's that may enter to our body. All of us feel well when the weather is good. To get a relatively clean air the house in which we live-in should be ventilated. That means the house which is constructed must have windows at proper place. In particular meeting halls and schools where a group of people may gather or learn should have windows are vents

Fig 1.9 ventilated v_S unventilated houses

In a ventilated house there will be fresh air. People living in or attending meetings in such houses can feel healthy. There is no suffocation because of shortage of air. The air in the house is continuously renewed. So, the inhaled air is relatively clean. Because of this the respiratory organs may not have too much work. Furthermore, the respiratory organs will have a minimum amount of dirt's. The dirt's that may enter to our body affect the respiratory organs. In addition to this they will also contaminate the blood. These finally may causes different kinds of diseases.

Activity 1-6

Perform this activity in group of 3 the materials needed are long glass-tubes, smoke, small glass tubes, and cotton. Let students A blow fresh air in along glass tube having cotton at half way, Students B blow a smoky air in to another long glass tube having cotton at a half way of the glass tube. What difference have you observed with the other group that carry out the same experiment

As can be seen from the above discussion and activity air containing dirt, may result in danger. This danger mostly attack the respiratory organs. These organs are interrelated with other different organs of our body. So, it will be necessary to keep the air around as clean. The simplest of all the method is to ventilate our house in which we live in. A person with a respiratory organ problem such as influenza, and tuberculosis and should hold his mouth with hand kerchief while coughing. Another way to keep the air around us clean is not to use excessive chemical. Industries should be constructed out side a town where there is a dense population.

There is also another method to keep air clean. That is the converting of harmful gases (by product of industries) in to harm less gases. This can be done by different method Can you suggest some of the methods? To sum up keeping the air around us clean has a

paramount importance. But most of the human activities add – dirt's to the atmospheric. This pollutes the air around us. Pollution is a contamination of the environment by man- made substances or energy. Energy is important for our life, but it may have an adverse (or negative) effects on living and non- living things.

Cars moving on road (with smile)	Industries with their by product	A man cutting trees and a bitter burning word

Fig 1.10 Different activities that adds dirt's to the environment

Air – Pollutants

The contamination of air, water or soil materials that interfere in human health is pollution. In simple terms, pollution can be seen as the wrong substance in the wrong place. Air is polluted by releasing toxics in gas and particle from automobile exhaust. Air pollutants can be divided in to particles and gases. For example, dust particles from cement factory and other factories can be considered as a particle pollutants. On the other hand, small particles of carbon (soot) are formed by inefficient combustion of fuel in diesel engine.

Gaseous pollutants can be added to the air by different activities. For example, the incomplete combustion hydrocarbon fuels in motor vehicles. The burning of coal and fuel oil in power station produce sulphur dioxide. Sulphur dioxide also occurs naturally in the gases resulting from volcanic activity. Nitrogen dioxide (brown-gas) is gaseous pollutant resulting from car exhaust.

Table 1-2 complete the table of pollutants

Pollutants	Gaseous	Particle	Sources
Dust		اے	- While farming - Unexpected wind - While road const
Pollen grain		اے	

Carbon monoxide	ـا		
Nitrogen dioxide			
Sulphur dioxide			
Hydrocarbon fuels			
Carbon (particulates)			
Smog			
Asbestos			
Coal dust			

Carbon dioxide occurs naturally in the air. Its amount has continuously increasing since 1980 E.C. Nowadays each year industrially developed counters generate billions of tons of carbon dioxide. This has created a rise of temperature on the earths surface. Therefore, it changes the climatically conditions of the world. This has been called Global warming (The Green house effect)

The air pollutants discussed till now are few in number. But there are plentiful man-made air pollutions, they can be classified in to three different groups. There are primary, Secondary and natural pollutants. The primary air pollutants are those emitted directly from identifiable sources. Those that are considered to be secondary are ozone and photochemical products, Natural pollutants are temperature, dust and volcanic eruptions. In addition to these accidental forest fire, bacteria, protozoa terpenes and bacterial spores are also included.

Effects of Air pollutants

The other important thing to know about air pollutants is they pass through the atmosphere by diffusion. They may not be seen by naked eyes. So they can enter easily in to our body.

Activity 1.7

Perform this experiment in group of five students. Try to collect different incense, sulphur, Kebrecho, Charcoal, perfumes and a simple container to burn charcoal. Put different incense, kebrecho, sulphur on the heated charcoal at different period What – varieties of odour do you feel? How does this smell come to you? Discuss these with your group and with class as a whole.

Diffusions is the spread of particles and gaseous molecule through space randomly. What a difference can you observe during a warm and cold weather? Discuss this in your group observe properly how diffusion is taking place watch cigarette smoke. A cigarette smoke is dangerous not only for the smokers, but it also affects the nearby persons. So. People who are living closely with smokers inhale polluted air and should take care for the danger.

A project work 1-1

Perform this project with a group containing 5-7 students. Aim how cigarette smoke affects the environment.

Select areas or roads where shops are available

Assign roads for the group

Let each group ask the shop keeper the following questions?.

Haw many cigarette he sold per day?

Which age-group buy cigarette repeatedly?

How many shops lave you found in your assigned area that do not sell cigarette?

Discuss the group report with the class

Discuss about the effects to secondary inhalation on the health of people

How can smoking-cigarette will be reduced?

What are the pollutants that come out of cigarette smoke?

AS it has been observed in the activities carried air pollutants attack respiratory organs. In particular the damage will be severe if there is a high concentration of pollutants Moreover, continued exposure over a long term to pollutants lead to permanent lung damage. Such kinds of damage may take a long period of time to cure. In most cases these type of diseases may end with death. The simplest reaction that may appear due to shorter irritation can be sneezing. This may also appeared or caused by temporary high level of pollutants with a short period.

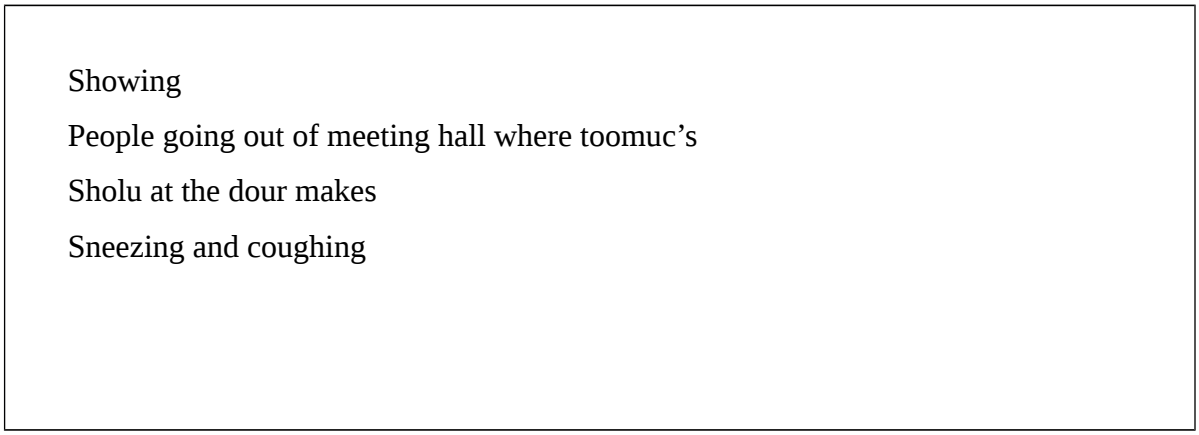


Fig 1.11 High level of pollutants at a time

The adverse (negative) effect of air pollutants on human health become worse and worse from time to time. Particularly in towns and large cities where more industries are found. So, life in towns is difficult not only because of economical issues but also the effects of pollutants.

Table 1.3 pollutants and their effect

Pollutants	Effects
Carbondioxide CO_2 (at increased level)	Global warming – increasing ear this temperature
Carbon-monoxide (CO)	Deprives body of oxygen by combining with hemoglobin Cause head aches, drowsiness Can be total at high level (leads to death)

Sulphur dioxide , SO_2	Acid rain – damage, plants, buildings & lake
Oxides of nitrogen (NO/NO_2)	Acid rain, irritation of lung tissues Increase susceptibility to viral attack
Ozone and chlorinated compounds	Are carcinogenic – cause cancer
Lead compounds (metal used to makes water pipes)	Slow the development of neural issue in children (mental retardation)
Coal dust Asbestos	Pneumoconiosis (a disease of lungs caused by the habitual inhalation of irritants) Asbestos is (is a pneumoconiosis due to asbestos particles)

It is important to investigate the health problem caused by air pollutants by interviewing patients. And carrying out a research work at health centers or hospitals in our locality. This enable us to get tangible evidence about the damage caused by air pollutants.

A project work 1-2

Perform this project in a group having 5-7 members. Aim to investigate the number of patients that have been attacked by air pollution. Select the health centers or hospitals in your locality Assign groups that go to each health center or hospital Interview the concerned health officials. Total number of patient in a year Number of patents because of respiratory organ problems Number of patients 10 years ago, again because of respiratory organ problem Discuss the report of the group with the class What was your conclusion?

Smog (fog + smoke) is a fog which have been made heavier and darker by smoke and chemical fumes. It is a natural fog containing impurities. The imparities are unburned carbon and sulphurdioxide. These have been ejected from domestic fires, industrial furnaces and internal combustion engines. In the lat e19th century where large scale coal burning as a domestic fuel was the source of smog. This results in high instances of lung disease.

Technology and air-pollution

Activity 1.8

What changes have you observed in your locality? What ate the causes of these changes? What are the advantages you get from the changes? Were there any harm brought about in your locality because of theses changes? Discuss with the class

Technology is a practical application of knowledge in a specific field or area. It can also be defined as a manner of accomplishing a task using technical methods or knowledge. This can shorten the time needed to perform the work. The progress in the technical methods of performing a certain task or project have made the world to be seen like a village. But this does not mean that it has brought a full satisfaction. What is the adverse (or negative) effect of technology?

Activity 1.9

Choose any 10 students from the class, debate on the advantages and disadvantages of technology by grouping them in to two, One supports the idea that technology is more important and has no disadvantages. The other group opposes this idea and forward that technology has so many negative effects

It is obvious that a motorized vehicle has shorten the time needed for transforming peoples and tons of goods. But this requires a large amount of energy. The amount of energy needed increases from time to time. As the demand for energy is increased the production of

toxic chemicals and gas – pollutants are also increased. There fore, the large scale use of non-renewable recourses, safety issues adds pollutants to the environment.

Fig 1-12 Different motorized vehicles that add pollutants.

The environment in which we live in is dynamic. Nowadays the changes is very fast. One can observe this in his local community. In a rural area a farmer uses fertilizer, pesticides and herbicides intensively. Deforestation is practices to prepare the land for farming or cultivation . This is also another factor that increase pollution. The establishment of a factory may be important because it produces goods needed by the community but it can be a source if air pollution. So, most of the human activities add pollutants to the environment. Mechanization of agricultural practices and the industrialization are products of modern

technology. They are important because of satisfying human need. This is a part of human effort to solve the growing needs of the society.

Fig 1-13 mechanization agriculture

. The technological progress have a lot of advantages.

Such as:- - Shorten the time.

- Full fill human needs effectively
- Taught us to manage resources
- Taught us to use resources wisely
- Makes the whole world as a village (globalization) and others.

Even though these and other technological progress have been attained, there is greater deal of pollution made by them.

The polution has changed the environment in such a way that it makes life difficult, A normal activities in plant and animal will be affected by pullutants in air. Some pollutants can kill immediately while the others can cause a chronic diseases such as cancer (carcinogenic). So what has to be done on pullutants? To Shun technology or to use it friendly?

fig1-14 A simple method to reduce pollution

Similar methods as in fig1-14 can be applied. This reduces the disturbance of environment. An out come of technology advancement can alto be use to reduce pollutants. Some of these are catalytjic converter, fuel gas desulphurization and electrostatic particle culmination. Catalyltic convertes can be used to convert pollutant gases in to harm less gases. Fuel gas desulphurization remove shlphurdioxide from the waste gases. The faul gas

desulphurization is applied at coal-fired power station where waste gases containing shlphurdioxide is produced. Sulphurdioxide can also be produced in areas where suphric acid and aluminium sulphate factories are established. In Ethiopia the aluminium sulphate factory is found in Awash melkasa town.

Fig 1.15 Aluminium sulphate factory (Awash Melkasa)

Sulphur and sulphur containing compounds are very important for many industries. Car-batteries, fertilizers and some medicine-making factories use these sulphur containing compounds in a large amount. But the hazard (pollution) cansed by them is dangerous. It can cause acid-rain, which may destroy the plant life. What other damage can you expect? How can you reduce this damage? Discuss with the class.

Particles of carbon formed together with waste gases in the combustion of fossil-fuels in power station. Moreover, car-ethoust also containg particles of carbon,. This kind of pollutant has brought a great deal of damage in industries

Fig 1.16 particles of carbon formation

A modern way to remove particles of carbon have been devised. This device is called electrostatic particle eliminator. It is used to remove carbon-particles from the waste gases produced by the fossil-fuelled power station.

There are also other methods that can reduce pollutants. On the other hand, there is a technique of using alternate sources off energy. For example, replacing coal and oil fired power stations by natural gas (methane, ethane, propane or butane). The use of electric-powered vehicles would greatly reduce air pollution. What alternate sources off energy are there that minimizes pollution?

Exercise 1-2

Say True or false

1. The carbon dioxide that is found in air at normal condition makes pollution
2. Carbon-particles are usully formed in kittcheens where wood is used as a fuel
3. Air pollutants can not reach at our lung.

II. Choose the best answer

4. A green house effect is mostly caused by an increase of_____
   A. Water vapor B. Carbon dioxide C. Oxygen D. Nitrogen

5. Which of the following reduce the amount of carbon dioxide in air?
   A. Photosynthesis B. Respiration C. Combustion of benzene

   D. Combustion of natural gas

6. The use of hydrogen as a fuel _____.
   A. Reduce the demand for crude oil
   B. Reduce the amount of carbon dioxide give out
   C. Increase the global warming D. All except C.

1.3. Air-Borne disease

Competencies

At the end of this lesson, you will be able to:

- Mention tuberculosis and influenza as air borne disease
- State the symptoms of tuberculosis and influenza
- Explain viruses and bacteria as caules of air borne diseases.
- List and explain the methods of prevention of tuberculosis and influenza

Activity 1-10

Perform this activity in groups of 5.7. Select a health centre or hospital in your village or town. Different groups will go to different health centre, and gather information about TB and influenza. Try to collect the number of people infected by TB and influenza in your assigned health centers. Ask the physicians the total number off patients and compare this with TB and influenza patients. Report your findings to the class. Discuss the result with the class what do your findings show?

How are infectious diseases such as influenza commonly spread? What measures should be taken to reduce the spread of such disease?

Diseases are caused mostly by viruses and bacteria. These organism are very small, and can easily move through air. These diseases that can easily be transferred from a patient to a healthy person by air are called air-borne disease. The most common form of such diseases are influenza and tuberculosis (or TB).

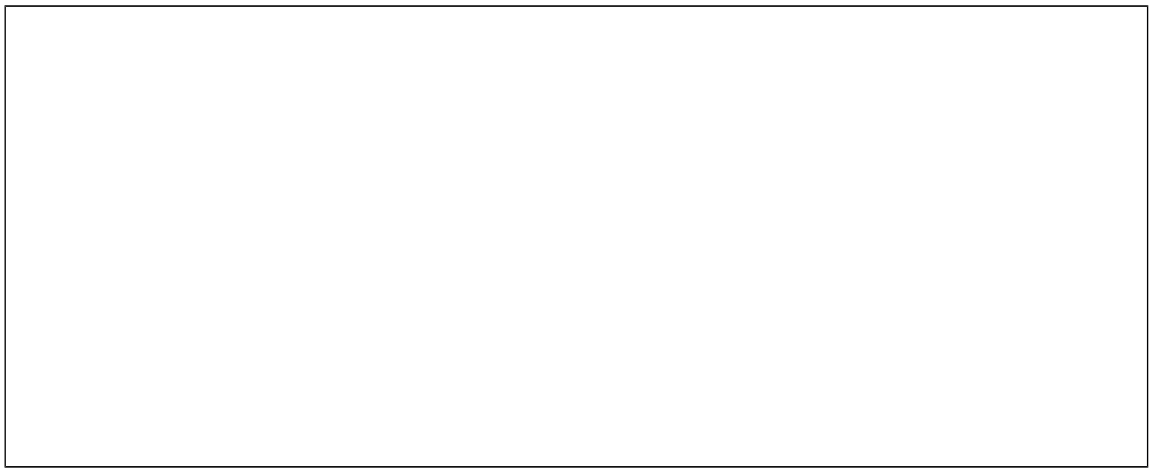


Fig 1.17 A student coughing in a class

While patient person coughs or sneezes, the virus or bacteria easily enter in to the healthy person body. This takes place by inhaling air. So, the viruses or bacteria affect the respiratory organs. There are different types of diseases that affect respiratory organs. Some of these are common cold, influenza and pneumonia. They are characterized by fever. Chills, cough and difficulty in breathing. What difference do you observe between HIV-AIDS and the above diseases? Discuss this with the class.

Influenza (shortly named flu) is an acute highly contagious virial disease. Characterized by sudden onset, fever, and progressive inflammation of respiratory mucous membrane. The virus that carry this disease can easily be transported by air from place to place. It is a world wide known epidemic diseases that appear at different occasion in history.

Activity 1.11

Perform this activity in group 7-10 students

-Go to woreda or zonal health center and collect the following information.
-How many world wide (epidemic) types of influenza were recorded in history?
-How many people have died during each period?
-What controlling mechanism has to stop the epidemic?

Common cold (‘Gunffan’ in Amhiric) is also another most known virial disease. It affects only upper part off respiratory tract characterized by inflammation of the mucous membranes of the nose. As in the case of influenza the virus can easily be transmitted by air. From the above

discussion influenza, common-cold and HIV-AIDS are disease caused by viruses. They are acute diseases. What is the difference between common cold, influenza and HIV aids?

Table 1.4. Difference among influenza, common cold & HIV-Aids

Disease	Kind of Virus	Transmission	It can affect
Common-cold	Rhino viruses respiratory syncas viruses	Air droplet	Upper respiratory tract (rpose, throat)
Influenza	Influenza virus	Air droplet	Lower respiratory tract lung and lung structure
HIV-Aids	Retro virus (HIV)	Sexual contact	Immune system

Tuberculosis is a highly **variable** communicable disease. It is caused by bacterial infection. The most common form of tuberculosis is that, it affects the lungs and it is characterized by fever, cough, difficulty in breathing. The bacteria, the mycobacteria tuberculosis can easily be carried by air (wind). Therefore, the common way of becoming infected is by inhaling or swallowing the bacterium. Are there disease that are caused by bacteria? Which of them are air borne?

Table 1.5. Difference among pneumonia, TB and cholera

Disease	Kinds of Bacteria	Transmission	Damage it can brought
Pheumonia	Streptocous pneumonia	Air droplet	Lower respiration tract lung lines
Tuberculosis	Myco bacteria tuber closes	Air droplet	Lower respiratory tract (lung and lung structure
Cholera	Viborrcolerae	Fecal contamination	Gastro intestine tract

From the above discussions it is clear that influenza, TB and other air borne diseases are dangerous. They can attack the individual and the society as a whole because they are easily communicable. In addition to this they attack the vital organs of our body. So, special care has to be taken to preventer or reduce the chance of the transmission. In areas where people are in close

proximity the opportunities for the transfer off air borne disease are high. What measures has to be taken to prevent or to reduce the transfer of air borne diseases? Discuss with the class.

Vaccination as a means of eradicating a diseases such as small pox and polio was successful. What about the air borne diseases ?

activity 1.12.

Perform this by classifying the class into three groups.

I) Let the first group discuss the care that has to be taken to prevent air borne disaise
II) Let the second group discuss the importance of vaccination. Are there side effect on vaccination for air borne disease?
III) Let the third group discuss methods of preventing tuber culosis. What will be the danger if it is not controlled?

- Let each group present its report to the class

Exercise 1-3

Choose the best answer

1. Which of the following is an air-borne disease?
   A. Cholera B. Kidney inflammation C. Hepatitis D. Influenza
2. One among the following is not virial disease
   I. Measles B. Common cold C. influenza D. Tuberculosis
3. Select out a means that can be taken to eradicate air-borne diseases.
   A. Development of effective drugs B. vaccination C. controlling infected castles D. all

Summary

Air is a mixture of gases. The components (members) of air are not chemically combined (united). The most important component are nitrogen and oxygen. Nitrogen forms 78% of the total air, while oxygen forms 21% and he rest (1%) occupied by carbon –dioxide and

traces of some noble gases. The components of the air can be separated by the fractional distillation of liquefied air.

Mixtures can entirely be formed from gases in air. They can also be formed from solids and liquids. It is also found as the mixture off two or more different states. Rocks are mixtures of minerals (solids), while cooking oil as a mixture of vegetable oils. Petrol is a mixture hydrocarbons, where as soil is a mixture of different sized particles and plant material. Mixtures can be classified in to two as homogeneous and heterogeneous.

Homogeneous mixture are mixture where the components can not easily detected with naked eyes . Heterogeneous mixtures are those that the component can easily be detected with naked eyes.

EX- Homogeneous:- Salt solution, alloy

Heterogeneous:- Teff and its husk, maize and wheat

There are different techniques of separation mixtures based on the physical properties of component. Some of these are filtration, distillation and evaporation.

Air is an important component of life. Both plants and animals need air for survival. But in most cases it easily contaminated or polluted. These can bring a great damage on living things. The ecology. The discharge of foreign materials to the atmosphere that can bring about a damage is called Air-pollution. The foreign particle discharged are called pollutants.

Air pollutants are classified in to two as

Particle and gases

EX - Particle---------- dust, pollen, carbon,

Gases---------- sulphur dioxide, Nitrogen dioxide, etc

Air pollutants can be categorized in to three as primary, secondary and natural air pollutants.

EX- Primary air pollutant - ---------- SO_2, NO_2, CO,NH_3

Secondary air pollutans---------- H_2SO_4,HNO_3, Smog fume.

Natural air pollutants ---------- dust, volcanic eruption, bacteria

The adverse (negative) effect of air pollutants become more complex and harmful from time to time. Technological progress made by man has positively changed the world, but it creats a number of pollutants. For example, the uses of freons or CFC'S, which depleted the ozone. The application of fertilizers, herbicides and pesticcidis has improved the yield and quality of crops. On the other hand, the chemicals have brought about pollution.

As un be seen from the above discussion technological advancement has brought about different forms pollutants nowadays technology have been devised to convert harmful pollutants to harmless ones.

Air Borne diseases are where infective agents such as virus or bacteria transmit through air. Some of these diseases are common cold, influenza TB and pneumonia. But all virial and bacterial diseases are not air-borne diseases. To reduce the chance of transference of these air borne diseases, proper ventilation in public transport and avoiding crowded rooms is important. The development of effective drugs and vaccination are some of the methods to eradicate the diseases.

Review exercise on unit 1

I Say True or False

1. Air is a mixture of gases.
2. The amount off carbon dioxide increases when plants prepare food.
3. Filtration is a method used to separate insoluble component from a liquid
4. Components of an air can be separated by fractional distillation of liquid air
5. Pneumonia is air-borne disease.

II. Choose the correct answer

6. Which of the following is a primary pollutant?
   A. Carbonic acid B. Sulphuic acid C. nitrogen dioxide D. Volcanic eruption
7. One among the following is a mixture
   A. rock B. Table saltC. water D. dry-ice
8. Accidental forest fire is_____
   A. primary pollutant B. Natural pollutant C. Secondary pollutant E. None
9. Which of the following is an air-borne diseases, but not bacterial?
   A. Tuberculosis B. Pneumonia C. influenza D. Cholera
10. One among the following is a heterogeneous mixture
    A. Table salt solution B. Alloy C. Blood D. Air
11. A car-exhaust containing un burnt carbon, this is_____

A. secondary pollutant B. gaseous pollutant C. Particle pollutant D. Natural pollutant

12. Which of the following diseases does not appear as epidemic in the history of the world?
    A. Spanish flu B. Birds flu C. Cholera D. none

Part-III- Give short answers

13. A) Air pollution
    B. Air borne diseases
    C. Homogeneous mixture
14. Describe the benefits of technology
15. What are the negative effect of technology?

UNIT – 2

WATER

Unit out comes:-

After completing this unit, you will be able to:-

- Describe the physical properties of water.
- Demonstrate the three states of water.
- Mention the general properties of acids and bases.
- Identify and use safety rules with acids and bases.
- Describe the general properties of salts.
- Tell the chemical composition of water.
- Describe the qualities of clean water.
- Mention factors that make water unclean
- Demonstrate some methods of purifying unclean water.
- List some common water borne diseases
- Mention the causes, symptoms and prevention of water borne diseases.
- Define crop irrigation
- Explain how water pressure is applied to crop irrigation and its importance.
- Explain how electric energy is generated from water.
- Define terms like conductors, insulators, electric current and voltage.
- Demonstrate series and parallel connection by constructing simple circuits.
- List electric appliances at home as technological products and state electric safety rules.
- Demonstrate scientific inquiry skills classifying comparing and contrasting, measuring, asking questions and applying concepts.

2.1. Physical properties of water

Competencies:- after completing this section, you will be

able to :- describe the physical properties of water

- Demonstrate the three states of water

Activity 2.1.

Perform this activity in group. Let the class form three groups A,B and C. Group A can name solid-objects that are found in their surroundings (environment). Group B may name liquid substances while group C names gaseous substance. After this let each group find the similarities and differences among the substances collected. Finally, report this to the class. The class discusses thoroughly about the important characteristics of those substances. What are the important difference hare you recorded among solids, liquids and gases? Describe some out-siding physical properties (or tangible) of substances.

What do you mean by the physical proprieties of substances? How can you understand the physical properties of a substance?

The source of water or the orgin of water on the earth is not clear so far. But it is important to us. We use water to drink and wash every day Water is the general (or a universal) solvent in living things. It maintains the turgidity of a cell and proper functioning of protoplasm. Water appears as visible and invisible forms. The gaseous water (water vapor) is the invisible form of water. Water in the form of ice, river, dew. fog, clouds, rains are the visible forms. It moves from the ocean to air to land to ocean in a set of cyclic pattern called hydrologic cycle. In other words it represent, a continuous process of exchanging of water from the earth's surface to the atmosphere and vice versa.

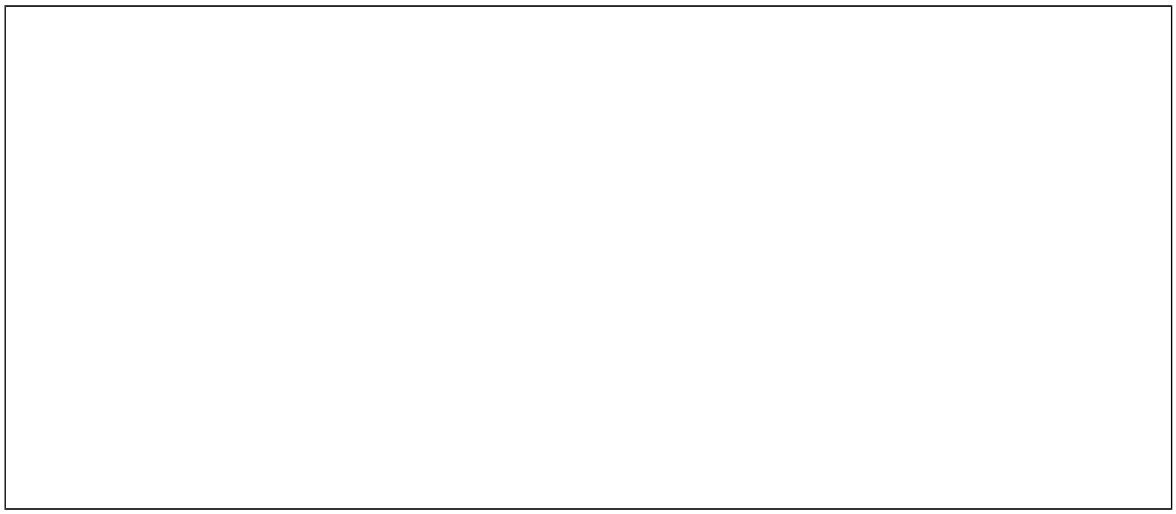


Fig 2.1.

Water cycle in nature

The hydrological cycle is usually carried out when the heat from sunlight vaporize the water in the ocean; lakes, rivers or sea. Evaporation is the conversion of liquid water in to vapor (gaseous). It takes place at all temperature.

A. Density

Density is a physical property of a substance. It is measured by the ratio between the mass of an object and its volume.

$$\text{Density} = \frac{mass}{volume}$$

Substances that have a density lower than that of water, float. Those that have a density greater than water sink. This is because when an object is placed in water. The up ward force that the liquid has, may not be strong enough to with stand by it self. In other wards the density of the object is greater than that of the water. It is alto clear that every thing is subject to the down ward pulling force of earth, which is known as gravity. If the gravitational force considers the weigh on an object equal to the upward force exerted by the liquid, then the object floats on the liquid. The amount of the upward force depends on the density of the object. Gravitational force is directly proportional to the mass of an object. Which is also directly related with the density of the object in to consideration.

Activity 2.2

- Perform this activity in groups of 5-7 numbers
- Take a certain milliter of distilled water (15-20ml)
- Using graduated cylinder
- Take the mass of the volume of distilled water
- Determine the density of water you heve taken compare your result with other groups.

B. Boiling point and freezing point

Boiling point is another physical property of a liquid. The boiling point is the point where the vapor pressure of the liquid equals to the atmospheric pressure. It varies with the altitude of the area. Because the atmospheric pressure of an area varies with the altitude. The boiling points normally refer to at standard atmospheric pressure (760mmltg). At this point the liquid is freely converted in to vapor. It is measured by in degree Celsius or degree Fahrenheit scale or kelivin (or absolute temperature). Water boil at 100^0C at a pressure of 760mm hg (1atm)

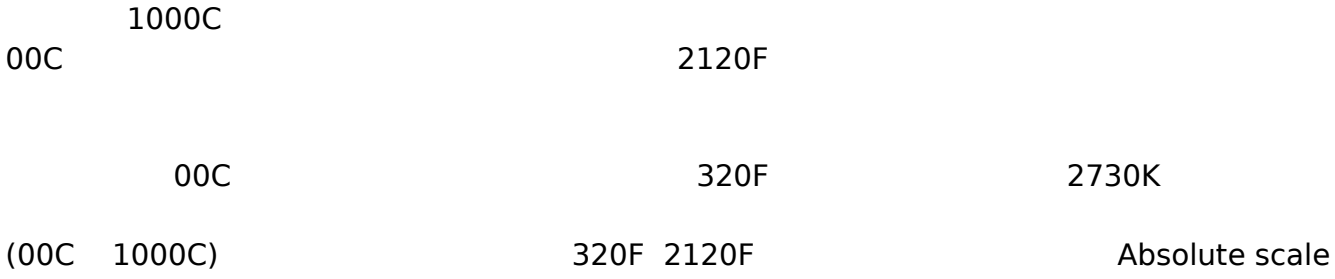


Fig 2.2 comparison of temperature scale

The inter- conversion of degree Celsius in to degree Fahrenheit and the vice versa is possible.

To convert a temperature in degree Celsius in to degree Fahrenheit.

If 'X' is the temperature in degree Celsius

(x) $\left(\frac{9}{5}\right)$ + 32 = _____ ^{o}F

EX_1 – Convert 40^0C in to a temperature in degree Fahrenheit.

Soln 40(9/5)+32= $\underline{\underline{104^0F}}$, therefore $40^0C=104^0F$

To convert a temperature in degree Fahrenheit in to degree Celsius

If 'y' is the temperature is degree Fahrenheit (y-32)5/9= ___^{0}C

EX- Convert 68^0F in to a temperature in degree Celsius

Soln:- (68-32)5/9= (36)5/9=20^0C, therefore $68^0F=20^0C$

To convert a temperature in degree Celsius to absolute temperature scale (or Kelvin scale)

If 'z' is the temperature in degree Celsius Z+273.15= ___^{0}K

As it is discussed above the temperature at which water boils at 760mmHg is 100^0C. This is correct if and only if !

I) The water is clean (or distilled)

II) The pressure is 760mmhg or 1-atm.

The presence of impurities or dirt (water which is taken from rivers or lakes or seas) increases the boiling point of water.

Ethanol boils at 78^0C, benzene boils at 80.4^0C where as we should know water boils at 100^0C. Therefore, the boiling point of water is one of the physical properties that characterizes it from other liquids. The other physical properties of water are: it is colorless, odourless and tasteless. It's freezing point is 0^0C. Freezing point is the temperature at which the liquid changes to solid. The solid form of water is ice. As liquid water cools, its molecules lose energy. At 0^0C (or 32^0F), the energy which possess through the molecules which falls on, the molecules stop

moving freely. They become fixed in arrangement called crystal. But, watch that water expands when it freezes above 0^0C or 32^0F. Solid water has a lesser density than liquid water.

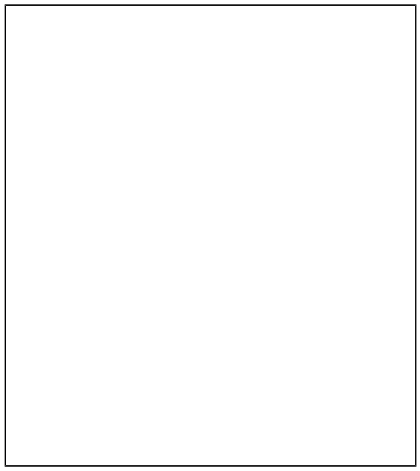


Fig 2.3. An ice (solid water) floats on water

To measure the freezing point or he meting point of water you can perform activity 2.3. Watch carefully and answer the related questions based on your observation

Activity 2.3.

Perform this activity in a group 5-7 students.
The materials you need are crushed ice, funnel beaker and thermometer.
Arrange the apparatus as shown in figure
Insert the thermometer in the middle of the funnel
Report your observation to the class
Discuss on the report
At what temp.ice melts?
Do all groups arrive at the same conclusion?

It is clear that the freezing and melting point of water is the same. Is this true for all liquids? Discuss this in your groups.

The boiling point of water is 100^0C at a standard condition. But this result varies with the altitude Why not you prove by measuring its boiling point in your locality?

Activity 2.4.

Perform this activity in your groups carefully

The material you need are distilled water, thermometer, boiling chips, beaker, burner

- Take 20-30ml of water in a beaker

- Put the beaker on a burner, and watch
- Before the water starts to boil please hold the thermometer a little above the surface of water
- At what temperature the water starts to boil?
- Discuss the result with the class.

To sum up, the physical properties of water has helped us to identify it from other liquids. Moreover, some of the properties of water are measurable while the others are not,. Freezing point boiling point, and density are measureable while odour and color are not measure able.

Table 2.1. Boiling and freezing point of some liquid at 1-atm Pressure

Liquid	Boiling point	Freezing point	Density
Ethanol	78^0C	-169^0C	0.61gmlcc
Benzene	80^0C	5.5^0C	0.88gmlcc
Water	100^0C	0^0C	1gmlcc
Ether	34.5^0C	-116^0C	0.71gmlcc

Exercise 2.1.

Choose the best answer

1. Which of the following is not a physical property of water
   A. texture B. Colorless C. Boils at 100^0C D. Odorless
2. One among the following is a measureable physical property of water.
   A. Texture B. Freezing point C. Odour D. Color
3. -40^0C is the same as
   A. 40^0F B. 32^0F B. -32^0F C. -32^0F D. -40^0F
4. Which of the following process takes place at all temperature
   A. Freezing B. Boiling C. Evaporation D. none

2.2. Water as a neutral compound

Competencies:-

At the end of this section, you will be able to

- tell the chemical composition of water.
- Indicate that compounds are either acids or bases or neutral.
- Describe the general properties of acids, bases and salts

- Give examples of acids and bases.
- Identify acids and bases using locally prepared indicators.
- Use safety rules with acids and bases
- Show that water is a neutral compound.

Activity 2.5.

Perform this activity in a group of 10-15 students. Take three substances water, petrolatum(or Vaseline) and table salt

- What is common among these substances?
- What differences do you observe among the substances
- Which difference is basic between a compound and a mixture

From your grade -5 lesson you had seen that compounds and mixtures are different substances. A compound is a substance formed by the chemical combination of elements or simpler compounds. Water is a compound formed by the chemical combination of hydrogen and oxygen. The properties of water are different from those elements. In addition to this water as a compound is different from a mixture of hydrogen and oxygen. When hydrogen burns in the air on cooled flask a colorless liquid is collected the flask. The formation of water after the process can be tested or checked by:

I. Using anhydrous copper (II) sulphate (white to blue)
II. Using anhydrous Cobalt (II) Chloride (white to pink)
III. Measuring the boiling point or freezing point

There are many other compounds formed like water. They are classified in to different groups according to the properties. Some of these are grouped under acids, bases and salts.

Activity 2.6

Perform this activity in groups of 5-7 members.

- Name acids that are found in food stuffs
- What common properties do they have?
- Discuss on each group report
- What is the conclusion?

A. Acids

Acids are the most important groups of compounds. They are mostly formed by the chemical combination of non-metallic oxide and water. In general they have a sour taste; but they can be used in food stuffs some of the acids used in food stuffs are citric ethanoic, tartaric and ascorbic acid. Citric acid is the acid that is found in citrus frnits like lemon and orange. This acid can be used in the extraction of medicines. It can also be used as it is to protect from deficiency diseases. Tartaric acid is a crystalline acid which found is obtained from wine vats ('Yewenfir' in Amharic). It is used in baking powder and as food stuff additive. When it is added to water, the acid dissolves and reacts with baking soda to make the mixture more pleasant to drink. Baking powder is a mixture of tartaric acid and baking soda, added to cakes to make them rise during baking.

Besides, the acids mentioned above are laboratory acids. Hydrochloric, nitric and sulphuric acids are the common laboratory acids. They are usually kept in a reagent bottle properly labeled.

Fig 2-4 some common laboratory acids

The above mentioned laboratory acids are also considered as industrial acids. In particular nitric and sulphuric acids are widely applied in industries.

B. Bases

Bases are another group of compounds which formed by chemical combination of simpler compounds except ammonia. Most bases are formed by the chemical combination of metallic oxide and water.

Activity 2.7.

Perform this experiment in groups of 5-7 students.

- Name some bases which are known in your locality
- What common properties do you observe among them?
- What differences are there?
- Discuss in your groups

Sodium hydroxide, calcium hydroxide and ammonia solutions are some of the common laboratory bases. They are commonly have a bitter taste. They are also important in industries . For example, sodium hydroxide is used in soap, paper factories, and in textile industries.

Activity 2.8.

Perform this groups of 5-7 student

- Mention some of the uses of calcium hydroxide
- State uses of ammonia solution
- Discuss the solutions in your groups

From the above discussion, we have seen that acids and bases are important compounds. But, both these compounds are corrosive and dangerous. There fore, proper handling is necessary. Since they are potentially harmful, they have to be handled with a special care. Strictly follow the following safety rules carefully while working with these chemical compounds.

Safety Rules

1. Never taste chemicals.
2. Wear gloves and goggles.
3. Uses test tubes and test tube-holders.
4. Follow the procedures strictly.
5. Never add water to acids.
6. Do not use highly concentrated acids and bases.
7. Clean the table immediately, if these chemicals are spilled on the table (use too much water)
8. Wash the part thoroughly with too much water if these chemicals are spilled on your hand (body) by chance or accidently.
9. Place the chemicals after you use, in their proper place.
10. Clean the table, test tubes and other laboratory equipments with sufficient water after you complete the work (experiment)

Following these safety rules is important to save your and others life. Besides, you will save material,

a) oxidizing	b) Harmful irritant	c) Dangerous for the environment	d) General Danger
e) Risk of fire	f) risk of explosion	g) Toxic Hazard	h) Corrosive substance
i) risk of Ionizing radiation	j) Non- Ionizing radiation	k) Risk of electric shock	l) laser beam
m) Biohazard			

Fig 2.5. Hazard signs

The hazard signs are mostly appear on the reagents bottles of acids and bases. They are also appear in containers and large store houses like fuel stations. The fuel stations can catch fire

easily because there are inflammable substances in them which can bring about a great damage. Have you ever seen the sign_Fig 2-5 (e)? It tells you that the barrel contains an easily inflammable substance, so do not smoke or do not perform fire-work around.

Activity 2.9

Perform this activity in groups of 7-10 students

- Name the danger signs you know other than those in figure 2.5.
- Write the meanings of each danger sign
- Discuss this in your groups.

In our discussion water as a compound we have also thoroughly analyzed other compounds. That is acids and bases are also formed in the same way like water. To identify one compound from others, their physical property can be used. This can be a visible or tangible evidence to assure what the compound look like in the real world. Scientist device a special kind of paper or solution to indicate the nature of the compound. That means to tell whether the compound is acid or base or neither of the two, this indicating substances are used. Therefore, an indicator is a substance used to show the presence of a chemical substance or ion by its colour. Acid base indicators are compounds, such as phenolphthalein and methyl orange.

Table 2.2 Indicators and color change

Indicator	Color change	
	Acid	Base
Litmus paper	blue red	Red blue
Phenolphthalein	Red colorless	Colorless red
Methyl orange	Yellow orange	Orange Yellow

Activity 2.-10

Perform this activity in groups 5-7

- Take any three substances, fore example pure water, saliva and lemon juice
- Use litmus paper to identify whether the compound is acid, base or neutral
- Discuss your report with the class

From activity 2-10 it is clear that water is neither acidic nor bbasic. In other words, water is a neutral compound. So, it is important to know that indicators will not tell us the quality level, but only the kind of substance.

Activity 2-11

Perform this activity in group of 7-10 students.

- Collect arose flower from a school garden or some where else.
- Put the rose flower in a dish containing water for about 5-10min
- Insert a piece of paper (white)in the dish and keep it for about 2-5min
- That paper will be colored, you can use it as a litmus paper
- Put the litmus paper in test tube containing a basic solution
- What change have you observed on the paper?
- Discuss this with the class.

C. Salts

In the above discussion we have two compounds formed in the same manner as water. Do you know other groups of compounds? Acid and bases seen to be chemically opposite. When acid and base are added together a chemical reaction takes place and another group of compound called salt is formed. There are many kinds of salts which are important for our life. Some of them are used as food stuff and others are used for medicines.

Activity 2-12

Perform this activity in a group of 5-7 students

- List some common salts.
- Describe the uses of the listed salts.
- What differences have you observed among the listed salts?
- Are salts acidic, basic or neutral?
- Discuss the question together with the class

The seas and oceans of the world contain 97% of our plant's water. Sea water is water that has various things which are dissolved in it chiefly salt. Salt water boils at a higher temperature than pure water. Animals who live in seas get their food from the salt water. They are commonly called sea animals. Most of the minerals found in the seas are salts. The sea-animals get al of their minerals by eating living things that contain the minerals. The minerals that an animal needs are commonly found in non living materials. A very large part of the body in every animal is water. Animals obtain water in Three ways:- These arel

i. They can drink it directly.

ii. they can obtain it form the food they eat

iii. Animals that live in a watery environment can simply absorb water through their skins

As we see from the above discussion most of the planet's water and minerals contain salt. That means one-way or the other salts are our food stuffs. There are also salts that can be used as a fertilized. Ammonium nitrate, ammonium phosphate (DAP) and potassium chloride are some of the salts that are used as a fertilizers. Are these the only uses of salts?

Activity 2-13

Perform this activity in groups of 7-10 students
- Name some of the salts that are used as medicines - Describe the kinds of diseases that these medicines are administrated for. - Discuss your group-report with the class

To sum up, we have seen that water is a neutral compound by comparing with other compounds. Salts are compounds which are different from acids and bases, but they can be formed by the combination of the two compound. The unique property of salt is that it can be neutral, acidic or basic in nature. Salts which are neutral are commonly called normal salt fore example, table salt (sodium chloride).

Exercise 2.2

I. Say true or false

1. Water is neither acidic nor basic compound.
2. Water is formed by burning hydrogen in the air.
3. Saliva (Human) is acidic in nature.

II. Choose the best answer

4. Which of the following salt is considered as our food stuff.
   A. table salt B. copper sulphate C. sodium carbonate D. potassium chloride
5. A salt considered as washing soda is
   A. potassium chloride B. table salt C. copper sulphate D. sodium carbonate
6. Water is a result of a chemical combination of

   A. oxygen and hydrogen B. hydrogen and nitrogen

   C. nitrogen and oxygen D. hydrogen and carbon monoxide

II.3. Clean Water

Competencies:-

At the end of this section, you will be able to:-

- Describe clean water.
- List the factors that make water unclean.
- State simple methods of purification of water.
- Demonstrate simple methods of purification of water.

Activity 2-14

Perform this activity in groups of 5-7 students.
- List the types of water you now. - Describe the differences among the types of water. - Which of them are clean? - Explain why the others are unclean. - Discuss your group reports with the class

Water is needed to fulfill different needs in so many different ways. It is vital to life in all physiological activities of plants and animals body. In the process of photosynthesis, which green plants make their own food, water plays a decisive role. Therefore, it serves as not only to quench the thirst but also to meet the food requirements of plants. But the type of water the

plants need can not quench the thirst of man. Drinking water and the water used in industries (machineries) should be clean. A clean water is that does not contain impurities and micro-organism in it. In other words it is the water that is safe to drink, or that does not affect health. But most off the water in the world is unclean. What makes water unclean?

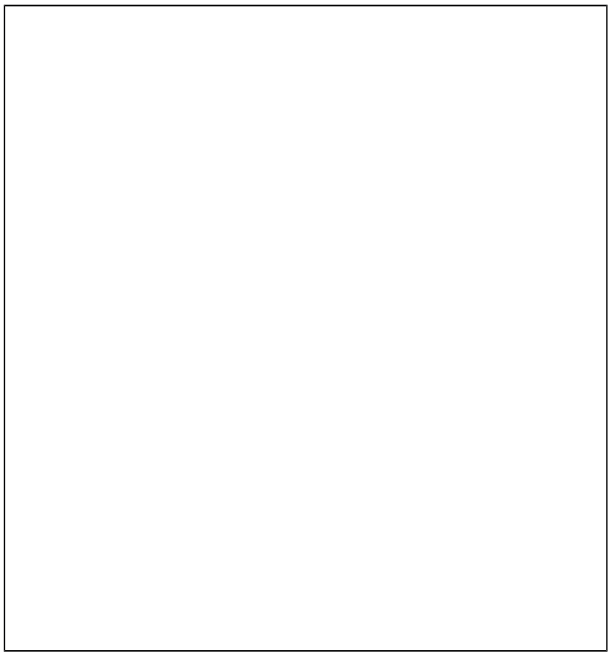


Fig 2.6. Activities that make water unclean

Human beings use water for routine activities like for drinking, irrigation, industries, transportation etc. From fig 2.6. we can under stand that people over use the water resources and pollute the water every day. Water pollution is the state of deviation from the pure condition, its normal function and properties are also affected. The figure shows that major routes of pollutant inter changes. Some times clear water seem to be clean but not clean because it contains harmful microorganisms. So, water can be unclean because of impurities that can be seen or the things that cannot be seen.

Fertilizers, insecticides, detergents, industrial wastes, sand and other particles are visible materials that make water unclean. Rivers carry these wastes to the seas, the pollutants constitute hazard since they can be absorbed by fish and finally are eaten by us. More over, the unseen dirts in water that are micro-organisms can be taken by us as we drink water. How can you remove these dirts?

Activity 2.15.

Perform this activity in group of 5-7 student.

- List the sources of drinking water in your locality
- What methods are applied to get clean water?
- Explain the difference among the methods applied to get clean water
- Discuss on your group-report with the class.

Our drinking water must contain none of the pollutants mentioned above. Different methods of removal of these dirts can be applied. Some of the common methods are: decantation, filtration and distillation. The fastest but the least effective method is decantation. It can most probably remove only sand and other weighty dirts. Filtration is better because it can remove minute particles and small micro organisms. Now a days there are different forms of filtration techniques: such as, sand filter and electric water filter. In the water works of a town, raw untreated water is mixed with alum. When some of the impurities settle down, it is then passed through several layers of sand which acts as filter. Finally, liquid chlorine is added to kill the germs. This purified water is now pumped to different parts of the town. Water for industrial process can also be purified in the same way (malt-factory in Assela) How does the modern electric water filter work?

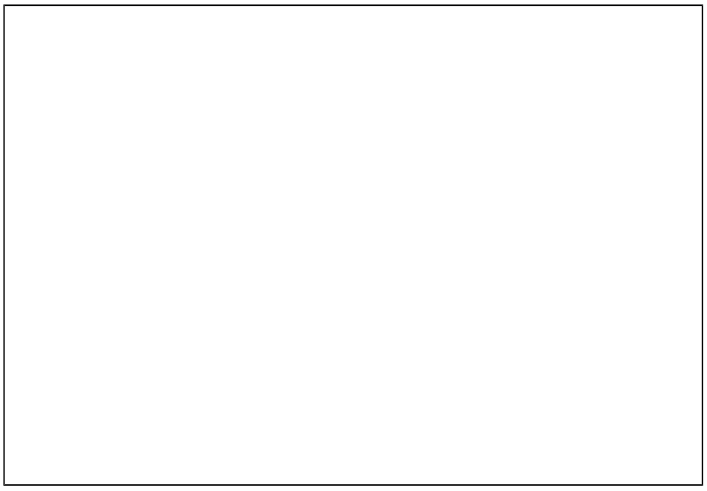


Fig 2.7. Modern electric filter

The modern electric water filters kill bacteria using ultra-violet rays. They do not kill viruses. But, it is by far better than the above mentioned methods. The most effective way to purify water is by boiling it for 7-10 min after filtering and it kills most of the harmful germs including some viruses. There fore, boiling is necessary to kill any harmful microbes which as in water .

Distillation is an obvious way of softening water, as this removes all dissolved solids (Salts) and hence produces pure water. A distilled water is pure and clean, so it is safe to drink.

Sea water contains too much salt, it is unsafe to drink and to use it for machinery (in industries) One of the most common ways of removing dissolved salt is distillation. When these salts are removed, the water may be used for domestic consumption. From the above discussion which is the best technique filtration or distillation?

Activity 2.16

Perform this activity in the form debate
-Form two groups of students -One group says filtration is very important method than distillation -While the other supports the idea that distillation is a very important method than filtration

Filtration and distillation techniques of purifying water are different as can seen from the above discussion. But both of them are applied alternatively to prepare drinking water.

Table 2.3. Difference between filtration and distillation

Filtration	Distillation
- Uses filter paper and funnel - Removed only insoluble impurities - Do not necessarily kill microbes - The final product is filtrate - Clear but not clean	- Distilling flask and condenser - Remove in soluble and soluble impurities - Can kill microbes - The final product is distillate - Pure and clean water, preferable to drink

The last method to prepare clean water is passing chlorine gas through water and ion-exchange methods. Chlorine is commercially used as bleaching agent and disinfectant (kills germs). This method can be called as chlorination, and is the most effective of all methods discussed methods above. Which method of water treatment is used in your locality or town?

Filtered water (filtrate) can be treated with chlorine tablet and then repeat the exercise with another agar-gel to show that chlorination kill off microbes.

To sum up, water is an important thing that is needed by both plants and animals. In particular for human beings, it is crucial. Two thirds of our body, by mass is made up of water. It is extensively used in industries for heating and cooling, for producing steam to drive turbines, and as a solvent. There-fore, getting a clean water is crucial. For this purpose identifying and applying better technique is very important. In some countries ozone is used instead of chlorine.

The disadvantage of ozone is that it does not have any residual sterilizing effect. Therefore, If the sterilized water becomes contaminated again before it is used, there will be no ozone left in the water to remove the contamination.

Exercise 2-3

Choose the best answer

1. A clean water may not be used necessarily for_____
   A. drinking B. Machinery C. Irrigation D. none
2. Water should be necessarily clean when used for_____
   A. Machinery B. Irrigation C. Transportation D. none
3. Most of the water in the world is_____
   A. Clean B. Pure C. Salty D. all
4. Which method is the best to get clean water?
   A. Chlorination B. Filtration C. Decantation D. Smoking

II.4. Water borne Diseases

Competencies

At the end of this section, you will be able to:-

- list some common water borne diseases of their locality.
- Mention the causes of ascariasis and bilharziasis.
- State the symptoms of ascriasis and bilharziasis
- Describe the modes of transmission and methods of prevention of ascariasis and bilhariziasis
- Discuss disposing human wastes at wrong places are harmful practices.

Activity 2.17

Perform this activity in groups of 5-7 students
- Select the health center or hospital in your village or town. - Assign your groups to go to one of the health centers or hospital .

- Ask how many patients were there last year.
- How many of the patients were affected by water borne diseases.
- Discuss your group report with the class.
- Which type of water borne disease affect in your locality?

How do you define a disease? Which diseases are common in your village or locality? Diseases can be grouped in to two, as infections and non infections. Infections diseases are contagious or communicable diseases that are transmitted from person to person or from animal to person. Therefore there are living infections agents, which are transmissible.

The infections agents can be viruses, bacteria, fungi, or protozoa Transmission of infections agents may be occurred by contact, ingestion from contaminated hands, food or water. Do not drink unclean water. Wash your hands in clean water after leaving for the toilet and before you eat. Cholera, typhoid dysentery and bilharziasis are serious diseases that are carried by water. What are other diseases that are carried by water?

Fig 2.8. Practice washing hands after toilet and before you eat

A- Ascariasis

Ascariasis is an intestinal infection that occurs when eggs of parasitic round worm enter to the body in infected food or water. So, when preparing food, washing hands using clean water can protect as from infection. The diseases are transmitted either passively by ingesting infective eggs of parasites or actively by precutaneous spread of filariform larva. When people swallow eggs containing larvae, the young worm hatch and are set free in small intestine and begin the migration. That is through the walls of small intestine to the liver. They are then carried by the

blood stream to the right heart and to the lungs, there they remain for several days. Finally, they may re-enter to the small intestine where they become sexually matured for about two months.

Fig 2.9. The movement of ascariasis worm in an infected person

Contact between the mouth and various inanimate objects carrying the adherent eggs can also spread the infection. When the number of worms are small there are not obvious symptoms. But more serious infection results in inflammation, fever and diarrhea. Serious problems may occur if the worm migrates to other parts of the body as shown in figure 2.9.

B. Chlorea

Cholera is a disease of rapid onset characterized by vomiting and profuse dchydrating diarrhea with ‘rice water stool’. It is marked toxaemia (blood poisoning) muscle cramps, suppression of urine and shock occurs later. It is caused by vibrio chlorea. Transmission is caused by contaminated water, food, flies and also in-animate objects. The early diagnosis, isoltation and treatment of patients with antibiotic is important to control the spread of the

diseases. But before a patient (infected person) takes antibiotic medicine a home made oral dehydration salt (ORS) may help him for the time being. How can we prepare home-made ORS.

Activity 2-18

Perform this activity in groups of 5-7 students

- Get distilled water minimum one litre (boiled-cooled and filtered)
- Spoonful of sugar
- Table salt (1/4 a spoonful salt)
- Add small amount of lemon juice.
- Shake the bottle until the sugar and the salt are dissolved
- Keep the bottle closed to keep the solution clean.
- Compare the taste with normal ORS prepared at clinical level.
- What difference have you observed?
- Discuss with the class.

If some one has had diarrhoea, give him one glass rehydration salt solution to drink slowly everyhour. If the patient does not recover, take him to the nearby clinic or hospital. Chlorea was once an empdemic diseases in Ethiopia. When did this happen? How many people were affected?

C. Shigellosis

Shigellosis is a diseases characterized by diarrhea (Containing blood, mucous and pus), fever and sudden onset of abdominal pain. It is caused by several varieties and species of shigella which are subgrouped in to four.

Shigellosis is transmitted by focally contaminated food, water and flies. Food we eat may be contaminated through soiled fingers of patients, carriers or flies. There fore, using of unclean water enable to transmit (carry) shigellosis from person to person. Shigella is a bacteria normally present in the intestinal tract of worm- blooded animals and humans

Activity 2-19

Perform this activity by grouping the class in to three

- Let the first group collect information about amoebas is (group-A)
- Let second group collect in formation about shigellosis (group –B)
- Let third group collect in formation about cholera (group –C)
- Ask all groups to report their findings to the class.
- Let the class discuss on these diseases with respect to their localities or villages
- Which diseases are widely known in your village? Why?

D – Bilharziasis

Bilharziasis or schistosomiasis is a disease caused when the larvae of a parasitic flatworm enters to the body through the skin. /The larval develops in the body spending time in the lungs and liver before it goes to the kidneys and bladder it is transmitted by an intermediate hosts which are called fresh water snails are various species of snails which are responsible for transmitting the disease. The transmission in caused by wading, swimming, bathing or washing clothes and utensils in the water bodies (rivers, lakes, etc),that are pollutes with infective larvae.

Fig 2-10 Transmission of Bilharziasis

The infective larval stage for man, emerges from the snail and swims. When there is contact with man it penetrates the skin, sheds its tail and becomes schistosomula then it goes to veins (blood vessel) and it will mature to adult worm. At a lesser extent the immature adult worms cause chronic inflammatory changes. But at a later stage of infection there may be abdominal pain and pronounced dysentery blood and mucous passed out of the intestine in the form of feces. The liver and spleen may be enlarged.

Activity 2-20

- Perform this activity in groups of 7-10 students.
- Select health centre of hospital in your locality or town.
- Go to the heath center or hospital for which you are assigned and then introduce your self and ask the following questions
- How many patients did you see who are effected by water borne diseases?
- How many of these patients were infected by bilharzias is (or schistosomiasis)?
- What were the reasons for the diseases?
- Discuss your report with the class

Since Ethiopia is a land of many rivers every body has to take care in using water from rivers and lakes. Bilharzias is not only affect abdominal part, liver, kidney but also it affects the urinary system. Blood and mucous may pass out with urine. The symptoms are abdominal pain, coughing, diarrhea, fever and tiredness.

Acacias is, chlora, shigelloses is and bilhariziasis are some of the water- borne diseases which are common in Ethiopia. A person who is infected can transmit the disease to others. Eggs from the parasitic worms leave the body in the form of feces and live in water. What measures should be taken to remove these parasitic worms? How can a person be protected from such kinds of diseases?

As can be seen from the above discussion while we are drinking, bathing, Washing utensils and preparing our food, clean water has to be used. This is because water might become contaminated by infected feces.

Table 2-4 Causes and symptoms of some water-borne diseases

Diseases	Causes	Modes of transmission	Symptoms
Ascariasis	- Nematode (round-worm	- By contaminated food or drink (water) faeco-oral disease	- Larval development in the liver and lungs, fever allergic dermatitis& pnesmims - Heavy infection may result in vomiting. Abdominal discomfort
Chlorea	- Vibriochlorea	- Contaminated water and found	-Vomiting, diarrhea with rice water stool, -muscle cramps & shock occurs later -Marked blood poisoning
Shigellosis	-Several varieties Sub grouped in to four -the epidemic due to s. dysenterial	-by faecally contaminated food and water	Characterized by fever and sudden onset of abdominal pain Diarrhea containing blood mucous and pus
Bilharziasis	-treated infection deacon (carried by fresh water snails)	-infected water By wading, swimming, bathing and washing clothes and utensils	- Chronic inflammatory changes - Abdominal pain dysentery blood and mucous in faces and in urine

The diseases mentioned above in Table 2-4 are all water – borne discuses which are transmitted from person to person easily through unclean or contaminated water. There fore, every body has to use clean water. But most of the water which are found in nature are not clean. That is found in nature can be classified in to two as surface and ground water.

Surface water – sea water, oceans, river water, lake water

Ground water – well water spring water

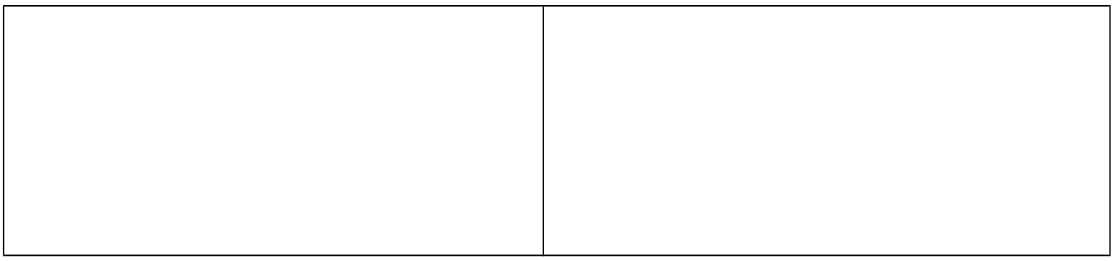


Fig 2-11 Different types of water

As can be seen from figure 2-11 most of the water are not clean except the tap water. The rain water may seem clear but not clean because it may contain micro- organisms. A tap water is filtered and chlorinated form of water. There-fore, it is relatively clean. It is preferable to use rain water for washing clothes or washing utensils because it does not contain or may contain a minimum amount of dissolved minerals. The other types of waters are unsafe to drink or to use them for other purpose (even for swimming). These waters might be clean by applying one of the methods discusses in section 2-3. Once the water is made clean the containers, drinking vessels (glasses) and stores (water reservoirs) should also be made clean. A chlorinated water is the best to be used in all aspects. Because when chlorine is added to about two-thirds of it simply dissolves forming hydrochloric acid and choric(I)acid. This bleaches (choric acid) water, and acts as a germicide (germ killers) which can be used for sterilizing. The gas (chlorine) itself is used to kill harmful bacteria in drinking water and in swimming pool water.

The other way of to be protected from water born diseases is to avoid disposing human wastes, at wrong places. This adds danger for the community. Which may result at times epidemical disease to be spread.

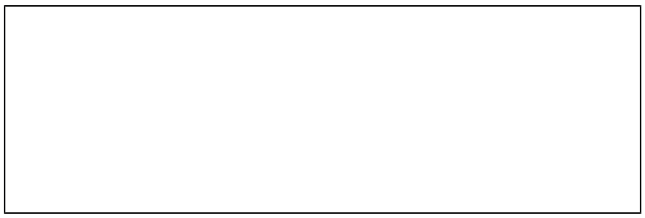


Fig 2-12 Disposing wastes at wrong places

In recent years, water pollution has become a serious problem. People are disposing domestic and industrial wastes at wrong places as can be seen in figure 2-12. This experience aggravates the problem of getting clean water. More over, it can be a cause for the spread of water-borne diseases. There fore we have to devise a plan for the provision of clan water

i. – protecting water bodies is important
ii. – A proper place for wastes should be kept which should be far away from water bodies.
iii. If possible burry or burn wastes as soon as possible
iv. Spray chemicals at intervals whenever there is demanding conditions

The other possible measure to be taken to protect the community from water-borne diseases is having properly constructed latrine.

Activity 1-21

Perform this activity in groups of 7-10 students .

- Select the road side of your village
- Assign the groups to different parts of the roads side
- Register properly constructed hygienic latrine

- Register houses that do not have properly constructed hygienic latrines
- Identify latrines which are constructed with water supply. Identify latrines where more than two families use in common / or the public latrine
- Discuss your group report with the class
- What are your conclusion?

A latrine should be constructed property, separately and should be a way from the water supply. This will protect us not to be affected easily by water-borne diseases.

fig 2-13 properly constructed latrine Vs improperly constructed latrine.

Exercise 2-4

I match 'A' with 'B'

A	B
1. Bilharziasis	a) is an epidemic disease
2. Boiling point	b) freezing point
3. Cholera	c) physical property
	d) fresh water snail
	e) air-borne diseases

II choose the best answer

4. One among the following is not water borne disease

A. pneumonia B. Bilharzias C) cholera D) Shigellosis

5. Which of the following is a water borne disease?

A. malaria B. pneumonia C) influenza D) chlorea

2.5 Water and Technology

competencies

By the end of this section you will be able to:-

- Define crop irrigation as to bring water to crops through canals.
- Explain the importance's of crop irrigation
- Describe methods of crop irrigation
- Indicate the application of water pressure in crop irrigation.
- See how electric energy is generated from water.
- Define con doctors as materials that will carry an electric current
- Give examples of conductors.
- Define insulators as a material which do not allow electricity to pass through it.
- Give examples of insulators
- Define electric current as the flow of electricity through a wire.
- Define voltages as an electric force
- Demonstrate series and parallel connection by constructing simples circuits
- List electric appliances at home as technological products.

Activity 2-22

Perform this activity in groups of 7-10 Students

- select a garden place, it can be in side or outside your school
- The group seriously observe the difference in the growth of certain plant
- Think or ask why there is a difference in the growth of plants.
- Register the color or size differences you have observed
- Register how do these plants get water? Is it only from rain or any other source?
- Discuss your group report with class

How do plants get water? What is the importance's of water for plants? When rain drops on the dry soil, the soil particles will set wet.

As the rain continues raining land surface will get wet. The gravity will pull the excess water down through the spaces in the rock sand or gravel below the surface of the earth. It is from these film? That plants roots take up all the water they need. But rain fall now a days is highly variable. More over water is being unevenly distribute over the land, it is important to devise a system to control and manage properly the water movement. The controlling and using water effectively done by means of constructing dams. The progress of developing countries like Ethiopia usually involving the ability to build dams to agriculture, power generation (like Reinasiance Dam on Abay river) and flood protection. Most of the rivers in Ethiopia are not effectively used.

Activity 2-23

Perform this activity in groups 7-10 students

- List the names of the rivers in Ethiopia
- Try to set the exact location
  Of these rivers (Region, zone, ward or mountain
- Which rivers are used for agricultural purposes (irrigation)
- Which rivers have dams for power generation (electric)
- Which of them are used for both irrigation and power generation
- Discuss your group report with the class

A Irrigation

Irrigation is a mechanism that supplies water to crops where the rain fall is in sufficient or small. This is more practical and fruit full in hot areas where there is a little amount or no rain fall. It is also applicable to use water economically, During the dry season. The method is helpful

i. Reaching to all plants
ii. Minimum time
iii. Not wasting water (con trolling the amount of water that can reach to the plant)

The method of irrigation can make the agricultural process more productive with a minimum expense. It is also economical because there is no wastage of water. Besides, the period of harvesting can be more than in a given pored of time .

Activity 2-24

Per form this activity (debate) by grouping the class in to three (according to the interest of the students)

- Let the group select any kind of irrigation.
- Group A may explain the advantages of drip-irrigation
- Group –B may explain the advantages of sprinkler irrigation
- Groups c may explain the advantages of cannel irrigation
- Which one is the best kind if irrigation? Why?

Which method of irrigation is used un your locality? What are the good qualities of this kind of irrigation? Can you suggest on modification the method? In each method of irrigation there might be certain defects. But the most important thing is by any means of irrigation the water that is needed by the plants easily reaches to the plant. The global average irrigation efficiency (successfulness) is estimated only 37 –percent. New irrigation technologies can increase the percentage significantly. The drip irrigation, involving a network of perforated plastic tubing can achieve up to 95- percent efficiency.

Fig 2-14 A net work in drip irrigation (in the school garden

The drip-irrigation which is shown in fig 2-13 can increate crop yields, because it avoids saturating the soil with water. An alternative to drip irrigation is a newly d nkler system, Which gives water in small doses (amounts) just above the soil surface. This system is particularly effective for grain crops.

Fig 2-15 Sprinkler – system of irrigation

Most of the world's farmers (including Ethiopian farmers) lack the needed capital and maintenance facilities. What can be the solution for this? Discuss this and related issues with each other. Improving irrigation efficiency is important not only for water conservation per-Sec, but for solving the problems which are caused by over use of the irrigation of water. It also

reduces salinization. Unless there is good drainage system the salts build up in the soil over times . From where do we get water for hot areas (low rain fall areas) can be obtained for irrigation?

People or farmers in hot areas may prepare reservoirs or build dams to keep water during the rainy season. The other alternative is if there is a river passing through farmers can change (reverse) the direction of the river or use pumps to set the water from the river. The third option is they may use under ground water by using triddle pumps and plastic pipes to direct the water to the farm areas

Fig 2-16 water from tridle pump Irrigation

The channel irrigation may be applied to extensive farms like sugar –cane plantation in wonji , Methara and Finchua. Plants which are near the channel need more water.

B) Water as a source of Electrical energy

When water moves slowly, it becomes calm flowing liquid, But when it is under pressure, it will become a powerful force. Water does not require any external force to create pressure its weight is enough. Moving water contains a considerable amount of energy that can be used to drive machines. Some of the earliest machines were water wheels shich were open used to turn millstones in Amharic ‘yeweficho Dingaye’ to grind corn.

Fig 2-17 A river –showing water fall

The modern equivalent machine is turbine, which uses water power to generate electricity . Electricity is generated by water power which is known as Hydro-electricity. Hydroelectric power stations are cheap to run, because their fuel (water) comes from free of charges. Water stored behind the dams in order to provide a constant supply. Each turbine is attached to

electricity generator in the power- house in front of the dam. The electric current is produced and then carried by cables to the pylons carrying the power supply.

Fig 2-18 Hydro electric power plant

Dams generally electricity by releasing a controlled flow of high pressure water from reservoirs through a channel. The current then passes through a “step-up” transformer that changes it from a large current at a low voltage to a small current at high voltage. Ethiopia has hydroelectric powers at the Awash River in koka, melka-wekane, and at wabe River. But nowadays a number of dams are being constructed, and some have already been generating electricity. The most important and the largest-dam of all is the great Renaissance dam which can generate 5250 mega-watt is under construction. It is constructed on the river abay.

Table 2-5 Hydroelectric power generation Installed capacity ICS generation plant

R.No	Name of Hydroelectric p.	Capacity Installed p.	Dam on River	In service year (GC)	Renewal
1.	Koka	34.2	Awash	1960	
2.	Awash II	32.00	Awash	1966	
3.	Awash III	32.00	Awash	1071	
4.	Finchua	134.00		1973	renewed (2003)
5.	Meleka wekena	253.00	wabe	1988	
6.	Tis Abay-1	11.00		1964	
7.	Tis Abay –II	73.00		2001	
8.	Gelegel Gibe I	184.00	G.be	2004	
9.	Tkeze	300.00	Teleze	2009	
10.	Gelegel -2	420.[00	G.be	2010	
11.	Tana Beles	460.00		2010	
12.	Finchua-Amertnesh	97.00			

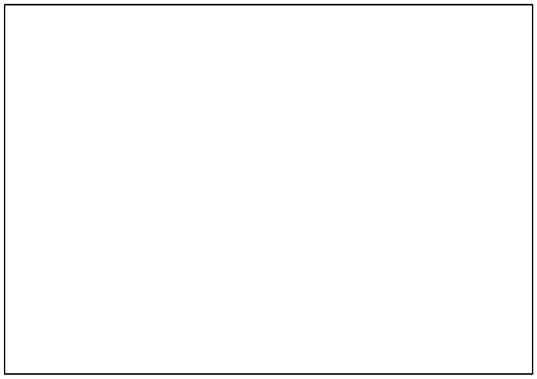


Fig 2-19 The Great Renaissance Dam on the abay river

In Ethiopia most people and areas get electrical energy from hydro eclectic powers but there are also other sources such as wind –power, geothermal and diesel that can help to generat electricity. The newly constructed dams on the Gibe (184 +420-MW) and Tekeze River (300MW) are generating additional energy for the country. By what percent of will ‘The Great Reinaissance Dam’ increases the amount of electricity for the country? How many Megawatts of electrical power is expected from this great dam?

C) Conductivity

The electrical energy is produced at the power stations may be trans-ported to different areas by means of conductors. Conductors are materials that can pass current through them. Substances that can not conduct current are called insulators.

Activity 2-25

Perform this activity by grouping the class in to two.

1) Let you connect the cells, a bulb and the wire in series and put the switch place open
   - Bring and put the copper metal at open place and observe the Situation. Does the bulb gives light ?
2) change the metal switch by plastic and wood, and observe the situation
   - Does the bulb give light?
   - Discuss the conductivity of those substance with the students

Conductivity is a property of a substance. All metal conduct electricity. The best metal conductor is silver which is used in circuits in computers. But silver is expensive. The best low cost metal conductor is copper. Current is the flowing of electron in a conducting media like copper. The electric current that flows from a battery always travel in the same direction. This type of current is called direct current (DC). But most of the electricity you use comes from the supply lines from the power station. This current is constantly changing directions backwards and forwards. It changes directions as often as 50-60 times per second, it is called alternating current (Ac). Ac is used for the mains supply because it can be transmitted more cheaply than Dc. For most purposes Ac is move efficient.

The electric potential difference from two points on a conducting wire carrying a constant current of one –ampere which is measured in volts. The potential difference electromotive force or village are represented by the symbol ‘V’. Current and voltage are different. It is possible to assume the difference by a water falls analogy. That means the current as the amount of water and the voltage the height of the waters fall. Voltage is directly proportions to current.

An electric appliance in a machine that you use to do some sorts of works probably you use many electrical appliances in your home. Appliances may use electric power to produce light or heat to drive motors or to produce sounds. Different appliances use different amounts of

current. Each appliance has a circuit that can be connected in to the power supply. There are two types of circuits. These are series and parallel.

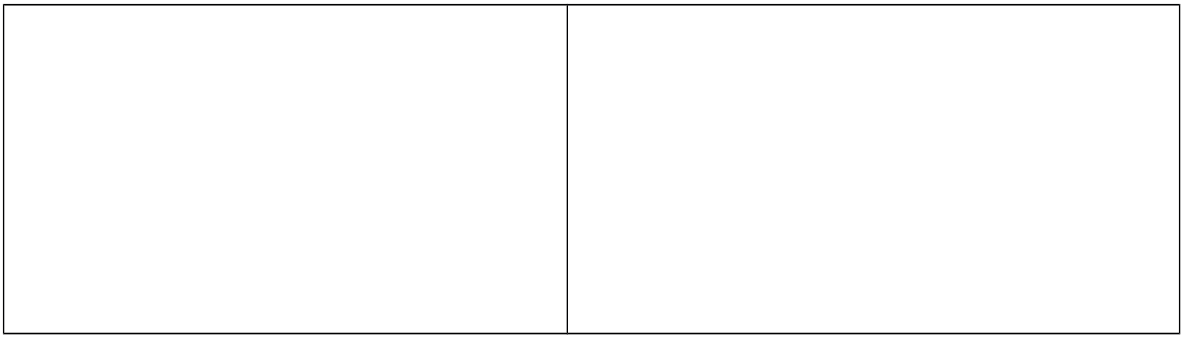


Fig 2-20 series and parallel circuits.

As can be seen on fig2-20 the voltage of a series circuit is different parallel circuit. To examine the difference, it is possible to carry out an experiment using a cell and two lamps in series and two lamps in parallel.

Activity 2-26

Perform this activity in groups of 5-7 students

- Get cell containing two dry cells
- First connect the dry cells in series
- Watch the light an the lamps
- Second connect the dry cells in a parallel form
- Watch the light on the lamps
- Discuss the difference with the class as a whole

Table 2.6 Difference between series and parallel circuits

Series circuit	Parallel circuit
- The total source current is equal to the current through each bulb - The sum of the voltage on each bulb is equal to the source voltage - Opposition to the current flow is larger than parallel	- The sum of the current through each bulb is equal to the source current. - The voltage on each bulb is equal to the source voltage - Opposition to the current flow is smaller than series circuit

The electrical appliance which is found in small scale is different from that of large scale. There are also differences of electrical appliance on the basis of the purpose of utility. Furthermore, the electrical appliance which is found is our homes varies on the basis of what they do. What are some of the works that need electrical appliance in your home?

Activity 2-27

Perform this activity in groups of 5-7- students.

- List the electric appliance which is found in our homes.
- What differences do you observe regarding the amount of energy needed?
- Which needs the maximum amount of energy and which needs the least amount of energy?
- Discuss the similarities and the differences among the different form of electrical appliances
- Discuss the group conclusion with the class as a whole

The survey of different electrical appliances in your home needs different amounts of voltage. It is also true that different amount of current can pass through to meet the required goal. Domestic lighting is connected in a parallel not in series, This also helps us to calculate, to determine the amount of voltage and current. In the same way it helps us to be aware of that electricity is potentially dangerous and appliances should be handled with care.

Activity 2-28

Perform this activity in groups 7-10 students
- List some of the possible dangers that can be created be-cause of using electricity in our homes wrongly. - What should be done first to avoid this danger ? - What measures should be taken if an accident occurred? - Discuss the group conclusion with the class as a whole

Exercises 2-5

Choose the best answer

1. Which river is used for both irrigation and generating electrical energy in Ethiopia?
   A) Awash B) Omo C) Wabe D) Baro
2. Watering the garden by pouring water on the growing plant is known as
   A) Erosing of water B) drip irrigation
   C) Chinnal irrigation D) Sprinkler irrigation
3. The water obtained from rain can be used effectively Except _____.
   i. For constructing dams B) practicing good farming
   C) water harvesting ponds. D) erasing of water
4. The type of electrical energy used from dry cells in
   A) AC B) DC C) both D) none

Unit summary

Water is a very unusual substance because we often see it in three physical stales. As a Liquid it flows in rivers and pipes, and as a vapor it floats in the air. When it is cold enough it freezes into solid ice, where its density decreases it floats in a liquid water. The difference among the states is the amount of energy in water molecules. These hydrological cycle can take place when the heat form sunlight vaporize the water in the oceans or rivers.

The boiling, freezing point and the density of water are the other physical properties of water which are measureable. This can tell us the purity of water at the noral conditions. Some of the other properties such as colorless, odorless and tasteless are properties of water which are not measureable. Furthermore we know that water in miscible with some Liquid such as ethanol, but not with other liquids such as naphtha and benzene. What does this tell you about water?

Water is formed when hydrogen burns in air or oxygen. Is the rain formed in the same way? The proportion of water are different from hydrogen and oxygen.This is a characteristic of chemical combination of substance. Some of these chemically combination substance are acids and base. To identify these compounds from water, we may use indicators,

Special care has to be taken in using and dealings with acids and bases, because they can damage property and our lives. The principle that you ***should not pour 'water into Acid'*** is very important while performing experiment in the laboratory. Fur there more, other safety rules has to be seriously considered. It is also important understand the meaning hazard warning symbols.

The groups of compound which are formed the chemical combination as in the case of water are salts. Some salts are neutral, while the others are acidic or basic. They are very important because they can be used as fertilizer, medicines, foods and pesticides.

A clear water seem to be clean but not. It may contain dissolved minerals and micro organism. So, drinking water should be clean. To get a clean water some purification methods should be exercised. Some of these methods are: decantation, filtration and distillation (boiling followed by cooling). There are different methods of filtration one of which is done by passing the water through a filter bed of gravel and sand. Modern filtering techniques can also be applied. Finally, it is better to treat the filtered water with chlorine . Adding chlorine is the best way and makes water safe to drink and also kills microbes.

There are different diseases that comes from drinking unclean water. Some of them are cholera, ascariasis, typhoid, garidia, and bilhariazsis. These diseases are mostly affecting the small intestine where the process of digestion of food is completed. So, special care has to be taken in using water for drinking and cooking. The prevention techniques should be

exercised to be healthy other wise the effect will be not to attend normal classes and it may event threaten our lives.

Water is used for great application in technology which may improves our living standards. World wide, agriculture accounts for the lion's share of water use and, agricultural demand in growing as population growth increases continuous (by now it is around of 7-billion). Large inputs of water is needed for agriculture because the growing plants, transpire rapidly. That is why nowadays new irrigation technologies are applied. They can increase the percentage of crop yield substantially. Some of these irrigation methods are sprinkler and drip irrigation. Despite the high cost of maintenance, they are very important.

The share of world electricity provided by hydropower is about 20 percent. Ethiopia has started to use the power more effectively than be for. Nowadays, in Ethiopia almost four rivers have damas that can generate electricity. There are also other rivers that can possibly be used.

Like other forms of solar energy, hydroelectricity adds no carbon dioxide nor other emissions to the atmosphere. Electricity is very important for the development of a nation. But it is not the only way to get out of poverty.

Review Exercise on unit 2

I) Say True or False

1. Water is formed by chemical combination of hydrogen and oxygen.
2. Tuberculosis is a water borne disease
3. Clear water looks always clean.
4. The presence impurities in water decreases its freezing point
5. The 'Great Renaissance Dam is being constructed on the Blue –Nile which generates 5250 megawatt or electrical energy

II Choose the best answer

6. How much percent of water in the world is non salty?
   A) 3 B) 50 C) 78 D) 97
7. Which of the following physical property of water is measureable

   A) Colour B) odour C) density D) taste.

8. One of the following electric appliances requires lesser energy.

   A) heat B) light C) Sound D) drive a motor

9. When people are drinking coffee in Ethiopian in what method do they get clear coffee?
   A) by filtration B) by decantation C) By sublimation D) by distillation

10. Which of the following is a water –borne disease?
    A) Guardia B) pneumonias C) TB D) influenza
11. Which of the following is not a surface water?
    A) Well water B) sea water C) river water D) rain water

12. In which of the following states the water molecules have the highest energy?
    A) gaseous B) liquid C) solid D) they have equal energy in all
13. The bacteria that are found in a polluted water can be avoided by _____ followed by _____.
    A) chlorination - filtration
    B) filtration – decantation
    C) decantation – filtration
    D) chlorination – smoking

14. Which of the following rivers in Ethiopia has not more than one dam to generate electricity?
    A) Awash B) Abay C) Gibe Tekeze

15. One among the following energy source carbon dioxide to the environment.
    A) hydroelectric power B) Solar energy
    C) wind power D) Coal

III Give short answers for the following questions

16. Mention two importance of water at large scale
17. State at least three electric safety rules.

Unit – 3
Plants

unit out comes: At the end of this unit you will be able to:

- Give examples of algae, fungi, Mosses and ferns
- Indicate their importance.
- Identity the parts of a flower and describe their functions.
- Define pollination, explain its type and list down pollination agents.
- Identify the parts of seed, and describe their functions, dispersal mechanism and processes of germination.
- Demonstrate the necessary conditions for germination through practical activities.
- List down the food storage organs of plant, give examples for each and explain the importance of plant foods for health.
- Explain the steps followed in raising tree seedlings and transfer of seeding explains how to give care to the seedlings as they grow.
- Describe the processes of harvesting and storing crops and compare traditional and modern methods of harvesting and storing crops
- Construct simple models of modern stories.
- Appreciate the role of technology of hybrid crops and selected seed varieties and compare them with normal crops.
- Demonstrate scientific enquiry skills. Observing, classifying, comparing and interpreting data.

3.1. Algae, fungi, mosses and ferns

Competencies

By the end of this section, you should be able to:

- Describe and identify plants such as algae, fungi, mosses and ferns.
- List down some examples of algae, fungi, mosses and ferns.
- Identify and explain the structures of algae, fungi, mosses and ferns.
- Indicate the habitats of algae, fungi, mosses and ferns.
- Explain the economic importance of algae, fungi mosses and ferns

Algae, fungi, mosses and ferns are small non- flowering plant like organisms. Algae, fungi and mosses have no root, stem and leaves like other higher plants, But ferns have true root, stem and leaves. They do not produce seed they are known as non –flowering seedless plants.

- They are capable of adapting different environment. They live in water habitat such as ponds, lakes, rivers, streams, seas and oceans some of them live on land habitat, on rocks, on other living organisms as parasites and on dead, decaying substances.

- They are important food source for aquatic and for many land organisms. There is a multi- cellular and uni-cellular alga. Uni- cellular algae live in fresh water. All uni-cellular algae are known as green algae.
- Multi –cellular algae are live in marine water (salty water) such as seas and oceans, brown and red algae are multi-cellular algae.
- Most fungi is uni-cellular while some of them are multi-celluar.

Activity 3.1

Identification of algae.

Discuss in your groups on the following questions Questions for discussion. I. Have you ever seen the mass of Slimy green substance on the surface of stagnant water and on stones near by water shore? II. What do you observe? III. Do you think that mass of slimy green substance where algae?

Algae

What algae look like?

Algae are small plant-like organisms with simple body structures which have no root, stem and leaves. They are non-flowering seedless plants. Usually algae are aquatic, which are living in water and commonly known as sea weeds.

Most algae are uni- cellular that have one cell and colonial. All green algae are uni –cellular.

Examples of uni –cellular green algae are:
Chlorella, spirogyra, Volvox etc.

Fig 3-1 chlorella Uni- cellular green algae.

Fig 3-2 volvox Uni – cellular green algae.

Activity 3-2
Identification of spirogyra

Materials required – Not book, pencil pen forceps, (small sticks)
Procedure –

- Go to the pond near by with your teacher
- Form groups of 4 to 5 students
- Observe a mass of green substances on the surfaces of pond and on stones found in the pond.
- By using forceps or small sticks take out the substance that you are observed

from the water surface and from the surface of stones and draw the structure of the substance with your pencil.

- 3. What do you feel when you rub it the substance between your fingers?
- 4. A substance you take out from the water surface is single or many?

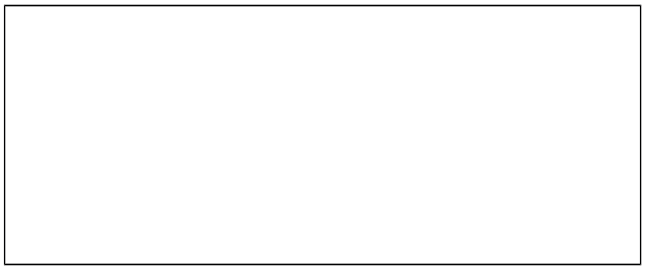


Fig 3.3. Spirogyra uni-cellular green algae

Spirogyra is Uni- cellular slimy filamentous green algae that live in colonies. That is many single cells come together and joined each other and to form tread like structures called filament.

All Uni-cellular green algae are photo synthetic. They can be able to produce their own food. They have green pigment called chlorophyll which contains in the structure called chloroplast .

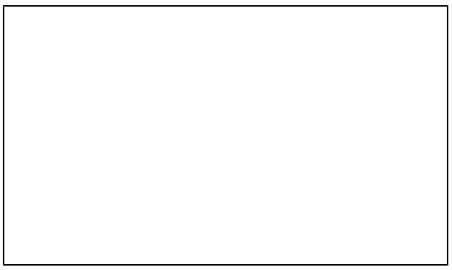


Fig 3-4. Ficus: multi-cellular algae.

- Brown and red algae are multi-cellular that they have many cells and which live in marine water such as sea and oceans and they are also photosynthetic.

Habitat of Algae

Where do algae live?

- Uni- cellular green algae live in fresh water such as ponds, Lakes, rivers. Some of them are live on tree trunks and moist surface of the land. For example, Chlorella usually

found in moist soil while spirogyra found in ponds and other stagnant water. It is also found on the surface of stones which and on the water shore.

- Brown and red multi –cellular algae live in marine water (i.e. salt – water) such as seas and oceans.

The Importance of Algae

Do you think that algae are important?

- Algae are very important organism.
- They produced food for other aquatic (water) organisms such as fish.
- Some algae are used as food by humans.
- They are important raw materials to produce chemicals and cosmetics
- Brown and Red algae are used by farmers as fertilizer and they also serve as food additives for cattle.
- Algae produce large amount of oxygen in water.

Fungi (Fungus – singular)

Activity 3.3. Examine the yeast cell

Materials requires:- note book, pen
procedure:

- Observe when your mother prepares 'injera' or bread in your home.
- See the prepared dough after few hours.
- You can observe the dough raises up
- Ask your mother what makes the dough to raise up.
- Take notes what your mother tells you.
- Come to the class and report what you were told about the substance that raise up a dough to the class.

What a fungi looks like?

- Fungi are plant like organism with Simple body structures. They range in size from uni-cellutar to multi-cellutar. All fungi can not able to prepare their own food. Some fungi get their food from dead organic substances others live on other living organisms as parasites.
- As a plant fungi have no root stem and leaf as well as flowers. And they have no green pigments called chlorophyll as algae and other plants have.
- Most fungi are important for humans while some others cause disease to humans, animals and plants.
- Some examples of uni-cellular fungi are: yeast, Ring worm; athlete foot ---etc.
- Examples of multi –cellular fungi are:-

Mushrooms, puff ball, toadstool—etc.

Activity 3.4. Identification of mould

Materials required:

- Apiece of ‘injera’ or bread
- Rip tomato
- Dish or any other container.

Procedure:

- Take loaf of bread or ‘injera’, and rip tomato
- Moisten bread or ‘injera’ with water
- Place (put) moisten bread or injera, tomato on dish or any other container and cover it.
- Put in a warm and dark place for 3 to 4 days.
- Open the container and observe the change take place on bread, ‘injera’ or tomato.
- Answer the following questions based on your observation.

A5. What structures do you observe on bread ‘injera’ and tomato?

Q6. What is the colour and the structures that you observed?

Q7. What do you think about the structure that grows on bread ‘injera’ or tomato?

Do you know the fungi bread mould spoil food?

- Bread mould is the fungus which grows on moist bread, ‘injera’, damaged fruits, other food substances and as well as on decaying materials. It grows like a mass of cotton on many foods and fruits. Its body is made up of fine, thread like white structures called hyphae. (hypha-singular). The group of hypha, is known as mycelium.

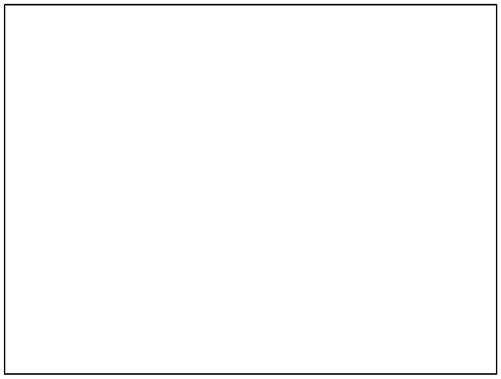


Fig 3.5. Bread mould grown on bread

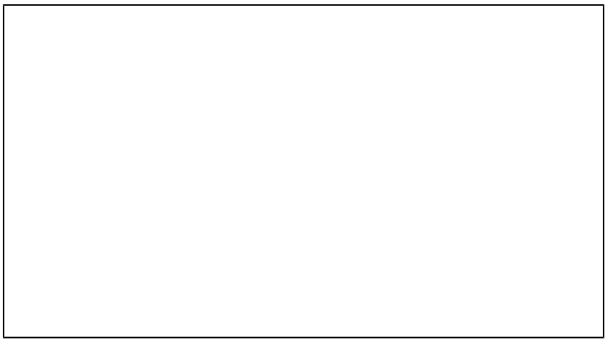


Fig 3.6 the structures of breads mould.

Mushrooms

What mushrooms looks like?

Do you know that mushroom is large multi-cellular fungus eaten by humans?

- Mushrooms are large advanced multi-cellular fungus that has an umbrella like shape usually grown in moist soil and on decaying organic matter.

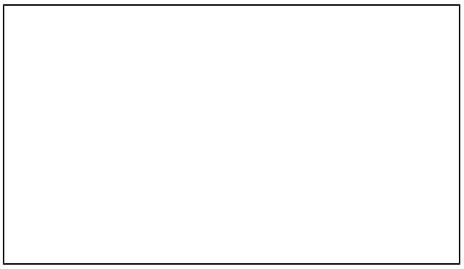


Fig 3.7 Mushroom multi-cellular fungi

Habitat of fungi

- Many fungi live on dead organic substances and others live on other living organisms as parasites, they live in or on the body of many living organisms' plants and animals. Most parasitic fungi cause disease. Some of parasitic fungi are: Ring worm athlete foot, Powdery mildew---etc
- Others live on moist organic soli fungus such as mushrooms.

The Importance of fungi

- Most fungi are important for humans and other living organism.

Some of the importances of fungi are:-

- Used as food for humans
- Used to manufacturing of medicine.
- Important for manufacturing of industrial alcohols such as beer, wine, --- etc
- Used for the preparation of bread, 'injera,' cocks----etc
- Important to decay dead bodies to increase soil fertility and for nutrient recycling.

Mosses and Ferns

What do you know about mosses and ferns?

- Mosses and ferns are small green non-flowering plants. That are found on the damp shady places, damp Soils, on rocks, walls and barks of trees Furthermore they also grow around the house, on pots or other materials by humans to decorate their surroundings. .
- Mosses have no true roots, stems and leaf but the body of ferns differentiated in to true root, stems and leaf. They have green pigment called chlorophyll.

Mosses

- Have you ever seen small green plant like structure during rainy season on the wall of your house or on your school buildings and rocks?
- What do you know about those green plants like organisms?

Activity 3.5.

Identification of mosses
Materials required – small knife dish and hand lens not book, and pen. Procedure - Select an area where mosses grow? In your school compound,. - Find small green plant- like organisms - With your knife picket up and do not damage their parts. - Bring them to your class and observe them and then look through your hand lens. - Write what you observe.
Questions Q8. Do you see (observe) roots, stem and leaf on their body? Q9. Do you observe some hair like projection growing from the base of it ? Q10. Haw they grows in single or cluster?

Mosses –are small green-non-flowing plants usually grown in cluster. Their bodies are not differentiated in to true root, stem and leaf; they have no vascular tissues such as, xylem and phloem. They attach them selves on rocks walls and moist soil by their root – like structures which grows at the base. Mosses are photo synthetic seedless and produce their own food. They have chlorophyll which are contained in side the chloroplast

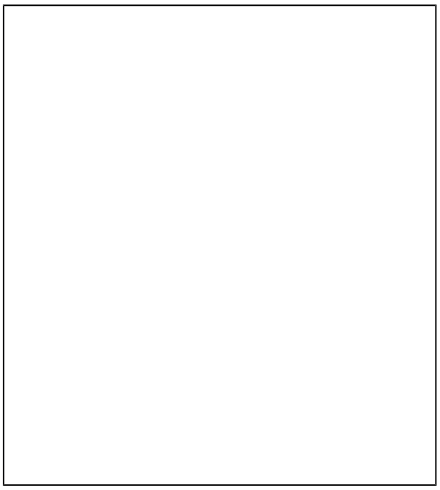


Fig 3:8 Moss

Habitat of mosses – mosses are usually grown on moist ground (soil) under tree shades on rotting logs on the walls of buildings and on rock.

- Importance of mosses – Mosses are very important plant for the formation of soil,
- They are important source of some small organisms
- They produce oxygen
- Protect soil from erosion.

Do you observe plants that have roots, stems and leaves, but no flowers and do not produce seeds around your home or in your school?
What do you know about them?

Activity 3.6.

collection and identification of fern
Materials required knife hand lens. Procedure - Collect fern plant from your school compound or from your surroundings - Observe the structures that found on their body. - Cut the stems and observe them by using hand lens. Questions Do you identity roots stem and leaves? - Do you observe flowers and seeds? - Does water or fluid com out from their cut surfaces?

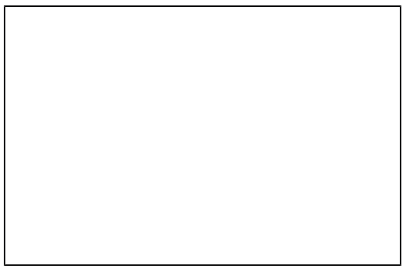


Fig 3.9 Fern plant

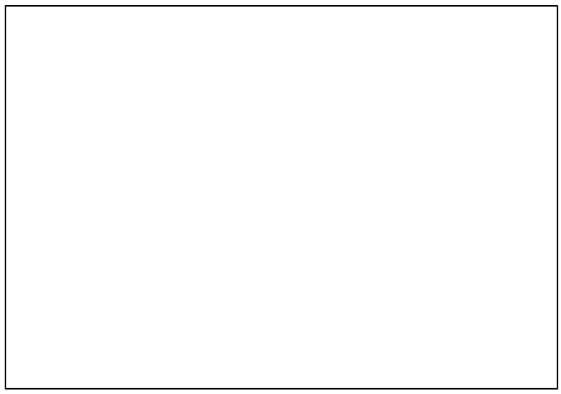


Fig 3.10 under ground stem of fern

What are ferns?

- Ferns are non flowering seed less plants with true roots stems and leaves. They are photo synthetic green plants which have chlorophyll in chloroplast. They can produce their own food. In addition, ferns have vascular conductive tissues which transport water minerals and food Such as, xylem and phloem. Xylem transport (conduct) water and minerals from the soil to the other parts of the plant. While phloem transports (conducts) food from the leaves to stem and roots.
- They attach themselves on the ground or on the branches of other trees by their roots. They have small leaves known as fronds. In most ferns the stems grow under ground horizontally. This under ground stem of ferns is known as rhizome.
- Habitat- Ferns grow on land, on the trunks of other plants and some grow in the water

The Importance of Ferns

- Ferns are important land plants some of their importance
- They hold soil in place and protect from erosion.
- Provide food for many animals.
- They are sources of medicine.
- Produce oxygen.
- Are important ornamental plants (pot) plants for decoration.

Table 3.1. Comparison between mosses and ferns

Mosses	Ferns
-They do not have true root, stems and leaves	- They have true roots stems and leaves
-They do not have vascular conductive tissues (xylems and phloem's)	- They have vascular conductive tissues xylems and phloem
-They have green pigments called- chlorophyll	- They have green pigments chlorophyll
-They produce their own food	- They produce their own food.
-Do not have flowers and seeds	- Do not have flowers and seeds
-They found on shady area under trees, rocks and moist soils	- They found on land on trees trunks and water
- Protect soil from erosion	- Protect soil from erosion
-Produce oxygen	- reduce oxygen

Exercise 3-1

1. Write down examples of unicellular and multi-cellular algae_____
   a) uni-cellular algae_____, _____.
   b) multi-cellular algae _____,_____.
2. Give examples of uni-cellular and multi-cellular fungi._____, _____ _____,_____, _____.
3. Write down the difference between algae .and fungi_____.
4. Where do you find uni-cellular green algae? _____.
5. Fungi that spoil foods are _____.
6. Write down the differences and similarities of mosses and ferns.

-Similarities_____

_____

_____

- Differences_____

_____

3.2. Reproduction in plants structure and functions of pants of flower.

Competencies

By the end of this section you should be able to:

- Define reproduction.
- Identity parts of a flower.
- Describe the functions and parts of a flower.
- Identify male and female parts of a flower.
- Define pollination and identify types of pollinations.
- Explain the difference between two types of pollinations.
- Define pollinating agents and give examples.

- All living organisms (Plants and animals) are the results of reproduction.
- Do you think that you are the result of reproduction?
- Reproduction is the process of producing new offspring (organism) from two parents or from one single parent of the same species.

- **How could higher flowering plants reproduce?**
  - Flower is the sexual reproductive organ of the higher flowering plant.

Activity 3:7observing and identification of the structures of flowers

Materials required- knife or blade forcipes and real flower.
Procedure-

- Collect different types of flowers from your locality.
- Bring them to the class and dissect them with your knife or blade one at a time.
- Take out each parts separately
- Observe each part gently.

Questions

Q 1) Do you observe different structures
Q 2) The structures that you observed are similar or different?
Q 3) What do you think about the functions of each parts?

- Compare the parts that you observed with the real flowers with fig 3:13

Fig 3:11 the structures of a flower.

Fig 3:12.(a) The parts of a female flower (pistil)	Fig 3:12(b)– parts of male flower (semen)

What difference do you observe, among the different flowers that you collected in activity 3.7?

- There are variations among different flowers; flowers differ in their colors, shapes and sizes. For example rose flowers, are large and colorful while the flower of corn, wheat and grasses are not colorful and are not easily identified.
- Flowers are the part of the shoot which modified for sexual reproduction. So, flowers are the reproductive structures of the flowering plants.

- Flower have different parts, The different parts of a flower have their own specific function. Many flowering and non-flowering plants can be reproduce by a sexual method of reproduction from their stems roots and leaves. This asexual method of reproduction is known as vegetative propagation.
- Examples of vegetative propagation.

Are - cutting
- layering and
- Grafting

 What do you think about the functions of each parts of a flower?
- Each parts of a flower has a particular function.

- Receptacle – is apart of a flower which is, found at the base of a flower. It supports the other parts of a flower.
- Sepals – are part or structure of a flower that they cover and protect the rest of the flower part. The group of sepals is called calyx
- Petals – They are usually brightly colored.
  They attract insects. The group of petals are called corolla.
- Stamens – Are the male reproductive organs, which contains two parts. These are filament and anthers.
- Pistils are the female reproductive organs which are found at the center of the flower. They contain the structures such as an ovary, a style and stigma.
- In some plants the male reproduce structures and female reproductive structures of the flower are found in two different (separate) plant of the same kind

  Eg. Papaya.

Exercise 3:2

Table 3.2. Fill each column with correct male female and accessory structures of a flower.

Male reproductive structure of a flower	Female reproductive structure of a flower	Other accessory structures of a flower

Pollination

Activity 3.8. Identification of pollen

Materials required – Mature flower knife or a blade. Hand lens

Procedure-

- Collect mature flower from your locality and bring to your class.
- Observe the anther with your hand lens
- Touch the anthers with your fingers
- Sneak the anther on white paper. .

Fig 3:13 (a) self – pollination On the stigma of the same flower eg. Rose	Fig 3:13 (b) self pollination on the stigma of an other flower on the same plant eg. Rose

Fig 3:14 Cross pollination on two different flower of the same kind.

Activity 3:9

Identification of pollination Agents
- required materials – Insect net, note book, pen, pencil Procedure- - Select the area where different flowers are found in your locality . - Identity the flowers visited by different insects regularly. - Observe flowers that have not attractive colors. - Observe the colors of the flowers visited by insects registry - Catch the insects from the flower by using your insect net. - Observe the back body of insects especially their legs. - Again observe the flowers that are not visited by insects. - Shake the anther of the plant. - Write what you have observed when you shake the anther.

- Draw and name the insects that you have observed on the flowers.

- Which pollinating agents transfer pollen?
- Pollen grains (male) gamete of a flower is transferred from anther to stigma by some kind of external agents.
- The external agents which bring or transfer pollen grains from anther to the stigma are called pollination agents.
- Examples of pollinating agents are: -

- Insects – such as bees and butter flies.
    - wind
    - animals and
    - water
- Wind and Insects are the two most common agents of pollination
- Flowers that pollinated by insects have bright and attractive colored petals to attract insects, but flowers pollinated by wind have long anther

Dull and non-attractive petals produce large amount of pollen grains.

.	

Fig 3:15(a) Insect pollinated flower Fig 3:15 (b) Wind pollinated flower

Exercise 3.3.

Table 3.3. Fill in the table the name of flowers pollinated by insect and wind.

Name of flowers pollinated by insect	Name of flowers pollinated by wind

- - - - - - - -	- - - - - - - -

3.3 Seed dispersal and germination

Competencies

By the end of this section you should be able to:-

- List dawn different means of seed dispersal.
- Explain the importance of seed dispersal.
- Identify the structures of seed
- Describe the functions of the different structures of the seed
- Define germination.
- Describe the necessary conditions for seed germination and explain the process of seed germination
- carry out the experiment on seed germination
- Seeds are fertilized ovule that has different structures. Dry seeds are living and they are able to germinate in to seedling when they get necessary conditions. Until they get necessary conditions dry seeds are dormant and it became in active. This inactive period of seeds are known as a period of dormancy. Examples of seeds:-
  - peans, beans maize, coffee----etc.
- List down some other seeds that are found in your home and around your locality?

Activity 3.10.

Identification of external and internal structure off been seed
Materials required- Been seeds, water container Such as, beaker, razor or blade, Hand lenses A- External structure of bean seed procedure- - Collect some bean seeds. - Put the seeds in water for 12 hours. - Remove the seed coat (external) cover using blade or razor. - Examine the seeds care fully. B- Internal structure - Procedure remove the seed coat - Cut it open length wise equally by using blade or razor - Identity the two cotyledon carefully - Observe other structures by using your hand lens

What structures do seeds have?

- Seed structure and their functions
- Seeds have different structures that have different functions. These are:-
- Testa (seed cat) – is the external layer of a seed that covers the other internal structures of the seed and it protects the seed.
- Hilum – is a seed structure some kind of scar which the seed where attached to the pod (ovary).
- Micropyle- is a tiny hole near the hilum that allows air and water enters to the seed.
- Cotyledon – is the seed structure that store food for the embryo until the embryo grow and able to make its own food.
- Some seeds have two cotyledons.
  Example: bean pea, etc--- and some others have only one cotyledon,

Example: maize, wheat, oat etc.

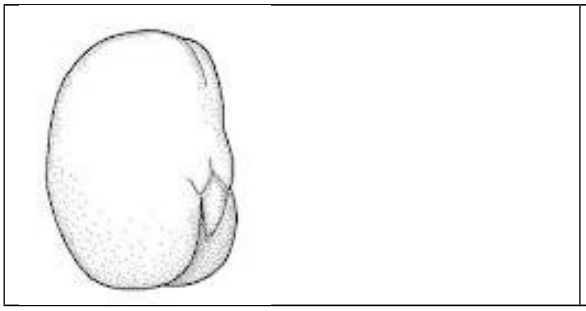


Fig 3.16. (a). External structure of bean seed

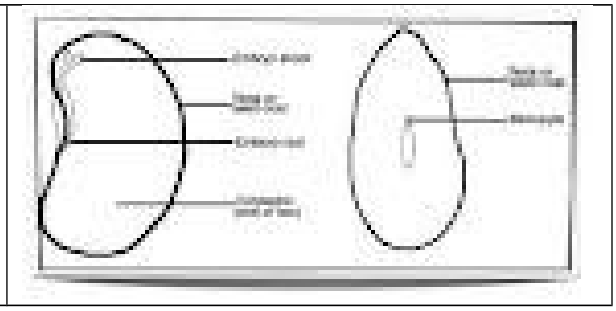


Fig 3.16.(b). Internal structures of bean seed.

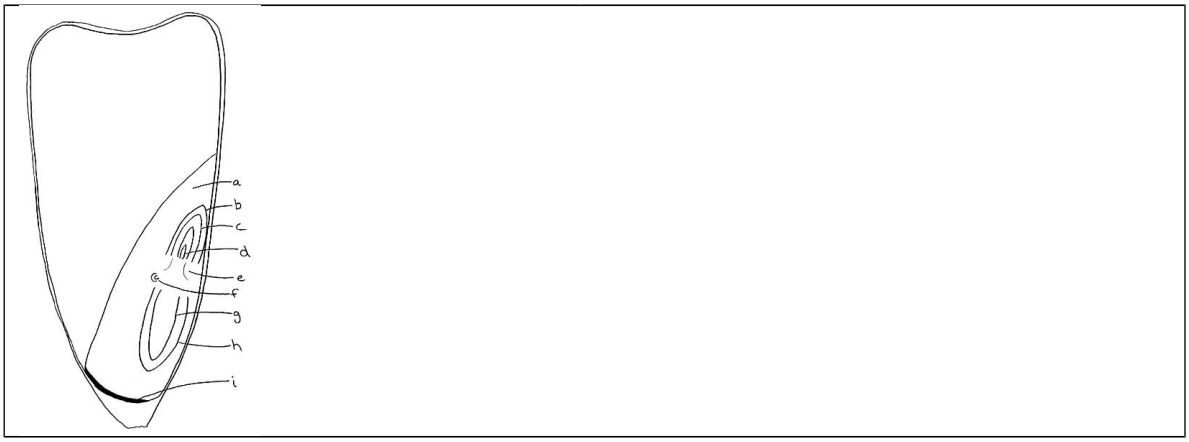


Fig 3.17. The structures of maize seed

- The embryo has two parts; the plumule and the radicle.
- The plumule is the part of embryo which grows in to the shoot.
- The radical is the part of embryo which grows in to root.

Seed Dispersal Mechanism

- Seeds and fruits are dispersed or transported from on place to another [lace by different seed and fruit dispersal agents. Most of plants that we see around in our locality are produced by dispersed seed and fruits from their parent by different agents.

How seeds and fruits could disperse?

- There are different mechanisms in which seeds and fruits are carried from parent plant to the other place.
- Agents of seeds and fruit dispersal

are: - Wind
- Water
- Animal such as humans, birds, insects--- etc
- Mechanical dispersal method by an exploding pod.
- Seeds with light and have large surface area are easily carried by wind

eg – sycamore seed.

- Seeds with a spongy layer are able to float on water surface,
- Seeds that are carried by the water

Are: - water lilly, coconut

- Animals disperse seeds by carrying the seeds on their bodies, in side their bodies when animals are eaten the fruits. seeds that usually carried by animals have hooks, spirls or hair to attach on the bodies of the animals. Some have sweet taste with bright color to attract animals such as insects.

  Eg. Orange, mango, tomato, coffee, etc.

- Some seeds are dispersed by mechanical dispersal the seed dispersed by this mechanisms are, poppy, eucalyptus, beans, castor, pean----etc.

Seed Germination

Activity 3:11

– Examine the important factors for seed germination

Materials required – cotton wool, soaked been seed, test tubes, water, refrigerator or cold place.

Procedure:-

- Take four test tubes and label 1-4
- Put soaked cotton wool and three bean seed, in the test tube -1
- Put dry cotton wool and three bean seeds in test tube -2
- Add boiled water and three bean seeds in the test tub -3 and pour some oil

- Put the above three test tubes in place with suitable temperature and air
- Put soak cotton wool and three bean seeds in test tube 4 and place it in a refrigerator for or in a cold place.
- After 5 days observe the four test tubes carefully.
  Questions
- What do you observe after 5 days in lest test tub 1-4?
- In which test tube the bean seed properly germinate

Test tube -1 test tube 2 test tube 3 test tube 4

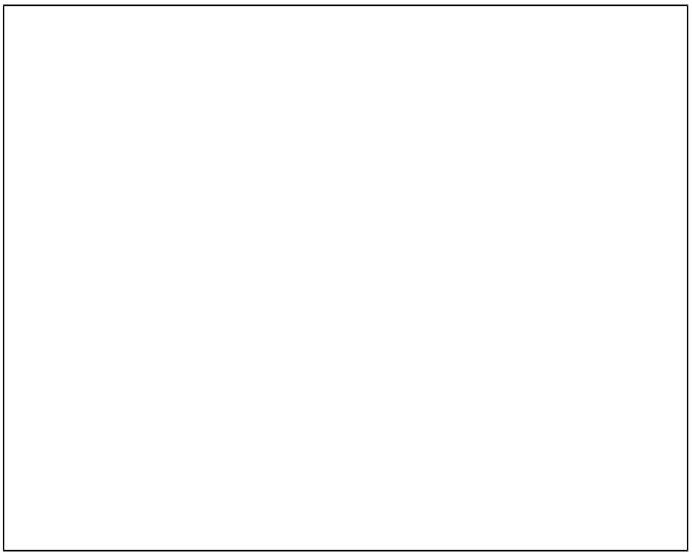


fig -3: 18 Experiment on factors necessary for germination

What are the necessary conditions for seed germination?

- Germination- is the process by which the embryo of the seed starts to grow in to seedling
- A dry seed is a living seed which stay dormant until it gets the necessary condition to germinate
  When a dry seed gets the necessary or right conditions the embryo inside the seed starts to germinate into seedling
  - There are some basic conditions for seed germination. These are
- Proper amount of moisture.
- Temperature and
- Oxygen
- When dry seed exposed to these conditions it starts to grow by bursting the testa then the embryo transformed in to a seedling to be an independent plant. The part of seed that

germinate out ward is called plumule and forms shoot system. The part that germinates inward to the soil is radical and forms root system.

Exercise 3:4

Write the names of the seeds with two cotyledon and seeds with one cotyledon.

1. Seeds with two cotyledons seeds with one cotyledon
   1. _____ 1. _____
   2. _____ 2. _____
   3. _____ 3._____
   4. _____ 4,_____
   2. List down the basic conditions for seed germination .
   1. _____ 2. _____ 3. _____ ___

   3. Write the functions of the following seed structure.
      1. cotyledon –
      2. Hilum
      3. testa-

3.4. Plants as food source for Humans

Competencies

By the end of this section, you should be able to:

- List and describe the parts of plant used for food by humans.
- Indentify fruits and vegetables eaten by humans.
- Give some examples of food storage organs of plants eaten by humans in their locality.
- Explain the use of plant food for health.

Why Humans use plants as food

- Plants are very important source of food for humans and for most animals.
- Animals are depend on plants for food. Plants store different food .
- Nutrients which are useful for health
- Plants store food nutrients in their different organs- such as roots, stems, and leaves.

What plant organs are eaten by humans?

- Humans use different plant organs for food plants store food nutrients in different organs, They store food nutrients, in their root, Stem, leaves, flowers and in their seeds for their use.
- These plant parts have their own dietary importance for human.

Activity 3:12. Identify plant organs used as food by humans,
Materials – required – Note book, pencil Procedure: - Collect the plant part - Make a group of 4 or 5 students - Go to the shops or markets where different fruits and vegetables are sold. Around your Locality. - Ask people the part of the fruits or vegetables and seeds used as food by humans , - Ask the importance of eating plants food. - Write piece of information that you get from the people. - Come to the class and relate the information that you of gathered from peoples with notes which are found in your text book.

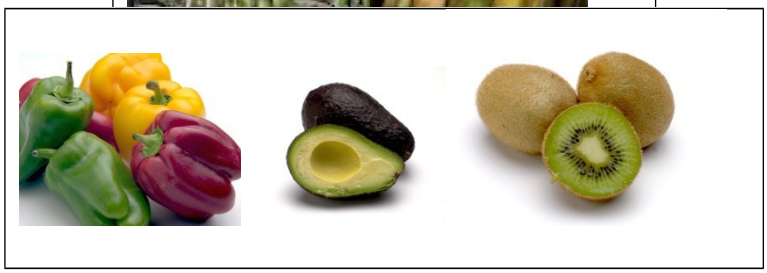
A leaves of a plant used for food

B

Roots of plant used by human as food

C

Stems of plants used as by humans as food



D

Fruits used as food by humans

Fig 3:19 A-D plant organs used as food by humans

- Plants store food in their different parts (organs) in the form of carbon hydrate lipid, protein and vitamins. Humans eat different plant parts or organs to get the age those food nutrients

  Examples of plant part (organ) which are eaten (used) as food by humans are:-
- Leaves- eg cubage onion lettuce, celery.
- roots – eg. Carrot. Sweet potato.
- Stem – eg. Rhizomes (Ginger) , Enset sugar can
- Fuits - Papaya, Lemon, Mango-----etc.
- Seeds- Beans, pea, oats, Maize wheat, etc.

And some plants store food in their flower.

How plant food is important for health?

- Plants store many different food nutrients that is important for human health.
- They store these food nutrients in different parts of their bodies many plans store food as form of carbohydrate, lipids, proteins and vitamins which are useful for human health.
- The person who eats only plants, food but not meat is known as a vegetarian.
- Vegetarian diet is rich in most food nutrients which are useful for human health.

  Exercise 3.5.

Give answer for the following questions.

1. List down food storage organs of the plant and give on example for each.
   1. _____ _____
   2._____ _____
   3._____ _____
   4._____ _____
   5_____
2. Plants store food nutrients in the form of _____, _____ , _____ and _____

3.5. Raising tree seedlings.

By the and of this section, should be able to:
- Explain the steps followed in raising tree seedlings. - Explain how we raise tree seedling in post and on seed beds. - Explain how we transfer the seedling to where they will grow. - Describe haw to take care for the seed lings as they grow. - Identify indigenous tree sand their names. - Make clear what is being done across the country to re- establish forest.

Why we raise tree seedling?

In order to plant frees in large area we must raise trees seedlings. In our country large areas of the country where re-forested (covered) by indigenous and other varieties of exotic tree plants. It needs the raising of tree seedlings in large scale.

Raising tree seedling is a step wise processes which take place in pots and on seed beds

What are the steps followed in raising free seedlings? **Activity 3:13 Identify the steps followed in raising tree seedling**

Materials required – note book , pen or pencil Procedure:
- Visit seedling raising center neat by in your locality with your teacher. - Ask peoples who are working in the center about the steps that they followed in raising tree seedlings - Ask what care they are taking to raise tree seedlings.

- Ask the necessary conditions for raising of tree seedling. Ask at what stage tree seedlings are transfer to the ground
- Ask how to prepare the ground to transfer seedlings and what cares to be taken to the planted tree seedlings.
- Write notes on your note book and come to the class and prepare seed bed and raise tree seedlings in your school compound.

The steps followed in raising tree seedlings are:

1) Plan and select suitable place for preparing seedbeds.

2) Get the tools used to prepare the beds

3) Prepare the soil by breaking and polishing the ground.

4) Measure the size of your beds and dived the in equal size (if it is necessary)

- Leave 50cms between the beds for a path way during working in the seedling garden.
- Plough the beds thoroughly and level it as shown in fig.
- Increase the fertility of the beds soil by adding animal manure and green manure.

5 cm

1 cm

50 cm

1 cm

5cm

Fig 3.20 A Path way for seedling plant beds

- Supply water to the beds be fore the seeds are planted.

5) Select good seeds:

- Which are not damaged
- Seeds that have normal weight.
- Plant the seeds in row in shallow depth.
- Space the planting correctly.
- Cover the planted seeds with the soil using your fingers.
- Cover the beds with dry grass, straw, etc
- Supply water regularly and correctly.

6) Take care for the germinating seedlings

- Remove the dry grass or straw that you had cover the beds to allow the seeds to germinate
- Water the seedlings regularly
- Spray insect and pesticides on the seedlings
- Remove the germinating weeds.

7) Transplanting seedlings to the final position where it grows to the tree.

What are the steps to follows in order to transplant the seedlings in to final position?

Transferring of seedlings from seed beds have its own steps. These are:

1. plan and select the land for planting seedlings
2. pre pare tools for digging
3. Dig a hole big enough for the root ball.
4. Take up the seedlings and put in to prepared hole firm in to the ground
5. Tie the seedlings to a stalk unit support them selves.
6. Protect the seedlings from grazing animals
7. Continue to water the seedlings in dry spells until their root system sufficiently well established.

Activity 3.14. Identify the indigenous trees found in Ethiopia and write their names

Materials- note book, pen

Procedure:

Go to the area where forests are found around your locality with your teacher.
Identify forests those where forested in 1900 and which are forested now.
Observe the difference between them.

- Identify the indigenous tree which are found in the forest and find out their names and write down on your note book.
- Come to the class and discuss about the importance afforests and indigoes trees.

- Forests are important natural resources which play a great role in many ways. One of these is to maintain climate change. They are used as shelter (home) for many wild animals
- They have also many other values such as
    - Food
    - Medicinal
    - Industrial

- Energy
- Building materials etc.

- Because of these values and uses we must keep forests from destruction noonday re-forestation is practiced in large scale the country.

Activity 3:15 identify other uses of forests.

Materials required – note book, Pen Procedure:
- Make group of 5 to 6 students list and discuss other uses of forests.
- List and discuss other uses of forests.
- List the indigenous trees of found in Ethiopia
- Discuss how to keep forests.
- From each group one student present the group answer for the class.

3.6. Harvesting and storing crops

By the end of this section the students should be able to:
- Define harvesting and storing
- Describe the process of harvesting and storing crops.
- Explain the advantages of harvesting and storing crops on time.
- Compare modern and traditional methods of storing crops
- Construct simple models of modern stores
- Identify methods of harvesting and storing crops in their locality.

Harvesting crops

- Harvesting is the processes of collecting (gathering) crops from farm-land.
  Activity 1:16 A filed work

Materials requires: Note book, pen
Procedure:
Make a group of 5 to 6 students.
-Go to the near by farm- land around your school or locality
Ask farmers and write down what the farmers tell you.
- Come to the class and one student from each group present. What the farmers told them to the class.

Questions.

Q1.. When and at what time do the farmers harvest their crops?

Q2. What are the advantages of harvesting crops on the right time?

Q3. What are disadvantages of harvesting lately or after the right time?

Q4. What methods the farmers use to harvest their crops and what kinds of tools they have been using?

- Harvesting crops at right time is important to increase the quality and quantity of the yield. When crops are harvested early or lately they lose their colors, tastes smell and lose their weights. These cause the loss of quality and quantity of the yield.
- When they harvested before they ripe and dry the seeds become shirked and lose the ability of germination and the seeds also have high content of moisture which makes storage more difficult.
- Crops which are harvested after the right time of harvesting they are over dried. This causes the seeds disperse and the stalks breaker easily. It makes harvesting very difficult and reduces the quality and quantity of the yield.

Traditional and modern Way of harvesting crops

What method of crop harvesting is practiced in your locality by the farmers?

Most local farmers of our country use traditional harvesting methods to harvest their crops. They use their labor and domesticated animals such as donkeys, horses, oxen to transport harvesting crops. Traditional harvesting practices take time and more labor. It also reduces the quality and quantity of the product.

While modern harvesting methods uses machines such as combiner, tractor, etc to harvest crops. Modern harvesting methods needs short time by less human labor and they also keep the quality and quantity of the product.

Traditional and Modern way of storing crops

- What method of storing crops is practiced in your locality by the farmers?

Activity 3:19

Visit local farmer’s (traditional) crop storage systems and modern storage systems (if it is found in your locality).
Materials required note book, pen Procedure: 1) Your teacher will take you to visit traditional and modern crop storage. 2) Identify the differences between two systems 3) Write the differences you have observed between the two systems on your note book. 4) After your visit discuss on the advantages and disadvantages of using traditional and

modern systems of storing crops

- Crop storing :- is the accumulation (putting) crops in different containers far are from different pests
- Crops are stored by traditional and modern storing systems. Local farmers of our country largely use traditional storing systems. Traditional ways of storing crops reduce the quality and quantity of the crops and exposed the crops for different pests and for some animals such as rats.

It also can not maintain optimum temperature and moisture for crops but it is simple and cheap to build.

- Modern storage system is used by some modern and large scale farmers in our country. Properly build modern stores prevent crops from spoiled, it munitions optimum temperature and moisture, allows free circulation of air, and clean air free from pests, prevent the entrance of rats, but moderns sores are very expensive to build.

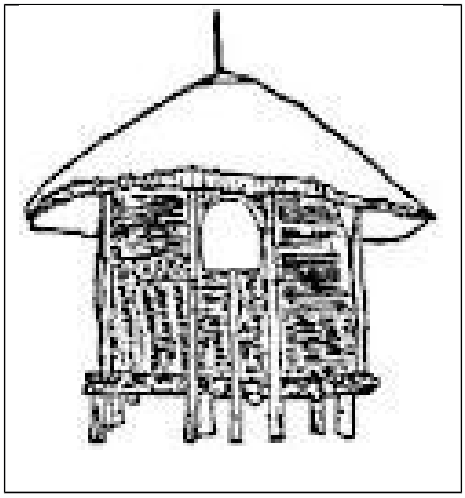


Fig 3:21. Traditional store

Fig 3:22 . Modern store

Table 3:4 Compression between traditional and modern way of housing and storing crapes.

Traditional	Modern
- More wastage of crops - It takes more Lab oar - Takes time - Small area harvested and Small amount of crops stored in long time - Physical - Slower and need many people - Not keep, quality and quantity of crops.	- Less wastage of crops - Take less labor - Short time - Large area can be harvested more amount is stored. - Physically less demanding - Faster - Keep quality and quantity. - It is expensive

3.7. Technology and agriculture

By the end of this section the students should be able to:-

- Appreciate the role of technology in agriculture
- Explain the advantages of hybrid crops and selected varieties
- Compare hybrid crops with normal and hybrid specimens
- Compare hybrid and normal selected seed verities using sample specimen.

What role technology plays in agriculture?

Activity 3:16 Identify factors that reduce productivity of farmers crops is cuss in groups.

Activity 3:16

Identify factors that reduce productivity of farmers.

- List down some factors that reduce crop productivity of farmers in your locality?
- How the factors that you list reduce crop productivity of farmers. Explain.
- What role technology plays to improve crop productivity of farmers?

- Technology plays a great role in agriculture by producing hybrid crops and selective seed verities to in crease the productivity of the farmers. Scientists produce hybrid and selective seed verities of particular crop by using technology from the existing normal seeds.

- They produce the seeds that have high germination rate, Strong growth on poor soil, drought and pest resistant quick growth, Large crops that earns a good price and easy to harvest.
- Technology provides modern hybrid seeds which are listed above while the existing normal seeds have not such qualities

Activity 3:19 Identification of hybrid crops with normal crops and selected seed verities with normal seed by using specimen,

- Compare hybrid crop with normal crops using sample specimen and identity the differences between them?
- Compare selected seed varieties with normal seeds using sample specimen and identify the differences between them.

Exercise 3.6.

1. List down three an importance of using technology in agriculture?
2. Write at list three disadvantages of using traditional crop stores_____ _____ _____ _____ _____
3. Write some advantages of using modern crop stores

Unit Summary

Algae are plant like organisms that contain the green pigment chlorophyll contained in chloroplast. They make their own food

Most algae's are aquatic live in fresh and marine water green algae are in uni-cellular and fresh water forms (live) in fresh water and brown and red algae are multi-cellular and live in water.

Algae are important food source for other water organisms and animals.

Fungi are organisms which does not have chlorophyll. They can not prepare their own food and depend on other organisms for their food. Some fungi live as parasite on other organisms and others are saprophyte live on dead organic substances.

There are uni- cellular and multi-ceuular fungi. Most fungi are important to produce medicine, food, and alcoholic drinks while others cause disease and spoil food.

Mosses and ferns are no flowering plants. Plants with out flowers are called non flowering plants masses have not true roots, stems and leaves, and found on rocks, tree shades and buildings. They are important to keep the soil from erosion but ferns are non- flowering plants with true root, stems and leaves. They have also vascular conducive tissues, (xylem and phloem) and important for preventing soil erosion.

Flowering plants are plants that have flowers. Flowers are the reproductive structures of flowering plants. They have male part (stamen) and female part (Pistil) and other accessory structures.

Pollination is the transfer of pollen gratings from the anther of stigma. There are two types of pollinations in flowering plants. These are: Self pollination and cross pollination.

Pollen grains transferred from anther to stigma by different agents such as, wind, insects, water e t c. Wind and insects are the most common pollination agents.

Seeds are dispersed by different mechanisms. They are dispersed by, wind, animals water, and mechanical action.

Germination is the process by which the embryo of a seed starts to grow in to the seedling. When dormant (dry) seed is exposed to suitable conditions, it starts to germinate. The suitable conditions for seed germination are: appropriate amount of moisture, temperature and oxygen.

Different parts of [plants are used as food by human beings. Such as, leaves, stems, roots, fruits seeds, plants store different food nutrients in their organs (parts) as form of carbohydrate, lipids, proteins and vitamins. Those are essential for our health.

Raising free seedling are step wise process the take place on the seed beds or pots and are transferred to the ground when the seedlings grow in some length. It is important to cover the land by forests.

Forests are important natural resources which have different values such as, medical, food values and used as home for different wild animals.

Crops can be protected from damages and spoilage by harvesting on time and using modern harvesting methods. The quality and quantity of crops can be maintained by when they are stored in the modern crop stores.

Using technology in agriculture is important to produce hybrid and selective seed varieties which grow well in poor soil that take short time to produce and it gives large yield, and resists pesticide, etc.

Review questions

I say True or False

_____1. All fungi are important.

_____2. Spirogyra is uni-cellular green algae.

_____3. Mosses and ferns are plants which have true root, stems and leaves

_____4. Flower is the reproductive structure in the flowering plants

II . – write short answer

5. The process in which the embryo of a seed starts to grow is called_____

_____ 6. The transform of pollen grains from anther to stigma is called_____

7. A fungus which is used as food by humans is_____.

III. Multiple choice

Choose the correct answer.

_____ 8. Which one of the following is not fungus?

A. Yeast C. chlorella

B. Mold D. Mushrooms

_____ 9. The male part of a flower is

A. Pistil C. Petal

B. Stamen D. Sepal

_____10. Which one of the following is a necessary condign for seed germination?

A. Suitable moisture C. Oxygen

B. Suitable temperature D. All

_____11. From the following one is store food in its leaf?

A. Sweet potato C. Lettuce

B. arrange D. carrot

_____12. Forests are important source of _____.

A. Medicine C. rain

B. food D. All

_____ 13. Which one of the following is not the use of technology in agriculture?

A. produces less productive crops

B. produces crops that resist drought

C. produce crop that give more yield

D. produces crops that resist pests.

Unit 4

Animals

Unit out comes

After learning this unit you will be able to:

- Explain the common characteristics of birds and give examples of birds.
- Describe the ways how birds are reproduced
- Name the types of poultry.
- Describe the importance of poultry farming and methods of feeding, care taking for and housing poultry.
- Construct model house for poultry
- Describe common characteristics of mammals and give examples of mammals.
- Describe the ways how mammals are reproduced
- Explain the importance's of lives tock of wild life
- Describe the methods of feeding, housing and care taking for live stock (for pastoral regions only) .
- Explain the importance's of wild life.
- Describe the methods of wild life conservation
- List the national parks of Ethiopia and explain their importance.
- Explain common animals which are found in the parks.
- Demonstrate scientific enquiry skills such as observing. Comparing contrasting, making models measuring, communicating asking questions and applying concepts.
- Identify endemic mammals and birds of Ethiopia

4.1. Birds

Competencies

At the end of this section you should be able to:-

- Identify the common characteristics of birds
- Give examples of birds.
- Describe the way how birds are reproduced by internal fertilization.
- Define the term poultry.
- Name the types of poultry and describe their differences.
- Explain the importance's of poultry farming.
- Describe the methods of feeding, housing and care taking for poultry.
- Construct a model house for poultry

What are birds?

Birds are vertebrate animals with back bones and they have many characteristics with other vertebrate animals. They live on terrestrial (land) and on trees and also in aquatic (water) habitat. Most birds are wild but a few of them are domesticated by human beings.

Activity 4.1 . Observation and identification of body structures of birds.

Materials required:- notebook pencil

procedure

- Observe different birds flying or walking around your schools village
- Draw the pictures of birds that you have observed.
- Compare your pictures with hens which are found in your home or village.
- Write the structures have identified during your observation.

Q. 1. What common structures have you identified?

Q.2. Have you observed some different structures?

IF you say yes, list them down the difference that you have observed?

Common characteristics of birds

- What are the common characteristics of birds?

Birds are animals which have common characteristics with other vertebrate animals. They are distinguished from other vertebrate animals by a number of characteristics. All birds have many common characteristics.

These are:- their body is covered with feathers

- They have wings for flying
- They have scaly feet with four digit toes and claws..
- They have mouth with beaks which are adapted to their diets.
- They lay eggs
- Their fertilization is internal
- They do not have obvious external sex organs.

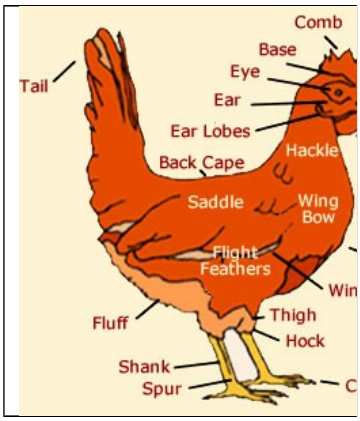


Fig 4-1 External structures of hen's

Examples of Birds

- Ducks, thrushes, herons, eagles, goose, ostrich hens, sun birds. Wood peckers, yellow – crowned bishop, klaas's cackoo, parots, etc are some examples of birds.

1 duck	2 heron
3 goose	4 sun bird
5 egle	6 wood –pecker

Fig 4– 2 some examples of birds

Types of fertilization

What is fertilization?

Fertilization is the fusion (union) of male gamete (sperm) with female gamete (egg). The fertilized egg is called zygote. There are two types of fertilizations. These are internal and external fertilization

A) **Internal fertilization** is the fusion (union) of male gamete with female gamete inside the female body. Animals such as mammals, birds, reptiles and insects are reproduced by internal fertilization.

B) **External fertilization** is the fusion of male gamete with female gamete outside the female body.

Most fishes and amphibians such as frogs and toads are reproduced by external fertilization.

In birds fertilization takes place inside the female body. Later on the fertilized egg is laid out and the development of the embryo takes place out side the females body. Each egg has a large amount of food in which the developing fertilized egg feed on until they hatched out.

Activity 4.2. To study how laid eggs develop and hatch in to young chickens

Materials required:- note book pen

Procedure :- make a group 5-6 students

- Each group select there group leaders
- Discuss on the questions which are presented below.
- The group leaders write the group's answers on their note book.
- At the end of the discussion the group leaders present their group answers to the class.

Questions to be discussed

a) How fertilized eggs are laid by female birds which are hatched in to chicken's?

b) What are the necessary conditions for the embryo chicken?

C) Why do female or male birds sit on the egg for a longtime?

Fig 4.3 female or male bird sit on laid egg.

Fig 4.4 Newly hatched chicken come out of the egg

It is only the fertilized egg which can develop and hatched in to chicken. The egg which was not fertilized can not be hatched in to chicken. This is because the embryo in sides the egg is not formed. How do the embryo in side the egg develops in to a young chicken?

Internally fertilized in the body of female is laid. Once the eggs are hatched they need to be incubation (warmth) to develop in to a young chicken. A female or male bird sit on the laid eggs continuously to in cubte (warmth) the eggs. As an embryo inside the eggs gets optimum temperature they develop in to a young chickens. The chickens hatched out by breaking the eggs.

Stages in the developement of a bird is

Fertilize egg ⇀↽ zygot ⇀↽ Embryo ⇀↽ young chicken ⇀↽ bird

Do birds take a parental care or protection?

Birds protect their eggs and young chickens from different enemies. Some of these enemies are cats, snakes, other birds etc. They do this until the young enable to fly and feed by themselves. Birds lay as small number of eggs that enables them to protect the young. But other animals which are reproducing by an external fertilization lay a large number of eggs. These animals can not protect their eggs and youngs.

Avtivity 4.3. Examine sex organs of birds.

Materials required:- Female and male hen's

Procedure:-

- Bring a Female and a male hens
- Open the feathers which covers the cloacae (anus)
- Look in to the openings

Questions

1- Have you examine (observe) any obvious or visible organ?

2- How many openings are you observed?

3- Is the egg and feces come out with the same opening or with different openings?

4- Do birds urinet?

- Discuss the above questions in groups
- Write a short report about your observation
- Present your report to the class

.

. Poultry Production

- What do you know about poultry? Poultry is the study of principles and practices which are involved in the production and marketing also includes ducks, geese and their production such as eggs and meat.

Activity 4.4 Visiting poultry farming

Material required:- Note book, pen or pencil

Procedure:- visit Poultry farming if there is your area with your teacher.

- Ask the people who are working in the poultry farming about the types, the importance's and the verities of poultry. Feeding method, of housing of poultry and about how to take care for poultry.
- Write all information that you get from your visit.
- Come to the class and discuss the advantages and disadvantages of poultry farming and varieties of poultry.

Types of poultries

There are two types of poultry. These are traditional and modern poultry. Traditional poultry is the raising (keeping) of cheekiness, duck and grease of the individual birds in house by many people those that have small of low productivity of egg and meat,

Modern poultry is the raising of genetically improved cheekiness that give large amount of yields. This is made by cross- breeding of indigenous (local) cheekiness with foreign chickens that give high amount of yields. (meat and egg). Those chickens can be able to be productive and give neat and egg after a few months of hacting. Improved poultry is also the raise of selective and good verities of chickens.

Poultry has its own specific characteristics in any animal husbandry. There fore, inures to start poultry there should be interest and basic knowledge. By now it is a good field in agriculture.

There are different varies of hens. Some are good in egg laying and the others are good in meat production. To distinguish chickens that are good in egg laying and meat product by observing their physical structures such as: size , plumage color, comb type, skin color, number of foes, amount of feathering, egg color and place of their origin.

Poultry productions need proper feeding, housing and protecting from their enemies and diseases.

Feeding – food is necessary for the growth maintenance. Prevention of diseases and for reproduction. There fore, chickens need proper and balanced diet to become more productive.

If the food that is supplied for hens is not enough or balanced we will not get enough eggs and meat. The food that is provided for hens must contain the following kinds of foods in different proportion. These are:

- Crushed maize
- Crushed boned and meat
- Salt
- Vitamins and calcium oxide.
- Juice of leguminous plants such as ‘yenugchemaki’ and ‘yetlba chemaki’.

- If the above food types are not available, it is possible to replace them with wheat, barely, juice of beans or juice of soya beans. The food which are provided for hens are different for those egg laying and meat hens. There are also differences on the basis of their gas.

Housing

Poultry productions need proper housing. That should be suitable for feeding and for egg laying. The sousing must be suitable for protecting the chickens from their enemies. It is different because of the environments conditions. The houses of hens can be made from the available local materials.

Fig 4.5 The house for chickens.

Protecting poultry from Enemies and Diseases

There are many different microorganisms that affect the health of chickens. Some of these micro-organisms are: virus, bacteria and protozoan's. They cause diseases that treatens their lifes. There are internal and external parasites that affect chickens:-

- Round worms

- Tape worms
- Caecal worms

The External perasities

- Ticks
- Mites

A poultry producers must take care of the chickens. This can be possible by providing suitable houses. Furthermore, cleaning their houses, isolating the infected hens and immunize the chickens with vaccines are very important. Spraying with proper medicines is also important to kill any disease causing micro-organisms. A continuous checkup (supervision) is also important

Table 4.1. Diseases caused by different micro-organisms

R No	Kinds of diseases	Cause of disease	Symptoms
1.	New castle	Virus	- Difficult breathing - Gasping - Uncoordinated movement - Dropping necked head partially open break
2.	Coccidiosiss	Protozoon	- Eating less food.\dropping tails - Ruffle feathers - Bloody (reddish brown) and watery faces
3.	Fowl cholera	Bacteria	- Loss of appetite - Greenish – yellow diarrhea - Thick discharge from the nasal passage - Difficult breathing
4.	Pullorum	Bacteria	- Wings are drooped - Chickens gather neara heat source - Weak and refuse to eat

Exercise 4-1

1. write some common characteristics of birds.
   i. _____
   ii. _____
   iii. _____
   iv. _____

2. What is external fertilization?
   _____

3. Which birds are kept for poultry production?
   I. _____
   II. _____
   III. _____

4. Write the names of the two types of poultry.
   1. _____
   2. _____

4.2 Mammals

Competencies

At the end of this section you should be able to: -

- Explain the common characteristics of mammal
- Give examples of mammals
- Identify and tell how mammals are reproduced by internal fertilization
- Describe the importance's of live stock farming
- Explain the methods of feeding, caring for and housing live stocks
- Identify domestic animals which are reared for various reassures

Activity 4.4 Identify mammals

Materials required :- notebook, pen or pencil

Procedure:- Observe domesticated animals such as cows, goats sheep's, cats, dogs horses, and donkeys in your village .

Identify external body structures of these animals

Observe how they give birth and how they are reproduce

Identify how they feed their youngs.

Present your observation to the class and discuss on the following questions.

Questions

1. What are the common characteristics of these animals?\
2. How do these animals feed their young's?
3. Do they lay eggs?

Mammals are animals that feed their offspring's (young's) milk from their breasts. Most mammals are wild animals. Some of them are domesticated by man and live together with human beings. Still there are other mammals that live in water.

The most common examples of mammals are cows, donkeys, rats, bats, loins, shale's etc. Bats ate the only mammals that are considered as flying animals

1. whale

2. Kangaroo

3. Sheep

4. Rat

5. ape

6. Bat

Fig 4.6 some examples of mammals

Common characteristics of mammals

What are the common characteristic of mammals?

Mammals are distinguished from other vertebrates by a number of characteristics, These are: The skins of most mammals are covered with hair.

- They have breasts to feed their young's.
- Most of then have four limbs.
- Their sex organs are visible (seen out side)
- They give birth to their offsprings
- They have different opening for giving birth and remove their wastes.

- They are fertilized internally.
- Their Embryos develops in side their mothers' uteruses

Types of fertilization

In mammals fertilization is internal, that takes place is side the body of females. When the male gamete uses with a female gamete this time fertilization takes place. This phenomena takes place inside the female body. The fertilized egg forms zygote and develops in to embryo. The embryo develops inside the uterus of the mother (female). It is inside the mother's uterus that the embryo is kept warm. feed and well protected.

The period of gestation (pregnancy) in different animals is different. For examples a human embryo takes about nine months while for cows it needs ten months, Mammals are highly advanced in taking care of their offspring's. The mother takes care of its baby by feeding its Milk. She also provide with some additional food. Further more, the mother does the protection until the baby able to protect by itself.

Activity 4.5: To identify defensive mechanism

Materials required: note book, pen or pencil

Procedures:

- Form a group of 5-7 students
- Select one group leader
- Each group leader, will write the group answers on his note book
- At the end of the discussion, each group leads will present the group answer
-

Questions for discussion.

1- How do different mammals protect themselves and their youngs?

2. List down the external body structure of mammals that is used for defence

Rearing domestic Animals in pastoral Regions

Why do domestic animals are mostly reared by pastoralists?

Activity 4..6. To investigate the nature of domestic animals reared by pastoralists.

Materials required: Note book, pen or pencil

Procedures:

- Form a group of 4-5 students
- Select a group leader for each
- The leader writes (holds) the group answer
- The group leader presents the groups conclusion to the class.

Questions of discussion

1. What kinds of domestic animals commonly reared in pastoral regions?
2. Why do pastoralists reared their animals?
3. What methods are used to feed, care, protect and housing for those animals?
4. Visit a near by pastoralist ask him and observe his work

Some of the common domesticated animals by pastoralists are goats, sheep Camels and cows. The pastoralists' rear these animals for many reasons. Some of these are: to get milk, meat, for market and for transportation. A pastoralist move from place to place with his animals in searching for food and water. He also uses different methods of feeding, housing and protection as he moves to different places.

Activity 4-7 Group discussion on the advantages and disadvantages of domestic animals

Discuss the following questions in groups

- What are the advantages and disadvantage of rearing domestic animals?
- How do these animals are allowed to goze when the food supply is plenty?
- How do additional food is given when there is shortage of food?

Live stock farm

Live stock form refers to the raising of one or more kinds of domesticated animals. This is done in an agriculture settings to produce different things such as food, fiber, leather. This does not include poultry and fish farm. Ethiopia has the largest lives tock population in Africa. In Ethiopia nearly all regions have the potential to raise livestock animals. In the high lands,

livestock constitutes a major part of mixed farming system. It means producing milk and can minimize the problem of food shortage. But in the low lands livestock husbandry is taken as means of survival. The only regions (areas) with no live stock are gambella and Benishanbul. This is because there is a high level of testesfly. It is important to note that inpastoral areas people rely mainly on live stock for subsistence.

Types of live stock Raising

There are two types of live stock raisings

These are:-

i. Traditional
ii. Improved (or modern type)

Most of the livestock's raised by pastoralists are traditional type. Mixed farming practices are also exercised as a traditional type. 'In this type of live stock the cattle's are raised to give only small amount of yields. The way of feeding and housing of the cattle's are poor.

In modern live stock raising the live stock animals are genetically improved and they are hybrids.

The local animals that are of similar species are hybridized to improve their productivity. Some times the local animals hybridized with different varieties of foreign animals. This is usually done in order to get a good yield of milk and meat. In the modern and improved livestock raising, the way of feeding and housing the animals are better, forther more the method of keeping the health of animals enables to increase the productivity.

Factors affecting livestock production in Ethiopia

There are many factors that affect the live stock productivity in Ethiopia. Some of these are:

i. Famine and starvation
ii. Nutrition
iii. Diseases
iv. Poor handling etc.

The major source of animal feed in Ethiopia comes from low quality pasture, rangelands and fallow. Crop residue are sloe important in many densely populated areas, In the high lands grazing resources are detracted because of dense population. Despite ample grazing areas, pastoralists are restricted to areas close to low lands where there is permanent water resource. Due to this live stock productivity is very low with milk yields (local cattle) .

The Economic value of live stock

The live stock farm is useful in the production of meat in the form of diet and energy. In addition to this dairy products, fibers and fertilizers are also obtained from mammalian live stock that can be used as a source of milk. The milk can in turn easily be processed in to other dairy products. Some of the dairy products are yogurt, cheese, butter, ice cream, kefir and kumis.

The other important product from live stock farm is fiber. They produce different range of fibers (textiles). For example, sheep's and goats produce wool and mohair. Furthermore, the skins of cows and sheep's can be made in to leather. Bones, hooys and the horns of the livestocks can be used in different ways. Some other byproducts of live stocks can be used as a fertilizer. The manure can be spread on fields to increase crop the yields. What other importance's of live stocks do you know? Discuss this in the class.

Exercised 4-2

1. Write some examples of domestic mammals
   i. _____
   ii. _____
   iii. _____

2. Mammals feed their young's with _____
3. Write at least three differences between brids and mammals
   i. _____
   ii. _____
   iii. _____

4. What are the common animals reared by pastorals?

i. _____ ii. _____ iii. _____ _____

5. What is live stock?_____.

4.3. Wild Life

competencies

By the end of this section, you should be able to:

- Explain the importance's of wild life.
- Describe the methods of conservation of wild life
- List the national parks of Ethiopia
- Explain the importance's of motional parks
- Name common animals which are found in the national parks of Ethiopia.
- Identify endemic animals of Ethiopia

What does wild life mean?

There are two school of thought about the definition of wild life. These are:

1) American schools of thought – according to this school wild life means all animals except man and tamed animals.
2) England school of thought. Wild life includes all animals and plants except those that are tamed.

In our country the proclamation that was made in 1964 E.C defined wild life as follows. Wild life includes all animals which are not tamed. These are mammals, vertebrates, invertebrates, birds, reptiles, amphibians and unicellular organisms. Give some examples of wild animals which are found around your locality.

Activity 4.8.

Discussion on the importance of wild life

Materials required – note book and pen

Procedures:

- Form a group of 4 to 5 students.
- Each group should select a group leader.
- Discuss 5 to 7 minutes on the importance's of wild life
- The leaders take a short note from the discussion in each group.
- Finally, The group leaders will present the result of the discussion in the classroom.

Questions to discussion

1) What are the importance's of wild life for us?
2) How do we conserve (protect) wild life in Ethiopia?

The followings are some examples of wild animals.

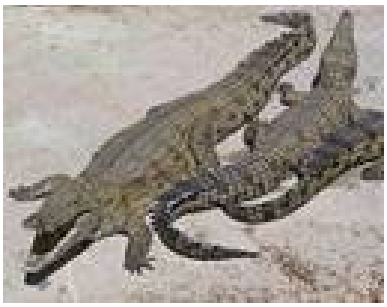
a. Ass

b. Hayna

c. Antelope

d. Monkey

e. Armadillo



f. Crocodile

g. Ostrich

Fig 4.7. Some example of wild animals

The Importance's of wild life

Wild life has a great importance's (uses) that benefit for us. Some of this major uses are:

- Recreational
- Educational and scientific
- Food and products
- Tourism values and
- To balance the natural ecology and for biomedical values

Activity 4..9.

Collect piece of information about the importance's of wild life Materials needed- notebook and pen procedures:- - Ask your family of some peoples about the importance's and the benefits of wild life in your locality - After you have collected piece of information compare and contrast your result with those values you learned. - Come to the class and present the importance's of wild life to your friends.

Wild life conservation

What is conservation?

Conservation is the process of keeping and protecting wild life from extinction .

Wild life are conserved in order to get benefit from them, to keep the diversity and to keep the natural ecology. There are different means to conserve wild life in Ethiopia

These are:

- Limitation of illegal hunting
- Preservation of land farming
- Sharing of water with wild life
- Preservation of a variety of habitats.
- Create public awareness about the importance's of preserving wild lifs
- Parking the area for wild life and create refuges.
- Planting different frees and limit the removal of forests.

There are some problems which affect the conservation of wild animals in Ethiopia.

These are:

- **Illegal hunting** - peoples hunt wild animals for food, held and cultural values.
- **Destruction of forests**- forests are a home of wild life. But because of forming and urbanization now a days forests are rapidly on destruction.
- **Over grazing**- People provide their domestic animals to graze in forests. The over grazing of forests will cause shortage of food to wild animals.
- **Large scale of burning** – in many parts of Ethiopia wild fire is a serious problems. This may kill a lot of wild animals. People also burn forests to clear the land for agriculture. Because of these many wild animals migrate to other areas and die out because of lack of food and shelter.

Questions which of the above problems is common around your locality? And how do we avoid or minimize these problems? Discuss in the class room.

National parks of Ethiopia

There are different places around the world for the conservation of wild lives. Do you know the type of wild life conservation in Ethiopia? And where are they found?. Mainly there are three types of wild life conservation in Ethiopia.

These are:

- Zoo
- Sanctuary and
- National parks.

Activity 4.10

The identification of the location of zoo's sanctuaries and national parks on the map of Ethiopia.

Materials required- white hard paper, pencil ruler and nap of Ethiopia

Procedures- Form a group of and 4 - 5 students

- Draw the map of Ethiopia on white hard paper
- Indicate the location of zoo's sanctuaries and national parks on your map
- Bring your map to the class and compare your map with other groups.
- Stick your map on the wall of the class and discuss the importance of zoo's sanctuaries and national parks for wild life conservation. And identify the differences between them.

There are many sanctuaries and national parks in Ethiopia. National parks consists of many different endemic and common animals. They are important to conserve wild lifies and to keep the biodiversity of the country.

Activity 4-11

Discuss the following points in group
• List down all the national parks which are found in Ethiopia. • Discuss the importance's and some common problems of these parks. • And how these problems are avoided?

The following tables show some sanctuaries and national parks in Ethiopia

Table 4.2. zoo's in Ethiopia

Name of zoo	Location
Chelibi	SNNPR
Bale	Oromia
Western Awash	Afar
Aledige	Afar
Gewane	Afar
Melee- serdo	Afar
Shere	Tigray
Tama	SNNPR

Table 4.3 sanctuaries in Ethiopia

Name of the sanctuaries	Location
Senekalle	Oromia
Yabelo	Oromia
Babile	Oromia and Somalia

Table 4.4 The National parks of Ethiopia

Name of national parks	Location	Common animals are found
Awash national park	Oromia and afar	Antelops sala arant's qazelle leiser – kudu oryx.
Semen mountain natconal park	Amhara	Semen fox, walia ibex Geleda Baboon, Miniliks Bush buck
Bale mountain national park	Oromia	Mount Nyala, red fox, semen fox minilik bush buck
Omo national park	SNNPR	Oryx, giraffe, buffalo, lion, leopard, Burchell's zebra, gureza, lesser, kukuostrich.
Mago national park	SNNPR	Greeter-kuku duiker African elephant, buffals, Lesser-kuku, oryx , Grant's gazelle lcopard, lion
Nechsar national park	SNNPR	Zebra, Burchels, zebra Grants qazelle greater, kuku water buck, jackal leopard lion, buth buck.
Gambela national park	Gambela	Lions, African elephants, spothed hyenas, cohibs monkey
Abiata- shalla national park	Oromia	Swaynes harts beets, oryx spothed hyena, coloubs monkey
Yangudi rassa natlonel park	Afar	African elephant - Spotted hyna - Grants gazelle giraffe

Recently found wild life protected area (parks) Chebera Churchura National park

Chebera churchura national park is wild life protected area of the country which is found in SNNPR between Dawro zone and konta special wored /district/. It is relatively untouched recently discovered and rich wilderness area. It is a home for over some 37 – larger mammals and 237 species of birds such as white- cliff chat, Banded barbet wattle ibis, black headed fores. Oriole and Thick- billed raven are endemic birds for the country found in this park.

Common mammals which found in the park include the African elephants, hippopotamus African buffalos, lions, leopards, water bucks, bush bucks, greater kudus and warthogs. The park is the best protected area to see the African elephants and bottles

Maze National Park

Maze National park is found is SNNPR to the south west of the region. It is one of wild life conservation area known for its good population of the critically endangered and endemic antelopes swayne's Hartebeests. The park supported a wide range of savanna special 39 large and modern mammals and 196 birds species. The other recently protected national park is Lokka Abaya National park.

Endemic Animals

Question. Do you know some endemic mammals and birds of Ethiopia? Discuss in groups

Endemic animals are animals which are found only in a particular country and there are also endemic plants. There are around six endemic mammals and many birds species are found only in Ethiopia. These animals are endemic to Ethiopia.

Table 4.5. Endemic mammals in Ethiopia

Name of the animals	Location
Simein fox	Bale and semein mountain Nationl park.
Walia Ibex	Semein mountain Natioanal park
Mountain NAyala	Bale mountain National park
Manilik's Bush buck	Bale and emein mountain National park
Gelada Baboon	Semein monntain national park
Swayens's Harte beest	Sinkele seanctuary

Activity 4:12

Group discussion
Discuss the following questions in group
Q 1) What are the importance of endemic animals for Ethiopia?
Q 2) How to conserve endemic animals?

Table 4.6. Endemic Birds in Ethiopia

Name of the Birds	Locations
• Harwoods Francolin	Bale and semein mountain National park
• Spot breasted plover	
• Yellow fronted parrot	
• Nechisar night jar	Abiate- shala lakes and Bale mountains
• Abysssinian wood pecker	Nechisar National park
• Abyssincan cat bird	Awash and Bale
• Black headed siskin	mountains National parks
• White tailed swallow	Bale and semein mountin National parks
• Yellow throated serin	Bale and semein mountain National parks
• Ankober serin	Yabelo zoo
• Abyssinian Busherow	Awash National park
	Semein mountain National park
	yabelo zeo.

a semein fox

b. walia Ibex

c. Mountain Nyale

d . Minilik’s Bushbuck

e. Gelada Baboon

f. Swayeni’s Harte beest

Fig 4.8. Endemic animals of Ethiopia

Hardwood's Francolin

Abyssinia long -claw

white tailed swallow

Golden backed wood pecker

Thick-billed Raven

yellow –throated seed –eater

Black – heeded forest ordile

Fig 4.9. Endemic birds of Ethiopia

There are also other endemic birds in Ethiopia such as white-singed cliff chat, Ruppeu's chat, marwood's rail Ehit billed starling etc--

Exercises 4.3.

I Answer the following questions

1. Write some examples of wild mammals which are found in your surrounding
2. What are the reasons of killing wild animals ?
3. List down some problem of wild life conservation in Ethiopia.

Unit Summary

Birds are vertebrate animals that have different characteristics in common. Most of them have two wings that enable them to fly. Birds reproduce by laying eggs and their fertilization is internal.

Internal fertilization is the fusion of male gamete (sperm) with the female gamete (egg) inside the body of female.

Poultry is the study of principles and practices which also involve in the production and marketing of chickens, duck, and geese for the production of eggs and meat. There are two types of poultry:

These are traditional and modern poultry.

Mammals are vertebrate animals that have different characteristic in common. The body of most mammals are covered with hair. They reproduce by internal fertilization and they give birth and freed their young's with milk. The fertilized egg develop in the body of the female in the uterus. Bat is the only flying mammal that give birth. Some other mammals live in the water.

Eg. Whales.

Domesticated animals are animals that are reared by humans for different purpose some examples of domesticated animals are cows, goats sheep, camels, hens, cats, dogs donkey etc.

Wild animals are animals that are not tamed. Such as reptails mammals, brides Amphibians and unicellular organisms.

Conservation is the process of keeping or protecting wild life from extinction. There are different methods of wild life conservation in Ethiopia. These are 700, Sanctuaries and National parks.

Endemic animals are animals that are found only in one particulate country. There are some mammals and birds that are found only in Ethiopia. There are also some endemic plants, reptiles and Amphibians. In recently founded national parks such as chebera churchura and maze have many indegered and endemic wild mammals.

Review questions

I say true of false

1. All animals are reproduces by internal fertilization
2. In birds the fertilized egg is developed inside the body of uterus.
3. Wild life conservation is important to keep biodiversity
4. Illegal hunting and clearing of forests for agriculture are the common problems in wild life conservation in Ethiopia
5. Endemic animals are animals which are found in particular areas.

II Match items under column B to column A

Cpulmn A	Colulmn \
6. Endemic bird	A) Tama
7. Domestic animal	B) Senkalle
8. Endemic mammal	C) Black headed siskin
9. National park	D) camel
10. Zoo	E walia Tbex
	F) Yongudirassa.

III choose the correct answer

11. Which one of the following is a mammal?
    A) Sparrew C) Bat
    B) Hen D) Frog

12. The process of forming a zygote from an egg and sperm is called
    A) Poultary C) Conservation
    B) Fertilization D) Pollination

13. One of the following disease is common in poultry?

A. Coccidiosis C) malaria

B. HIV D) Kolera

14. Mount Dyala is found only in:-

A) Kenya C) Sudan

B) Tanzania D) Ethiopia

15. Humans rear domestic animals for

A) marketing C) To food

B) Transportation D) All

Unit 5

Our Body

Unit out comes

By the end of this unit students will be able to :

- Identify the structure of the human eyes, understand their functions, the eyes defects, diseases and their correction and prevention methods.
- Understand propagation, reflection and refraction of light.
- Know lenses and other optical instruments .
- Define the brain, the spinal chord and hormons and explain the functions of brain, spinal chord and hormons.
- Diffrentiate some common drugs and their effects. Define menstruation and fertilization .
- Know common sexually transmitted diseases and describe their preventive methods.
- Understand about harmful practices like female genital mutilation, illegal abortion, abduction, rape and sexual harassment.
- Explain the care and affection that should be given to people living with HIV and AIDs and describe the social impacts of HIV/AIDs
- Differentiate empathy, cooperation love, interpersonal communication and problem solving as life skills that help them to prevent HIV.

5 .1 The Human Eye

By the end of this section, you should be able to :

- Identify the structures of the human eyes on a model or a chart
- Tell the functions of the structure of the human eye.
- Indicate light as a form of energy
- Demonstrate propagation, reflection and refraction of light
- Explain how eyes and other lenses produce image.
- Name other optical instruments
- Mention eye defects and their corrective methods
- Mention eyes' diseases and their preventive methods.

5.1 The human eye

Our eyes are organs of vision consisting light receptors. The receptors are connected to the nervous system. The eye ball is made up of three layers They are

1. The sclera
2. The choroid and
3. The retina layers.

The sclera layer is the outer part of our eyes. At the front of the eyes the sclera becomes the transparent of cornea. It is a membrane that lubricates and cleans the surface of the eyes.

The choroid part of the eyes contain blood vessels. Behained the cornea the choroid becomes the ciliary muscles.

The retina layer covers the rear part inside the eye. Light rays reflected from an object enter the human eyes and form an image on the retina. The retina consists of receptors which are connected to the brain by the optic nerve. The receptors on the retina send impulse through the optic nerve to the brain .

1.1 Parts of the Eyes and their functions

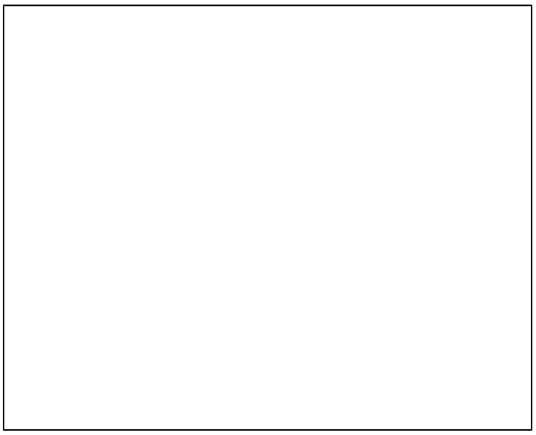
Our eyes have different parts. These parts and their functions are elaborated in the following table

Table 5.1 Parts and functions of eye

Part of eye	**Function**
Iris	Regulates light entrances
Pupil	Admits light
Lens	Reflects and focuses light rays
Choroid	Absorbs stray light
Sclera	Protects the eye ball
Cornea	Refracts light rays
Ciller muscles	Held lens in position
Retina	Contains receptors, cons and rods
Rods	Receptors for black and white vision
Cons	Receptors for color vision
Optic nerve	Nerve joining eye to central nervous system

- Rods are receptors for black and white vision

- Cons are receptors for color vision



Figs 5.1 The humane eyes structure

Activitiy 5.1

At day time in your school or in your locality you can observe (see) different materials including your friends. How these substance are seen ? discuss the reasons

When some one switch on a hand battry (torch) it gives light. When you switch on an electric line in your home, the bulb gives you light. If two dry cells and lamp are connected and switch on, the lamp will give you light etc.

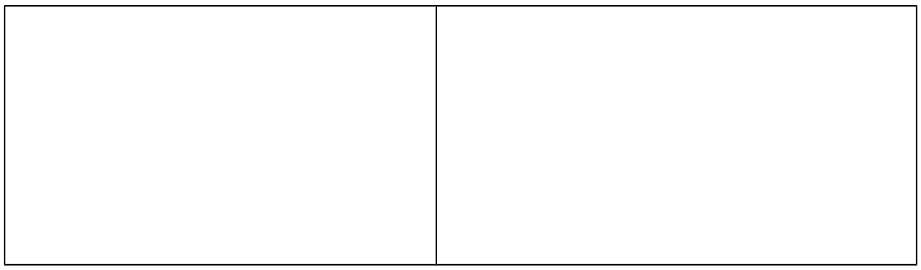


Fig 5.2 a) hand battery and b) a connected dry cells and lamp both give light

The students are observing the above situation and should give their suggetions about light rays and vision.

What is light

Light is a form of energy which is sensitive to our eyes and used to see an object

Light has different sources. There are natural and man made light of sources.

Questions

Name some natural and artificial sources of lights in the table given below

Table 5.1 Source of light

Natural source of light	Man made source of light
- _____ - -	- - -

Activity 5.2

Hold a torch (hand battery) and switch on it in a dark room with your friends and observe the situation . - Does the room becomes bright or dark? - If it is bright , what is the cause of its brightness?

After the test (experiment) the room becomes bright. You can see all substances in the room. The light should avoid the darkness of the room. This shows that light has energy. The light ray can spread in the room.

What are the properties of light ?

From the previous activity (5.2) you could see that the torch released a beam of light ray . This group of rays are known as **BEAM or pencil.**

A ray of light

A ray is a narrow stream of light energy. It is the direction of path taken by light. A ray is represented by a straight line arrow.

Some properties of light are

- Rectilinear propagation
- Reflection
- Refraction

Activity 5.3

Testing a light Ray

Put a burning candle in the darkroom in front of series of cards with holes .

and see the rays passing through the holes what do you observe ?

- Do the rays from the candle direct on a straight line or not ? discuss this with your partner

`From the above activity you can test that light rays from the candle is directing on a straight line .

Rectilinear propagation of light simply means that light can travel in a straight lines

How light Travels?

Light travels only in straight lines. This fact can be illustrated by the following simple experiment .

Place two card board having a hole in the center of each series as shown in the diagram. Light a candle and place it beyond the first board. Look through the hole of the second card board. The light from L can be seen from E. If all the card boards are in the same straight line .

If either the light or one of the card board is shifted slightly to one side the light will not be seen from E. This shows that light travels only in a straight lines.

Activity 5.4

Bring a torch, white paper and mirror in the classroom and test the properties of light with your friends. Put the white paper in front of a mirror and light on the torch on the mirror. What do you observe? Do light falls on white paper?

From the above experiment you can see that when light from the torch falls on the mirror reflected and seen on the white papers.

When rays of light from some source of light fall on the plane mirror, it is reflected back, such properties of light is known as reflection of light.

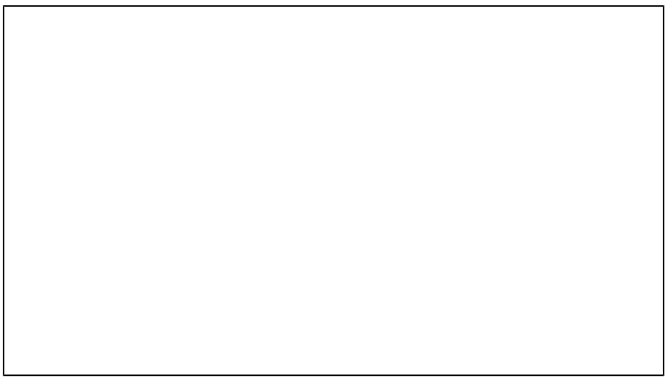


Fig 5.3 Reflection of light from a mirror

Activity 5.5

Observing refraction in group

Collect the following materials

- Glass
- Water
- Sticks or pencil

Now take the glass of water and insert half of a stick or a pencil into the glass and discuss in group. What do you see?

- What do you observe?
- What a stick or a pencil looks like?
- Does it look straight or broken?

We know that light travels in straight lines in the same medium. But from the activity 5.5 you see that light passes from air to water in hrte glass and get bent. There for, the stick or a pencil look like broken. This is because of the change in the direction of light . This property is known as refraction.

Refraction :- is the change in the direction of light when crossing the boundaries of two mediums

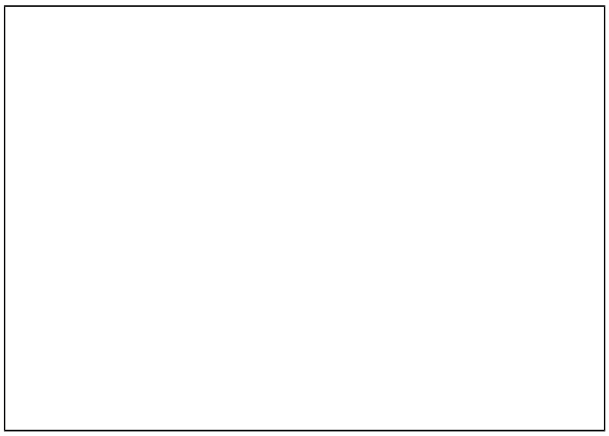


Fig 5.4 The light beam is bent when crossing air to water

From the figure above we see that the direction of the light is changing this is due to the change of the speed of light.

Lenses and Other Optical Instrument

Activity 5.6

If a laboratory room is available in your school, ask a lab technician or the teacher to show you different lenses. After the observation discuss with your friends.

- How many lenses are there?
- Ask and write the names of each lens.
- Which lens is thicker in the middle and
- Which one is thinner?

A simple lens is usually a piece of glass bounded by spherical surfaces. It is a transparent substance.

Lenses are grouped into two:

- Convex (converging) and
- Concave (diverging) lenses

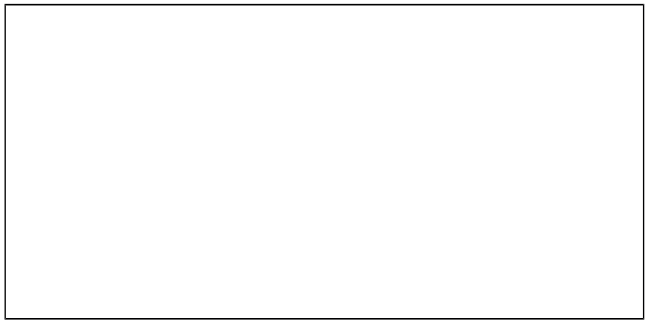


Fig 5.5 kinds and shapes of lens

Properties of Lens

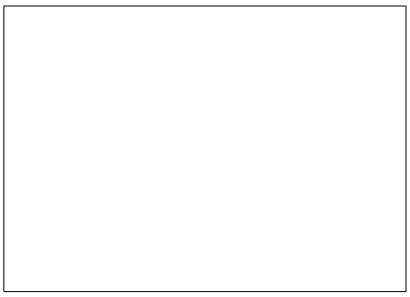
Lenses can be used for large or small objects

Converging lens - Converge, the rays to a point (focus)

- By moving the object closer or further to the lens, sometimes it makes large and sometimes it makes small the object.
- This lens is thicker at the center (middle)

Diverging lens - It diverges the rays from a focus

- The lens always makes the object smaller
- It is thinner at the center (middle)



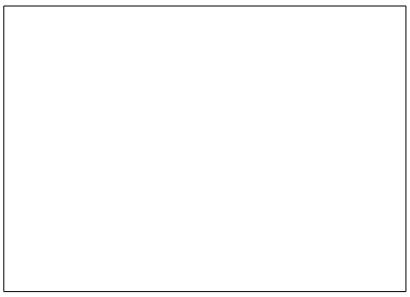
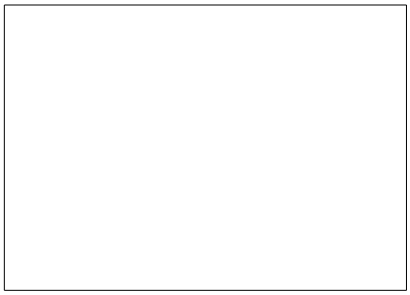


Fig 5.6 a) Convex lens converging rays of light

Fig 5.6 b) Concave lens diverging rays of light



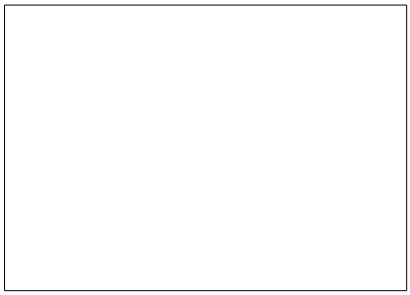


Fig 5.6 c) Convex lens large the object

Fig 5.6 d) Concave lens small the object

Since a lens is a transparent body light can pass through a lens in other direction. There fore a lens has a focus points. Each lens has a focal length.

The focal length is the distance between the center of the lens and the focus.

Other optical Instruments

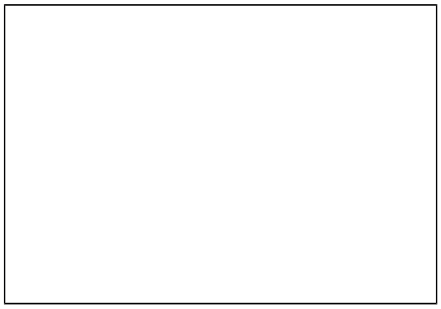
Instruments that aid the eyes to see an object better are called **optical** instruments . These instruments are:-

- A simple camera
- A microscope
- A telescope

A simple camera consists of lens and sensitive film mounted in a light – tight box, with provision for adjusting the distance between lens and film.

A shutter of variable speed and a diaphragm of variable sperture regulate the amount of light energy passing through the lens

A Sharp image being photographed is focused on the film by tuning the screw mount of the lens



Fig, 5.7 Hand camera

The human eyes can be compared to a camera, except the focusing of object which is different. The retina acts like a film the cornea and the lens as the leas system and the pupil is analogues to the diaphragm of a camera.

Table 5.2 Comparison of the eye with a camera

Human eye	camera	Functions
Iris	Iris diaphragm	Adjust the quantity of light
Cornea	Convex lens	Focuses light
Sensitive retina	Sensitive film	image is formed detects light

Light rays reflected from an object enter the human eyes and form an image on the retina. In the camera a sharp image is being photographed and focused on the film by turning the screw mount of the lens.

A simple microscope

A simple microscope – is a biconvex lens. The object is placed between the focus and on center of the lens. It is used to magnify objects in the nearer distances and used to see small objects.

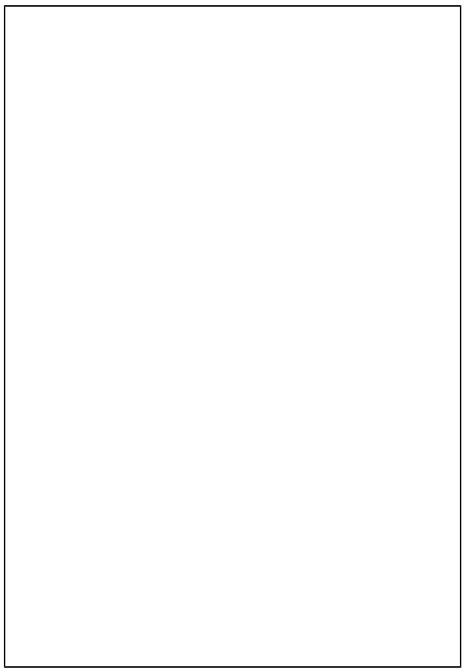


Fig 5..8 simple microscopes

A. Telescope

A telescope is used to see magnified image of distant objects.

Telescopes are of two types. These are:

1. Refracting
2. Reflecting

Refracting telescope has objective lens with large focal length and eyepiece with very small focal length the distant object first focused by objective lens and finally magnified by eyepiece lens.

In the reflecting telescope the objective is a very large concave mirror. This mirror focus the image in front of the eyepiece.

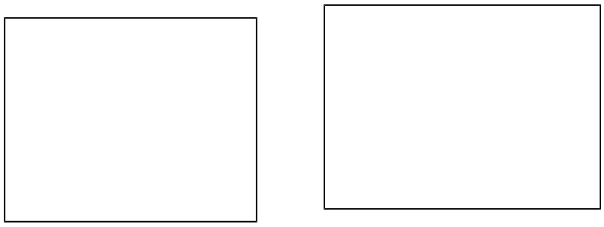


Fig 5.9 a) Refracting telescope

Fig 5.9 b) Reflecting telescope

Our Eyes and their Health

Our eyes are very sensitive part of human body, naturally it has self – protection mechanism. It avoid substances entering the eyes. For example, blinking of eyelids and tear avoids dust particles.

Our eyes must always be kept clean. otherwise they are affected by different diseases causing micro organisms.

Eye disease is a disease that affects our eyes because of poor hygienic practices. To avoid our eyes diseases we should wash our hands and face with soap and water regularly. In addition to

this we should avoid flies from landing on our eyes. because they are also causes of eye diseases. Some common eye diseases are:

- Conjunctivitis
- Glaucoma
- Cataracts.

Activity5-7

Go to any health clinic or office in group and ask health professionals on the causes and prevention of glaucoma, conjunctivitis and cataracts and report your findings to the class. • What are your contributions to avoid these diseases.

The ability of the eyes to see distant and near object is called **accommodation**. We can see near and far distance objects by changing the focal length of the lens. When our eyes focused on near objects the focal length decreases and for far objects it increases.

Fig 5.10 Accommodation a) focusing near object

Fig 5.10 Accommodation b) focusing far object

Our eyes defects:- Defects of vision results from an incorrect relation between the parts of the optical systems of the eyes.

There are various kinds of eye defects associated with vision. The most common are.

- Short and
- Long sightedness
- Astigmatism.

Short sight It is called **myopia**. This eyes defect is caused by a long eye ball. (the distance between lens to the retina is very long) and rigid lens. A person who is affected by this defect can not see distant objects clearly. This kind of defect can be corrected by eye glasses with concave lenses.

Long sight It is called **hypermetropia**. This defect is caused by a short eye ball. (the distance from lens to retina is very short) and weak lens. A Person who is affected by this defect can not see near objects clearly. It can be corrected by wearing eye glasses with convex lenses.

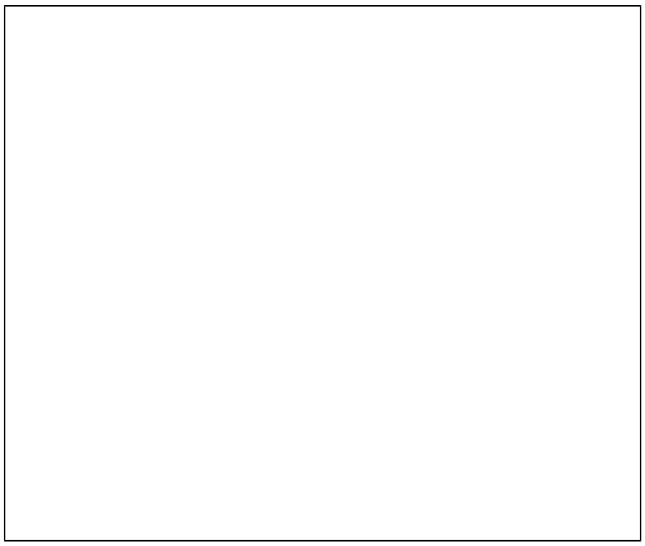


Fig .5.11 Eye defects and after correction.

Astigmatism. This defect is caused by the irregular shape of the cornea. Because of this an imperfect image is produced on the retina. It is corrected by wearing eye glasses with cylindrical and equally curved lenses.

Care of our eyes

Our eyes are very nearly spherical in shape. The front parts are sharply curved and covered by a strong transparent membranes. The functions of your eyes can be affected by irritations caused by dust or infected by contagious micro organism. To avoid eye-disease and keep the eye clean care should be taken by individuals. In addition, this sensitive part of our body can damaged by intense light or atomic radiation. This sudden damage should be avoided.

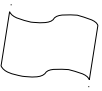
Exercises 5.1 I answer the following question

1. Name the parts of our eyes and explain their functions.
2. Name and explain sources of light
3. Explain using examples the properties of light separately
4. Explain the use and the differences of the two lenses.
5. Discuss with your friend about optical instruments
6. What is the difference between eye diseases and eye defects.

II Choose the correct answer

7. _____is the ability of the eye to see near and distant objects
   A) Accommodation b) astigmatism c) correction
8. Which part of the eye used to focus image
   a) Cornea b) retina c) iris d) lens
9. Which component of the eye is important in the brining near objects in to focus
   a) Retina b) iris c) lens d) cornea
10. . which one of the following lenses is used to correct short sightedness?

a) b) c) d)



5.2 The Human Nervous system

By the end of this section you should in able to:

- Define the nervous system as a system that consists of the brain, spinal cord and nerves
- Tell the importance's of the nervous system.
- Identify the brain and the spinal cord on a chart.
- Tell the functions of the brain and the spiral chord.
- Show the main parts of the brain and the spinal chord.
- Define hormones as chemical messengers.
- Explain the function of hormone adrenaline and insulin.
- Name some common drug abused in their locality including alcohol. Chat, tobacco and hashish.
- Explain the effects of drug abuse on individuals and their families.
- Express willingness to conform to a drug free behavior.

The Human Nervous systems

Our senses and nerves let the brain know what is going on. Our ability to think using the brain and our skill with our hands are controlled by our nerves.

What is Nervous systems?

A nervous system is the special body structure able to send, receive and the brain interprets information in the form of electrical messages.

The nervous system consists of:

- Brain
- Spinal cord and
- Other various nerves.

The role of nervous systems in our body are:

- With the help of receptors it collects information from internal and external environments
- Using the brain it coordinates various information in relation to previous experiences
- It acts upon the processing of information by coordinate the body activities.

The nervous systems are made up of nerve cells or neurons. The means of Communication between the nervous system and all other tissues of our body takes place by nerve cells.

Kinds of Nerve cells (neurons)

- Neurons (nerve cells) are the smallest structural and functional units of nervous system.

1. Sensory neurons- carry impulses from sense organs to brain and spinal chord.

2. Motor neurons – carry impulses from brain and spinal chord to glands and muscles.
3. Association neurons- connect sensory and motor nerves.

Fig 5.12 the structure of neurons.

Brain and spinal chord

The brain is a complicated organ of a nervous system enclosed by the skull bone called cranium.

The human brain is divided in to three parts. These are:

- The fore
- The mid and
- The hind brains

The fore brain is a highly developed part of the brain which contain large lobes called cerebral hemispheres. There are two major parts which are known as the cerebrum and the diencephalon .

The cerebrum is located at the front part of the human brain. The outer part is called the cerebral cortex.

The mid brain connects the fore brain with hind brain. It contains conduction path for both sensory and motor messages between fore and hind brains.

The hind brain contains three structure, These are: cerebellum, medulla oblongata and pons.

The cerebellum is the largest region in the brain and highly specialized part.

The medulla oblongata- acts as a link between the spinal chord and the brain. The pons links the nerve path way from medulla oblongata and cerebellum with midbrain.

Table 5.3 main parts of brains and their functions.

Parts of	
Fore bra	t learning feeling of - Interpret sensory information - Coordinate voluntary movement of body muscles.
Mid brain	- Controls wakefulness and sleep - Distribute nervous impulses to fore brain and hind brain.
Hind brain	- controls posture and balance writing or playing musical instruments. - Controls involuntary actions (salivation Circulation etc).

Fig 5.13. diagram of brain with different parts

The spinal cord

The spinal cord is one part of nervous system which has tubular structure and protected by vertebrae. It contains a hollow canal called the spinal canal.

The function of spinal cord is coordinating the activities between the brain and other parts of the body. The spinal cord is the center for reflex action.

Sections of spinal cord .

The spinal cord has two sections. These are: the white and grey matter

- The white matter contains bundles of nerve fibers which carry impulses up and down the spinal cord
- The grey matter surrounded by a white matter and encloses the spinal canal.

Reflex actions

A reflex action is involuntary automatic responses to stimulus.
Examples of reflexes actions are: knee- jerk, sneezing, blinking of the eye, ankle-jerk.

A simple reflex actions involves receptors and effectors. The path way of nerve impulses between receptors and effectors are called reflex arc .

The receptors are:

- Sensory
- Association and
- Motor neurons.
- Reflex action does not involve the brain. It is rapid and inborn.
- Effectors receives messages and reacts, glands secrete and muscles contract. \

Fig 1.14 A reflex arc

Hormones and their Functions

What are hormones?

Hormones are chemicals that are produced or secreted by glands and released directly in to the blood stream. They are transported in to their action by the blood and produce effects on physiological functions.

Activity 5.8.

At night time when you go outside in the dark you feel some kind of danger around you and you are ready for to escape or to fight against the danger. What makes you to feel some kind of danger around you? Discuss with your friends.

The activities of Hormones.

There are five steps to be involved in hormones activities. These are

- They must be synthesized
- Secreted in the blood
- Transported
- Exerts their effects and degraded after their tasks are completed

Classes of Hormones.

Hormones are classified based on their physiological functions. They are:-

- Metabolism Controlling hormones
- Digestion controlling hormones

- Growth and development controlling hormones
- Reproduction controlling hormones.

The human body produces chemicals in the tissues called glands. There are two major groups of glands the exocrine and endocrine glands.

Exocrine glands- release their secretions through ducts. Examples: salivary gland, pancreas mammary glands.-

Endocrine glands – are ductless glands release chemicals directly in to the blood stream-

Examples – pitutary gland, thyroid gland, adrenal gland etc.

Now we are going to see only the two glands. /They are adrenal and pancreas glands-

Adrenal gland.

This gland is found on the top of each kidneys. Each gland has two portions adrenal medulla (inner portion) and adrenal cortex (outer portion)

Adrenal medulla sometimes called emergency gland because it secrets the hormones adrenalin (epinephrthe) and non adrehalin during stress conditions.

The following are happened during stress conditions

- The heart increase the cardiac out
- The brain becomes alert
- Constriction of blood vessel to skin and kidney
- Dilation of blood vessels in muscles and brain

Adrenal cortex produces the hormones called

- glucocorticoies which controls blood sugar level .
- Minarelocorticoides which controls blood mineral level.

Pancreas – is found below the stomach and has exocrine tissue and endocrine tissue. It has cluster of cells. Among these 70% of these cells are called beta cells which produce the hormone insulin. And the remaining cells are called alpha cells which produce the hormone called glucagon.

Both insulin and glucagon regulate blood glucose level as one hormone increases glucose level the other decreases

Mechanism of Blood sugar control

High glucose level

- It is about 0.16g/100 cc.
- Stimulates beta cells of pancreas
- Insulin's is secreted to blood.
- Stimulates cells to take more glucose from blood
- Stimulates muscles and liver to convert excess glucose to glycogen
- Convert glucose to fat.

Low glucose level

- It is about 0.06 g/100 cc.
- Stimulates alpha cell of pancreas
- Glucagon is secreted to blood
- Stimulates liver to concert glycogen to glucose
- Mobilizes of amino acid and fats and convert in to glucose

The normal blood glucose level is 80g/100cc. The most series disorder of blood sugar level is called **diabetes mellitus**.

This abnormality of blood sugar level are two types.

- **Insulin dependent diabetes** is called juvenile- onset diabetes, usually develops before 30 years of age. The level of insulin decrease in the blood. This can be corrected by taking daily injection of insulin.
- **Non insulin dependent diabetes** is called maturity onset diabetes usually develops over 30 years of age of over weight persons. Enough insulin is secreted by the pancreas. The problems is the cells are not able to take up insulin and use it because their receptor cells may be covered with fats.

Effects of Drug Abuse.

What is drug abuse?

Drug abuse is the bad use or misapplication of drugs with out their medical practices. Drug is substance that modify the function of an organism by taking it.

Drugs are classified in to three: These are:

- **Painkillers**- they give relief from the gain with out curing the source of the pain. Examples: Asprin, paracetamol etc.
- Sedatives – produce a condition of calmness by alleviating anxiety. Example valium
- **Stimulants**- produce excitement and avoid depression and awaken the person.

Examples: chat cocaine etc.

Some effects of Drug Abuse

Drug abuse causes social and individual problems, For example **Health problems**- It can cause different infections and organic changes, mental disorderness and physical and psychological dependence

- **Economic problems** – because of they diseases which are caused by drugs we need money to get medical treatments
- **Family and social problems**- The family break down due to economic problems and because of bad behavior
- **It is related to society** – the health centers and services will be increased. The spread of drug abusers can cause ,crimes, accidents which affect the society

what to be done to stop drug abuse?

Some ways to control drug abuses are:

- Reduce social acceptance of drug and drug users.
- Limit the availability of abused drugs.
- Educate the society about the harmful aspects of drugs.
- Improve recreational and leisure time facilities
- Prohibit some drugs by law
- Avoid encouraging conditions to take drugs.

Exercises 5.2.

I Answer the following questions

a. Name and explain the major parts of human nervous systems
b. Discuss the main parts of the brain and spinal chord.
c. Explain the function of hormones by using examples.
d. Is insulin synthesized by pancreas? How?
e. Name and explain some reflexive actions
f. What are the major effects of drug abuse?

II choose the correct answer

g. The adrenal gland is found closest to the
a) kidney B) liver c) stomach d) Intestine

5..3. The Human Reproductive system

By the end of this section, you should be able to:

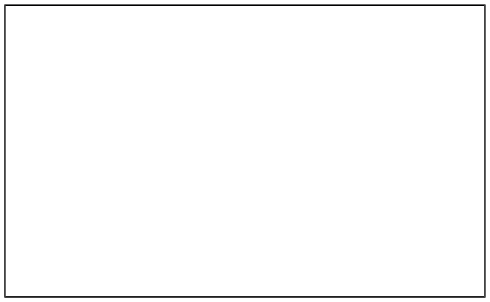
- Identify the main structures of male and female reproductive organs on charts.
- Define menstruation as a monthly loss of blood from uterus wall.
- Explain the care that should be taken before and during menstruation.
- Define fertilization as coming together with a sperm and an ovum to form a zygote.
- Explain how fertilization takes place in the female body.
- Explain the consequences of Unwanted pregnancy and the benefits of family planning.
- Discuss gonorrhea ,syphilis and cancroids as common sexually transmitted disease.
- Describe the prevention methods of common sexually transmitted diseases
- Discuss female genital mutilation, illegal abortion, abduction, rape and sexual harassment as harmful practices that should be stopped.

Activity 5.9

.
Discuss in group

- What makes the enlargement of sex organs during puberty stages?
- What physical changes do you observe on males and females in puberty stages?

What is Reproduction?



Reproduction is the process by which living things give rise to their own kind.
There are two types of reproduction. These are

- Asexual and
- Sexual reproductions

The human reproduction process involves the male and females reproductive organs.

Male Reproductive organ

In the male, the primary sexual structures consists of the penis and the testes in the scrotum.

The penis is an erectile structure made up of spongy tissue and blood vessels. Its function is to transfer male gametes in to the female sexual organ and it also used for urination.

The testes are the sperm producing organ. They are two in number and contained in scrotum. The site of sperm production is celled **seminiteroustubules.** There are also other structure that which you will learn later on

Fig 5.15 The male reproductive organs (structure)

Female Reproductive structure (organs)

The female reproductive structure consists of Ovaries, Oviducts, uterus, Vagina and glands

Ovaries are the organs which produce eggs (ova) and hormones called **estrogen** and **progesterone.**

Oviducts are tubes carrying egg from ovary in to the uterus.

Uterus (Womb) is the structures in which the embryo develops. It is connected to the vagina to the exterior past. Ring like muscles at the entrance of the uterus and vagina are called **cervix.**

Vagina is a tube opening in to the vulva. It is enclosed by outer (labia major) and inner (labia miner) double muscles. It increases in size during pregnancy. There are also glands which secrete lubricating substances.

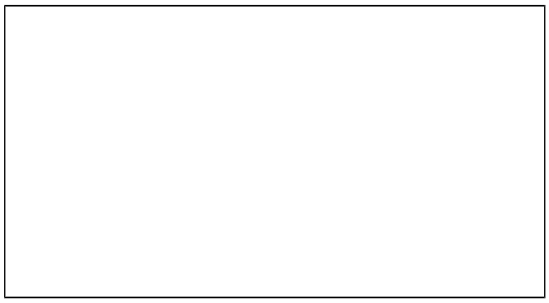


Fig 5.16 The female reproductive structure.

How Reproductive Processes takes place?

The male sperm which a very large in number are produced with in the testes. When the sperm is matured it is stored in different organs. It is delivered in to the urethra by the erected penis and finally it is ejaculated from the penis.

In the female reproductive systems a large number of eggs develop in two ovaries because of hormones. The egg in the follicle is released in to the fallopian tubes and extends from the ovary to the uterus and the embryo is developed. If fertilization doesn't occur soon after ovulation, the eggs are released out as a form of menstruation.

The reproductive organs are grown and enlarged during the period of puberty. Puberty is the stage of the beginning of sexual maturity.

In girls it occur between 12 and 15 years of age and in boys it occurs between 13 and 17 years.

Activity : 5.10

Discuss in group

- At what age in females menstruations begins?
- Why menstruation is happens and what it indicates?
  Make a group of 5 to 6 students and discuss on the above questions then present your finding to the class.

What is menstruation?

Menstruation is the discharges of bloody fluid from the uterus when fertilization does not take place. If the egg is not fertilized the thickened uterine wall breaks down and will be discharged out from the body through the vagina canal to the exterior part. This bleeding in girls occurs when they are in puberty stages. The time from one menstruation to the next is about 28 days on the average.

What are the effects during this period?

- Thickness of Uterus wall
- The release of an ovum
- The breaking down of a Uterus wall
- Loss of blood

During menstral cycle females fill unhappy, but this process should be taken as normal and natural.

The manestral cycle should be controlled by hormone. The hormone progesterone has an effect of thickening the wall of uterus in preparation for the implantation of embryo. It the level of progesterone decrease the result will be. The releases of blood.

What is fertilization?

Fertilization is the process by which the sperm and the egg are united in the female to form a fertilized egg (the zygote)

Fertilization takes place when the egg is released and it starts to move away from the ovary through the fallopian tube towards the uterus. It takes 3 days, Any sperm cell should move in to the fallopian tube in order to fertilize the egg. Fertilization should occur in the fallopian tube. Sperm is deposited in the vagina and move in to the uterus, Any one of the sperms which is successful fertilizes the egg.

If it reaches before 24 hrs of ovulation the fertilized egg will continuously moved and reaches in to the Uterus. An embryo is embedded and continuous its development during the period of pregnancy.

Pregnancy is the period of developments between fertilization and girth .

Once the embryo is implanted in the uterus, a series of villi grow between the embryo and the uterus wall. These enlarges and form the placenta which is attached with embryo with umbilical cord. It is important for the rapid exchange of materials between the mother and the implantation. It also produces hormones and prevents bacteria to enter.

After two months the human embryo is called fetus. The foetus lives in the amniotic fluid until its birth. In humans pregnancy lasts for about 280 days.

How to prevent pregnancy ?

Pregnancy may be wanted or unwanted. Most people may not need children but others may need, If we don't want a child we can prevent reproduction using different methods. These are:

- **Natural method** (Rhythm method)- naturally Controlled method by counting the day in menstrual cycle in that fertilization does not take place.
- **Mechanical method**
  - Using condoms
  - Using intrauterine device
  - Using diaphragm.
- **Chemical methods**
  - Using (taking) pills.
- **Sterilization methods.**

What are needed for birth control?

- Spacing the birth of children for the health of the child and the mother.
- Limit the number of children according to the family income

- Have a planned family life
- Control the fast growing population of the world.

Sexually Transmitted diseases – are diseases which spread through sexual intercourses between opposite sexes. They are called venereal diseases. These diseases are gonorria, syphilis chanceries and AIDS.

Gonorria:- is caused by an infection of a bacteria called Nisseriagonorrhea. In male it attacks the lining of the tube in the penis and in women it attacks the entrances of the vagina.

What are the symptoms?

In male after the infection of two days, there will be irritation and burning sensation on passing urine, A fluid is also discharged from the penis:

In female irritation and the discharge of fluid will occur but not seen soon as in males. If the treatment is delayed it can transmit of a sexual partner. We can prevent this disease by safe sex, promoting sex education and treated early is advisable.

Syphilis – is caused by a bacteria called **tryponemapallidum**. It is slowly progressive and attack the reproductive organs the blood stream and the nervous system, heart and blood vessel . The symptoms are painless red spot at the tip of penis and vaginal enterance. It may seen from 10 to 60 days. If it is not treated, it causes sterility.

To prevent this disease use a safer sex.

Cancroids- It is an open wound coursed by a round – shaped bacterium called **Homophiles** dvcreyi. It is common in males than in females. The symptom is seen between 3 and 5 days after infection. It starts as red flat surface and it bursts. It can be treated by antibiotics which are prescribed by a physician.

Activity 5. 11 Identification of other harmful practices which are found in your locality.

Material – note book pen etc. Procedure- Observe and ask some harmful practices which take place in your locality and write on your note book. Come to the class and report your finding to the class

Harmful Practices.

Harmful practices affect reproductive health most of these affect females. These are:

- Female genital mutilation
- Illegal abortion
- Abduction
- Rape and
- Sexual harassment.

Female genetal mutilation – is cut part of the female genital. It is painful and the results is loss of execs blood.

Illegal abortion * is the removing of foteus before the appropriate data of birth using drugs or traditional treatments. It is very dangerous and may result in death.

Abduction – is the tacking away a person or a women unlawfully by force and without the interest of individuals.

Rape – forced sex practices which is performed by males with out the will of females. It will have a physical, psychological and health injuries on females. It may also result in unwanted pregnancy and contraceptive diseases. It should be taken as a crime and we should react on it

Sexual harassment is unwanted sexual behavior ranges from making sex arising comments that forcing another person in to unwanted sexual acts.

Exercise 5.3. I Answer the following questions

1. Explain briefly the following terms:- tested, /uterus and ovaries?
2. Explain how reproductive process takes place?
3. _____ Is the stags of beginning of sexual maturity.
4. _____ Is the over flow of Unfertilized egg through vagina
5. Sperm cells are produced in the
   a. Epidermis c. Vaseterns
   b. Seminel vesicle d deminiterous tubule
6. Discuss the method of preveningy pregnancy
7. One of the following attaches the fetus and the mother Uterus.
   a. Umbilical cord c. fetal membrane
   b. Placenta d spinal cord
8. Explain the cause and effects of sexually transmitted disease.

5.4. <u>HIV and AIDS</u> ---------(5 periods)

By the end of this sections you should be able to:

- Explain the care that should be given to the people who are living with HIV and AIDS
- Explain the benefits of showing affection to the peoples who are living with HIV and AIDS
- Describe the social impacts of HIV and AIDS
- Demonstrate empathy, cooperation, love, interpersonal communication and problem solving as life skills that help them to prevent HIV.

Activity 5.12 Discuss in group

AIDS is a disease which is rapidly spreading all over the world and it is killer.

The students should be seriously discuss the following questions.

- How it is transmitted?
- How could we prevent this diseases?
- What is its symptoms?
- Does it transmit from people to people
  a) by sharing materials?
  b) by living under the same room?
  c) by sharing equipments like needles, razor, blades?

What is HIV and AIDS?

HIV (Human immune deficiency Virus) is a virus that commonly transmitted during sexual intercourse with an infected partner. The virus can enter through lining of vagina and penis. An infected male or female transmits the virus by sexual intercourses. When a person is affected by other sexually transmitted diseases they cause inflammation and fast transmutation of the virus..

AIDS (Acquired Immune deficiency syndrome) is a disease which is occurred due to the break down of immune systems. HIV target affect the white blood cells called CD4 cells. There will be a break down of the body's ability to defend itself against the disease. The cells are infected and rapidly destroyed by the virus. over many years (on average 10 years) the CD4 cells decreases and the body loses its ability to mount an immune response against the infection . This is an indication of the AIDS stage.

Therefore, the cause of AIDS is a virus called viruses HIV_1, and HIV_2. The virus can not survive out side the human body. It lives in:

- The blood of the infected individuals.
- The semen (ejaculated fluid in penis) of infected person.
- The vaginal fluid of infected female.

How HIV and AIDS is transmitted?

The virus HIV is transmitted when the body fluid from infected person is transferred to uninfected person. Some ways of the transmition are as follows:

- Sexual intercourse. (unsafe sex)
- Blood transfusion . (by touching infected blood)
- From infected mother to foetus.
- Blood contaminated materials such as needles, lazar blades etc.

Most of the time people who have more than one sexual partner who take unsafe medical treatment and have unsafe sex character are facing this disease.

What are symptom of AIDS?

AIDS is a serious disease that is rapidly spreading all over the world. When once the human body cells are infected and killed by HIV Virus and if it is below its normal level they can not defend the body from different kinds of disease and affected by the various disease continuously.

Some symptoms of HIDS are as follows:

- Loss of weight
- Frequent sweats and fevers
- Continued deep and dry coughing
- Long lasting of diarrhea.
- Lack of energy
- Increasing shortness of breath
- Unusual skin rashes
- Unexplained fatigue combine with head aches
- Swelling of glands which are located in the thoracic cavity

Care and Prevention of HIV /AIDS

AIDS has no treatment to be cured all over the world. There fore basically care should be taken by individuals:- The followings are preventing the transmition of this disease and avoid risky undertakings

- Practice safe – sex
    - by having one long lasting partner

- By using condoms
- Control blood transfusion (during blood exchange)
- Avoid infected mothers getting pregnant
- Using proper medical practices (during a medical treatment use sterile equipments)
- Educate the people about AIDS and its controlling methods.

By controlling physical, emotional, social and spiritual life, one can live with HIV and AIDS for a long period of time. A person living with HIV should avoid feeling of angry and sad, he keep his positive out look. A person living with HIV and AIDS should take the following care in order to live with a feeling of happy and strong.

- Seeking professional help from counselors
- Setting goals for the future and joining a support group
- Sometimes relax himself and eat a well prepared balanced diet ‘
- Getting treatments for infections quickly.
- Avoid getting sexually transmitted diseases
- don’t smoke and drink alcohol instead does
- express feelings by different activates
- Take anti- HIV drugs

Table 5.4. HIV transmition route in percentage

HIV transmition route	Percentage of Infection
• Blood transfusion	3 – 5 %
• Mother to child transmition	5 - 10 %
• Sexual intercourse	70 – 80%
• Injecting drug use	5 – 10%
• Health care (needle injuries)	< 0.01 %

Social impacts of HIV and AIDS

Every level of the society is deeply affected by HIV and AIDS. Individuals, families and the national economy are being affected by HIV and AIDS

The followings are some impacts of HIV and AIDS in the Society.

- reduced supply of labor
- Loss of skilled and experienced workers,
- absenteeism and early retirement
- Increase labor costs for employers from health insurance to retraining
- Reducing productivity contracting tax base and negative impact on economic growth.
- Social protection systems and health services under pressure
- Loss of family income and house hold productivity.
- Orphans and other affected children are forced out of school and participate in child labor.

Children will be come orphans by the death of their parents and face a number of difficulties. Most patients occupy hospital beds and its medical treatment which are very expensive.

In general, unless we fight against and control HIV and AIDS, it will continuous to kill us and to kill our country's development. Therefore, we students come together and participate in the fight against HIV and AIDS.

HIV counseling and testing

It is advisable the students and their parents to take a Voluntary HIV couns3ling and testing programs. Counseling by trained health officers will help you know much more about the disease. It encourages to explore possible solutions to the problems.

If the infection with HIV is known at earlier stage, we will get the following advantages

- Learn more about the virus and its transmition ways
- Look after our health so that we stay as healthy for long period of time
- Getting information and accepting the fact that HIV infected person seeking (Support, diet food, control stress)
- Find out what resources are available with in our community to help us manage our HIV status.
- Find out about drugs.
- Make sure that we do not affect any one else

- Learn how to manage the stress in our lives.
- If we are not infected. It motivates us to stay free from HIV / AIDS

.

Unit summery

In this unit you have learnt the following points

- The structure of the human eyes and their functions.
- Light is a form of energy and has different sources.
- Properties of light, Propagation of light, reflection of light and refraction of light.
- Light travels only on straight lines
- Types of lenses with their properties and other optical instruments, a simple camera, a microscope and a telescope.
- Compare the function of the human eyes and a camera.
- The difference between eye diseases and eye defect. How care should be taken for our eyes.
- Different parts of the human nervous systems, the brain and the spinal cord with their functions,
- Reflex actions which are the automatic responses to a stimulus.
- Hormons and their functions
- Mechanisms of blood sugar control by adrenalin and insulin
- Some effects of drug abuse and its controlling methods
- The male and female reproductive organs and the reproductive processes
- Menstrual cycle, pregnancy and prevention of pregnancy
- Sexually transmitted diseases and its preventions
- HIV and AIDS, ways of transmition and care and prevention
- Social impacts of HIV and AIDS

End of unit questions

Part I say True or false

1. The lens part of an eye reflect and focuses light rays
2. Rods distinguish white or black aspects of image
3. When you switched on a torch in dark room the light from the torch propagate in a straight line.
4. Reflection and refraction are the most properties of light
5. Converging lens is concave lens.
6. The nervous system in a body collects information from internal and external environment
7. Reflex action does involve the brain, it is rapid and inborn.
8. The penis is sperm producing organs found in scrotum.

9. In the reproductive system of the male the tube that serves as a passage for both the semen and urine is scrotum.
10. AIDS accur due to the break down of immune system

Part II choose the correct answer

1. HIV can be transmitted by all, except
   a. Sexual intercourse
   b. Living in the same room
   c. From infected mother to child
   d. Transfusion of infected blood
2. Gonorria is sexually transmitted disease caused by
   a. Nisseria gonorrre b) truponema pallidum
   b. Homophilus ducrey d) qonadorophins
3. The female organ which produce ora is
   a. Aviducts c) uterus
   b. Ovaries d) embryo
4. The ability of our eyes in a normal person to view either near or distant objects is:-
   a. Refraction c) Astigmatism
   b. Accommodation d) contraction
5. One of the following nerve cells carry impulses from sense organs to brain and spinal cord
   a. Motor neurons c) fore brain
   b. association neurons d) sensory neurons
6. The inner portion of an adrenal gland is
   a. Adrenal cortex c) adrehalins
   b. Adrenal medulla d) pancreas
7. Which one of following is an effect of drug abuse
   a. Health problems c) family and social problems.
   b. Economic problems D) all are its effect
8. Bouncing of light rays from the surface of a body's
   a. Reflection b) refraction c) diffraction d) all of them
9. The eye defect caused by the irregular shape of the cornia is
   a. Accomodetion b) Astigmatisn c) reflection d) correction
10. One of the following is harmful practices
    a. Rape b) sexual harassment
    b. Abduction d) illegal abortion e) all of the above

Part III match coulomb A with column B

Column A	Column B
1. Concave lens	a) cornea
2. Convex lens	b) diverging lens

3. Optical instrument	c) myopia
4. Focuses light	d) converging lens
5. Short sight	e) tests
6. Long sight	f) retina
7. Reflex action	g) ovaries
8. Pancreas	h) Telescope
9. Males reproductive organ	i) insulin
10. Female reproductive organ	j) sneezing
	k) hypernetropic
	l) gonorria

Part IV Fill in the blank space

1. The three main parts of neuron are_____ _____ _____
2. In a simple reflex arc the path of the nerve impulse is from_____ to____ to____ _____
3. The image formed by a diverging lens is always _____
4. drugs are not curing the source of the pain
5. The disorder of blood sugar level is called_____

Unit 6
Earth

Learning outcomes

- Demonstrate the shape of the earth \
- Describe the three layers of the earth
- Name the three types of rocks
- Tell the importance of the three types of rocks.
- Give examples of the three types of rock
- Identify the three types of rocks
- Explain the causes and effects of earth quakes and volcanoes.
- Describe the composition of the atmosphere
- Name the layer of atmosphere
- Compare the layer of atmosphere
- Define weather as the prevailing physical condition of temperature kainfall and wind .
- Construct some weather measuring instruments
- Use some weather measuring instruments,
- Name the climatic zones of the earth
- Show how the climatic zones affect the distribution of living organisms with examples
- Define global warming as the increase in temperature of the atmospheres of the earth
- Explain the causes and effects of global warning.

-

6.1. The structure of the Earth

By the end of this section you should be able to:

- Demonstrate the shape of the earth
- Describe the three layers of the earth
- Describe the three types of rocks
- Tell the importance of the three types of rocks.
- Give examples of the three types of rocks
- Identify the three types of rocks.
- explain the causes and effects of earthquake and Volcanoes.

Activity 6.1

The students are making a group in the class room and discuses each other on the following questions. • What number of planets are found in the solar system? • List the name of each planets • What is the shape and structure of our planet?

In grade five you learned about the Solar system. What substances this system contain?

The solar system is made up of the sun, the nine planets and their moons, comets and meteorites. Each planet is moving around the sun. The earth is the only planet that animals and plants are found. The shape of the earth is elliptical.

What is the structure of the earth?

The earth is made up of three layers. These are **crust**, **Mantle** and **core**.

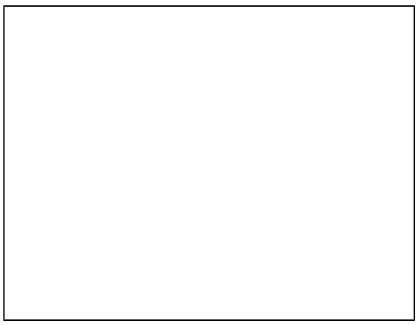


Fig 6.1 The structure of the earth

In the above fig . see the structure of the earth carefully and answer the following questions.

- Which layer is the outer part of the earth?
- Which layer is the Central part of the earth?
- Which layer is between the outer and the inner layer?
- Compare the size of each layer?

The curest is the outer and the thinnest layer of the earth. It is 5-7 km thick oceanaly and 20-40 km thick continentally.

The manetle is the middle layer between the curst and core. It is 2900 km thick.

The core is the central layer of the earth. It is 3470 km thick.

Compare the size of each layer from the diagram .

The core is thicker than mantle and the mantle is thicker than the curst.

The core is hotter than the mantle and curst and the curst is cooler.

What substances are composed in each layer?

The curst is composed of dense basalt, the mantle is composed of molten rock and iron and nickel are found in the core.

Types of rocks

Activity 6.2.

Go to the near by locality search and collect different rocks in groups. By asking your family or partner about the characteristics of each rock and:

- Identify the color of each rock
- List the name of each rock
- Discuss with your friends about their uses

What are rocks?

A rock is a mixture of minerals, mineraloids, glass or organic mater. Rocks have different characteristics. Their types differ in their color, hardness, density, texture etc. They Vary according to their origins. Rock types are divided in to three categories.

- Igneous
- Sedimentary and
- Metamorphic rocks

Igneous – rock: Igneous rocks are hot rocks of the upper mantle and lower crust melt forming a molten liquid magma. It forms when the magma is solidified

Example of this rock are **granite** and **basalt**

granites- a grained intrusive rock

Basalt – a very fine grained volcanic rock

Sedimentary rocks – It forms when sediments becomes pressed or cemented together. These rocks are often forms as layers. This rock is classified in to three. These are:

- Detrial sedimentary rocks
  Example sand stone , silt stone ,shale
- Chemical sedimentary rocks
  Example rock salt
- Organically formed sedimentary rocks-
  Example coal fossil

Metamorphic rocks. These rocks are formed because of change in temperature and pressure

The above two rocks can be changed in to hard metamorphic rocks such as **marble** and **quartzite**.

Example: Marble, slate

Table 6.1 Major rock types and their uses

Types of Rocks		Uses
Igneous	Granite	Building pottery etc
	Basalt	Foundation materials for roads
Sedimentary	coal	Thermal energy, power stations, industry domestic

	Sands tone	Building materials
	Lime stone	- Sheep pasture quarried for cement and limestone walls
	chalk	Cement and lime
Metamorphic	marble	Monuments
	Slate	Building material

Activity 6.3.

Did you hear or see what was happened in our region in sidama zone (in 2003) Bocaso woreda. In this area large numbers of equipments were destroyed and some buildings were crushed.

- What was the cause of this crush?
- Was it a natural or manmade disasters?
- What is the name of this disaster?
- List down some other natural disasters?

Earth quakes and Volcanoes

The earth is one of the most important planet where living and non-living things are found. These things are very useful for human being. But sometimes unfortunately, materials on the surface of the earth are affected or destroyed by natural disasters.

Have you ever watched television or hear on radio that earth quakes and volcanoes killed many lives of people, collapse buildings and destroyed many things?

Earth quake – An earth quake is a sudden motion of the earth caused by the abrupt release of energy that is stored in the rocks

Which areas of the world affected by earth quake frequently? It is estimated that about 80% of all the earth quake Occur in the following regions

- West cost of North America
- Central America and south America

- Southern Europe and southern Asia
- A belt in the pacific ocean including Japan the Philippine most of East indias.
- East Africa rift valley regions are the regions mostly affected by earth quake

The instrument which measure earth quakes strength is **seismograph**. The magnitude of its strength is read with **Richterscale.**

Table 6.2 some major earth quake and effects

Rank of damage	Area	Rector scale	Year
1	Bucharest	7.5	1977
2	Jianssu- hina	8.6	1920
3	Sanfransis co	7.1	1989
4	Dhamar yemen	5.8	1980
5	Tabos – Item	7.7	1978
6	Armenia	6.8	1988

Earth quake damage is greater near the **epicenter**. The epicenter – is a place where great earth quack occurs. 10% of the occurrence damage is near the epicenter. Up to now the greatest ever recorded earth quake had a Magnitude of 8.9. Richter scale.

Causes for Earth quakes

Earth quakes are associated with faults. They are caused by tectonic forces, fracturing, faulting and the movement of masses

Questions-

- What elements a Volcanic eruption Contains ?
- What are the three stage of Volcanoes?
- Discuss the characteristic of each stage?

What is volcanism

Volcanism is the process by which molten rock is transfer form deep seated source to the surface of the earth.

The elements contained by volcanic eruptions are:

- Steam and gases (CO_2, sulpher dioxide)
- Molten rock
- Solid fragments and very small dust and ash particles.

What are the effects of Volcanoes?

- It causes hot water.
- It provides geothermal energy E.g. Ethiopia Rift valley
- It provides fertile soils ‘
- It is the source of hard minerals
- It causes land formation

Volcano regions of the world

- The greatest concentration of volcanoes are found in the circumpacific region (termed as pacific fire). It extends for almost 3200 km from the Aleution is and in to Japan Philippines and Indonesia.
- Solomon is lands in the pacific New Hebride. Tonga
- The Atlantic coast (Madeira Asseneia, Capeverde)
- The Mediterranean regions (Vesuvius, Etan)
- The East African riftvally (m.t kilimangaro m.t fantale M.t. Cameron)

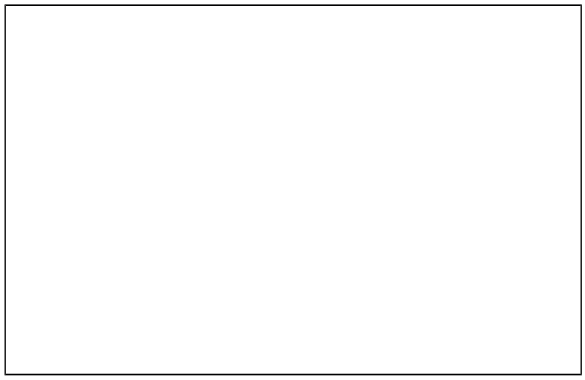


Fig 6.2. map of world distribution of earth quack and valiance

Exercise 6.1

1. Which part of the earth is most accessible?
2. Which part of the earth contains the largest volume of the earth?
3. List the main causes of earth quakes.
4. The three types of rocks are _____ _____ and _____
5. Which of the following rocks is formed when magima solidifies
    a. Igneous rock b) sedimentary rock c) metamorphic rock

6.2 Atmosphere and weather

By the end of this section, you should be able to:

- Describe the composition of the atmosphere
- Name the layers of the atmospheres in the order of their existence.
- Compare the layers of the atmosphere
- Define weather as the prevailing physical condition of temperature rainfall and wind
- Construct some weather measuring instruments
- Use some weather measuring instruments.

Activity 6.4

In groups, at break time tell your students to observe the environment above

the surface of the earth and discuss about the following question.

- What is the weather of the day?
- Is it sunny cloudy or raining?
- Is the day hot or cold?
- What surrounds the atmosphere?
- What is the composition of the air?

The earth is made up of land (lithosphere) water (hydrosphere) and the atmosphere (the air which covers the surface of the earth).

What is atmosphere?

The atmosphere is a blanket of gases and suspended liquid and solids that covers the earth. The gases are the products of volcanic Eruptions, hot springs, chemical break down of solid matter and from photosynthesis and human activities. It plays a great role for life to survive. Almost 8% - 10% of the magma contains almost all the gases that formed the atmosphere.

Composition of Atmosphere

The atmosphere contains gases like nitrogen, oxygen, argon and carbon dioxide. There are also rare gases such as neon, helium and methane. These gases account, 99% dry air. Oxygen is the

result of photosynthesis in plants and carbon dioxide is a product of combustion and exhaled by animals. Nitrogen follows a complex cycle through bacterial activity in the soil and animal tissue.

Table 6.3. The gases in the atmosphere and their percent by volume.

Gas	**Percent by Volume**
Nitrogen (N_2)	78%
Oxygen (O_2)	21%
Argon (A_7)	0.9%
Carbon dioxide (CO_2)	0.03%
Neon(Ne)	0.0018%
Helium (He)	0.005%
Methane (CH_4)	0.0002%

Structure of the Atmosphere

Discuss on the following questions.

- Name the layers of atmosphere?
- How many of them are? List down
- Compare them with your friends.

What are the layers of Atmosphere?

The atmosphere is divided in to four layers based on temperature. They are:

1. Troposphere
2. Stratosphere
3. Mesosphere
4. Thermosphere (Ionosphere, Exosphere)

The arrangements of each layer starts from the lower part of the atmosphere and goes to the upper part. Each layer is identified by its temperature structure.

Table 6.4. Atmospheric layers and their characteristics

Name of the layer	**Average height**	**Major characteristics**
Troposphere	Extends from 8 km to 16 km	• Holds ¾ of the atmosphere • The temperature decreases uniformly with increases altitudes • Its top boundary is tropopause • Contain high speed winds • Air pressure is high
Stratosphere	Extends upward up to 50 km	• Lies above tropopause • Have constant temperature • High concentration of ozon gases • No clouds dust or water vapor • The upper limit is stratopause
Mesosphere	Extends from- 50 km up to 80- km and 85 km - -	Coldest part Lies above the stratopause The temperate falls with increasing height The wind is strongest
Thermosphere - Ionosphere - Exosphere	Extends from- about 80 km- upward in to- space -	Have low density Very little heat can be Observed and conducted Temperature rises up to 12oo^{o}c Have two parts

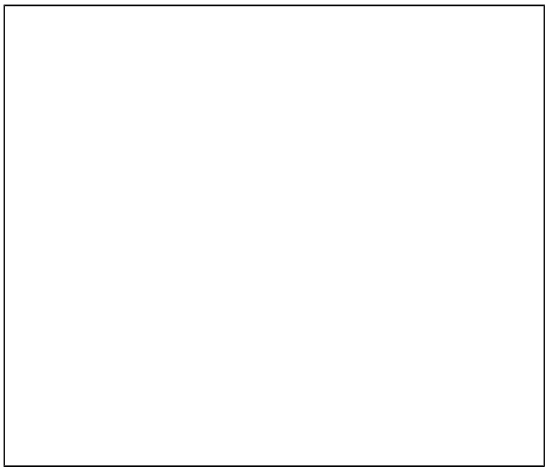


fig 6.3 . The structure of atmosphere

Weather and climate

Activity 6.5.

You may have watched television or have heard on the radio

how flood and drought affect human lives in the world

- What effects were measured?
- How they are controlled?

What is weather?

The two major areas “meteorology” and climatology are used to study the atmospheric science. Meteorology uses the method of the physical science to analyze, explain and predict atmospheric processes. It is also called the science of weather. Climatology used to explain the variation of meteorological processes.

Weather:- is the condition of the atmosphere at a particular place at some specific time.

The most important elements of weather and climate are

- Temperature
- Precipitation
- Pressure
- Wind

Questions

- Discusses some factors affecting temperature distribution?
- What elements are included in precipitation
- What instrument is used to measure temperature?

What is Temperature?

Temperature is the amount of hotness or coldness of an abject, Some factors affecting temperature distribution are bad **latitude altitude distance from the sea** and Ocean currents.

Temperature influence the amount of water vapor in the air. It decides the rate of evaporation and condensation. Temperature also affects the nature and types of cloud formation.

Precipitation. Means falling down of all kinds of moisture from the atmosphere to the surface of the earth. It includes rain snow, sail.

Rainfall – is a drops of water from clouds. The distribution of rainfall is not the same all over the world. The variation is caused by altitude (height from the see level) and relief.

Wind is air in motion over the surface of the earth. When air moves vertically Upward or down ward we call it air current.

The two aspects of winds are

- Wind direction and
- Wind speed.

Weather measuring Instruments.

Measuring Air temperature

To measure temperature we use an instrument called **thermometer**. There are different types of thermometers. The most common is the liquid thermometer.

Maximum thermometer- uses liquid mercury and measures the highest temperature which Occurs during the day time.

Minimum- thermometer- uses alcohol and measure the minimum temperature which occurs during night time.

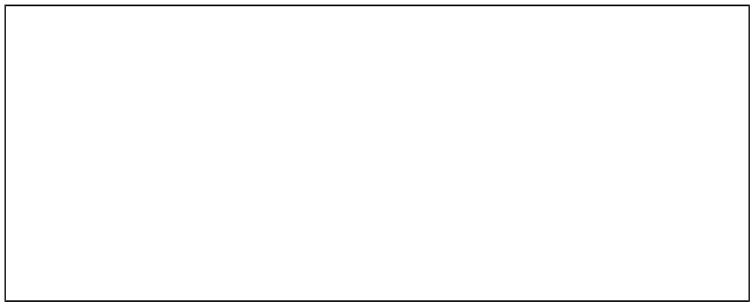


fig 6.4. maximum and minimum thermometer

How it works?

The two thermometers contain mercury and alcohol with smell metal indicators. When the temperature increases the liquids rise and as it decreases it falls. The metal indicator shows the highest and the lowest temperature readings

- The units of temperature are **Celsius scale** Fahrenheit scale and Kelvin scale

Describing temperature

To describe a temperature we use records for long period of time?

- **Daily average temperature** Obtained by adding the maximum and minimum temperature and dividing by 2.

Example Maximum = 25^oc

Minimum = 5^oC

Daily average = $\frac{max+min}{2}$ $\frac{25^{oc}+5^{oc}}{2}$ $= 15^oc$

Monthly average temperature – calculated by adding all daily average and dividing the sum by the number of days of the month.

Daily range temperature - is the difference between the maximum and minimum temperature in a day

Example max = 25^o_c min = $_5{}^oc$

Daily average = max –min

= 25 ^oc – 5^oc

= 20^oc

Annual range temperature is the difference between the temperature of the hottest and coldest months in a year

Example Hottest = temperature = 40^oc

Coldest temperature = - 10 ^oc

Find the annual range

Annual range = hottest temp- coldest temp

= $40^oc - (-10^oc)$

= $40\ ^oc + 10^o_c$

= 50^oc

worked example

The figures below show the maximum thermometer which indicates the highest temperature and the minimum thermometer shows minimum temp- By reading from the diagram find

a) Daily average temperature

b) Daily range temperature

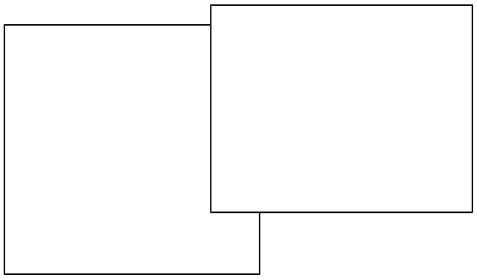


Fig 6,4 a Maximum thermometer

Fig 6,4 b minimum thermometer

Solution

The reading of fig A is 64^oc ⊣ max temperature

The reading of B is 36^oc ⊣ minimum temperature

a) Daily average = $\frac{max+min}{2}$ = $\frac{64^o c+34^o c}{2}$ = $\frac{100^o c}{2}$ = $\underline{50^oc}$

b) Daily range = Max – min = 64^oc - 36^oc = 28^oc

Measuring amount of rainfall

Amount of rainfall is measured by an instrument called a **Rain Gauge**. It consists of cylinder receiving funnel and a jar.

How it works?

The rain fall falls over the area of the top of the cylinder and passes through the funnel into the jar. Then the rain which collects in the jar is poured in to the measuring glass. The measuring glass shows the reading in cm or mm.

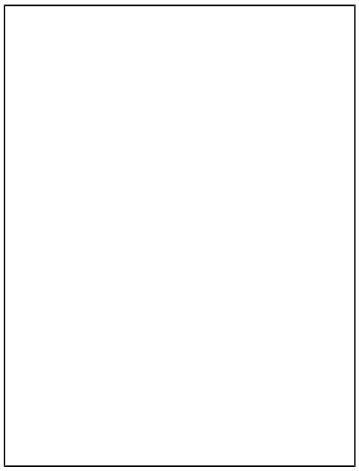


Fig 6.5. Rain gauge

- **Measuring atmospheric pressure**

Air pressure is measured by an instrument called **Barometer**. (mercury barometer)

How it works?

The barometer consists of a bowl of mercury with an inverted vacuum glass tube. The glass tube marked with scale. Now as the air pushes down the mercury inside the glass the tube will rise up. When the air pushes down less the mercury will fall down (the mercury will go up and down) and take the reading from the tube. The pressure unit widely used are miliBar (mb) which represents the force exerted by 1000 dynes on a square centimeter

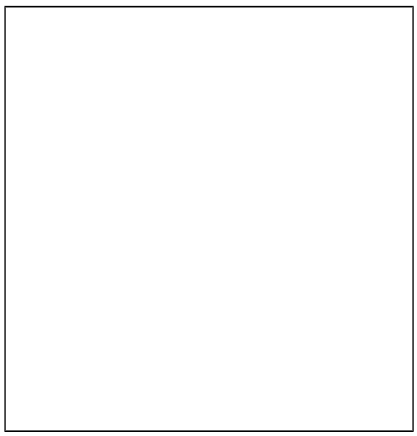


Fig 6.6 Barometer

- **Measuring a wind**

The wind is measured in two ways **wind direction** and **wind speed.**

- Wind direction is shown by a **wind vane**. The wind vane always points towards the direction of the flow of the wind
- Wind speed is measured by an instrument celled **anemometer**

Table 6..5. Instruments used for measuring elements of weather and climate.

Weather condition	Instrument
- Air temperature • Higher • lower	Thermometer Maximum Minimum
• Rain fall	Rain Gauge
• Air pressure	Barometer (mercury)
Wind – A) direction B) speed	Wind Vane Anemometer

Exercise 6.2.

- Answer the following questions
    1. How many layers does the earth atmosphere have?
    2. Discuss the composition of atmosphere
    3. Mention the layers of atmosphere of the earth
    4. According to average height which layer of the atmosphere
        a) Is the nearest to earth's surface ?
        b) is the farthest from earth's surface?
        c) Have the largest concentration of ozone gases?
        d) is the coldest than the others/

6.3. Earth Climate

By the end of this section you should be able to

- Define the term climate
- Name the climatic zones of the earth
- Show how the climatic zones affect the distribution of living organism with examples
- Define global warming as the increase in temperature of the atmosphere of the earth.
- Explain the causes and effects of global warming.

Activity 6.6.

Now a day in the world each earth climatic zones, climate is rapidly changing. This change causes drought and flood in the world .

- What are the cause of this change?
- How to control this rapid change? Discuses with your friends

.

The climate is the average weather condition of the atmosphere for along period of time in a given region. It is not uniform in all parts of the world. It plays a major role in socio-economic development of a society.

The earth can be divided in to three climatic zones.

1. Tropical zone
2. Temperate zone
3. Polar (frigid) zone

Table 6.6 The characteristics and location of each climatic zone

Climatic zone	Location	Characteristics
Tropical	b/n 23 $\frac{1}{2}$ N & 23 $\frac{1}{2}$ °s	- High temperature through out the year - Annual average temp is $20^{o}{}_{+}$c - Rainfall and temperature are seasonal - Temp and rainfall decrease pole wards
Temperate	b/n tropical and the frigid zone 23 $\frac{1}{2}$ N and s - 66 $\frac{1}{2}$ ° N and s	- Temperature ranges from 26^{o}c in summer to 10^{o}c in winter - Annual rain tall varies from 380 mm to 700 mm - The rainfall caused by south east trade winds - Rain fall decreases from east to west - Most of the rain occurs in summery
The polar or frigid	b/n 66 $\frac{1}{2}$ N – 90°N and 66 $\frac{1}{2}$ s – 90^{o}s	- Very low annual temperature - In mid winter the temperature are as low as – 37^{o}c and much colder in the interior - Rainfall is small and annual total is 250 -300 mm - Humidity is low between of cold temperature - Only 4 months have temperature more then freezing point

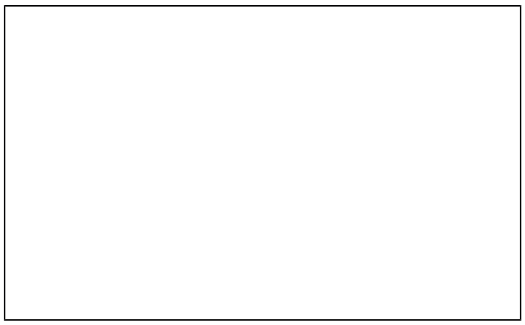


Fig 6.7 map of earth climatic zones

The tropical climate divided in to

- Tropical rain forest climate
- Tropical savanna climate
- Tropical hot and dry climate

The temperate climate divided in to

- Marine west coast climate
- Mediterranean climate
- Humid subtropical climate
- Humid continental

The polar climate divided in to

- Tundra climate
- Ice capes climate

The distribution of living organism will be affected in all climatic zones. For example , In temperate areas many people do not settle on the highlands because they are too cold and covered with ice and snow and there is very little soil because of erosion.

Many people settle on the high lands of tropical areas because of the following reasons.

- Easier to clear natural vegetation
- No much disease such as malaria

- The rain fall is better to cultivate
- The area is cooler than the low lands
- The soil is fertile
- In polar zone the growth of plants are impossible because of the region are covered by ice and snow. The temperature falls below 6^{o}c. On the other side of this zone there are short trees flowering plants lichens mosses and seidges grow. No permanent human settlement. Some animals found in each climatic tic zones.
- In tropical zone – gazelle, hare , fox, snakes and lizards . In temperate zone – squirrels, fox, beaver, skunk ermine bear.
- In polar zone – sea animals, seals, walrus & wholes flesh eating animals
- Polar beers, Arctic fox wolf
- Wingless mosquitoes, birds like the penguins.

Global warming

Activity 6.7

Do you know that human being activities such as removing of vegetation, poor farming practice over grazing etc. are changing the earth climate. Go to the near by agricultural bureau in group and ask the professionals the following questions and collect the information and bring it the class room and discuss with your teacher.

1. What is global warming?
2. What are the main courses of global warming?
3. Mention the effects of global warming .

What is Global warming

Scientists have discovered that concentration of minor green house gases in the atmosphere. Particularly carbon dioxide (Co_2) is rising. This gases could trap more heat in the atmosphere. This could be harmful to the environment and for human health .

Global warming has emerged as the most series environmental threat of the 21st century. climate change is the greatest environmental challenge which is facing mankind on earth.

Global warming is an increase in the earth's temperature due to the use

of fossil fuels and other industrial processes leading to a build up of greenhouse gases in the atmosphere .

Causes of Global Warming

The main cause of global warming is green house gases. These are carbondioide, methane, nitrous oxide, chlorofluorocarbon and ozone. The amount of these gases are increasing due to increased Industries and agriculture.

Another cause for global warming is ozone depletion. The layer is depleting by gases which are commonly used in spray cans, refrigerators, air conditioners and foem producing equipments. Another cause is deforestation. The cause of these are shitting cultivation, conversion of forest area to cash crops, building of infrastructure and land settlement.

Effects of Global warming

- The followings are effects of global warming
  - Climatic effect
    - Warning of the earth surface
    - Changing of temperature rainfall soil moisture wind direction.
  - Rise in sea level
  - Impact on forests
  - Biotic effects
  - Effects on human settlement and society
  - Effects of human health.

Control measures

- Decreases industrial wastes
- Decreases nuclear plants waste
- Increase forestations.

Unit summery

In this unit you have learnt the following point

- The shape and the three layers of the earth the crust mantle and core.
- There are three types of rocks these are: Igneous rock, sedimentary rock and metamorphic rock.
- Causes and effects of earth quakes and volcanoes.
- An instrument seismograph and Richter scale which measure earth quake strength and magnitude.
- Regions in the world the greatest concentration of volcanoes is found in the circumpacific region.
- The structure of atoms per are **troposphere stratosphere**, **mesosphere** and **thermosphere**,
- Important elements of weather and climate are **temperature**, **Precipitation**, air **pressure** and **wind**
- Weather measuring instruments are the thermometer rain gauge **barometer wind vane** and **anemometer**
- The three major climatic zones on the earth are: **tropical temperate** and **polar** (frigid) zones.
- Factor affected the distribution of living organisms in different climatic zones
- The cause and effects of global warming and its control measure.

Exercises 6.3

1. Which of the following is not an element of climate?
   a. Temperature b) dust particles c) rainfall d) pressure
2. How the plants adapt themselves to the particular climatic condition .
3. Is temperate zone a transitional zone between tropical and polar zone? Explain
4. List down the main causes of global warming?
5. Discuss the cause of ozone layer depleting?

End of unit questions

Part I say true or False

1. All rocks are made up of minerals.
2. Sedimentary rocks are changed rocks
3. Crust is the central part of the earth.
4. Marble is a good example of igneous rock
5. As the depth increase temperature increase inside the earth

6. The earth is the nearest of all planets to the sun.
7. Temperature decreases pole ward from the equator.
8. Gazelle is a tropical zone animal as ermine a polar zone animal .
9. The soil is fertile on the highlands of tropical areas
10. Deforestation causes global warming.

Part II choose the correct answer

1. Molten rock is found in the _____
   a. Upper part of the core C) inner part of the core
   b. Outer part of the crust d) upper mantle
2. The outer and thinnest layer of earth is _____
   a. Mantel b) crust c) core d) none
3. Temperatures are always high in _____
   a. Temperate zone c) tropical zone
   b. Polar zone d) Arctic zone
4. The main causes for the occurrence of earth quakes:
   a. External movement c) tectonic force
   b. Internal movement d) b and c
5. Which layer of atmosphere consists the largest size of ozone
   a. Troposphere c) mesosphere
   b. Stratosphere d) Thermosphere

6. An instrument used to measure rainfall is
   a. Anemometer c) wind cane
   b. Rain gauge d) Barometer
7. The largest gas in the atmosphere of the earth is
   a. Oxygen c) carbon dioxides
   b. Nitrogen d) Argon
8. Which animal does not found in tropical zone
   a. Hare b) snake s c) Lizards d) Bear
9. Which area is not frequently affected by earth quack
   a. The west coast area
   b. A belt across southern Asia
   c. A belt in the pacific Ocean
   d. Central Australia
10. One of the following is not an internal force
   a. earth quack c) erosion
   b. Folding d) Volcanic eruption

Part III Matching

A B

1. Measures temperature	a) basalt
2. Metamorphic rock	b) marble
3. Shows direction of wind	c) barometer
4. Measures air pressure	d) Rain gauge
5. Chemical sedimentary rock	e) salt
6. Extrusive igneous rock	f) granite
7. Measures wind speed	g) thermometer
8. Intrusive Igneous rock	h) wind vane
9. Organically sedimentary rock	I) anemometer
10. Measures rainfall	j) coal

Part IV Fill in the blank space

1. _____ Is the upper most layer of atmosphere
2. _____ Rock used for foundation materials of roads
3. The earth quake damage is greater near the_____
4. Volcano causes _____ and _____ and provides_____ and _____ _____
5. If a maximum thermometer reads a temperature of 54^{o}c and the minimum thermometer reads 16^{o}c of a day. calculate
    a. Daily average temp.
    b. Daily range temp
6. The _____ scale measures the magnitude of an earth quack .

Glossary

Abduction:- take away unlawfully by force

Abortion:- giving birth before the right time

Acid:- is a type of compound that contains hydrogen and dissociates in water to produce hydrogen ions.

Air – borne: is some thing carried through the air air droplets or darts as by an

Air craft or transports by the air (allergens)

Antibiotics :- chemical substances that destroy (killorinhibit) the growth of microorganism

Aquatic:- is water habitat

Aquatic organism : are organisms that lives only in water

Atmosphere (air) :- is a mixture of gases surrounding the earth

Base:- is a type of compound that dissolves in water to produce hydroxyions

Boiling point :- is the temperature at which a liquid changes in to gas or vapor.

Celsius:- is the temperature scale on which the freezing point of water is zero degrees and the boiling point of water is 100^{o-}c . It is the same as the centigrade temperature scale

Circuit: is a complete path around which an electric current can flow.

Chlorophyll:- is a green pigment which absorb sunlight in photosynthetic plant .

Chloroplast :- is the cup – like structure which contains chlorophyll and other pigments

Climate :- is an annual weather condition of a place or regions

Clolonies :- is a mass of single cells which live (exist) in the form of one organism.

Conductivity:- is a property of a substance that is used to measure the ability of a substance to allow heat or current to pass through it.

Conductor:- is a substance that can allow heat or current to pass through it

Converging :- come towards each other and meet at a point

Core:- is the middle part

Cotyledon:- is the leaf of seedling

Crosspollination:- is the transfer of pole grains from anther to the stigma of another plant of the **same kind crust**: is the outer portion of earth

Decantation :- is the separation of a solid from a liquid by allowing the former to settle and pouring off the latter.

Defect:- is an imperfection (lack of perfection)

Density :- is the mass of unit volume of a substance, usually expressed in grams per cubic cent meter

Distillation :- is the process of converting a liquid in to vapor condensing the vapor and collecting the liquid or distillate.

Diverting :- get farther apart from a point.

Domesticated animals:- are animals which are reared by human beings.

Dust :- are fine particles of matter (soil or coal)

Ecosystem:- all living organisms in a particular region as well as the soil, water rand other non-living features that interact with each other

Electric current:- is a flow of negative charge (electron) round a circuit.

Endemic animals:* are animals which are found only in a particular country.

Environment: -is the conditions in which an organism lives

Epidemic:- is an outbreak or a product of sudden rapid spread, growth or development of a disease

Evaporation:- is the process by which the surface of water is constantly losing molecules of water.

External fertilization :- is a process by which the union (fusion) of male gamete (sperm) with a female gamete (egg) outside the females body.

Fahrenheit :- is a temperature scale on which the freezing point of water is 32^{o} and the boiling point 212^{o}

Fertilization:- is a process by which the union (fusion) of male gamete (sperm) with the female gamete (egg)

Filament:- is a thread like structures which are found in spirogyra.

Filtration:- is the process of separating insoluble solids from liquids by passing them through a filter

Fractional:- distillation is the separation of a mixture of several liquids that have different boiling point (like petroleum refining)

Freezing point :- is the temperature scale at which water turns in to ice.

Fronds:- are the leaves , of ferns.

Generator :- is a machine that used the rotary motion of a metal coil in a magnetic field to produce an electric current that flows through the wire

Genital :- an external organ of reproduction

Germination:- is the process by which the embryo in the seed develops in to seedling .

Global warming:- it is the projected immanent climate change attributed to the greenhouse effect

Greenhouse effect:- it is the phenomena of the earths atmosphere by which the energy of the solar radiation (from sun light) absorbed by the ground and re-emitted as infrared energy is prevented from escaping by various gases in air'

Harassment:- make a repeated attack (sexual harassment)

Harvesting :- is the process of consisting of distilling dissimilar or diverse ingredient or constituents.

Homogeneous:- is something of uniform structure or composition throughout:-

Hydroelectricity:- is the power produced by using water to drive turbine generators

Ltypha:- is white and fine thread like structures of bread mould

Illegal:- contrary to law

Insulator:- is a substance that do not allow heat or current to pass through it

Internal fertilization;- is a process by which the union I(fusion) of male gamete (sperm) with female gamete (egg) inside the female body.'

Irrigation :- providing extra of additional water to crops where rainfall is not sufficient:-

Kelvin temperature scale is the temperature scale on which absolute zero is O and the freezing point of water is 273.15. Degrees on this scale are the same size on the Celsius scale.

Layer r: thickness of material spread over a surface

Livestock :- refers to one or more domesticated animals raised in an agricultural settling to produce commodities such as food, fiber and leather.

Mammals :- are animals that feed their young with milk from their breasts.

Melting point:- is the temperature at which a solid turns in to a liquid

Micropyle:- is a seed structures which allows air and water in to a seed .

Mixture: - is a form of substance consisting two or more component is varying proportions that retain their own properties.

Multicellualr:- are organism which have more than one cell

Mutilation:- injury by tearing or cutting

Mycelium :- is a group of hyphen

Neutral :- describing a compound or solution that is neither acidic nor basic

Ovale is a female gamete (egg) which contain in the ovary of a flower.

Particulate :- is a very small piece of solid material that is considered to have mass but not size and volume

Phloem:- is a conductive tissue in plant which conduct (transport) food from the leaves of a plant to the other parts.

Polar :- is a place (location) at the north or south pole

Pollen:- are dusty particles which are found in the anther of a flower.

Pollution:- is the release of unwanted or dangerous materials in to the natural environment to the stigma.

Pollination:- is the transfer of pollen grains from anther to the stigma

Poultry:- is the study of principle and practices involved in the production and marketing of chickens, ducks geese truck eggs and meat.

Pregnancy :- state of being pregnant

Propagation:- spread more widely

Puberty:- maturing of the sexual function

Rhizome:- underground stem of ferns

Reflection:- throw back

Reflex:- is an action that is independent of the will

Refraction:- to bend aside

Reproduction:- is the process of producing new offspring (young) from two parents or from a single parent

Echo: Solid and stony part of the earth

Seaweeds:- are small plants which are found on the surface of water

Seed:- fertilized avulse

Seedling :- young plant which are formed from the embryo

Self pollination:- is the transfer of pollen grains from another to the stigma of the same flower or to the stigma of another flower on the same plant.

Sexual:- bodily union of opposite sex

Technology:- is a capability given by the practical application of knowledge

Testa:- is the external layer (cover) of a seed.

Turbine :- is the machine that converts the energy of moving water (or steam or egg) to some other form of energy Turbine usually generates electricity.

Turbulence :- is the swirling movement in a gas or a liquids it is coursed when an object moves through a gas or liquid .

Unicellular:- are organisms which have only on e(single) cell (protozoan's)

Vascular tissue:- is a plant tissue which can conduct (transport) food, water and minerals from one part of the plant or the other part.

Ventilation:- is the act of exposing to air and especially to a current of fresh air

Voltage:- is an electric potential or potential difference expressed in volts.

Water borne: is something carried or transmitted by water

Watt:- is a unit used to measure power. One watt equals one joule per second

Weather:- temperature pressure and other related condition over a particular area at a specific time

Xylem:- is a plant conductive (transport) tissue which conduct (transport water and minerals from the soil to the different parts of plant.

Zone :- parts in to which the earth surface is divided by imaginary lines.