

BASIC INTEGRATED SCIENCE

TEACHER'S GUIDE

GRADE 5

Prepared by:

Abate Dessalegn(B.Ed)

Temesgen Sebsibe(B.Ed)

Anteneh Mergia(B.Ed)

Edited by:

Lewtayehu Legesse (content)

Abdi Jemal (content)

Ashenafi Jamma (language)

2004 E.C (2012G.C)

BASIC INTEGRATED SCIENCE TEACHER'S GUIDE

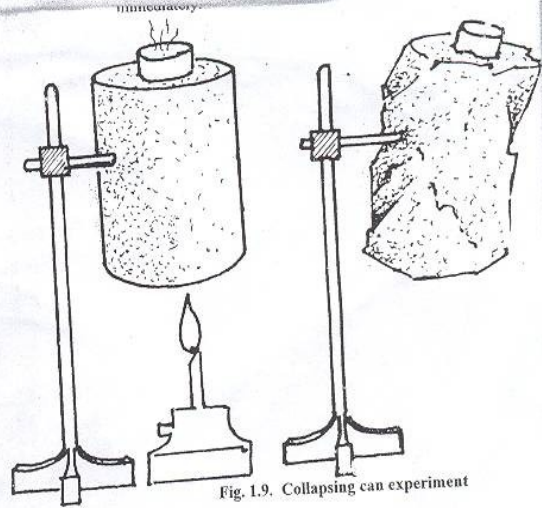
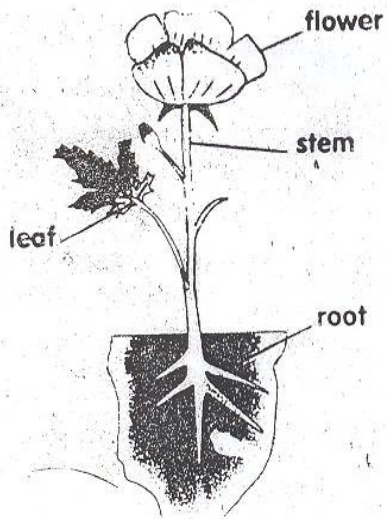
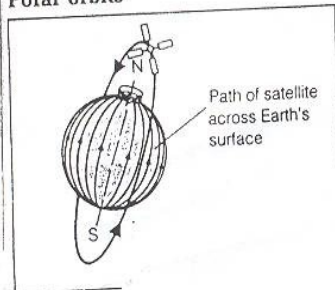


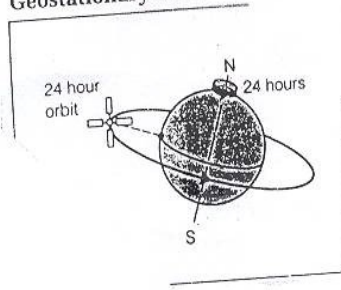
Fig. 1.9. Collapsing can experiment

Questions: What happens to the can?
Why does this occur?
Explain your answers.

Polar orbits



Geostationary orbit



GRADE 5

Contents	page
Introduction to teachers guide	4
General objectives of the grade 5 basic integrated science	5
Teaching methodologies	8
Unit 1 Air	15
1.1 Air as substance	16
1.2 Properties of air	20
1.3 Importance of air	23
1.4 The human breathing system-----	24
1.5 The effects of smoking on health	27
1.6 Harmful traditional practices	28
Unit 2 Water	31
2.1 Introduction	32
2.2 Water in nature	33
2.3 water as a compound	34
2.4 The importance of water	37
2.5 Wastage of water	41
2.6 Pollution of water	42
2.7 Methods of water conservation	44
Unit 3 Plants	48
3.1 Parts of plants and their function	50
3.2 Importance of plants	51
3.3 Soils and plants	53
3.4. Soil improvement practices	55
3.5 Our forests	56
3.6 Raising vegetable seedlings and crop growing	57
3.7 Weeds and weed controls	59
3.8 Harmful practices towards forest conservation	60
Unit 4 Animals	63
4.1 How are animals classified	65
4.2 Insects-	65
4.3 The life cycle of some harmful insects	67
4.4 Useful insects	68
4.5 Fish	70
4.6 Amphibians -	72

4.7	Reptiles	73
Unit 5 Our body		77
5.1	Exertion	78
5.2	Food hygiene	80
5.3	Food as a source of heat energy	81
5.4	Food shortage	84
5.5	Harmful practices	85
5.6	HIV and AIDS	86
Unit 6 Earth		89
6.1	Components of the solar system	90
6.2	The earth in the solar system	93
6.3	Artificial satellites	94

Introduction to the Teachers guide

This book is intended for grade five students of SNNPRG. It is designed based on the new education and training policy. The book covers the topics: Air, Water, Plants, Animals, Our body and the Earth

These units of the book contain both practical activity and project approaches of the subject matter and discussion of over all units depending on other related teaching and learning methods.

It is a great hope of the producers that, the subject teachers will use and implement this guide book and students text making large effort to refer to other sources on the subject to maximize their potential, to create and give attention to the use of local material and internet access.

Writers

General objectives of Grade 5 Integrated Science

1. To develop understanding and acquire knowledge of:

- substances and air as a substance, its properties, components and importance and products of technology that use air
- some common elements and their properties as metals and non metals
- breathing, organs involved in breathing , composition of inhaled and exhaled air, and harmful effects of cigarettes, “gaya”, “suret” and uvular mutilation on the breathing system
- natural waters and the differences between them
- compounds and water as a compound , its importance, wastage, pollution and conservation.
- importance of plants to soils and soil to plants, soil profile, depletion and conservation
- fertilizers, their importance and classification.
- Ethiopia’s forest cover, deforestation and conservation of forests
- biogas as an alternative source of energy.
- common weeds, their harms and control methods.

- vertebrates and invertebrates and their characteristics
- insects, fishes, amphibians and reptiles, their characteristics, structures and life cycles
- structures and functions of the excretory system and importance and methods of keeping a larine hygienic
- food hygiene, food preservation, food as a source of energy and food shortage
- mechanisms of heat transfer
- harmful practices related to feeding habit and disposing waste
- ways of transmission and prevention HIV
- the solar system, its components and celestial bodies
- motion of the earth, its types and effects
- eclipses of the sun and moon and uses of artificial satellites.

2. To develop skills and abilities of:

- classifying elements into metals and non metals
- demonstrating the breathing mechanism
- demonstrating oxides.
- demonstrating methods of water conservation
- classifying fertilizers into natural and man made
- preparing organic manure
- planting tree seedlings, raising vegetables seedlings and growing crops
- classifying animals into vertebrates and invertebrates
- constructing a model pit latrine
- Keeping food hygiene and food preservation
- demonstrating the three mechanisms of heat transfer
- making decisions, assertiveness and critical thinking to prevent HIV/AIDs
- Locating the position of the eight plants using model
- demonstrate eclipses of the sun and moon

- Scientific enquiry: observing classifying , comparing , making models, communicating, measuring , asking questions, drawing conclusions, applying concepts, interpreting photo and illustration and relating cause and effect.

3. To develop the habit and attitude of:

- appreciating the fact that old scientific ideas are rejected as new scientific findings are published
- love and respect to nature and life
- Curiosity to explore new knowledge, every time, in learning science
- working in groups , cooperating with each other and respect and love for each other
- willingness to participate in community activities of protecting the environment by keeping it clean , planting trees and conservation practices.

Teaching methods

The subject content can be delivered in different way in order to achieve the specific objectives. The types of teaching methods used will affect the skill and attitudes that the students develop. The teacher can use the most effective methods for particular topic. In teaching of the subject, it is recommended that the teacher use more than one teaching method in a single lesson the discussion method might be suitable for the beginning of the lesson, followed by the practical activity. The strengths and weakness of a range of different method are summarized in the table below.

Method	Strengths and weaknesses
Lecture – content is delivered to students by teacher	Students receive correct factual information from teacher. Useful to stimulate thinking. Students develop skills such as identification, observation, recording, making predictions, synthesis, analysis and drawing conclusions. Students develop qualities such as self-confidence, curiosity and inquiry.

	<p>Useful for large number of students.</p> <p>Makes students passive because it is one-way communication.</p> <p>Makes learning difficult to assess.</p>
<p>Discovery - teacher guides students to discover scientific facts for themselves</p>	<p>Students develop skills such as identification, observation, recording, making predictions, synthesis, analysis and drawing conclusions.</p> <p>Students develop qualities such as self-confidence, curiosity, interest and co-operation.</p>
<p>Discussion – sharing of ideas between students and teacher</p>	<p>Allows sharing of each other's ideas.</p> <p>Can be useful at start of a lesson to motivate students.</p> <p>Allows ever one to participate actively.</p> <p>A few people may and up dominating the discussion.</p> <p>Not easy to conduct for large classes.</p> <p>Can be time consuming.</p> <p>Teacher can easily lose track of the argument.</p>
<p>Question and answer – teacher asks questions, students answer. Students also ask questions</p>	<p>Useful for gauging students' understanding or knowledge of fact or concept.</p> <p>Useful for beginning and ending a lesson.</p> <p>Need to ensure sufficient questions are framed to stimulate thinking closed questions do not achieve this.</p> <p>Can be counterproductive if the teacher asks too many questions.</p>

<p>Problem solving- students are presented with an exercise where they must find an answer to a problem</p>	<p>Students develop skills such as identification, observation, recording, making predictions, synthesis, analysis and drawing conclusions.</p> <p>Students develop desirable qualities such as seeking knowledge, curiosity, enquiry and responsibility.</p> <p>Worked examples in the Students' Book can usefully be presented as problems for students to solve- see notes for each topic for further details.</p> <p>Can waste time if not properly planned and guided.</p>
<p>Assignments – specific task given to students to find out about a particular problem or issue</p>	<p>Students have the opportunity to research a topic and look for information on their own.</p>
<p>Worksheets – handouts to guide students in practical work</p>	<p>Allows students to think for themselves without outside influence, Allows individual ideas to be shared in a group.</p>

Method	Strengths and weaknesses
<p>Demonstration – teacher carries out practical work if materials/ equipment are inadequate or the procedure is too complex or unsafe for students</p>	<p>Students develop skills such as identification, observation, recording, making predictions, synthesis, analysis and drawing conclusions.</p> <p>Students develop desirable qualities such as self-confidence, curiosity, interest and cooperation.</p>
<p>Practical activities- students carry out practical work individually or in groups; Students gain hands- on experience</p> <p><i>This method is highly</i></p>	<p>Gives teacher an opportunity to develop students' interest in the subject.</p> <p>Teacher has opportunity to interact with students.</p> <p>Teacher provides the standard/expected results for each activity.</p> <p>Can be used with discussion method (during discussion of results)</p>

<i>Recommended and should be used as much as possible</i>	<p>Students develop skills such as identification, observation, collecting, measurement, manipulation, data recording , investigation, making predictions, interpretation, evaluation, synthesis and drawing conclusions.</p> <p>Students develop desirable qualities such as self-confidence, curiosity interest and co-operation.</p>
Field work – outdoor learning activity	<p>Helps students develop skills such as identification, observation, collecting, measurement, data manipulation, recording, analysis, report writing and verbal reporting.</p> <p>Students appreciate the environment.</p> <p>Can waste time if not properly planned and guided.</p>
Project - short or long-term investigation	<p>Helps students develop (among others) report – writing presentation and data analysis skills.</p> <p>Students develop skills in using scientific methods.</p> <p>Can be time-wasting if not properly planned and guide</p>
Case study – study carried out on a particular natural environment, then applied to another similar setting	<p>Allows students to apply new knowledge and skills.</p> <p>Allows development of analytical and problem solving skills</p> <p>Allow exploration of solutions for seemingly complex problems.</p> <p>Students may not see application to their own situation.</p> <p>Students may get wrong results due to insufficient information.</p>

Assessment and Evaluation

Assessment and Evaluation helps you identify whether learning has occurred, and is a part of the teaching and learning process. The review questions and end of unit question are set to help test these. However, it is unlikely that the teacher will be able to test every simple objective in a term or year: if we did that, there would be probably little or no time left for teaching!

There is in fact a danger that we spend too much time testing and too little time teaching .We want to avoid this danger, yet at the same time it is important to meet the requirement of the syllabus, which indicates that we should do our best to find out , in one way or another, how far we have achieved the objectives set at the start of a given unit. The answer is that we should carry out continues assessment. This means that in the course of ordinary classroom teaching, and setting and making assignments, we need to keep a record of how well the class does.

Continuous assessment helps teachers to ensure that all students have the opportunity to succeed in school in any class there may be a wide range of abilities or needs, and by using continuous assessment, teachers can adapt their approach at all of them. The teacher should continually observe the students to see what they know and can do.

There are many different kinds of assessment activities included in this course. Some, like the review question, ask the students to recalled information while other, such as the activities in star, focus on processes such as analysis, constructing or showing a skill. There is a wide range of approaches that can be used for this, including classroom practical activities and project works.

In both continuous assessment and regular testing or exam- setting, teachers should assess all aspects of knowledge and understanding knowledge, comprehension, application, analysis, synthesis and evaluation

Knowledge: means recalling previously learned information, such as terminology, classification sequences and methods. In tests, some of the key words used for this sort of question are list, define, describes, label, name, etc

Comprehension: means understanding the meaning of information. A comprehension questions uses key words such as summaries, interpret, contrast, predict, distinguish, estimate, discuss, etc

Application is the use of previously learned information to solve problems in new situations. It is identified by key words such as demonstrate, calculate, complete, illustrate, relate, classify, etc

Analysis: means the breaking down of information into its component parts, examining and trying to understand such information to develop conclusions by identifying causes, making

inference and/or finding evidence to support generalizations . Questions contain key words such as explain, separate, order, arrange, compare, select, complete, etc.

Synthesis means applying prior knowledge and skills creatively to produce a new or original thing. Questions contain key words such as plan, rearrange, combine, modify, substitute, rewrite, etc.

Evaluation means judging the value of something based on personal opinion resulting in a final opinion, with a given purpose, without really right or wrong answer. Students might have to compare and discriminate between ideas, assess the value of some evidence of theory, or make choices based on a reasoned arguments Examples of key words are assess, recommend , convince, select summaries, criticize, conclude, defend, etc

Unit 1 Air (23 periods)

Unit Introduction

In this unit students will learn about air, its properties and importance. This section gives opportunities for understanding the human breathing organs and the effects of smoking on health.

Unit outcomes

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

- ❖ define substances and list students will be able to:
- ❖ give examples of common elements, classify them into metals and non-metals and explain their properties.
- ❖ explain and demonstrate properties of air and define pressure.
- ❖ explain the Importance of air and identify some products of technology that use air.
- ❖ define breathing, state organs involved, explain and demonstrate the breathing mechanism and identify composition of inhaled and exhaled air.
- ❖ describe the harmful effects of cigarette smoking inhaling “ gaya” and “suret” and uvular mutilation health
- ❖ demonstrate scientific enquiry skills : observing , classifying, making models, measuring, asking questions and interpreting data.

Teaching Learning Materials (Teaching aids)

- ✚ Simple diagrams.
- ✚ A pie chart
- ✚ Experimental materials such as chemicals, laboratory equipments,
- ✚ A lung model
- ✚ Real situations.

Method of teaching and Learning

- ✚ Laboratory (practical activities)
- ✚ Demonstration.

- ✚ Group discussion
- ✚ Lecture
- ✚ Classroom presentation
- ✚ Panel discussion
- ✚ Question and answer ,etc

1.1 Air as a substance (6 periods)

After this Lesson the students will be able to:

- ❖ define a substance as a solid, liquid or gas that may contain one or a mixture of components.
- ❖ list nitrogen, oxygen argon and carbon dioxide as components of air.
- ❖ give example of common elements.
- ❖ explain physical properties of metals and non-metals.
- ❖ classify common elements into metals and non-metals.

You can use group discussion, question and answer as a method for teaching this topic;

You are advised to start (begin) the class with the activity given in the student's text book. It is designed to provide a good atmosphere and increase the participation of students. The activity and the figures in the student's text help students analyze the air as a substance.

Let the students discuss the start – up activity on a seat. Then invite a students to present the ideas of a group to the class and, ask students in other groups if they have different opinions from the former group you also give a chance if they have different opinion.

After the discussion, you have to bring the ideas.

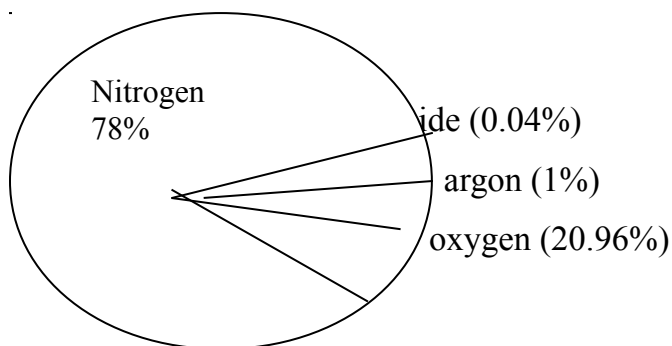
- air is a substance it all around us and our life depends up on it.
- Our earth is surrounded by different layer of air (atmosphere). We live at the bottom of this sea of air

Let the students discuss the activity in their group. Then invite a group representative to present their ideas of the groups , to the class. Then ask other groups whether they have different ideas.

Finally, you have to summarize the points

- Air has no colour and odour but it is possibility to show its presence by constituents oxygen is necessary for animals to live.

- Air is a mixture of different gases. The composition of air is restricted to nitrogen, oxygen, argon and carbon dioxide. There are other gases in small amounts which are included. But they are raised (discussed) in this level for the sake of simplicity.
- Ask students to draw a pie chart based on the composition of air as follows.



- It is advisable to start this section by raising the questions in the students text. The elements, nitrogen, oxygen and helium are the constituents of air. Then you have to explain:

- All substances are either a mixture, compound or elements. Elements are found naturally or artificially. Ninety two of the elements are found naturally. They are used to form compounds and mixtures.
- The difference between mixture and compounds are given in the table below.

Mixture

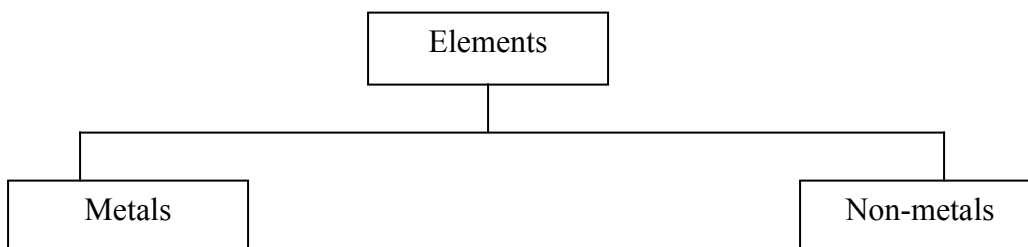
- no new substance is produced
- the properties of the mixtures are similar to those of substances in it
- the composition of a mixture can vary

Compounds

- a new substance is formed
- the properties of the compound is different from the constituents
- the composition of the elements in the compound is always the same

Elements

You can start introducing the classification of elements by asking questions. The questions will help the students the way of classification. Finally, you will show the figures in the text.



Provide students with samples of different metals and non-metals. Students should examine them and compile a list of general physical properties like solid, hard, flexible.

You have to use metals like a copper wire, gold, iron nail and non-metals like carbon from dry cell, sulfur available in local markets.

Furthermore, you have to take thermometer, show the liquids in it is mercury. Mercury is the only liquid metal.

Tell them alloys are not a metal. But it is a mixture of elements. For example, steel is a mixture of iron, carbon and other elements.

Answer key for Exercise 1.1

I. Answer key to exercise 1.1

1. C. mixture
2. C. Nitrogen
3. B. carbon dioxide

II. Matching

1. B. Iron rust
2. C. alloy
3. A. a solid non-metal
4. D. a liquid metal

1.2 Properties of air (4 periods)

After this lesson, the students will be able to:-

- ❖ explain the properties of air.
- ❖ define pressure as a force exerted over an area.
- ❖ demonstrate some of the properties of air

Let the students to do the practical activities and discuss with their groups select one group randomly to present their findings to the class. Finally, you summarize the points as follows:

- It is possible to show the presence of air by the movement of trees, and other materials.
- During the riding a bicycle or a horse; the person feels cold around the face or the air pushes him back.

Please, teacher helps the students to demonstrate the practical activities given in student's text.

Practical activity 1.1

Air occupies space.

Air occupies space and has weight. Have you heard about an empty bottle and empty room? But the empty room and empty bottle are filled with air.

Therefore, when you push down the glass in “a” case the water never enters into the glass because of the glass is filled with air and no space for the air escape from the glass. In “b” case water enters into the glass because of air has a space to escape from the glass.

Practical Activity 1.2

Air is compressible

To show air is compressible provide the students with small syringe and pull the piston (plungers) out, place their fingers over the end of the syringe and push the piston (plunger) back in as far as it will go.

Challenge the students to explain, the observation they make during the practical activity.

It is possible to push the plunger even the end of the plunger sealed. This tell up air can be compressed.

Practical activity 1.3

Air can diffuse

Demonstrate that the gas will expand to fill the space available by pouring a small amount of volatile substance with a characteristic smell.

Example perfume into an open dish and placing it at the front of the classroom. Explain to the students that liquid evaporates and its vapour soon fills the room. All gases behave in this way. Introduce the term diffusion which describes this behavior.

Practical activity 1.4

Air Exerts pressure

A drinking straw experiment shows that if the bottles are turned over, the liquid is sucked more easily out of the bottle. The practical activity shown in case “b”.

This is due to atmospheric pressure pushing down the liquid inside the bottle in “b” case. Therefore, in “a” case the water is not easily sucked but in “b” case it is easily sucked from the bottle.

In “a” case no atmospheric pressure to support sucking easily the water from the bottle but in “b” case the atmospheric pressure helps to suck water easily from the bottle.

Practical Activity 1.5

Collapsing can experiment

As you seen from the collapsing can experiment, the heat is lost from the can, the steam condensed and the inside pressure decreased. The atmospheric pressure is much greater than the pressure inside the can, so it crushes the can.

Therefore, the can crushed due to the unequal amount of inside and outside of atmospheric pressure. Because the inside and the outside of atmospheric pressure is not equal.

1.3 Importance of Air (3 periods)

After this lesson, the students will be able to:

- ❖ explain the importance of air.
- ❖ Identify some products of technology that uses air.

Students should appreciate that air has very important chemical property associated with oxygen it contains. Point out to the students that they, all living things need oxygen from the air to survive and that is why we breathe in air all of the time. Similarly, one of the components of air, carbon dioxide is used for plants to make their own food by the process called photosynthesis.

Practical Activity 1.6

Air support combustion

Students should carry out a simple experiment to show that air is necessary for burning. This can be shown by placing a small lit candle in a jar and placing some thing over the top of the jar. Students could extend this by placing the same candle in different sized jars, and looking at a pattern between the sized of the jar and how long the candles down.

The candles with a large, jar will burn for longer time than the candle with in smaller jar. Because the larger jar contains sufficient amount of gas (air) that support combustion than the smaller jar.

Practical Activity 1.7

Extinguishing fire by eliminating air

Students should discuss ways of extinguishing fire by eliminating air like covering with a blanket or with sand. This could be demonstrated to emphasis the importance of air for burning.

1.4 The human breathing system (5periods)

After this lesson, the students will be able to:

- ❖ define breathing at the taking in of oxygen and giving out of carbon dioxide.
- ❖ state organ of breathing
- ❖ identify composition of inhaled and exhaled air
- ❖ explain the breathing mechanism.
- ❖ demonstrate the breathing mechanism of using a lung model.
- ❖ explain the effects of cigarette smoking in health.

Remember to use a wide variety of teaching styles to maintain interest in your students

In this section you will help your students understand the process of breathing and how exchange of gas takes place in our body. Ask them why they think people need to breathe and then after its to explain the process of respiration.

You should also teach breathing system removes waste gases from the body.

Organs of Breathing

you can start the lesson by asking the students to mention the main organs of breathing. There is a clear labeled diagram to help you deliver the structure of the breathing systems. A lung model, chart or a preserved specimen could be used according to their availabilities.

Nasal cavity, pharynx, trachea, bronchus, bronchioles and alveoli should be stated with their functions. Try to put the order of these structures starting from the outside to the inside.

Finally, you teach your students that air is always not clear and the roles of the nose and nasal cavity to filter the air.

Alveoli and gas exchange

It is important to help the students understand how exchange of gas takes place in alveoli. Use the diagram and try to explain the content of carbon dioxide that is high in the blood because each body cell releases CO_2 after respiration. While in the lung (alveoli) there is high concentration of oxygen than the blood stream. Therefore CO_2 moves to the alveoli from the blood stream. Therefore CO_2 moves to the alveoli from the blood cells simultaneously that oxygen diffuses to the blood stream due to the difference in concentration.

Inhaled and Exhaled air

First of all define the terms inhalation and exhalation. You can help them to understand the words take one student in front and make him/her to take in air

(inhale) and out air (exhale). Try to explain the role of air specially oxygen to burn the food particles so as to derive energy to the cells of the body.

Practical Activity 1.8

A detailed analysis of inhaled and exhaled air is not easy in the school Lab, but you can do a relatively simple experiment to demonstrate that the CO_2 content of the air you breathe out is different from the air you breathe in. This experiment uses lime water ($\text{Ca}(\text{OH})_2$) as an indicator of the presence of CO_2 . The clear liquid turns cloudy when CO_2 is bubbled through it and the faster it turns cloudy the greater the concentration of CO_2 present.

In the simplest form of this experiment you simply need a tube containing some lime water and a straw. Ask the students to breathe in normally and gently but breathe out gently through the straw. They should repeat this until the lime water turns cloudy. This shows that there is carbon dioxide in the air when they have breathed out.

Answer key to Exercise 1.2

1. Bronchi
2. Alveoli
3. Mucus
4. Trachea
5. It is used to burn the food particles to generate energy.

Mechanism of Breathing

Discuss the mechanism of breathing or how air is moved in and out. Make discussion that lungs, are not made of muscles but with other associated structures such as, diaphragm, inter costal muscles and ribs help the lung to take in and out air.

It is impossible to see exactly what is happening inside your chest. However, there are two simple investigations; you can try to build up a useful model of what is going on inside you. Students can use their own bodies to see how the volume of the chest changes as a result of the movement of the ribs.

Practical Activity 1.9

The other best method is preparing a simple model to show parts of the breathing mechanism. It can be made by using a bell jar. A rubber sheet should be stretched across the bottom of the bell jar to represent the diaphragm and a balloon can be attached to a y-glass tube and seal the tube. Partially inflate the balloon to represent a single lung and seal the tube. When the rubber sheet is pulled down the pressure in the bell jar is reduced and will increase in size. Point out to the students that this causes air to be drawn into the lungs.

When the rubber sheet is pushed up the pressure inside the bell jar increases and the balloon becomes smaller. Point out to the students that this cause air to be forced out of the lungs.

Answer key to Exercise 1.3

1. Nitrogen, oxygen, carbon dioxide and others.
2. Oxygen and carbon dioxide gases.
3. Nose (nostril)
4. Nose (nostrils) → glottis → trachea → bronchi → bronchioles
→ alveoli.
5. Ribs muscles, diaphragm

1.5 The effect of smoking on health (3 periods)

After this lesson, the students will be able to:

- ❖ explain the effects of cigarette smoking on health

Teach your student, presenting helpful information about health and the effects of smoking various substances on the lungs and on the body. You can explain the content of tobacco smoke and their effect on the health of the smoker.

Students should discuss how people smoke cigarettes in Ethiopia affects and the way that smoking damages our lungs. Discuss the effects, of smoking such as lung cancer, bronchitis heart, disease, bad smell and so on.

Statistical data can be used to reinforce the harmful effects of smoking (see table 1. 5 from the students text)

Students should analyze the table and make notes on: non – smokers live longer than smokers; the more cigarettes smoked per day the short the life expectancy is.

Mother who smoke during pregnancy have smaller babies than non-smokers.

Students should discuss in groups about personal issues of smoking. Example, stained fingers, bad breathe, cost of smoking, etc

You can ask students to discuss (debate) the effects of smoking on family life.

Answer key to Exercise 1.4

1. bronchitis, heart faller
2. X 13
3. Damages the tissues of
4. Let the students to mention according to their locality

Practical Activity 1.10

Please teacher, help the students to participate the activity given in the text.

1.6 Harmful traditional practices (2 periods)

After this lesson, the students will be able to:

- ❖ mention inhaling ‘ gaya’ and ‘ suret’ and uvular mutilation of babies as harmful traditional practices.
- ❖ describe the harmful effects of “gaya”, “suret” and uvular mutilation on health.

Uvular mutilation

In this section you will introduce the students about harmful traditional practices that cause, negative effect on health. Raise any harmful traditional practices in relation to breathing organs as well others and make hot discussion on health related problems of such actions.

During the discussion the following ideas should be raised:

- the reasons why some people choose to damage their health by in having noxious substances such as “gaya” ”suret” tobacco, etc .
- what pleasure do they get from smoking?
- What should be done to overcome these problems?
- The students should aware of the location of Uvular and their bodies and uvular mutilation of babies is a harmful practices.
- The students should understand why parents practice Uvular mutilation of their babies, what benefits do they get by mutilating their babies and how to avoid this practices and educate them to stop.

Air Borne Diseases

Discuss how disease causing germs (micro organisms) transmits via air. Explain to the students during coughing, sneezing or spitting how bacteria and viruses pass from the patient to the normal person and mention some examples of air borne diseases.

Do not go deep on air born diseases, they will get the detail of it in grade six basic integrated sciences.

Answer key to Exercise 1.5

1. Not at all
2. Common cold, influenza, Tuberculosis (TB)
3. Rape, abduction, Female genital mutilation.....(it depends on the culture of the society.)
4. When we run we need large amount of energy. To burn the food we need too much oxygen. That is why we breathe in faster rate.
5. When an infected person coughs, sneezes or spits and when we use materials in common with other peoples.

Answer key for review exercise of unit 1

I. True / False item

- | | | | |
|----------|----------|---------|---------|
| 1. True | 2. True | 3. True | 4. True |
| 5. False | 6. False | | |

II. Matching item

- | | | | |
|------|------|------|------|
| 1. C | 2. A | 3. E | 4. D |
| 5. F | | | |

III. Choose the best answer

- | | | | | |
|------|------|------|------|------|
| 1. D | 2. C | 3. D | 4. C | 5. B |
|------|------|------|------|------|

IV. Short Answer

1. Elements and compounds
2. Gold and silver
3. Air borne diseases
4. Metallic elements: gold, silver, copper, etc
Non- metallic elements: carbon, sulphur, oxygen, etc
5. Tar, carbon monoxide and nicotine

Unit Two

Unit Outcomes

(20 periods)

After completing this unit, students will be able to:

- ❖ know the different types of natural waters.
- ❖ know the meaning of compound and identify water as a compound.
- ❖ understand the meaning, types and formation of oxides.
- ❖ know the importance of water.
- ❖ understand the causes and effects of water wastage.
- ❖ understand the causes, effects and prevention methods of water pollution
- ❖ know the methods of water conservation.
- ❖ demonstrate scientific enquiry skills:-
- ❖ Observing, classifying, comparing and contrasting, asking questions, applying concepts and relating cause and effect,

2.1 Introduction

This unit begins by introducing the abundance of water in our earth. The main emphasis of this unit is in the usage of water. It introduces the difference between compounds and mixtures using practical activity.

This unit gives emphasis how water is wasted and conserved. The first section of this sub unit 2.2 deals with the abundance and sources of water.

The emphasis of the next section 2.3 is on water as a compound. It demonstrates the difference between a mixture and a compound. It also tells the types of oxides and shows the proportion of oxygen in air.

The following section 2.4 deals with the importance of water in life activities. It also describes the importance of water in industry, agriculture, hydroelectric power, transportation and universal solvent.

Section 2.5 introduces the wastage of water. Mainly this section deals with the causes, effect and a remedy on the wastage of water.

The emphasis of section 2.6 is on the pollution of water, especially on the causes, effects and methods of controlling water pollution.

After completing this subunit, students will be able to:-

- ❖ explain the occurrence of water
- ❖ List type of natural water

Forward planning

There are practical activities under this title. So you have to prepare the necessary equipments, and conduct the practical activity before you come to class (present).

State with the questions which are raised on the student's text. Let the students identify large parts of the earth which covered by water using the figure on the text.

Oceans, seas, rivers, lakes, streams, rain water and under ground water are sources of water to living things. Humans all daily activities rely on the amount (demand) of water.

The great majority of the rural communities water supply rely on ground water through shallow wells deep wells and springs.

Let the students list down the different sources of water. Among the lists, they can sort out that are used in your community.

In order to show the presence of other dissolved substances in the water you have to perform the practical activities. It is advisable to use only three samples of water. This includes lake, stream, river, tap, and distilled water.

2.2 Water in nature

period allotted 2

After completing this subunit, students will be able to.

- ❖ identify types of natural waters
- ❖ tell the difference between types of natural waters.

Water is the common solvent. Many dissolved minerals are found in water. Therefore, peoples use it as the raw materials in extraction of compounds and elements. For example in some countries the table salt consumption comes from sea by evaporating.

You have to lead students in performing the experiment and in collecting all the available materials. It is difficulty in finding some materials use other alternatives.

Encourage the students to do the experiments using the steps and answer all the questions.

Select one/two volunteer students to present their result to the class.

All the samples water contains a residue except the distilled water. Distilled water does not contain soluble materials. One to this distilled water is used for medical and other purposes.

Additional questions

List all of the fresh water bodies in their area and classify them into groups based on some criteria such as, whether the water flows, as in a river, or not flow, as in a lake.

2.3 Water as a compound

Period allotted 4

After completing this subunit, students will be able to:

- ❖ define compound as two or more elements chemically combined together.
- ❖ identify water as a compound
- ❖ give examples of compound
- ❖ define oxides
- ❖ give common examples of oxides
- ❖ demonstrate oxides with simple practical activities

To start teaching contents on that sub topic. Let the students recall elements, mixtures and compounds and identify the substances they listed as elements, mixtures and compounds.

Water is not a mixture like air but it is a compound it is formed from hydrogen and oxygen.

Compound is a substance composed of two or more elements chemically combined.

Example: water, marble, table salt, etc

compound and mixture

compounds and mixtures are substances. Even all the substances you used are either a mixture or a compound. Their differences are summarized in the following table.

Mixtures

- the constituents combined physically
- the properties of the constituent are not changed when they are

compounds

- the constituents combined chemically
- the constituent losses their properties when they are

- | | |
|---|--|
| <ul style="list-style-type: none"> - mixed - can be separated by physical process | <ul style="list-style-type: none"> - combined to form compound. - can be separated by chemical reactions |
|---|--|

Demonstrate the differences between a mixture and a compound using.

1. a mixture of iron and sulphur
2. the heating of the mixture of iron and sulphur

Demonstrate physical properties of iron by using a magnet. Let the students try to separate the two samples, i.e. a mixture of iron and sulphur and a compound of iron sulphide by magnet. But a magnet has no effect on the iron sulfide (the black substance formed on the practical activity.)

Demonstrate different physical properties as follow:-

1. Mixed iron and sulphur reacts with dilute acids to form hydrogen gas.
2. the heating of the mixture of iron and sulphur(iron sulfide) reacts with dilute acids to form hydrogen sulfide gas.

In addition to these you have to tell (show) the gas which is produced in number -2 (hydrogen sulfide) which has a rotten egg smell.

You have to give a number of common examples of compounds and discuss what elements are present in the compounds like:-

1. Sodium chloride contains an element sodium and chlorine
2. Calcium carbonate(marble) contains an element calcium, carbon and oxygen.
3. Iron sulfate (a tablet for anemia) contains an element iron, sulfur and oxygen.
4. Copper sulfate contains an element copper, sulfur and oxygen

Oxides

To make the lesson interesting you should begin by burning the dried leaves from school compound. Then raise different questions concerning their observation and leave them for a few minutes to discuss in groups. After giving to one or two students to present their findings then you should summarize the lesson.

Oxides include:

- the gas (chiese) which is produced during the burning of the leaves is a compound
- this binary compound is called anoxide (carbon dioxide)

Oxides are binary compounds of oxygen and other elements. Based on types of elements, oxides are classified into two groups. These are metallic oxides and non-metallic oxides.

The most common examples of oxides are: water (hydrogen oxide), carbon dioxide, carbon monoxide, iron rust (iron III) oxide, etc

2.4 The Importance of water

Period allotted -2

After completing this subunit, students will be able to:

- ❖ explain the importance of water

Answers to practical activities.

Practical Activity 2.1 All the sample contains a residue except the sample with distilled water . Distilled water does not have residue because it is pure.

1. Yes
2. a solid substance (salt)

Practical Activity 2.2

1. Yes
2. it is impossible to separate by a magnet

Practical activity 2.3

- 1 gas
- 2 hydrogen gas in sample (-1)
hydrogen sulfide gas in sample-2
- 3 yes
4. Sample 1-2
5. Hydrogen sulfide

Practical activity 2.4

1. black copper (II) oxide
- 2- No

The inside part of copper envelope do not get heat like the outside parts.

Metallic Oxides

The formation of metallic oxides can be shown by heating metals with air. The burning of a magnesium ribbon with air is a good example. It gives a bright flame and a white powder. The white powder is a magnesium oxide.

Practical activity 2.4

The burning of a fold sheet of copper. After the practical activity allow the students to write their observation and present to the class. Then your summary must include the following points.

- Two colors are observed. The outside of the sheet is covered in black copper (II) the oxide. Because it is exposed to the air. The other parts of sheet, i.e., the inside of the envelope are not changed because it has a metallic appearance.

Non metallic oxides

Practical activity 2.5

Oxygen is about 20.9% of air by volume

- initially the level of water in the tube should be the same as in the through and bang should be placed in the top of the tube
- Over a period of days the water level in the tube will rise as oxygen is used up as rust forms.
- After several days the water level remains constant as all the oxygen had been used up.
- By measuring the height of gas in the tube at the start and finish the reaction a rough estimate.

Answer key for exercise 2.1

1. True

2. True

3. False

4. False

Water is essential for all life. Over 2/3 of your own body mass is water. It plays a very important role in the economy of a country. For example.

1. Domestic water supply (water in our home)

- for cleaning, cooking, drinking, and for carrying away wastes, etc

2. Power production

hydroelectricity,

3. Food production
irrigation, fishing
4. Transport
- shipping of goods, traveling
5. Industrial needs
- cooling, heating, as solvent

The amount of water used by a community depends on its state of economic development. The one which has a large economic power uses a large amount of water. For example, in developed countries like Britain, each person uses about 140 liters of water per day. So the amount of water used by a person is differing from community to community depending on the availability of water.

A. **Water in our home**

We use water in our homes for different purposes. For example, for cooking, cleaning, drinking, bathing and carrying away wastes.

Students could discuss how they and their family use water at home. You should encourage them to quantify the water used in a day at their homes. And give a chance to some students present their ideas to the class. Water is necessary for every activity. So you have to use water economically (To us every drop of water is precious)

B. **Food production**

We use water to irrigate dry farm lands. To raise enough food for their needs, people must irrigate dry areas. Because plants can not grow without water.

Now a day in Ethiopia people use rivers for irrigation. The farmers plough their lands during the dry seasons to get crops. Because of their farming are becoming wealthier and wealthier by using irrigation.

Practical Activity 2.6

Plants need water

The students perform the activity as given in the text book. Let the students record their observation and report their findings to the class.

The plants grow well in areas where regular water is found than the other areas which do not get water. The students should know the uses of pumps and irrigation channels to direct water to growing areas.

C. Industrial uses

Water is extensively used in industry. For example, in soap industry, the water in steam form is used as the source of heat or to melt the raw materials.

It is also used for heating, cooling, producing steam, to drive turbine's as a solvent and a raw material in the manufacturing of ammonia and ethanol.

D. Power production / Hydro electric power

Water is one of the sources of electric power. Ethiopia electric power comes from hydro electric station. Now Ethiopia is in way of building the largest (biggest) dam in Africa. It is found in Benishangule region and its name is renaissance dam (Hedassie gideb).

Students could draw a water cycle and from this deduce that some of the energy from the sun can be converted to electricity as water past through hydroelectric power plants.

E. Transportation

Most of the earth's surface is covered by water. Therefore, people use water for transportation. Today countries use this means of transportation for exporting and importing goods. It is also used for recreation (water sports).

Answer key for exercise 2.2

1. D 2. D 3. D

2.5. Wastage of water

Period allotted -3

After completing this subunit, students will be able to:

- ❖ mention the effects of water wastage.
- ❖ describe the effects of water wastage.
- ❖ indicate ways of using water economically.

Water is wasted in one way or another in every day. Most of them are due to unwise use of water by people. Others can be maintenances problem. Some of the common ways of water wastages are:-

1. wastage of rain water
2. wastage of water in the purifying ,storing and distributing
3. during house hold use

The water which comes from the sky is seasonal. So people can collect them using different materials for other days. This is not done by organizing the society or individuals . Therefore, it can be one of the causes of water wastage. During the rainy season most of the water(many cubic meters of rain that falls) enters to rivers, lakes or enters to seas with out giving any uses to the society.

Humans waste water in their homes for example:

- sometimes due to not taking care we leave the tap on even after we do our work.
- washing one cloth at a time
- leaking taps due to damage.
- Methods used to decrease the wastage of water are:-

1. store rain water

- it can be used for house hold purposes, in some areas it is also used for watering garden. When large amount of water is collected.
- it can be stored in:-
 - large containers made of wood or plastic
 - reservoirs can be built underground using cement.

2. change the materials which cause leaking of water by new one

3. turn the tap off after you have washed the materials or hands.

4. washing multiple clothes together which don't require more water than washing multiple at one time.

5. suitable maintenance.

The wastage of water has an impact on the shortage of water in rural or urban areas. Therefore, we have responsibility to.-

- make people conscious.
- inspire people to use wisely the natural resources.
- use water appropriately.

2.6. Pollution of water

period allotted -4

After completing this subunit, students' will be able to:

- ❖ mention the causes of water pollution.
- ❖ explain the effects of water pollution
- ❖ state methods of preventing water pollution

It is advisable to start this topic by raising the questions which is found in the student's, text and about pollution. You should allow the students to discuss in groups to a few minutes. And give a chance to present their findings to the class.

Causes of water pollution

A. Domestic wastes

The water that leaves our homes is not pure. It is a mixture of different harmful materials. It includes house hold wastes liquid from toilets, kitchens, showers and so forth that are disposed of via sewers. Others which pollens water are fertilizer and chemicals on a farm. The fertilizer and other chemicals (insecticides, herbicides) which are not absorbed by the soil are carried out by running water and enters to water surface.

B. Industrial wastes

The wastes of industries that comes out in the form of liquid or gas can pollute the water. Acid rain is formed from the industrial gases. It kills fish and other living things when they are washed into lakes or rivers. The liquid wastes from industrial can pollute the water surfaces if they are not treated.

Effects of water pollution

Water pollution is a major problem of the world. It affects plants and animals living in the bodies of water. It affects drinking water, rivers, lakes and ocean water. This consequently harms human health, the natural environment and the life of aquatic animals like fish.

Methods of controlling water pollution

In our everyday lives a great deal can be done to minimize pollution . These methods of controlling pollution fall into the following.

- 1- Do not put (throw) a solid pollutants any where. But bury them in dumps or burned it.

- 2- Chemical reaction can be used to remove pollution from water. The pollutants react with chemical and form a precipitate and being to settle out. Finally, remove these wastes from the water. This can be mostly called the treatment of water.
- 3- Biology agents also used to remove pollutants from water. The bacteria attack themselves to certain chemical in polluted water and convert them to a harmless form.

Project work 2.1

The aim of the project work is to protect the society from pollution.

You should plan and collect information about the places before accomplishing the project. It is also necessary to cooperate the students and encourage them to collect information.

2.7 Method of water conservation

Period allotted- 5

After completing this subunit, students will be able to;

- ❖ describe methods of water conservation
- ❖ demonstrate methods of water conservation

You should raise other questions which makes the lesson more altercative. Challenge the students to explain why an area may receive a large amount of rainfall but still suffer from droughts. Direct them towards the idea that there are periods when there is lots of rain (the rainy season) and periods when there is little or no rain (the dry season). Ask then how the amount of water received annually might be evened out – and lead the discussion into the idea of storing water.

One of the most important natural resource is water. It is recycled in the environment. We should have responsibility to protect this natural resources because our life is relied on it.

The reason of draught is the absence or shortage of water. Therefore, we have to follow the following common methods of water conservation.

A. Constructing Dams

Dam is one of the methods to conserve water. It is constructed mainly in the river to cease the flow of water. Then water is not lost, and the fertile part of the soil (top soil) not washed away. The water which is collected is used for different purposes from home activities to produce a large amount of energy. The problem in relation to water can be answered in some ways.

B. Water harvesting ponds

In Ethiopia people collect the rain water using different materials. Some uses this water for washing cloths, house hold materials and others uses for their cattle. The society use this method in large scale in some parts of Ethiopia effectively. Dig-well in the surroundings and cement the inside part of the well

This technology is essentially especially in drought prone areas. Even though, drought is purely natural calamity caused by the failure of rain , it can be minimized by careful planning and operation . Large amount of water is collected in good rainy seasons. So shortage of water is due to the low water storage capacity or not using this technology.

Students could identify local water storage facilities and find out the height of water at the end of the rainy season and at the end of the dry season. From this they could estimate the amount of water is used.

C. Planting Trees

Start the lesson with the activity given in students' text. It is designed to appreciate (encourage) students in planting trees for making the environment comfortable to humans. Let the students discuss this activity in groups for a few minutes and present their finding to the class.

After this, tell them that:

- planting trees in our responsibility threats can conserve water
- They protect the soil from erosion.
- They also contribute to moderate our atmosphere.

Students could measure the temperature of the soil in different locations, some are exposed and some are covered in foliage. They should relate the temperature of the soil to the amount of water lost from the surface by evaporation. And from this deduce that less water is lost from the ground by evaporation when the ground cover plants and trees are present.

D. Good farming practices

Now a day farmers in Ethiopia are on the way of practicing good farming methods. This includes irrigation and terracing.

Farmers did not wait a rain to plough the is land and saw instead they use an irrigation. It is used to assist in the growing of agricultural crops . This way of cultivating crops increases the farmers leaving standard and fulfill the people crop demands.

Terracing prevents soil erosion and assists the farmers in getting a good result. This farming method protects the minerals from washing away. The minerals in the soil are important for the growth of plants. The run off water mostly take the soil with their minerals. Finally, the plant growth or getting a good result becomes difficult with out fertilizers.

Students could use a small amount of soil to model a hillside. They can scratch lines from the top to the bottom, gently pour a container of water from the top to simulate rain and observe how quickly the water runs of and how particles of soil are carried down. The process can then be repeated but this time lines should be scratched in contours around the soil. A third experiment carried out by fashioning the into a series of terraces and observing how water flows over them.

Answers to review exercise for unit two.

I – True/ False item

1. False
2. True
3. True
4. False
5. True

II- Multiple choice item

1. C
2. C
3. A
4. B
5. D
6. D
7. C
8. D

III Matching item

1. B
2. D
3. A
4. C

IV- short answer item

1. Koka, Melka wakana, Chise Abay, Gilge gibe -1, Gigel Gibe – 2, Fincha
2. Dams, water harvesting ponds, planting trees, good farming practices (irrigation and terracing)

Unit 3 Plants

(30 periods)

Objectives of the Unit:

At the end of the lesson, the students will be able to:

- ❖ explain the importunes of plants to humans and soil to plants.
- ❖ describe the soil profile in relation to its significance to plants
- ❖ define soil depletion and state its causes and methods of prevention.
- ❖ define fertilizers, explain their importance and classify then into natural and artificial.
- ❖ prepare organic manure for use in the school grade.
- ❖ compare Ethiopia’s forest cover the past and the present, mention the causes and consequences of deforestation, and describe the methods of conservation of forests.
- ❖ plant tree seedling in and around their school compound.
- ❖ describe and demonstrate the biogas technology as an alternative source of energy.
- ❖ raise vegetable seedlings, grow crops and demonstrate crop protection methods.
- ❖ explain the harmful effects of weeds
- ❖ discuss the harmful effects of seding forest tires and clearing forest fire and clearing forest.

Teaching Learning Materials (Teaching aids)

- ✚ Simple diagrams.
- ✚ Models
- ✚ Experimental materials such as chemicals, laboratory equipments,
- ✚ Parts of plants
- ✚ Real situations.
- ✚ Plant specimens

Method of teaching and learning

- ✚ Laboratory (practical activities)
- ✚ Demonstration.

- ✚ Group discussion
- ✚ Lecture
- ✚ Class room presentation
- ✚ Panel discussion
- ✚ Question and answer ,etc
- ✚ Project works
- ✚ Group assignments

3.1 Parts of plants and their functions.

At the end of this topics the students should be able to:

- ❖ Mention the main parts of plants.
- ❖ Explain the functions of roots, stems, leaves and flowers

Unit Introduction

This chapter introduces the general features of plants, their parts and the importance of plants. The students will learn about soil and plants, the importance of soil to plants , soil profile and soil erosion and its causes and prevention mechanism. Students will also recognize the threats of forests and their conservation. Finally, the students have a plan to grow vegetables from seeds at school or at their homes.

A good way to begin teaching this session is discussing on the general characteristics of plants. You can raise the following ideas:

- plants as producers.
- all other living things are depend on plants for food and O₂
- they can not move from place to place
- they need air, water, light , etc.

It is very important to help your students understand the difference between plants and animals. You can show the different parts of the plant by bringing the seedling to the class or. You can take the students to the school garden to show them the different parts the plant and their functions.

Ask them to tell the functions of root, stem, leaf and flowers, of the plants.

Answer key to Exercise 3.1

1. I. Support the branches , leaves and flowers
II Transport water, minerals and food to the rest part of the plant
2. root
3. carbon dioxide, water and sunlight.
4. Mostly photosynthesis takes place in leaves of plants.

3.2 The Importance of plants

The students should identify examples of plants that are used to provide food, medicines, clothing, shelter, furniture, etc.

Students could carry out a survey of the plants grown for food in their area including those which are grown to feed the family and those which are grown for sale in the markets. They could also find out more about herbal medicine made from locally grown plants. They should be aware that plants maintain normal climate. This could be illustrated by comparing the climate (air condition) of a given locality well known by students to another locality with little or no vegetation at all.

The students could dig up several different common local plants and examine the root system to see how the roots and the particles of soil together. They could examine the areas where plants are no longer found, due to overgrazing or other causes and observe the resulting soil erosion.

They should identify plants which are grown for their attraction. They could discuss the reasons why people grow decorative plants in their groups.

The students will learn that plants are source of drugs and medicines. Try to differentiate between medicine drugs and mood altering drugs. You can lead some interesting discussions on commonly used mood altering drugs like chat, hashish and tobacco. The following points should be raised during the discussions:

- the negative effects of mood altering drugs
- physical, economical and social disadvantages of being addicted to certain drugs.

Students debate on , smoking is now banned in public places in many nations (Countries). It is no longer permitted to smoke in cafes, restaurants, bars, on public transport or in enclosed public places. So let the students debate whether such a ban would be appropriate in Ethiopia and how people would react to it.

Students should be aware on the advantages of drug free behavior and the consequences of being addicted to certain types of drugs.

Answer key to Exercise 3.2

- 1 Root, stem, leaf, flower, fruits, etc
- 2 seeds, root, stem, leaf, fruits, etc
- 3 After photosynthesis plants release oxygen and takes in CO₂ that makes air fresh and pure.
- 4 Using a drug for a long period of time may lead to drug addiction. Drug addiction is the repeated use of a drug, which the uses find difficult to stop. He or she can not carry out daily activities with out using it.
- 5 Tobacco, chat, cannabis, etc

3.3 Soils and plants (5 periods)

Objectives of the topic:

At the end of the less students will be able to:

- ❖ explain the importance of soils to plants.
- ❖ describe the soil profile in relation to its significance to plants.
- ❖ define soil depletion as the wearing out of minerals from the soil
- ❖ state causes of soil depletion.
- ❖ explain methods of prevention of soil depletion.

You can start the lesson explaining, low soil is formed. Before millions years ago the earth surface was covered by very large(huge) rocks . These rocks during the day time, they exposed for the sunlight and during the night time for very clod temperature, thus, due to this the rocks started to crack and changed to smaller rocks. Again through time the smaller rocks which are

broken down to gravel and then soil. You can add their contribution to plants animals and human for the formation of soil.

Students should appreciate that soil is a growing medium in which plants are growing. The soil provides a plant with water and minerals which are essential for their growth.

you can demonstrate soil profile by taking the students to the place, which is dig as a hole to the deep. or simple diagrammatical representation can be used to show the three layers of soil. Students could investigate the components of soil by placing soil in jar with water, shaking the mixture and heaving it to settle. They will see a graduation of particles starting with the larges at the bottom the finest at the top. Humus win float on the water. This can also be used to show different layers of soil.

Types of soil

Students should be a ware of the three main types of soil and their characteristics such as, water holding capacity, their texture, nutrient contents, etc. Try to make clear for the students the advantages and disadvantages of each types of soil.

Soil Damage

In this section students will learn about soil depletion, soil erosion, their causes and consequences. This section gives you opportunities to teach about how soil can be conserved and what are the treats of our forests. Students should observe some of the causes of deforestation and measures should be taken to stop deforestation.

The discussion on soil depletion can be linked the previous work on water retention and the importance of plants. Try to explain how rain washes top soil away and how this can be avoided.

In this section you will introduce the main causes of soil erosion. Discuss on the contribution of human activities in accordance with accelerating soil erosion. If possible visit a land which is exposed to soil erosion try to describe the role of poor farming method and its impact on the soil.

Your students need to develop knowledge of conserving soil. They are asked to think of imaginative plans for the wise uses of soil and other natural resources, they should develop positive attitude for educating local people about the need for conservation of soil.

Answer key for exercise 3, 3.

1. Top soil.
2. Clay soil.
3. Continued planting of the same crops on a particular farm land will draw minerals from the soil and may result in serious depletion of these minerals. This condition is called soil depletion.
4. Soil erosion : is the washing away of the top soil by the action of running water or wind while soil depletion is exploiting certain minerals from the soil by planting the same crops year after year.
5. Plants hold soil particles by their roots
6. Soil is a growing medium for plants, provides water and minerals and anchor them with the ground

3.4 Soil improvement practices (5 periods)

After this topic:-Students will be able to:-

- ❖ define fertilizers.
- ❖ explain the importance of fertilizers .
- ❖ classify fertilizers as natural and artificial.
- ❖ prepare organic manure for use in the school garden.

Students should be aware of that plants need certain minerals in order to grow and remain healthy, and to get these minerals from the soil. Try to demonstrate that there are two main groups of fertilizers. There are natural and chemical fertilizers students could investigate to effectiveness of different types of dung fertilizers. They could identify the different types of chemical fertilizers such as urea, ammonium nitrate and potassium sulfate.

It is important to recognize about the advantages of using natural fertilizers and the techniques of preparing compost. (green fertilizers) students could discuss what material will compost.

Answer key for Exercise 3.4

1. Fertilizer
2. To keep soil fertility or to avoid soil depletion.
3. Natural and chemical fertilizers

3.5 Our forests

(5 periods)

After this topics the students will be able to:

- ❖ compare Ethiopians forester, cover of the past and the present.
- ❖ mention the causes of deforestation.
- ❖ describe the consequences of deforestation.
- ❖ describe the consequences of deforestation.
- ❖ describe the methods of conservation of forests,
- ❖ plant three seed lings in and around their school compound,
- ❖ describe the biogas technology as an alternative source of energy.
- ❖ demonstrate the bio/gas technology using a simple model.

It is very important for the students to recognize the varieties of plant life (forest) in their own area and you have a chance to show the layers of the trees, bushes (shrubs) and grasses in the forest.

Students could research for old maps or information detailing the areas of Ethiopia covered by forests in the past and in the present day and from this estimate the extent of deforestation.

3.6. Raising vegetable seedlings and crop growing

(6 periods)

After this topic Students will be able to:-

- ❖ raise seedlings of vegetables in pots or in school grader
- ❖ grow crop in school garden
- ❖ grow crops in schools garden
- ❖ demonstrate crop protection methods

This section gives you opportunities for a number of practical investigations which is very important for the learners. They learn about the remainder of seed and its parts, how seed germinate what conditions should be fulfilled. Students could carry out experiments to determine what is needed for the seed to germinate .Germinate batches of seeds in the absence of light, water or in the absence of oxygen.

The practical activity will help you to demonstrate the parts of a seed and what happens when seed germinates. And try to answer the questions after the practical activities.

As we know the seed starts to increase its size because the water enters to the seed and the seed coat teared. As a result, all parts can easily observable.

Biogas

Students discuss some of the problems of current fuses observe biotechnology as an alternative means (biogas). If biogas is generated locally the students can understand biogas in action.

Biogas consists mainly methane, together with a small proportion of carbon dioxide. Show the students a simple diagram of a biogas unit and explain how it works. They will be asked to design and build a small biogas unit. For example, a large glass jar could be used for the fermenting vessel, a mechanical stirrer to mix the dung with water and a flexible rubber tube to collect the biogas over water. Students with the teacher could discuss different uses of dung including:

- * burning as a fuel.
- * spreading it on fields as a fertilizer
- * fermenting it to produce methane

They should explain the advantages of using such alternative energy sources. On this and on other topics you can invite any guest who is familiar to this

The Importance of forests

students should be aware of that trees are cut down to provide firewood materials for construction, lumber, paper, etc

Deforestation could be linked into work already carried out on water conservation_and soil erosion_ Ask the students the consequences of deforestation

Arrange the students in groups of five. Tell each group to look for an old map gather piece of information about the areas which are covered by forests in the past and in the present days.

Ask them to guess the total area of forest in the past and in the present and from this guessing the extent of de gap forestation.

Conservation of forests

Working in their small groups, students continue planning how they would conserve an area of a forest. Present their ideas in the class and vote for the best conservation ideas that are suggested and try to apply to conserve and plant trees.

Answer key to exercise 3.5

1. A. prevent soil erosion and flood.
B. It is homes for many wild animals
C. Regulate the climatic conditions.
D. Are good sources of energy.
2. A. Avoid over grazing of forests.
B. Organizing fire control mechanisms.
C. Educating the people.
D. use other alternative sources of energy
3. It is about 3%

3.7 Weed and weed control

(3 periods)

At the end of this topic students will be able to:-

- ❖ give common examples of weeds
- ❖ explain the harmful effects of weeds
- ❖ describe weed control methods

Crop protection

In this section you should encourage the students to plan their own methods so as to protect the school garden. Explain the effects of pests, birds, weeds, etc. on our agricultural products and what measures should be taken. Try to give them an over all picture how to care and protect crops.

Students should plan to grow vegetables from seed on a small plot either at school or at their homes. They should consider such factors as:

- which vegetables grow
- how long seeds to germinate
- How long plants need to grow
- How to prepare the ground
- How and when to apply fertilizers.
- which fertilizers should be used, etc

Tell your students to name some common weeds in their locality you can use to local name of the weeds. Students could walk in the locality and dif up examples of common weeds that could be brought back to the classroom, identified and drawn. They should be dried and used in display.

Discuss the harmful effects of weeds in class and also discuss the characteristics of weeds such as:

- grow rapidly
- flourish in a range of different types of soil;.
- produce lots of seeds.

Weed control methods

Students should be aware of that weeds can be controlled by both physical and chemical methods. Students should name some chemical weed killers and which are effective against the weeds. There must be discussion on the advantages and disadvantages of both physical and chemical weed control.

Tell the students to consult a farmer or agricultural expert in their localities about weed and weed control and let them to present their findings to the class room. As a teacher please facilitate the discussion and give them any corrections

3.8 Harmful practices towards forest conservation (3 periods)

At the end of this topic students will be able to:

- ❖ mention setting forest fires and clearing forest as harmful practices
- ❖ discuss the harmful effects of setting forest fire and clearing forests.

This topic is related to de forestation which is discussed earlier in this unit . The students have the knowledge problems associated with deforestation. They could discuss different aspects of deforestation.

- Loss of habitats for animals.
- Loss of plants for food and medicines
- Loss of source of fire wood.
- Soil erosion

- Loss of water retention
- Loss of aesthetic pleasure given by flowers and plants

Students should be made aware of that setting fire to forests provides additional farming land is a very short sighted practice. In the short term, the ash provides the ground with nutrients for the crops growth but the burning damages the surface soil structure and destroying humus, so after a few years of growing crops, the soil is left sterile and open to erosion.

Answer key for review exercise of unit three

I- True or False

- | | |
|----------|----------|
| 1. True | 6. True |
| 2. True | 7. True |
| 3. False | 8. False |
| 4. True | 9. False |
| 5. False | 10. True |

II- Matching

11. B
12. E
13. D
14. A
15. C

III. Choose

16. D
17. C
18. B
19. C
20. D
21. A

IV. Short answer.

22. Because animals cannot prepare their own food.

23. Drug addiction can lead to:

- health problems

- social disturbance
- economical crisis

Unit Four

4. Animals.

Objectives of the unit

At the end of this unit the learners will be able to

- ❖ Classify animals into vertebrates and invertebrates
- ❖ Describe the general characteristics of animals
- ❖ Describe the common characteristics of insects, give example and show their external structures with their functions
- ❖ Diagram the life cycle and explain the importance of silk worm
- ❖ Mention the general characteristics of fish, give examples, show their external body structures and explain how they reproduce
- ❖ Describe the importance and methods of fish farming
- ❖ Mention the general characteristics of amphibians, give examples, show their external body structures and explain how they reproduce
- ❖ Mention the general characteristics of reptiles, give examples, show their external body structures and explain how they reproduce
- ❖ Demonstrate scientific enquiry skills: classifying, asking questions, applying concepts and relating cause and effects.

Introduction.

This chapter deals about animals, classification of animals, the general features of insects, fishes, amphibians and reptiles.

Teaching – Learning materials (teaching aids)

- ✚ preserved animal specimens
- ✚ Real situations
- ✚ If possible documentary video
- ✚ Diagrams
- ✚ Charts that show the life cycle of some animals

Method of teaching and learning

The teacher can choose the most suitable methodology for each topic.

The following methods can be used

- ✚ explanation
- ✚ discussion
- ✚ demonstration
- ✚ various practical activities
- ✚ buzz group discussion
- ✚ experiments
- ✚ field observation
- ✚ panel discussion

4.1 How are animals classified?

(2 periods)

At the end of this lesson the students will be able to:

- ❖ classify animals as invertebrate and vertebrates
- ❖ describe the general characteristics of invertebrates and vertebrates.
- ❖ Give examples of vertebrates and invertebrates

Students could be given pictures of some different animals to study. Preserved / fresh specimens could be used if available. The specimens should be both invertebrates and vertebrates. From their observations students should be asked to divide the animals into two broad groups on the basis of their observation. Use this exercise to introduce the idea of animals with out back bones vertebrates.

It is a good opportunists to explain the effect of malaria on human health how much it is serious and disease in the world. The students will also learn measures that should be taken to control mosquitoes.

4.2 Insects (10 periods)

At the end of this topic, the students will be able to:

- ❖ describe the common characteristics of insects.
- ❖ show the external strictures of insects.
- ❖ tell the functions of external structures of insects

- ❖ give examples of insects
- ❖ diagram the life cycles of locust house flies, mosquito honey bees and silk moth.
- ❖ explain the harmful effects and control methods of locusts and mosquitoes.
- ❖ describe the importance of silk worm,

Ask the students to give more examples of invertebrate and animals vertebrates animals. Make the students to identify some group of invertebrates which as insects, worms, etc. and vertebrates including fish, amphibians and reptiles.

Try to demonstrate the general features and characteristics of insects. Some insects can be caught and brought to the class room. Students should be warned that some types of insects bite or sting and are best left alone.

The teacher or the students could examine different insects and look for similarities in their external structures such as:

- Three body parts – head, thorax and abdomen.
- six legs.
- mouth parts.
- antennae

Explain the way how insects reproduce and the process of metamorphosis. Students should look at the life cycle of some insects and the characteristic features of each stages.

students could evaluate the differences between complete and incomplete metamorphosis.

Answer key to Exercise 4.1

1. I- Animals cannot prepare their own food.
 II. Animals consume plants or other animals as food.
 III. Most animals can move from place to place
2. Invertebrate (animals without back bone) and vertebrates (animals with back bone).
3. I. Have segmented body – head, thorax and abdomen.
 II. Have jointed legs.
 III. Have six legs

4.3 Life History of Harmful insects

A. House fly

Students should be made familiar with the external structure of houseflies their life cycles and how houseflies can transmit disease, causing organisms.

You can use the diagrams or the specimens of houseflies to demonstrate in the class room. Students should discuss the life cycle of houseflies by using flow chart.

Let the students to carry out practical activity 4.1, studying the metamorphosis of the houseflies and be sure whether questions of practical activities answered or not.

You can have class room discussion on how houseflies are as vectors of diseases and how can we control them.

Answer key for exercise 4.2.

1. Proboscis.
2. Maggot
3. legs, mouth parts (Proboscis) hair like structures, etc
4. Larva stage
5. The egg.

B. Locusts

Students should be familiar with the external structures of the locusts and identify the typical insect characteristics. They should see each stages of the locust life cycle – egg, hoppers (nymph) and adult and be aware the locusts live together in swarms. They should be given data about the locust.

Example: an average swarm of locusts have 1,500,000,000 insects and covers on area of 30km².

Each locust eats its own body mass of each day. An average locust has a body mass of 2 gram. From this data allow students to calculate the amount of food eaten by a swarm each day. Try to explain the damage done by locusts to crops and the problems of controlling them.

C. Mosquitoes and Malaria

In this section you will explain to your students how mosquitoes transmit malaria. The students should learn the life cycle of mosquitoes. They need to learn the metamorphosis of the insects and how they carry the plasmodium parasites from the patient to the health person.

It is a good opportunity to explain the effect of malaria on human health how much it is serious and a deadly disease in the world. The student will also learn measures that should be taken to control mosquitoes.

4.4 Use full Insects.

Ask the students to list out some useful insects. Discuss how the insects are important

A. Honey bee

Insects are important. Students could explain the general features of honey bees. Try to explain the division in bee hives and the three casts of honey bees.

Students should be made aware that how honey is made by the honey bees. And the economic importances at bee keeping allow the students know the advantages of using modern bee hives than traditional bee hives.

Carry out project work 4.1 to explain the advantages and disadvantages of the traditional and modern bee hives.

Answer key for exercise 4.3

- A. Complete.
- B. Transmits disease called malaria.
- C. Locust.
- D. Destroy crop.
- E. Feed on dead and decayed matters.
- F. Transmits diseases.
- G. Honey bee.
- H. complete
- I. Feed on the sweet of flowers and honey.

B. Silk worms

Students should be familiar with the external structures of the silk moths and identify the typical insect characteristics preserved or fresh specimens could be used if available. A visit could be arranged where silk worms are kept for study or silk production.

Documentary video on silk worms (if available) also gives the students a good chance to observe the life and the importance of silk worms.

Students should describe the life cycle of the silk moths and be aware that natural silk is obtained from the larva which spins around it when it is ready to become a pupa.

Students should appreciate the importance of mulberry leaves as the source of food for the silk worms. Allow the students to investigate the properties of silk by comparing silk thread with other threads which are obtained from natural sources like cotton, linen and wool.

Answer key for exercise 4.4

1. Vectors.
2. Plasmodium
3. Silk worm.
4. Mosquito
5. Cholera, amoeba, typhoid, etc.
6. Insecticides are chemicals that kill insects.

4.5 Fish

(7 periods)

At the end of this topic and sub topics the learners will be able to:-

- ❖ mention the general characteristics of fish.
- ❖ give examples of fishes.
- ❖ show the external body structures of fish.
- ❖ explain how fishes breathe in water.
- ❖ explain how fishes reproduce
- ❖ describe the importance of fish farming
- ❖ explain method of fish farming

Students should be informed about the general structures of fish. They should also know they are vertebrate animals. Students could examine fish and draw its external structure including the mouth, eye, gill cover, fins, head, body, scales and the tail. Students could dissect a dead fish if available. By carefully removing the gill cover and they could observe the gill rakers and the gill filaments using a glass rod. Students should follow the path of the water which is taken in through the mouth and out through the gills.

Ask the students to list the examples of fish. Students should observe that

there is no external sex organ during their investigation of the external structure of the fish . From this they could summarize that fertilization takes place outside the body. Students should learn how the female fish lays its eggs outside the body and these are fertilized by the male who squirts out fluid called milt that contains sperm. Students could be given data to discuss how the number of eggs laid by an animal are related to the amount of parents care after the offspring are hatched.

e.g. Fish -----	3,000,000 eggs.
Amphibians-----	1,500 eggs.
Reptile-----	30 eggs.
Birds-----	10 eggs.
Mammal-----	1 eggs.

These should discuss why fish lay so many more eggs than other groups of animals.

In this section you have an opportunity to describe how fish farming takes place and the students could discuss the advantages and disadvantages of fish farming . The advantages includes:

- easy to capture
- control food supply
- harvest at a particular size

The Disadvantages includes

- diseases can easily spread.
- build up of waste products
- attracts predators such as fish eating birds.

students could study how fish move by observing them in aquarium or pond.

Answer key for exercise 4.5

1. Having elongated and streamlined line shape helps the fish to penetrate and move forwards in the water easily.
2. Because they have no lungs that helps the fish to take in air from the atmosphere.
3. Fish farmers should consider – the growth rate of a fish
- Diseases resistant and

- taste good

4. It has external type of fertilization which takes place in the water.

4.6 Amphibians

At the end of this topic the students would be able to:

- ❖ Mention the general characteristics of amphibians.
- ❖ give examples of amphibians.
- ❖ show the external body structures of amphibians.
- ❖ explain how amphibians reproduce.

Give a chance to the students to examine a frog and its external structures including the mouth, eyes nostrils, damp (moist) skin, short strong front legs, long back legs and webbed feet.

Let the students to explain what type of fertilization do amphibians have and challenge them+ to answer why the male frogs mounts on the back of the female. And try to explain the reasons, as you know the male mount on the back of the female frog to maximize the probability of fertilization and to initiate the female frog to release its eggs, in the water. This is not internal fertilization

students could compare and contrast the general characteristics of fish ad amphibians. Let the students present the similarities and differences bet ween fish and amphibians in their general structures, life cycles, etc.

Consider as frog as a representative of amphibians and describe the way how amphibians feed, reproduce and carryout the metamorphosis. Finally, try to explain the three mechanisms with which frogs breathe.

Answers key to exercise 4.6

1-

tadpoles	Adult frogs
1. Breath through gills.	- Breath with lungs
2. Live only in the water.	- can live both on land and in the water
3. Have tails	- Have no tails

4. Have no legs	- Have two pairs of legs.
-----------------	---------------------------

2. It helps the tadpoles to swim in water.
3. Because the hind legs of frogs are used to leap (jump) so they helps to move quickly.

4.7 Reptiles

At the end of the lesson students should be able to:-

- ❖ mention the general characteristics of reptiles.
- ❖ give examples of reptiles
- ❖ show the external body structures of reptiles
- ❖ explain how reptiles reproduce.
- ❖ Mention the difference between reptiles and amphibians
- ❖ Explain the general structures of reptiles. Let the students draw and label a diagram of lizards, snakes, or turtles.

Let the students discuss the way how reptiles are reproduced and give them a chance to compare with the reproduction of amphibians.

They can compare with reference to:

- the number of eggs produced
- the type of fertilization
- the place when eggs are laid, etc

Answer key to exercise 4.7

1.

Amphibians	Reptiles
- Lay thousands of eggs at once	- Lay a dozen of eggs.
- have external fertilization'	- have internal fertilization
- Lay eggs in the water	- lay eggs on land (sand)
- the eggs have no outer	- the eggs are covered with leathers shell.

thick coverings	
-----------------	--

- 3. The presence of lungs that are used to take in oxygen from the atmosphere, the presence legs to move on land, having dry scaly skin to reduce water loss,.....
- 4. The leathery shell of the reptile's egg protects the eggs from drying out and break

Answer key to review questions for unit four

I- True or False

- 1. False
- 2. True
- 3. False
- 4. False.
- 5. False
- 6- True

II Fill in the blanks

- 7. Lung
- 8. Tail
- 9. Croaking
- 10. Tongue
- 11. Nymph
- 12. Gills
- 13. Hind legs
- 14. Fins

III- Multiple choice

- 15. A
- 16. D
- 17. D
- 18. A
- 19. C
- 20. A

IV- short answers

- 21- Frog can breathe in 3 different ways
 - I. Through the moist skin.
 - II. Through the lining of the mouth (buccal) cavity

III. By means of Lung

22- Insects can be used for many purposes. They

- I. serves as pollinating agents.
- II. Like honey bees produce honey and wax and
- III. The moth's larvae produce silk.

23 I. have dry scaly skin which prevent loss of water from the sun light

II. Posses well developed lungs to take in oxygen from the air

24- A. Are eggs laying animals.

- can live on land.

B. Both are vertebrate animals

- Are egg laying animals.

C - Both live only in the water bodies

- both breathe with gills.

D - Both are egg laying animals.

- can live on land

E - Are vertebrate animals.

- Both lay eggs in the water

25- I - They have gills which are adapted to take air (oxygen) from the water

II- Have fins which aids the fish to swim in the water

III- Have elongated and streamlines shapes which help to penetrate and swim easily in the water.

26- Mulberry leaves and cassava,

Our body

Unit – 5

Our body

(24 period)

Unit outcomes:

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

- ❖ define excretion, name the organs involved, indicate their structures and tell the functions of the structures.
- ❖ describe what a hygienic latrine is, explain its importance, discuss the methods of keeping it clean and construct a model pit latrine using car board or other available materials.
- ❖ describe and demonstrate the methods of keeping food hygiene and food preservation.
- ❖ explain how food serves us as an energy source and compare human body with an engine regarding energy changes.
- ❖ explain, give examples and demonstrate the three mechanisms of heat transfer.
- ❖ explain the causes and recommended solution of food shortage.
- ❖ describe eating raw meat, drinking un-boiled milk and disposing waste at wrong places as harmful practices and discuss their harmful effects.
- ❖ define HIV and AIDs, describe the ways of transmission and preventions and demonstrate decision making assertiveness, and critical thinking skills that help them to prevent HIV
- ❖ demonstrate scientific enquiry skills:- observing, comparing, making models, communication, measuring, asking questions, drawing conclusions, applying concepts and relating causes and effect.

5.1 Excretion

(5 periods)

After the end of this lesson, the students will be able to:

- ❖ define excretion as loss of waste products which are produced by metabolic processes in the body.

- ❖ name organs of excretions.
- ❖ indicate the structures of organs of excretions.
- ❖ tell the functions of the structures of excretions

Start the topic by explaining the difference between excretion and egestion. Excretion is the loss of waste products resulting from metabolic processes where as egestion is the loss of undigested food from alimentary canal through the rectum and anus. And students could list the waste products including: carbon dioxide, water urea and others and explain each as carbon dioxide is excreted by the lungs is about 100 times richer in carbon dioxide than the air inhaled. water is also a waste product. This water, together with excess water taken in with food and drinks, is excreted in a number of ways.

These are: - In exhaled air – which is always saturated in water vapor

- through the skin during sweating
- In the form of feces
- As urine

and also a waste product from the liver. It is lost through the skin during sweating and with urine.

Finally, help the students to understand the structures of excretions organ (skin, lung, and kidneys)

Organs of Excretion and their Functions

Start the lesson by asking the students which parts of our body used as an excretion organs, and help them to define each organs of excretion in detail and their structure as well as their use.

Hygienic latrines their importance and constructions a model

Start the lesson by explaining the uses of hygienic latrines used for removing products of excretion and egestion, and distinguish excretion from egestion.

Discuss why human waste has an unpleasant smell and why it attracts insects like flies.

Help the students to list the features of hygienic latrine, and compare the quality of the school latrine and provide ideas, suggestion, etc. as to how it could be improved.

Project work 5.1

Please, teacher help the students to work on the project by using local available materials, and group the students to made pit latrine.

Answers key for Exercise 5.1

1. Skin, Lung, and Kidneys
2. Kidney
3. Excretion is the loss of waste products resulting from metabolic processes in the body.
4. Epidermis is a thin upper layer of the skin.
5. A thick layer of skin under epidermis of the skin.

5.2 Food Hygiene

(4 periods)

After this lesson, the students will be able to:

- ❖ describe the methods of keeping food hygiene.
- ❖ demonstrate some of the methods of keeping food hygiene
- ❖ demonstrate some of the methods of food preservation
- ❖ describe methods of food preservation

Start the lesson by telling that when food enters the body through the mouth it has to be free from harmful organisms which could cause illnesses.

Use this idea to generate a discussion of what precautions must be taken when preparing food to ensure good hygiene.

Help the students to carry out a survey of different methods of preserving food. These should include both traditional and modern methods.

And also the students should discuss the advantages and disadvantages of each method and why some methods of preservation are particularly suitable for certain food but not others,

Answer key for exercise 5.2

1. Food hygiene is keeping food clean and safe
2. In the following area food hygiene is needed:-

- home
 - food trade
 - Preparing area, etc.
3. Give the chance to the students to mention them.
 4. salting, drying, bottling and conning, ---
 5. Because of disease causing organisms, such as bacteria, fungi,

5.3 Food as a source of heat energy (6 periods)

After this lesson, the students will be able to:

- explain how foods serve as an energy source.
- compare human body with an engine regarding energy change.
- explain the three method of (mechanisms) heat transfer.
- give example for the three mechanisms of heat transfer.
- demonstrate of heat transfer.
- demonstrate the three mechanisms of heat transfer

Start the lesson by asking to compare energy production by our body with that of engines:-

Our body: Food + Oxygen → Carbon dioxide + Water + Energy

Engines: Fuel + Oxygen → carbon dioxide + Water + Energy

Then help the students to differentiate the similarities between our body and engines.

Therefore, the students able to point out that both processes could produce heat energy and that an engine has a cooling system where as our body maintains body temperature.

Help the students to mention the three mechanisms of heat transfer. As they are:

A) conduction

Condition is the method of heat transfer through solids and to a much lesser extend in liquids

Practical Activity 5.1

A metal rod conducts heat where as a plastic rod, wood rod doesn't conduct heat. From this we can conclude that conductor, like copper (Metals) are good conductors of heat, but insulator like plastic rod are poor conductors of heat.

B) Convection

convection is the means by which heat is transferred by liquids and gases.

Help the students under stand what happens to the density of liquid and gases when they are heated. When a liquid or gases heated, it expands and its volume increases since.

$$\text{Density } (\rho) = \frac{\text{mass } (m)}{\text{Volume } (v)} \quad \text{this results in a fall in density.}$$

The less dense liquid or gases rises and cools, more dense liquids or gases takes its place and the result is convection current.

Support the students to give more examples about the transfer of heat by convection.

Examples – radiator to heat the air in a room

- in kettle where the water at the bottom is heated,etc.

Practical Activity 5.2

The colored liquid can be seen rising with the water above the color or dye (potassium manganet (VII)) and the whole body of the water is circulating in the breaker. This flow of water is known as convection current.

C Radiation

Radiation is a means of transferring heat without the need of medium . Heat radiation passes across vacuum and is the way in which heat passes from the sun to the Earth across the vacuum (free space) of space.

Answer key for Exercise 5.3

1. Fuel :- an energy for engine
Food :- an energy for our body
2. Heat energy is the form of energy that moves from hot body to cold body

3. conduction, convection and Radiation.

Conduction:- is a transformation of heat that takes place with out the movement of particles particularly in solids.

Convection: is a transformation of heat that takes place in liquid or gases.

Radiation: is a transformation of heat from hot body to a cold body without the help of a medium.

5.4 Food shortage

After this lesson the students will be able to:

- ❖ explain the causes of food shortage
- ❖ recommend solution for food shortage

Food is a source of energy for all living things. As a living thing, human beings need food for their existence. Living organisms do not exist on earth with out food and other necessities.

The food that human beings eat comes from plants and animals. But most of them are plant sources so the human being depends on plants.

However, this plant sources of food are not found in equal amounts and types in all places. In some places people suffer from shortage of foods.

The reasons for this shortage of food are.

- poor harvesting.
- droughts.
- floods.
- crop diseases.
- bad weather conditions and insufficient rain
- population growth (the food produced is unable to feed the large number of people)

All the above listed conditions do not occur once. Some countries especially poor countries have too little food to feed their people because their population growth is faster than their food supply. Other countries have less food supply this is due to the soil and the climate is not well suited to large scale food production.

There are many causes for the decline of food production. In some parts of the world, the product becomes less and even not enough for their people. But there are mechanisms to improve the yield of crops in terms of quality and quantity. For example:

- built a reservoir (pond) to collect rain water in the rainy season.
- use streams rivers and other water surfaces to get enough crops
(mechanized farming)
- use chemicals to improve the fertility of the soil and to control the damage of the crops by insects, pests and weeds.
- protect the soil from erosion
- prepare large parts of land to get large amounts of crops

All these contribute to store large quantities of food for food securities.

5.5 Harmful practice

After the lesson the students will be to:

- ❖ mention eating raw meat, drinking un-boiled milk and disposing wastes at wrong places as harmful practice
- ❖ discuss the harmful effects of eating raw meat, drinking un boiled milk and disposing wastes at wrong place

In general, cultural practices are beneficial to the society. In some places up to now are ruled by cultural practices. But some of these cultural practices can bring dangers to humans for example, eating raw meat drinking un-boiled milk and disposing waste in wrong places are a few to mention.

Most parts of Ethiopia these practices are observed. They can disturb our day to day activities because they are the causes for diseases. So, the people or the society must stop these harmful practices or use other alternatives which do not damage our health.

For example: eating cooked meat instead of eating raw meat, drinking boiled water, etc.

5.6 HIV and AIDs

After this lesson the students will be able to:

- ❖ Define HIV as a virus that causes AIDS

- ❖ Define AIDS as disease caused by HIV and make the body vulnerable to a wide range of infections
- ❖ Describe the way of transmission and prevention of HIV/AIDS
- ❖ Demonstrate decision making assertiveness and critical thinking skill that help them to prevent HIV/AIDS

It is advisable to start the lesson by working on the activities which are given in the student's text. Let the students discuss about HIV/AIDS and make use of their contributions. Select one or two groups to present their findings to the class. Explain that HIV is a virus which attacks the white blood cells which protects the body from diseases. It infects white blood cells, including T- helper cells. The white blood cells play key roles in the functioning of the immune system.

HIV can live in our body for two to twelve years without producing any outward sign of illnesses. A person who is infected by HIV shows common symptoms like tiredness, enlarged lymph glands, yeast infections, skin rashes and other disease,

AIDS is one of the most serious, deadly diseases which is caused by HIV and it destroys a type of defense cell in the body called a CD4 helper lymphocytes.

HIV can be transmitted from a patient to others by sexual intercourse, direct contact with infected blood and from mother to child. Most of the people are infected by sexual intercourses (careless and free sexual intercourse)

The prevention of HIV/AIDS is not only duty of Ministry of Health or associations in HIV/AIDS but it is a responsibility of all of us. It has no boundary and any body can get the disease at any time in any place when care is not taken.

HIV/AIDS creates heavy social pressure on families, communities and psychological stress on people that are infected by HIV. For example.

- marriage is destroyed and families relationship can disturbed
- children are forced to become street boys/ girls
- hinder the national (country) economic growth
- the number of people in work places may be decreased.

It is possible to prevent the transmission of HIV. All of the people have responsibilities to prevent it because it hinders the country's growth in general.

In addition to the methods of prevention in the student's text the following points are also incorporated.

- Educating the society about AIDS, both in school and in the community.
- Raise the awareness of the society on the modes of transmission and prevention of HIV/AIDS.
- Mobilize the society to make its contribution in preventing and controlling the spread of HIV/AIDS.
- Bring about behavioral changes
- Mobilize the society to give appropriate care and support to the people who are living with HIV
- Providing medical cares

It is important to develop personal skills, to help us and the society from getting HIV. This personal skills are assertiveness, decision making and problem solving.

Answer key to review questions for unit five

I- True or False

- | | |
|----------|----------|
| 1. False | 5. True |
| 2. False | 6. False |
| 3. True | 7. False |
| 4. False | |

II. Choose item

- | | |
|-------|-------|
| 1. D. | 5. B. |
| 2. D. | 6. D |
| 3. C. | 7. B |
| 4. A. | |

III. Short answer item

1. Epidermis
2. Ureter
3. Conduction, convection and radiation

Unit -6

The Earth

(14 periods)

Unit outcomes: After this unit the students will be able to:

- ❖ define the solar system, list the components of the solar system and mention asteroids, comets and meteors as celestial bodies.
- ❖ indicate the position of the sun in the solar system and explain its importance as a source of energy.
- ❖ name the eight and the three dwarf planets, identify that each has their own satellites and locate the position of each planet using – a model.
- ❖ acknowledge that the reported number of planets varies from time to time as new scientific findings are published.
- ❖ identify the types and effects of the motion of the Earth.
- ❖ explain and demonstrate eclipse of the sun and the moon.
- ❖ explain the uses of artificial satellites.
- ❖ demonstrate scientific inquiry skills: observing, classifying, comparing and contrasting, making model, interpreting photos and illustrations and relating causes and effect.

6.1 Components of the solar system

(5 periods)

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

- ❖ define the solar system
- ❖ list the components of the solar system.
- ❖ indicate the position of the sun in the solar system.

- ❖ explain the importance the sun as a source of energy.
- ❖ name the eight planets.
- ❖ acknowledge that the reported number of planets varies from time to time as new scientific findings are published
- ❖ identify the planets that have their own satellites.
- ❖ locate the positions of each planet using a model.

Start the lesson by asking questions like where is the sun location in the solar system and tell them to understand that the sun sits at the centre of the solar system and that the planets are around it. The sun is the source of energy in the solar system.

Help the students to carry out research about early ideas of the solar system in which the earth was thought to be at the center of the solar system (Geocentric) rather than the sun (Heliocentric).

The observations and ideas were made by Galileo on the moons of Jupiter and his conclusions about the heliocentric solar system.

The students could discuss the process by which energy is produced by the sun. Early scientists suggested that the sun was a large piece of burning coal. Make your students discuss why this could not be true.

Please, teacher help the students to carry out research about the process of nuclear fusion.

Students should be able to name the eight planets starting from nearest to the sun. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. It is known that Pluto was considered as a planet but now studies revealed that it is not. Pluto, Eris and Ceres are called as dwarf planets because they are too small to be called as true planets. Please, teacher help the students to solve the problems from the data on page 13 of the students text and follow how much the students understand to answer the questions.

Answer key for activity 6.1

- | | |
|------------|-----------------------|
| 1. Venus | 4- Mercury |
| 2. Jupiter | 5- Earth |
| 3. Mars | 6- Jupiter and Saturn |
| | 7- Pluto |

Answer key for exercise 6.2

Part I. true or false items

1. false
2. false
3. true

6.3 Part I Multiple choice items

1. A
2. A
3. A
4. C

Other celestial bodies

By the end of this topic the students should be able to:

- ❖ mention asteroids, comets, and meteors as celestial bodies other than the solar system.

Students should be aware that there are other bodies that inter and pass through the solar system but not part of it. This includes:

- Asteroids
- Metros
- Comet

And the students could research to find out more about Halley's comet.

Answer key for exercise 6.2

I. true or false item

1. True
2. True
3. True

II. Choose item

1. D
2. C

3. B

6.2 The Earth in the solar system

(7 periods)

At the end of this lesson the students will be able to:-

- ❖ identify the types of motion of the earth.
- ❖ explain the effects of motion of the Earth.
- ❖ explain eclipse of the sun and moon.
- ❖ demonstrate eclipse of the sun and moon.

Start the lesson by asking questions how much the students have understood about the solar system and tell them that the solar system consists of the sun, the eight planets, the three dwarf planets and the natural satellites or moon which orbit around the asteroid belt that exists between the orbits of Mars and Jupiter.

The motions of the earth

Start the lesson by asking how days and nights are occurred and in addition to their how seasons are occurred. After asking and gathering information from the students tell them that the Earth rotates on its axis and revolves around the sun. These two motions of the Earth are called rotation and revolution.

Please, help them to do the following activities:

Students could use a torch, to represent the sun, a foot ball, to represent the Earth and a tennis ball to represent the Moon. They could experiment by placing them in different positions to satisfy themselves that at certain times, the Moon passes between the sun and the earth giving rise to the solar eclipse. During this time the moon casts shadow on the Earth. At another times the Earth moves between the sun and the moon giving rise to a lunar eclipse. The earth casts a shadow on the moon making it invisible.

6.3 Artificial Satellites

(2 periods)

After this lesson, the students will be able to:

- ❖ explain the uses of artificial satellites

Please, teacher try to help the students to distinguish natural (moon) and artificial satellites (man – made satellites). And artificial satellites can be put into geostationary orbits and polar orbits.

Artificial satellites are used for communication, weather casts, and also for human civilization this day.

At the end help the students to research on the internet (other options) or source to find out more about the Hubble telescope.

Assessment and Evaluations

These two terms are used to check whether the students understand the unit or sub-topics by using term test, class works home work, etc.

Therefore you should asses and evaluate the students' progress at each subtopic and the unit summary of the lessons.

Answer key for review Questions on unit 6.

Part II True of False items

1. False
2. True

3. True
4. False
5. True

Part I multiple choice items

1. D
2. C
3. B
4. C
5. B

Part III

6. Solar system consists of the sun, the planets, and their satellites, asteroids comets, and related objects that orbits the sun
7. Inner planets: Mercury, Venus, Earth and Mars
Outer planets: Jupiter, Saturn, Uranus and Neptune
8. Eclipse the cutting off parts or all light from one celestial object
(Moon, sun, Earth) by another
9. Artificial satellites – man – made satellites used for communication, weather, cast, etc for human civilization
10. Earth has two motions
Revolution: it revolves around the sun
Rotation: it spins or rotates on its axis

